

Clinical Pathways in the Prevention and Treatment of Venous Thromboembolism



Ministry of Health
Malaysia



Malaysian Society of
Haematology



National Heart Association
of Malaysia



Academy of Medicine
Malaysia

Name of Assessor:

Date:

1. Patient information

NAME:	DOB:	SEX:
HOSPITAL NO.	IC NO.	

2. Assess the risk for VTE and the risk for bleeding

- ❖ Assess all patients on admission to identify:
 - those who are at increased risk of VTE
 - those who are at increased risk of bleeding
- ❖ Reassess patients' risks of VTE and bleeding within 24 hours of admission and whenever the clinical situation changes
- ❖ Weigh the risk of VTE against the risk of bleeding

3. Risk factors for VTE

- ❖ Active cancer
- ❖ Age >60 years
- ❖ Dehydration
- ❖ Critical care admission
- ❖ Obesity (BMI >30 kg/m²)
- ❖ Use of oestrogen-containing oral contraceptive pill
- ❖ Use of Hormone Replacement Therapy
- ❖ Post-partum (within 6 weeks)
- ❖ Previous VTE
- ❖ Family h/o VTE
- ❖ One or more significant medical comorbidities:
 - Heart disease

- Metabolic, endocrine or respiratory pathologies
- Acute infectious disease
- Inflammatory conditions
- Sickle cell disease
- Thalasassaemia
- ❖ Varicose veins with phlebitis

4. Risk factors for bleeding

- ❖ Active bleeding
- ❖ Acquired bleeding disorders (such as acute liver failure)
- ❖ Concurrent use of anticoagulants (e.g. warfarin with INR >2.0)
- ❖ Lumbar puncture/epidural/spinal anaesthesia expected within the next 12 hours
- ❖ Lumbar puncture/epidural/spinal anaesthesia within the previous 4 hours
- ❖ Acute stroke
- ❖ Uncontrolled systolic hypertension (230/120 mmHg or higher)
- ❖ Untreated inherited bleeding disorder
(e.g. haemophilia or von Willebrand disease)

5. Hospitalised Patients at increased Risk for VTE

Medical patients

- ❖ Regard medical patients as being at increased risk of VTE if they:
 - have had or are expected to have significantly reduced mobility for ≥3 days OR
 - are expected to have ongoing reduced mobility relative to their normal state AND
 - have one or more of the risk factors for VTE

Surgical & trauma patients

- ❖ Regard surgical patients and patients with trauma as being at increased risk of VTE if they meet one of the following criteria:
 - Surgical procedure with a total anaesthetic and surgical time of >90 minutes, or 60 minutes if the surgery involves the pelvis or lower limb
 - Acute surgical admission with inflammatory or intra-abdominal condition
 - Expected significant reduction in mobility
 - One or more of the risk factors for VTE

6. Methods for VTE prophylaxis

A. Mechanical

- ❖ Base the choice of mechanical VTE prophylaxis on individual patient factors including clinical condition, surgical procedure, patient preference and if bleeding risk outweighs the risk of VTE
- ❖ Choose any one of:
 - Anti-embolism stockings
 - Foot impulse devices
 - Intermittent pneumatic compression devices

Anti-embolism stockings (thigh or knee length)

- ❖ Do not offer anti-embolism stockings to patients who have:
 - Suspected or proven peripheral artery disease
 - Peripheral arterial bypass grafting
 - Peripheral neuropathy
 - Any local conditions in which stockings may cause damage e.g. dermatitis, gangrene, recent skin graft
 - Known allergy to material
 - Cardiac failure
 - Severe leg oedema
 - Unusual leg size
 - Major limb deformity
- ❖ Use stockings that provide graduated compression and produce a calf pressure of 14 - 15 mmHg
- ❖ Encourage patients to wear their stockings day and night until they no longer have significantly reduced mobility
- ❖ Remove stockings daily for hygiene purposes and to inspect skin

Foot impulse devices

- ❖ Encourage patient to use foot devices both in bed and when sitting in a chair

Intermittent pneumatic compression devices (thigh or knee length)

- ❖ Encourage patient to use IPC devices for as much time as possible both in bed and when sitting in a chair

B. Pharmacological

- ❖ Base the choice of pharmacological VTE agents on individual patient factors, including clinical condition and patient preferences

- ❖ Choose any one of:
 - Low molecular weight heparin SC
 - Fondaparinux sodium SC
 - Rivaroxaban PO (at present, licensed for THR and TKR)
 - Dabigatran etexilate PO (at present, licensed for THR and TKR)
 - Unfractionated heparin SC

Low molecular weight heparin

- ❖ Choose either:
 - Enoxaparin
 - Enoxaparin 40 mg daily or
 - Enoxaparin 20 mg daily (for moderate renal impairment with eGFR 15 - 30 mL/min/1.73m²)
 - Tinzaparin
 - Tinzaparin 3500 units daily (lower VTE risk or moderate renal impairment) or
 - Tinzaparin 4500 units daily (higher VTE risk e.g. hip or knee surgery or during pregnancy)

Fondaparinux sodium

- Fondaparinux
 - Starting dose at 2.5 mg (6 hours after surgery) followed by 2.5 mg daily
 - Contraindicated in severe renal impairment (eGFR <30 mL/min/1.73m²)

Rivaroxaban

- Rivaroxaban
 - Starting dose at 10 mg (6 - 10 hours after surgery) followed by 10 mg daily
 - No dose adjustment in renal impairment with prophylactic dose

Dabigatran etexilate

- Dabigatran
 - Starting dose at 110 mg (1 - 4 hours after surgery) followed by 220 mg daily
 - For elderly >75 years, moderate renal impairment: 75 mg starting dose, followed by 150 mg daily

Unfractionated heparin

- ❖ Choose UFH for patients with severe renal impairment (eGFR <15 mL/min/1.73m²)
 - UFH dose is 5000 units bd □

7. Monitoring platelet counts

- ❖ Patients who are to receive any heparin should have a baseline platelet count
- ❖ Post-operative patients, including obstetric cases, receiving UFH should have platelet count monitoring performed every 2 - 3 days from days 4 to 14 until heparin is stopped
- ❖ Post-cardiopulmonary bypass patients receiving LMWH should have platelet count monitoring performed every 2 - 3 days from days 4 to 14 until heparin is stopped
- ❖ Post-operative patients (other than cardiopulmonary bypass patients) receiving LMWH do not need routine platelet monitoring
- ❖ Post-operative patients and cardiopulmonary bypass patients who have been exposed to heparin in the previous 100 days and are receiving any type of heparin should have a platelet count determined 24 hours after starting heparin
- ❖ Medical patients and obstetric patients receiving heparin do not need routine platelet monitoring

8. Using VTE prophylaxis in hospitalised patients

General medical patients

- ❖ Offer pharmacological VTE prophylaxis
- ❖ Start pharmacological VTE prophylaxis as soon as possible after risk assessment
- ❖ Continue until patient is no longer at risk of VTE

Patients with stroke

- ❖ Do not offer anti-embolism stockings for VTE prophylaxis to patients who are admitted for stroke
- ❖ Consider prophylactic-dose LMWH if a haemorrhagic stroke has been excluded and the risk of bleeding is low
- ❖ Until the patient can have pharmacological VTE prophylaxis consider a foot impulse or IPC device

Patients with cancer

- ❖ Offer pharmacological VTE prophylaxis and continue until the patient is no longer at increased risk of VTE

Patients in palliative care

- ❖ Consider pharmacological VTE prophylaxis in patients who have potentially reversible acute pathology
- ❖ Do not routinely offer pharmacological or mechanical VTE prophylaxis to patients admitted for terminal care

All surgical patients

- ❖ Assess the risks and benefits of stopping pre-existing established antiplatelet therapy 1 week before surgery
- ❖ Consider regional anaesthesia for individual patients as it carries a lower risk of VTE than general anaesthesia
- ❖ If regional anaesthesia is used, plan the timing of pharmacological VTE prophylaxis to minimize the risk of epidural haematoma
- ❖ Continue pharmacological VTE prophylaxis until the patient no longer has significantly reduced mobility (generally 5 - 7 days)

Cardiac surgery

- ❖ Start mechanical VTE prophylaxis
- ❖ Add pharmacological VTE prophylaxis for patients who have a low risk of bleeding

Gastrointestinal, gynaecological, thoracic and urological surgery

- ❖ Start mechanical VTE prophylaxis
- ❖ Add pharmacological VTE prophylaxis for patients who have a low risk of bleeding
- ❖ Extend pharmacological VTE prophylaxis to 28 days post-operatively for patients who have had major cancer surgery in the abdomen or pelvis

Neurological (cranial or spinal) surgery

- ❖ Start mechanical VTE prophylaxis
- ❖ Add pharmacological VTE prophylaxis for patients who have a low risk of bleeding
- ❖ Do not offer pharmacological VTE prophylaxis to patients with
 - ruptured cranial or spinal vascular malformations or
 - acute traumatic or non-traumatic haemorrhage until the lesion has been secured or the condition is stable

Orthopaedic surgery

- ❖ Offer combined VTE prophylaxis with mechanical and pharmacological methods for lower limb surgery
- ❖ Do not routinely offer VTE prophylaxis to patients undergoing upper limb surgery

Elective hip replacement

- Start mechanical VTE prophylaxis at admission and continue until the patient no longer has significantly reduced mobility
- Start pharmacological VTE prophylaxis after surgery. Choose any one of:
 - LMWH: starting 6 - 12 hours after surgery
 - Fondaparinux: starting 6 hours after surgical closure, provided haemostasis has been established
 - Rivaroxaban: starting 6 - 10 hours after surgery
 - Dabigatran etexilate: starting 1 - 4 hours after surgery
- Continue pharmacological VTE prophylaxis for 35 days

Elective knee replacement

- Start mechanical VTE prophylaxis at admission and continue until the patient no longer has significantly reduced mobility
- Start pharmacological VTE prophylaxis after surgery. Choose any one of:
 - LMWH: starting 6 - 12 hours after surgery
 - Fondaparinux: starting 6 hours after surgical closure, provided haemostasis has been established
 - Rivaroxaban: starting 6 - 10 hours after surgery
 - Dabigatran etexilate: starting 1 - 4 hours after surgery
- Continue pharmacological VTE prophylaxis for 35 days

Hip fracture

- Start mechanical VTE prophylaxis at admission
- Add pharmacological VTE prophylaxis. Choose any one of:
 - LMWH: starting at admission, stopping 12 hours before surgery and restarting 6 - 12 hours after surgery
 - Fondaparinux: starting 6 hours after surgical closure. It is not recommended for use pre-operatively for patients undergoing hip fracture surgery
- Continue pharmacological VTE prophylaxis for 35 days

Vascular surgery

- ❖ Offer VTE prophylaxis to patients undergoing vascular surgery who are not having other anticoagulant therapy and are assessed to be at increased risk of VTE
- ❖ Start mechanical VTE prophylaxis
- ❖ Add pharmacological VTE prophylaxis for patients who have a low risk of bleeding
- ❖ Continue pharmacological VTE prophylaxis until the patient no longer has significantly reduced mobility

Major trauma

- ❖ Offer combined VTE prophylaxis with mechanical and pharmacological methods to patients with major trauma
- ❖ Regularly reassess the patient's risks of VTE and bleeding
- ❖ Start mechanical VTE prophylaxis at admission or as early as clinically possible
- ❖ Continue mechanical VTE prophylaxis until the patient no longer has significantly reduced mobility
- ❖ Add pharmacological VTE prophylaxis if the benefits of reducing the risk of VTE outweighs the risk of bleeding and the bleeding risk has been established as low
- ❖ Continue pharmacological VTE prophylaxis until the patient no longer has significantly reduced mobility

Spinal injury

- ❖ Offer combined VTE prophylaxis with mechanical and pharmacological methods to patients with spinal injury
- ❖ Regularly reassess the patient's risks of VTE and bleeding
- ❖ Start mechanical VTE prophylaxis at admission or as early as clinically possible
- ❖ Continue mechanical VTE prophylaxis until the patient no longer has significantly reduced mobility
- ❖ Add pharmacological VTE prophylaxis if the benefits of reducing the risk of VTE outweighs the risk of bleeding and the bleeding risk has been established as low
- ❖ Continue pharmacological VTE prophylaxis until the patient no longer has significantly reduced mobility

Lower limb plaster casts

- ❖ Consider pharmacological VTE prophylaxis to patients with lower limb plaster casts after evaluating the risks and benefits based on clinical discussion with the patient
- ❖ Offer pharmacological VTE prophylaxis until lower limb plaster cast removal

<p>Pregnancy and up to 6 weeks post-partum</p> <ul style="list-style-type: none"> ❖ All women should be assessed at booking and after delivery and stratified into risk groups according to risk factors and offered thromboprophylaxis with LMWH where appropriate ❖ This assessment should be repeated if the woman is admitted to the hospital for any reason or develops other intercurrent problems during the antenatal and postpartum period
<p>Critical care</p> <ul style="list-style-type: none"> ❖ Assess all patients on admission to the critical care unit for their risks of VTE and bleeding ❖ Reassess patients' risks of VTE and bleeding daily and more frequently if their clinical condition is changing rapidly ❖ Offer VTE prophylaxis to patients admitted to the critical care unit according to the reason for admission, taking into account: <ul style="list-style-type: none"> • Any planned interventions • The use of other therapies that may increase the risk of complications
<p>Patients taking anti-platelet agents or anticoagulants on admission or needing them for treatment</p> <ul style="list-style-type: none"> ❖ Consider additional pharmacological VTE prophylaxis to patients who are taking one but not two anti-platelet agents to treat other conditions and who are assessed to be at increased risk of VTE ❖ Consider additional mechanical prophylaxis to patients who are taking two anti-platelet agents to treat other conditions and who are assessed to be at increased risk of VTE ❖ Do not offer additional pharmacological or mechanical VTE prophylaxis to patients who are taking vitamin K antagonists and who are within their therapeutic range, provided anticoagulant therapy is continued ❖ Do not offer additional pharmacological or mechanical VTE prophylaxis to patients who are having full anticoagulant therapy
<p>9. Timing of regional anaesthesia / analgesia</p>
<p>Unfractionated heparin (subcutaneous)</p> <ul style="list-style-type: none"> ❖ Wait at least 4 hours after a dose before block or catheter removal ❖ Wait at least 1 hour before dosing after procedure (catheter insertion or withdrawal)
<p>Unfractionated heparin (intravenous)</p> <ul style="list-style-type: none"> ❖ Stop infusion 2 - 4 hours before block

<ul style="list-style-type: none"> ❖ Start infusion >1 hour after block ❖ Remove epidural catheter no sooner than 2 - 4 hours after discontinuation of infusion
<p>Low Molecular Weight Heparin</p> <ul style="list-style-type: none"> ❖ Wait at least 12 hours after a prophylactic dose before block ❖ Wait at least 24 hours after a therapeutic dose before block ❖ Wait at least 10 hours after dose before removing catheter ❖ After catheter removal wait 2 - 4 hours before next dose
<p>Warfarin</p> <ul style="list-style-type: none"> ❖ Proceed if INR ≤ 1.5
<p>Rivaroxaban</p> <p>Rivaroxaban is started post-operatively</p> <ul style="list-style-type: none"> ❖ Wait 12 - 18 hours after dose for epidural catheter removal ❖ Wait 6 hours before next dose
<p>Dabigatran</p> <p>Dabigatran is started post-operatively</p> <ul style="list-style-type: none"> ❖ Wait 12 - 18 hours after dose for epidural catheter removal ❖ Wait 6 hours before next dose
<p>Aspirin and NSAIDs</p> <ul style="list-style-type: none"> ❖ No issue
<p>Clopidogrel</p> <ul style="list-style-type: none"> ❖ Stop 7 days pre-op if possible ❖ If not, proceed with caution
<p>10. Patient information</p> <ul style="list-style-type: none"> ❖ Be aware that heparins are of animal origin and this may be of concern to some patients ❖ For patients who have concerns about using animal products, consider offering synthetic alternatives based on clinical judgement and after discussing their suitability, advantages and disadvantages with the patient ❖ In specific conditions such as pregnancy, LMWH is the anticoagulant of choice and is superior to UFH in its efficacy with less bleeding complications

- ❖ Before starting VTE prophylaxis, offer patients and their families verbal and written information on:
 - The risks and possible consequences of VTE
 - The importance of VTE prophylaxis and its possible side-effects
 - The correct use of VTE prophylaxis
 - How patients can reduce the risk of VTE (keeping well hydrated and mobilizing early)

11. Discharge plan

- ❖ As part of the discharge plan, offer patients and their families or carers verbal and written information on:
 - The signs and symptoms of DVT and PE
 - The recommended duration of use of VTE prophylaxis at home (if discharged with prophylaxis)
 - Ensure that patients who are discharged with pharmacological or mechanical VTE prophylaxis are able to use it correctly
 - Know who to contact if DVT, PE or adverse events are suspected

Thromboprophylaxis in Pregnancy

Ministry of Health
Malaysia

Name of Assessor:

Date:

Patient information

NAME:

DOB:

SEX:

HOSPITAL NO.

IC NO.

ANTENATAL RISK ASSESSMENT

- ❖ To be assessed at booking and with every admission into hospital
- ❖ Can be divided into 3 risk groups
- ❖ Management will depend on the risk group

These risk groups do not include those who are sufficiently high risk (very high risk) to require anticoagulation when not pregnant (on long-term warfarin):

- Previous VTE on warfarin
- APLS with previous VTE

This group requires therapeutic dose of LMWH antenatally

1. High risk

Recommendations

Risk factors

Management

Any one

- Single previous VTE with
 - Family history or
 - Unprovoked / estrogen-related
- Previous recurrent VTE >1

Requires antenatal prophylaxis with LMWH

- Enoxaparin 1 mg/kg daily or
- Tinzaparin 4500 units daily
(if BW >90kg, to dose at 75 units/kg daily)

2. Intermediate risk	Recommendations
A. Risk factors	Management
Any one (if admitted into hospital): <ul style="list-style-type: none"> ➢ Single previous VTE with no family history <input type="checkbox"/> ➢ Medical comorbidities e.g. <ul style="list-style-type: none"> • Heart/lung disease <input type="checkbox"/> • SLE <input type="checkbox"/> • Cancer <input type="checkbox"/> • Inflammatory conditions <input type="checkbox"/> • Nephrotic syndrome <input type="checkbox"/> • Sickle cell disease <input type="checkbox"/> • Thalassemia <input type="checkbox"/> • IVDU <input type="checkbox"/> ➢ Surgical procedures e.g. <ul style="list-style-type: none"> • Appendectomy <input type="checkbox"/> 	Consider antenatal prophylaxis with LMWH <ul style="list-style-type: none"> ➢ Enoxaparin 1 mg/kg daily <input type="checkbox"/> or ➢ Tinzaparin 4500 units daily <input type="checkbox"/> (if BW >90kg, to dose at 75 units/kg daily)
B. Patient risk factors (see below)	
<ul style="list-style-type: none"> ➢ Any ≥3 <input type="checkbox"/> or ➢ ≥2 (if admitted into hospital) <input type="checkbox"/> 	
3. Low risk	Recommendations
Patient risk factors	Management
Any 2 or less (not admitted into hospital): <ul style="list-style-type: none"> ➢ Age >35 years <input type="checkbox"/> ➢ Obesity BMI >30 <input type="checkbox"/> ➢ Parity ≥3 <input type="checkbox"/> ➢ Smoker <input type="checkbox"/> ➢ Gross varicose veins <input type="checkbox"/> ➢ Current systemic infection <input type="checkbox"/> ➢ Immobility e.g. paraplegia, long-haul travel >4 hours <input type="checkbox"/> ➢ Pre-eclampsia <input type="checkbox"/> ➢ Dehydration/ hyperemesis/ OHSS <input type="checkbox"/> ➢ Multiple pregnancy <input type="checkbox"/> ➢ Assisted reproductive treatment <input type="checkbox"/> 	Mobilisation Avoid dehydration

Patient Information		
NAME:	DOB:	SEX:
HOSPITAL NO.	IC NO.	
POSTNATAL RISK ASSESSMENT		
<ul style="list-style-type: none"> ❖ To be assessed in delivery suite ❖ Can be divided into 3 risk groups 		
These risk groups do not include those who are sufficiently high risk (very high risk) to require anticoagulation when not pregnant (on long-term warfarin): <ul style="list-style-type: none"> • Previous VTE on warfarin • APLS with previous VTE Switch from therapeutic LMWH to long-term warfarin postnatally		
1. High risk	Recommendations	
Risk factors	Management	
<ul style="list-style-type: none"> ➢ Any previous VTE <input type="checkbox"/> ➢ Anyone requiring antenatal prophylactic LMWH <input type="checkbox"/> 	At least 6 weeks postnatal prophylactic LMWH	
2. Intermediate risk	Recommendations	
A. Risk factors	Management	
Any one <ul style="list-style-type: none"> ➢ Caesarean section in labour <input type="checkbox"/> ➢ BMI >40 <input type="checkbox"/> ➢ Prolonged hospital admission <input type="checkbox"/> ➢ Medical comorbidities e.g. <input type="checkbox"/> <ul style="list-style-type: none"> • Heart/lung disease <input type="checkbox"/> • SLE <input type="checkbox"/> • Cancer <input type="checkbox"/> • Inflammatory conditions <input type="checkbox"/> • Nephrotic syndrome <input type="checkbox"/> 	At least 7 days postnatal prophylactic LMWH If persisting or >3 risk factors, consider extending thromboprophylaxis with LMWH	

- Sickle cell disease
- Thalassaemia
- IVDU

B. Patient risk factors (see below)

≥ 2 risk factors

3. Low risk

Recommendations

Patient risk factors

Management

Any 1 risk factor:

- Age >35 years
- Obesity BMI >30
- Parity ≥3
- Smoker
- Elective CS
- Any surgical procedure in the puerperium
- Gross varicose veins
- Current systemic infection
- Immobility e.g. paraplegia, long-haul travel >4 hours
- Pre-eclampsia
- Mid-cavity rotational operative delivery
- Prolonged labour >24 hours
- Assisted reproductive treatment
- PPH >1 litre or blood transfusion

Mobilisation
Avoid dehydration

Diagnosis and Treatment of Venous Thromboembolism

Ministry of Health
Malaysia

Name of Assessor:

Date:

1. Patient information

NAME:

DOB:

SEX:

HOSPITAL NO.

IC NO.

2. Triaging

➢ Suspected PE

Duration of Symptom(s):

➢ Suspected DVT

Site:

➢ Leg R L

➢ Suspected PE + DVT

➢ Chest R L

3. Vital Signs

Temp

Calf circumference (cm)

Peripheral pulses

Pulse

RR

R

L

BP

R

Popliteal

O2 sat

L

Pedal

Wt (kg)

Ht (cm)

BMI

Skin: Warm / Cold

4. Clinical Probability

DVT	Yes	No	PE	Yes	No
Active cancer or cancer within 6 months	1	0	Clinical signs & symptoms of DVT (minimum of leg swelling and pain with palpation of the deep veins)	3	0
Paralysis or recent leg plaster	1	0	An alternative diagnosis is less likely than PE	3	0
Bedridden >3 days or major surgery <12 weeks	1	0	Heart rate >100 beats/min	1.5	0
Tenderness along deep venous system	1	0	Immobilization >3 days or surgery in the previous 4 weeks	1.5	0
Entire leg swollen	1	0	Previous DVT/PE	1.5	0
Calf swelling >3 cm than asymptomatic leg	1	0	Haemoptysis	1	0
Pitting edema (symptomatic leg)	1	0	Malignancy (on treatment; treated in the last 6 months; or palliative)	1	0
Collateral superficial veins	1	0			
Previously documented DVT	1	0			
Alternative diagnosis more likely	-2	0			
DVT likely	≥2		PE likely	>4	
DVT unlikely	<1		PE unlikely	≤4	

5. History

History of present illness	
Past medical history	
Drug history	Allergies

6. Risk Factors

- ❖ Obesity
- ❖ Smoking
- ❖ Malignancy
- ❖ Anti-phospholipid syndrome
- ❖ OCP
- ❖ HRT
- ❖ Pregnancy
- ❖ Post-partum (within 12 weeks)
- ❖ Previous VTE
- ❖ Family h/o VTE
- ❖ Recent leg trauma or plaster
- ❖ Recent abdominal or pelvic surgery
- ❖ Bedridden >3 days
- ❖ Nephrotic syndrome
- ❖ Sickle cell disease
- ❖ Thalassaemia
- ❖ Inflammatory bowel disease

7. Blood tests

FBC	
Coagulation profile	
Renal profile	
Liver function	
Urinalysis	

8. DVT likely		
Request for Doppler Ultrasound		Date of US:
DVT confirmed		DVT not confirmed
Below knee	Above knee	Suggest repeat scan in 7 days Date:
Proceed to treatment		Repeat scan negative
		Discharge patient to Health Clinic
9. Other investigations		
CXR		ECG
10. PE likely		
Perform immediate computed tomography pulmonary angiogram (CTPA)		Date of CTPA:
PE confirmed		PE not confirmed
Full report		Doppler US both legs
		DVT confirmed
Proceed to treatment		Proceed to treatment
Consider systemic thrombolytic therapy for patients with PE and haemodynamic instability		No further action

11. Initial treatment for confirmed VTE	
a. Heparin or Fondaparinux and vitamin K antagonists (VKA)	
<ul style="list-style-type: none"> ❖ Offer a choice of low molecular weight heparin (LMWH) or fondaparinux to patients with confirmed proximal DVT or PE taking into account comorbidities, contraindications and drug costs ❖ Start LMWH (enoxaparin or tinzaparin) or fondaparinux as soon as possible and continue for at least 5 days or until the INR is 2 or above for 2 consecutive days, whichever is longer <ul style="list-style-type: none"> ➢ Tinzaparin dose is 175 IU/kg once daily <input type="checkbox"/> ➢ Enoxaparin dose is 1 mg/kg twice daily <input type="checkbox"/> ➢ Fondaparinux dose is 7.5 mg daily (5 mg if <50 kg; 10 mg if >100 kg) <input type="checkbox"/> ❖ Start VKA i.e. warfarin at 5 mg daily within 24 hours of diagnosis and continue for 3 months for provoked VTE or consider long term for unprovoked VTE 	
<ul style="list-style-type: none"> ❖ For pregnancy, LMWH is the treatment of choice ❖ Fondaparinux is not recommended in pregnancy as it may cross the placenta 	
<ul style="list-style-type: none"> ❖ For severe renal impairment or established renal failure (eGFR <30 mL/min/1.73 m²) <ul style="list-style-type: none"> • offer intravenous unfractionated heparin with dose adjustment based on APTT or • LMWH daily with dose adjustments based on anti-Xa assay (Fondaparinux is contraindicated in patients with renal impairment) 	
<ul style="list-style-type: none"> ❖ For patients with PE and haemodynamic instability <ul style="list-style-type: none"> • offer IV UFH and consider thrombolytic therapy • once patient is haemodynamically stable, switch to LMWH and start warfarin 	
<ul style="list-style-type: none"> ❖ For patients with active cancer and confirmed proximal DVT or PE, continue LMWH for 6 months. At 6 months, assess the risks and benefits of continuing anticoagulation 	
b. Rivaroxaban	
Rivaroxaban is indicated for the treatment of acute deep vein thrombosis and pulmonary embolism and the prevention of recurrence	

- ❖ For the initial treatment of acute DVT or PE
 - the recommended dose of rivaroxaban is 15 mg twice daily for the first 21 days followed by 20 mg once daily for continued treatment and prevention of recurrence □

12. Thrombolytic Therapy

Deep vein thrombosis

- ❖ Consider catheter-directed thrombolytic therapy for patients with symptomatic ilio-femoral DVT who have:
 - Symptoms of less than 14 days duration AND
 - Good functional status AND
 - A life expectancy of 1 year or more AND
 - A low risk of bleeding

Pulmonary embolism

- ❖ Consider systemic thrombolytic therapy for patients with PE and haemodynamic instability (e.g. systolic BP <90 mmHg)
- ❖ Do not offer systemic thrombolytic therapy to patients with PE and haemodynamic stability
- ❖ The most commonly used agent is t-PA infused at 100 mg over 2 hours followed by continuation of therapeutic heparin infusion
- ❖ Consider thoracotomy in critically ill / not suitable for thrombolysis

13. Mechanical Intervention

Compression stockings

- ❖ Prescribe below-knee graduated compression stockings with an ankle pressure greater than 23 mmHg to patients with proximal DVT a week after diagnosis or when swelling is reduced sufficiently and if there are no contraindications
- ❖ advise patients to continue wearing the stockings for at least 2 years
- ❖ ensure that the stockings are replaced two or three times per year or according to the manufacturer's instructions
- ❖ advise patients that the stockings need to be worn only on the affected leg or legs

Inferior vena cava filters

- ❖ Offer temporary inferior vena cava filters ONLY to patients with proximal DVT or PE who cannot have anticoagulation treatment

- ❖ Remove the inferior vena cava filter when the patient becomes eligible for anticoagulation treatment, at the earliest possible opportunity

14. Investigations for Cancer

- ❖ All patients diagnosed with unprovoked DVT or PE who are not known to have cancer should be offered:
 - A physical examination (further specific tests are guided by the patient's history)
 - Chest X-ray
 - Blood tests (FBC, LFT, RP, urinalysis)
- ❖ Consider further investigations for cancer with an abdomino-pelvic CT scan (and a mammogram for women) in all patients aged over 40 years with a first unprovoked VTE who do not have signs and symptoms of cancer based on initial investigation
- ❖ Tumour markers are not recommended for cancer screening

15. Thrombophilia testing

- ❖ DO NOT offer thrombophilia testing to patients who are continuing anticoagulant treatment
- ❖ Consider testing for lupus anticoagulant and anti-phospholipid antibodies in patients who have had an unprovoked DVT or PE if it is planned to stop anticoagulant treatment
- ❖ Consider testing for hereditary thrombophilia in patients who have had an unprovoked DVT or PE and who have a first-degree relative who has had a DVT or PE if it is planned to stop anticoagulant treatment
- ❖ DO NOT offer thrombophilia testing to patients who have had a provoked DVT or PE
- ❖ DO NOT offer thrombophilia testing to first-degree relatives of people with a history of DVT or PE and thrombophilia
- ❖ DO NOT offer heritable thrombophilia testing to patients who have had an arterial thrombosis (young stroke or myocardial infarction)
- ❖ Consider testing for lupus anticoagulant and anti-phospholipid antibodies in the following:
 - in the presence of both arterial and venous thrombosis
 - unexplained arterial thrombosis (young stroke or myocardial infarction with no risk factors)
 - ≥3 unexplained miscarriages <10 weeks gestation
 - a fetal death >10 weeks gestation
 - premature birth <35 weeks gestation due to severe pre-eclampsia or IUGR

16. Duration of anticoagulation therapy

- ❖ Consider extending anticoagulation beyond 3 months for patients with unprovoked proximal DVT if their risk of VTE recurrence is high (e.g. male, family history) and there is no additional risk of major bleeding. Discuss with the patient the benefits and risks of extending their treatment
- ❖ Offer anticoagulation beyond 3 months to patients with an unprovoked PE, taking into account the patient's risk of VTE recurrence and whether they are at increased risk of bleeding. Discuss with the patient the benefits and risks of extending their treatment
- ❖ Offer LMWH to patients with active cancer and confirmed proximal DVT or PE, and continue the LMWH for 6 months. At 6 months, assess the risks and benefits of continuing anticoagulation
- ❖ Experience with rivaroxaban in extending anticoagulation beyond 12 months is limited
- ❖ DO NOT routinely do D-dimer test and Doppler US on completion of anticoagulation except guided by clinical symptoms and signs

17. Follow up

- ❖ Arrange for follow-up at medical or haematology clinic
- ❖ Arrange for INR monitoring at the anticoagulation clinic (MTAC-Warfarin)

18. Patient information

- ❖ Verbal and written information are given to patients having anticoagulant treatment about:
 - Duration of anticoagulation treatment
 - Anticoagulation booklet
 - Possible side effects and what to do if these occur
 - The effects of other medication, food and alcohol on oral anticoagulant
 - Monitoring their anticoagulant treatment
 - Pregnancy and contraception
 - Surgery and dental treatment
 - Future risk reduction measures including travel
 - Clear advice on long term use of stockings

