# Deep Vein Thrombosis and Pulmonary Embolism

## Executive summary

## Introduction

Deep venous thrombosis (DVT) and pulmonary embolism (PE) are both manifestations of venous thromboembolism. DVT can be defined as the formation of a blood clot (thrombus) within a deep vein, with the most common site of affectation being the lower limbs. PE, on the other hand, is a potentially life-threatening complication of DVT in which the thrombus formed becomes dislodged and migrates to occlude an artery within the lung.

## Target users

* Nurses
* Doctors

**Target area of use**

* Gate Clinic
* Outpatient Department
* Ward

## Key areas of focus / New additions / Changes

This guideline provides information on the diagnosis and treatment of deep vein thrombosis and pulmonary embolism. A large proportion of patients with pulmonary embolism are asymptomatic. History and examination should seek for risk factures and clinical features of these conditions. The Wells scoring systems should be used to assess clinical probability of DVT and PE respectively. Patients should be initially managed on the ward with heparin, warfarin (non-pregnant patients only) and supportive care. Anticoagulation status should be reviewed using coagulation studies. Warfarin if used should be given for at least 3 months.

## Limitations

Facilities for monitoring and treating venous thromboembolism are not available at Keneba and Basse. Patients presenting there with these conditions should be stabilized and referred.

## Presenting symptoms and signs

Risk factors for venous thromboembolism should be ruled out.

* Malignancy
* Prolonged bed rest
* Smoking
* Stroke
* Obesity
* Pregnancy
* Recent long-distance travel

Symptoms and signs of DVT usually occur distal to the site of venous occlusion and include:

* Pain in affected limb: occurs in about 50% of cases
* Limb swelling: most specific symptom. DVT should be ruled out in all patients presenting with unilateral pedal swelling

In as many as 40% of patients, PE is silent without obvious symptoms. Those who are symptomatic may present with sudden onset of:

* Shortness of breath
* Chest pain worse on inspiration
* Haemoptysis
* Cough
* Syncope
* Death

## Examination findings

In suspected DVT, a general examination should be carried out, followed by examination of the affected limb. Presence of any of the following should raise suspicion of the presence of a DVT.

* Unilateral pitting oedema
* Homans sign: calf pain on foot dorsiflexion with the knee extended
* Pratt sign: Tenderness over calf muscle on palpation

PE may present with:

* Deranged vitals:
* Low saturation of oxygen
* Tachypnoea
* Tachycardia
* Hypotension

Chest examination

* Maybe normal in the majority of patients.
* Occasionally, a pleural friction rub may be heard over the affected area

Cardiovascular examination (may be normal apart from tachycardia):

* Parasternal heave
* Loud pulmonary component of the second heart sound
* Raised jugular venous pressure

### Wells scores

If the diagnosis of DVT is suspected following history and physical examination, the two-level DVT Wells score should be used to estimate the clinical probability of DVT.

*Two-Level DVT Wells Score*

|  |  |
| --- | --- |
| **Clinical Feature** | **Points** |
| Active cancer (treatment ongoing, within 6 months or palliative) | 1 |
| Paralysis, paresis or recent plaster immobilization of the lower extremities | 1 |
| Recently bedridden for 3 days or more or major surgery within 12 weeks requiring general or regional anaesthesia | 1 |
| Localized tenderness along the distribution of the deep venous system | 1 |
| Entire leg swollen | 1 |
| Calf swelling at least 3 cm larger than asymptomatic side | 1 |
| Pitting oedema confined to the symptomatic leg | 1 |
| Collateral superficial veins (non-varicose) | 1 |
| Previously documented DVT | 1 |
| Alternative diagnosis at least as likely as a DVT | -2 |

*Interpretation:*

|  |  |
| --- | --- |
| DVT Likely | 2 Points Or More |
| DVT Unlikely | 1 Point Or Less |

If the diagnosis of PE is suspected following history and physical examination, the two-level PE Wells score should be used to estimate the clinical probability of PE.

*Two-Level PE Well’s Score*

|  |  |
| --- | --- |
| **Clinical Feature** | **Points** |
| Clinical signs and symptoms of DVT (minimum of leg swelling and pain with palpation of the deep veins) | 3 |
| An alternative diagnosis is less likely than PE | 3 |
| Heart rate > 100 beats per minute | 1.5 |
| Immobilisation for more than 3 days or surgery in the previous 4 weeks | 1.5 |
| Previous DVT/PE | 1.5 |
| Haemoptysis | 1 |
| Malignancy (on treatment, treated in the last 6 months, or palliative) | 1 |

*Interpretation:*

|  |  |
| --- | --- |
| PE Likely | More Than 4 Points |
| PE Unlikely | 4 Points Or Less |

## Differential diagnoses

* Cellulitis
* Lymphoedema
* Soft tissue injury
* Dependent oedema
* Congestive cardiac failure
* Renal failure
* Nephritic syndrome
* Swelling in a paralysed limb

## Investigations

All patients with suspected DVT should be offered:

* Doppler ultrasonography: to confirm the presence of a clot
* Coagulation studies: INR, PT, APTT to investigate for hypercoagulability if indicated.

In suspected PE, the following should be done:

* CXR: findings might include: Enlarged pulmonary artery (Fleischner sign), peripheral wedge of airspace opacity which implies lung infarction (Hampton’s Hump), regional oligaemia (Westermark sign) or [pleural effusion](https://radiopaedia.org/articles/pleural-effusion)
* ECG: May show sinus tachycardia (most common), right heart strain pattern: seen as a right bundle branch block pattern or right axis deviation or SIQIIITIII pattern: this refers to a deep S wave in lead I, Q wave and T wave inversion in lead III
* Echocardiography: Right ventricular wall hypokinesis, right ventricular dilatation, and pulmonary artery hypertension may be seen
* INR: Done to get baseline value before the commencement of warfarin therapy

## Management

### Management in Gate Clinic

All patients with features of a DVT or PE should be referred immediately to the ward for urgent review by a doctor.

### Management on the Ward

In suspected acute PE, commence intravenous fluid and oxygen (if oxygen saturation < 88%).

Heparin and warfarin should be started as soon as possible for prophylaxis in high-risk patients or treatment after confirmed DVT or PE. Heparin should be continued for at least 5 days or until 2 consecutive target INR results are obtained. In pregnancy, only heparin is used

Unfractionated heparin can be given subcutaneously as 250 units/kg stat then every 12 hours. It is the preferred option in patients with kidney disease. Enoxaparin can be given subcutaneously as 1.5 mg/kg/dose OD.

Monitor APTT (ideally, every 6 hours) and adjust unfractionated heparin dose accordingly.

Warfarin can be initiated with a once-daily dose between 2 mg and 5 mg. The maintenance dose of warfarin is usually between 2 mg and 10 mg once daily.

Daily INR monitoring should start from day 3 of initiation of therapy until INR is at target for more than 2 consecutive readings.

|  |  |
| --- | --- |
| **Condition** | **Target INR** |
| DVT prophylaxis | 2 – 2.5 |
| DVT or PE treatment | 2 – 3 |

Thereafter, the frequency of INR monitoring is twice weekly but can be reduced gradually to once-weekly, once every 2 weeks, and then once monthly as long as the patient’s INR remains within the therapeutic range. Warfarin doses should be adjusted according to the INR results. More frequent monitoring is needed after any dose adjustment until stable readings are obtained.

Warfarin should be continued for at least 3 months. Warfarin therapy should be extended beyond 3 months for patients with unprovoked proximal DVT or PE if their risk of recurrence is high and there is no additional risk of major bleeding.

Paracetamol can be prescribed for pain in DVT

**Key Issues for Nursing care**

* Monitor vital signs every hour initially in acute PE. This frequency may be reduced to every 4 hours as patient stabilizes.
* Monitor vital signs once every shift in DVT.
* Nurse with affected leg elevated
* Avoid IM injections on the affected limb
* Strict fluid charts
* Ensure enoxaparin is given at the same time every day.
* Be wary of heparin concentrations when calculating doses
* Call the doctor if:
* Temperature > 38.5ºC
* Pulse < 50 or > 120 bpm
* Systolic blood pressure < 90 or > 160 mmHg
* Diastolic blood pressure < 60 or > 90 mmHg
* Oxygen saturation < 90%

## References

NICE Guidance for Venous Thromboembolic Diseases <https://www.nice.org.uk/guidance/cg144/chapter/recommendations#diagnosis-2>

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