Pulmonary Embolism

Pulmonary Embolism Rule-out Criteria (PERC)
For patients presenting with **pleuritic chest pain**

PERC is 'negative' if all of the following are present:

- PE clinically unlikely ie no unexplained breathlessness / tachypnoea, no thrombophilia, no cancer
- Age <50
- HR <100
- O_2 sats in air 95% or more
- No prior history of DVT / PE
- No Recent trauma or surgery (within 6 weeks)
- No haemoptysis
- No exogenous oestrogen
- No clinical signs of DVT

Wells score for PE

Previous PE or DVT	1.5
Heart rate >100 beats/ minute	1.5
Surgery or immobilisation within 30 days	1.5
Haemoptysis	1
Active cancer (within 6 months)	1
Clinical signs of DVT	3
Alternative diagnosis less likely than PE	3

Clinical probability

PE Low Risk	= score 4 or below
PE High Risk	= score 4.5 or above

If pregnant seek senior advice

Notes on D-dimer
Normal < 0.5 mg/L

May be elevated with:
- Cancer
- Infection
- Inflammation / arthritis
- Necrosis
- Aortic dissection
- Pregnancy
- Trauma
- Recent surgery
- Age over 50
  (normal range increases with age eg age/100 or 60 years = 0.6)

Can PE be ruled out on clinical assessment (PERC score negative)?
Breathlessness and / or tachypnoea (with or without hypoxia, peuritic chest pain & haemoptysis), without **clear alternative diagnosis** = needs Wells score

Yes

PE ruled out

If **PERC negative**, PE can be ruled out without need for D dimer

If PERC positive but **WELLS score Low Risk**, a negative D dimer rules out PE without need for imaging

Seek alternate diagnosis

Advise patient that PE is highly unlikely, but to seek further medical attention if symptoms worsen

No

Assess the clinical probability of PE using Wells score
CXR & ECG to rule out other pathology

Low Risk
Score 4 or below

Investigations
D dimer only needed if **Low** risk
A negative D dimer does not rule out PE if **High** risk

D dimer
NEGATIVE

D-dimer
POSITIVE

High Risk
Score 4.5 or above
OR
Known / suspected pro-thrombotic disease
OR
Known DVT

Imaging
Discuss with radiology
1. CTPA (first line)
2. Consider V/Q scan if: [NB limited availability]
   - Patient under 50 years without cardiorespiratory co-morbidities and normal CXR
   - Renal impairment
   - Contrast allergy

Imaging should be completed within 1 hour
If this is not possible, give Clexane 1.5 mg / kg sc while awaiting scan

Is scan positive?

No

Yes

Massive PE

No

Suspected Massive PE
- Collapse / hypotension
- Respiratory distress
- Engorged neck veins
- Right ventricular strain on ECG

Move to Resus

Management
High flow oxygen via non-rebreather
CXR, troponin
Inform:
- ED SpR / Consultant
- Immediate bedside echo
- +/- urgent CTPA if stable
- Give Heparin 5000 units iv (unless clexane already given within 5 hours)
- If not for thrombolysis, give Clexane 1.5 mg / kg in addition

Thrombolysis
Indications:
Senior clinical decision
Consider discussion with Interventional Radiologist, via xxxx

Suspected or confirmed massive PE with:
- **Cardiac arrest / peri-arrest**
  Alteplase 50 mg iv stat
  and
  2nd 50 mg iv over 1 hour post ROSC
- **Clinical cardiogenic shock**
  Alteplase 10 mg iv over 1-2 mins
  then
  Alteplase 90 mg iv over 2 hrs
  -Total dose 1.5 mg/kg if < 65 kg
- Normotensive but with evidence of significant **right heart strain** on echo or positive troponin
  (weaker evidence but may reduce incidence of pulmonary hypertension)
  Alteplase 50 mg over 1 hour
- Give Clexane 1.5 mg/kg sc od post thrombolysis

In **cardiac arrest**, consider continuing CPR for 60 - 90 minutes after thrombolysis

Notes on Clexane (Enoxaparin)
Contraindications:
*Active bleeding
*Known bleeding disorder
*Thrombocytopaenia
*Severe uncontrolled hypertension (SBP > 200 mmHg)
*Recent intracranial haemorrhage
*Major surgery within 2 months
*Acute bacterial endocarditis
Cautions:
*Liver impairment – reduce dose
*Renal impairment – reduce dose
*Varices
*CVA within 2 years

Discuss with Haematology if already on warfarin / aspirin / clopidogrel

Yes

Suitable for ambulatory care?
Exclusions: 1100 - 1900 only
- Abnormal vital signs eg GCS < 15, P > 110, sBP < 100, RR > 30, Sats < 95%, Temp < 36°C
- Age > 65
- History of cancer, cardiorespiratory co-morbidities or mental health problems
- Active bleeding or coagulopathy
- Inadequate social circumstances

Tests for confirmed PE
FBC, Ca, LFT, CXR, urinalysis

Yes

Ambulatory Care
1100 - 1900
Discuss with Ambulatory Dr bleep xxx
Med reg 001?

No

Admit
Refer Medics bleep **001**
Commence Clexane 1.5 mg/kg sc od unless contraindicated

Management of Pulmonary Emoblism

Notes on Warfarin

Contraindications:
- Haemorrhagic stroke
- Significant bleeding
- Pregnancy, including up to 7 days post partum
- Severe liver disease with prolonged prothrombin time
- Severe renal impairment

Cautions:
- History of GI bleeding or peptic ulcer
- Recent surgery
- Recent ischaemic stroke
- Bacterial endocarditis
- Uncontrolled hypertension
- Mild to moderate liver or renal impairment

Warfarin is not present in breast milk in significant amounts, but prophylactic vitamin K for the infant is advised

Patients should avoid alcohol and cranberry juice
Check all medication for interactions

Treatment

Baseline prothrombin time should be sent
Usual adult loading dose is **10 mg** (**5 mg** in elderly)
Subsequent doses determined by INR
Continue Clexane for 5 days, or until INR above 2 for more than 24 hours
Maintenance usually 3 – 9 mg taken at the same time each day
Lower doses may be needed in liver or renal impairment

Clexane for 6 months if active cancer
Clexane for pregnancy

Discuss with Haematology if patient taking aspirin or clopidogrel

Follow-up

Anticoagulant Clinic
Review of underlying cause:
Full history and examination
FBC, Ca, LFT, CXR, urinalysis

Consder: CT abdo / pelvis, sputum cytology, mammogram

Haematology Clinic 3 months

Consider thrombophillia screen if under 40 with first unprovoked VTE

Target INR

- **2.5** for first PE, or recurrence that occurs when warfarin stopped. Includes patients with antiphospholipid syndrome
- **3.5** if recurrence of PE while on warfarin with INR above 2

Treatment Duration

First episode PE = **3 months**

Consider longer duration if recurrence or underlying risk factors

Pulmonary Embolus

Lead Author

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Reference Documents

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