

# Deep Vein Thrombosis (DVT)

This pathway is for lower limb DVTs. See also [Anticoagulation Therapy for DVT](#).

## [Disclaimer](#)

## Contents

<b>Contents</b> .....	<b>1</b>
Red flags .....	1
<b>Assessment</b> .....	<b>2</b>
Superficial venous thrombophlebitis (SVT) .....	2
Examples of other causes of leg swelling.....	3
Pulmonary embolism (PE) .....	3
Risk factors for DVT .....	3
Clinical Risk Assessment: Modified Wells Criteria.....	4
Limitations of the doppler compression ultrasound.....	4
D-dimer .....	4
Modified Wells score.....	5
<b>Management</b> .....	<b>5</b>
Enoxaparin .....	5
<b>Renal impairment</b> .....	5
Prophylactic dose of enoxaparin .....	6
Oral or topical anti-inflammatory medications.....	6
Determine if anticoagulation is required.....	6
Options for management of anticoagulation.....	7
Underlying cause of the DVT .....	7
Post-thrombotic syndrome .....	7
<b>Referral</b> .....	<b>8</b>
<b>Information</b> .....	<b>8</b>
For health professionals.....	8
Sources .....	8

## Red flags

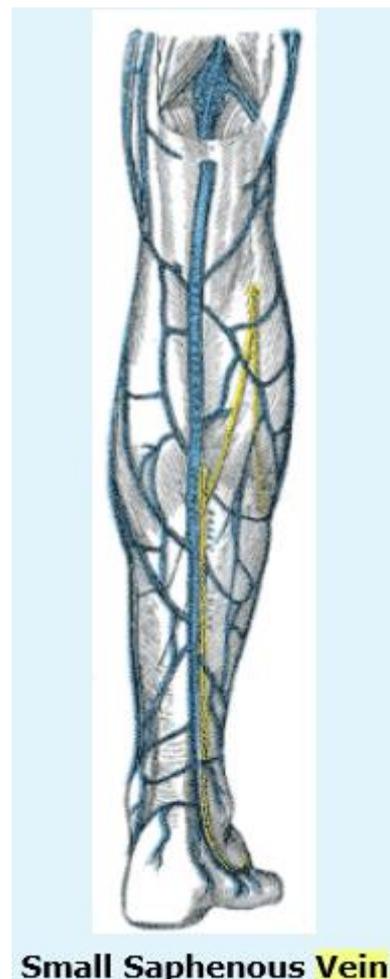
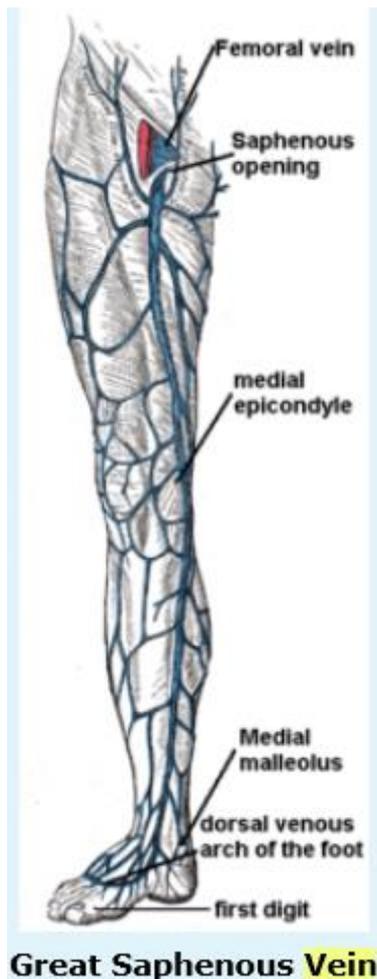
- Heart rate > 100, SaO<sub>2</sub> < 95%, Respiratory rate > 30
- Pleuritic chest pain
- Acute iliofemoral or supra-inguinal vein thrombosis
- Thrombophlebitis within 7 cm of the saphenofemoral junction

## Assessment

1. If there is swelling, pain, tenderness, and dilated superficial veins in the leg(s), suspect:
  - DVT
  - pulmonary embolism (PE)
  - **superficial venous thrombophlebitis (SVT)**

### Superficial venous thrombophlebitis (SVT)

- *Previously regarded as a benign, self-limiting condition, up to 25% of patients presenting with SVT will also have a DVT. For the remainder, there is a 10% risk of extension to the deep veins in the next 10 days.*
- *Clinical findings e.g. tenderness, induration, pain, or erythema along the course of a superficial vein will usually make the diagnosis.*
- *Consider doppler compression ultrasound to rule out underlying DVT*
- *SVT is not an infective process – redness and swelling is due to inflammation.*
- *D-dimer is not considered sensitive or specific enough to predict DVT in SVT.*



2. Rule out **other causes of leg swelling.**

## Examples of other causes of leg swelling

- Muscle strain, tear, or injury
- Oedema in a paralysed limb
- Lymphatic obstruction
- Ruptured Baker's cyst
- Cellulitis and soft tissue infections, including necrotising fasciitis
- Knee pathology

3. Assess for symptoms and signs of **pulmonary embolism (PE)**.

## Pulmonary embolism (PE)

Symptoms:

- Acute onset chest pain, especially pleuritic chest pain
- Acute onset dyspnoea
- Cough
- Haemoptysis

Signs:

- Tachypnoea
- Tachycardia
- Hypoxia

4. Assess for **risk factors for DVT**.

## Risk factors for DVT

These risk factors are cumulative.

- Major risk factors:
  - Recent surgery – within 4 weeks
  - Recent trauma to limb involved
  - Malignancy – either known or undiagnosed
  - Previous thrombosis or family history of thrombosis.
  - Immobilisation e.g. stroke
  - Postpartum
  - Thrombophilia
- Other risk factors:
  - Pregnancy or current oestrogen therapy e.g. combined oral contraceptive, hormone replacement therapy
  - Travel or cramped conditions for longer than 6 hours
  - Thrombocytosis
  - Obesity
  - Varicosities

5. Complete the **Clinical Risk Assessment** (to determine the pretest probability score of a DVT.

Arrange investigations based on score. To rule out DVT if score:

- $\geq 2$ , two negative tests are required i.e. a negative DVT scan and a negative D-dimer.
- $< 2$ , one negative test is required i.e. a negative D-dimer.<sup>1</sup>

## Clinical Risk Assessment: Modified Wells Criteria

Clinical feature	Points	Patient score
Active cancer (treatment ongoing, within 6 months, or palliative)	1	
Paralysis, paresis or recent plaster immobilisation of the lower extremities	1	
Recently bedridden for 3 days or more or major surgery within 12 weeks requiring general or regional anaesthesia	1	
Localised 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	
An alternative diagnosis is at least as likely as DVT	-2	
	<b>TOTAL</b>	

6. If pretest probability score is high:

- arrange a doppler compression ultrasound of the affected leg, taking into account the **limitations of the doppler compression ultrasound scan**. The Emergency Department cannot arrange after-hours calf ultrasounds.

### Limitations of the doppler compression ultrasound

- *Cannot reliably exclude a below knee DVT, although it can often detect them.*
- *A follow-up scan is often needed when the initial test is negative as about 2% develop a positive test when rescanned 7 days later. General practitioners have a medicolegal responsibility to document that they gave this advice to the patient.*
- *If uncertain, discuss with a radiologist.*
- arrange a **D-dimer**. Do not wait for the D-dimer result before arranging ultrasound, as this result is only useful if the DVT scan is negative.

### D-dimer

- *D-dimer tests may not be appropriate if delays in receiving a result are expected.*
- *Be aware of the limitations of D-dimer testing:*
  - *Due to low specificity, it is only useful as a rule-out test in the early stages of symptoms. After 3 days of symptoms, it becomes increasingly sensitive.*
  - *Can be positive in pregnant women, the elderly, and those with heart failure, recent surgery, malignancy, renal disease, recent trauma, or severe infection.*
  - *A negative D-dimer combined with a low revised [Wells score](#) has about 99% sensitivity to rule out a DVT or PE.*

#### Results:

- Pathology labs provide unique reference ranges based on reagents used. Check D-dimer reference ranges when interpreting results.
- Negative: < 0.5 mg/L (SJOG pathology).
- Positive: ≥ 0.5 mg/L (SJOG pathology).

7. If pretest probability score is low, arrange an urgent [D-dimer](#):
  - If a negative D-dimer and a low **Modified Wells score**, a clinically significant DVT is excluded.

### Modified Wells score

- A high pretest probability score is a result ≥ 2.
  - A low pretest probability score is a result < 2.
- If a positive D-dimer, arrange a doppler compression ultrasound of the affected leg(s).

## Management

Most patients with lower limb DVTs do not need hospital admission.

1. Arrange immediate referral to the Emergency Department for [immediate vascular surgery referral or admission](#) if suspected pulmonary embolism (PE) and:
  - HR > 100 bpm, SaO<sub>2</sub> < 95%, or respiratory rate > 30.
  - pleuritic chest pain.
2. If an ultrasound is not available for > 6 hours, arrange a first dose of **enoxaparin**.

### Enoxaparin

- 1.5 mg/kg with a cap at 150 mg/daily
- Modify dose if **renal impairment** (creatinine clearance < 60 ml/min) or extremes of weight e.g. < 45 kg or > 150 kg.

#### **Renal impairment**

- Dose reduction is recommended if creatinine clearance < 30 mL/minute.
- Although no adjustment is recommended for moderate renal impairment (creatinine clearance 30 to 50 mL/minute), enhanced vigilance for bleeding is required. Consider requesting [renal](#) or [haematology advice](#).

- If the calculated dose of enoxaparin is > 150 mg daily, lower the dose and give it 12 hourly e.g. 1 mg/kg every 12 hours if renal function is adequate.

3. Manage according to the diagnosis:

#### ❖ **Superficial venous thrombophlebitis**

1. If superficial venous thrombophlebitis within 7 cm of the saphenofemoral junction, refer to the [emergency department](#) for immediate vascular surgery care.
2. If SVT ≥ 7 cm of the saphenofemoral junction:
  - treat with a **prophylactic dose of enoxaparin** for 6 weeks, unless the thrombus is < 5 cm or the patient is at very high risk of bleeding.

## Prophylactic dose of enoxaparin

- Creatinine clearance  $\geq 30$  mL per minute: 40 mg subcutaneously, daily
  - Creatinine clearance  $< 30$  mL per minute: 20 mg subcutaneously, daily
- and the thrombus extends, or a deep venous thrombus is detected, commence full anticoagulation.
  - there is no role for antibiotics.
3. Offer **oral or topical anti-inflammatory medications** for symptom relief, if not contraindicated.

## Oral or topical anti-inflammatory medications

*Topical preparations – Hirudoid cream (heparinoid) 0.3% w/w applied 2 to 4 times daily.*

*Oral non-steroidal anti-inflammatory drugs*

- Ibuprofen 200 to 400 mg, 3 or 4 doses per day
  - Diclofenac 25 to 50 mg, 2 to 3 doses per day
  - Indomethacin 25 to 50 mg, 2 to 4 doses per day
  - Avoid NSAIDs in renal impairment, peptic ulcer disease, and active heart disease
4. Recommend the use of a compression stocking until resolution of symptoms.

### ❖ Deep vein thrombosis

1. Refer for [immediate vascular surgery referral or admission](#) for thrombosis therapy or an inferior vena cava (IVC) filter if:
- extensive DVT, extending to proximal common femoral vein
  - acute iliofemoral, supra-inguinal vein thrombosis, or iliac veins
  - IVC.
2. If DVT seen on ultrasound, determine if **anticoagulation is required**. If required, decide on the best **options for management of anticoagulation** and start [Anticoagulation Therapy](#).

## Determine if anticoagulation is required

*DVTs above knee should have anticoagulation therapy unless contraindicated, as these are more likely to cause an acute pulmonary embolus (PE).*

- *If provoked DVT, anticoagulate for 3 months.*
- *If unprovoked ongoing risk factors and re-thrombosis, anticoagulate for at least 6 months and arrange [urgent or routine haematology referral](#) for consideration of indefinite treatment.*

*DVTs limited to the calf are difficult to treat with anticoagulation therapy and the optimal treatment is yet to be determined. Consider that:*

- *calf DVTs do not cause clinically significant pulmonary emboli but approximately 1 in 10 extend proximally.*
- *most patients should be treated with anticoagulation therapy for 6 weeks with a repeat ultrasound at 6 weeks to exclude progression of the clot.*
- *alternative management may include no initial anticoagulation with an ultrasound at 10 days to exclude clot progression.*

- *anticoagulation of below knee thrombi may reduce the incidence of post thrombotic syndrome and chronic venous insufficiency.*

## Options for management of anticoagulation

- *General practitioner management using anticoagulant therapy with support from community services.*
- *Referral to [Hospital in the Home](#).*
- *[Emergency referral](#) – most patients will not require an acute admission unless there are significant co-morbidities, extremes of weight, marked renal impairment, suspicion of a pulmonary embolism, or contraindications to anticoagulation.*

- Investigate the **underlying cause of the DVT**, if appropriate.

## Underlying cause of the DVT

- *If < 45 years and unprovoked DVT, consider screening for hypercoagulable state. A Thrombophilia Screen is generally taken at commencement of anticoagulation but may be taken during or after anticoagulation.*
- *If a proximal vein thrombosis, this is more commonly associated with serious chronic disease e.g. **active cancer**, heart failure, respiratory insufficiency. It is important to consider the underlying cause and, in most cases,, it will be obvious.*

### Active cancer

- *History*
    - *Examination routine*
    - *Laboratory tests*
    - *Chest X-ray*
    - *Routine age-specific cancer screening tests.*
  - *If a distal thrombosis, this is more often associated with transient risk factors e.g. recent surgery, immobilization, travel, pregnancy.*
  - *If recurrent idiopathic DVT, refer for [urgent or routine oncology referral](#) as these patients represent a high-risk group and need to be more aggressively investigated.<sup>2</sup>*
- If severe symptoms or failure of conservative management refer for [immediate vascular surgery referral or admission](#).
  - Consider the use of below knee compression stockings for established **post-thrombotic syndrome**. Be aware they do not prevent recurrent symptomatic DVTs.

## Post-thrombotic syndrome

- *About 30% of patients develop post-thrombotic syndrome after a DVT.*
  - *It can range from mild symptoms to significant venous insufficiency with pain, oedema, ulceration.*
  - *The use of graduated compression stockings starting about one month after the DVT (once the acute symptoms have settled) for at least one year can help reduce this risk.<sup>3,4</sup>*
  - *Compression stockings are contraindicated if there is significant peripheral arterial disease.*
3. For DVT not seen on ultrasound, arrange a follow-up doppler compression ultrasound in 5 to 8 days if:
    - the pretest probability score is high ( $\geq 2$ ) and D-dimer is positive.
    - the symptoms persist and an alternative diagnosis is not apparent.

## Referral

- Refer to the [emergency department](#) for immediate vascular surgery care if:
  - superficial thrombophlebitis within 7 cm of the saphenofemoral junction.
  - HR > 100 bpm, SaO<sub>2</sub> < 95%, or respiratory rate > 30.
  - pleuritic chest pain
- Arrange [immediate vascular surgery referral or admission](#) if:
  - acute iliofemoral or supra-inguinal vein thrombosis
  - severe symptoms or failure of conservative management
  - extensive DVT, extending to proximal common femoral vein
  - acute iliofemoral, supra-inguinal vein thrombosis, or iliac veins
  - inferior vena cava.
- If contraindications to community management of DVTs, arrange an [emergency referral](#) or [Hospital in the Home](#).
- For recurrent DVTs or considering indefinite anticoagulation, arrange [urgent or routine haematology referral](#).
- If post-thrombotic syndrome that is severe or failing conservative treatment, refer for [urgent or routine vascular surgery referral](#).
- If recurrent idiopathic DVT, refer for [urgent or routine oncology referral](#).

## Information

### For health professionals

#### Further information

- Bpacnz – [Low Molecular Weight Heparin Use in Primary Care](#)
- Department of Health and Human Services – [Hospital in the Home](#)
- THANZ – [New guidelines from the Thrombosis and Haemostasis Society of Australia and New Zealand for the Diagnosis and Management of Venous Thromboembolism](#)

### Sources

#### References

1. Scarvelis D, Wells PS. [Diagnosis and treatment of deep-vein thrombosis](#). CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne. 2006 Oct;175(9):1087-1092.
2. Prins MH, Hettiarachchi RJ, Lensing AW, Hirsh J. [Newly diagnosed malignancy in patients with venous thromboembolism. Search or wait and see?](#) Thrombosis and Haemostasis. 1997;78(1):121-5.
3. Kakkos SK, Daskalopoulou SS, Daskalopoulos ME, Nicolaides AN, Geroulakos G. [Review on the value of graduated elastic compression stockings after deep vein thrombosis](#). Thrombosis and Haemostasis. 2006;96(4).
4. Brandjes DP, Büller HR, Heijboer H, Huisman MV, de Rijk M, Jagt H, et al. [Randomised trial of effect of compression stockings in patients with symptomatic proximal-vein thrombosis](#). Lancet (London, England). 1997;349(9054):759-62.

## **Select bibliography**

Baglin T, Tait C, Laffan M, Makris M, et al. [Guidelines on the investigation and management of venous thrombosis at unusual sites](#). British Journal of Haematology. 2012;159(1):28-38.

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