NHS
Greater Glasgow and Clyde

# CLINICAL GUIDELINE

# Investigation and Management of Suspected Pulmonary Embolism

A guideline is intended to assist healthcare professionals in the choice of disease-specific treatments.

Clinical judgement should be exercised on the applicability of any guideline, influenced by individual patient characteristics. Clinicians should be mindful of the potential for harmful polypharmacy and increased susceptibility to adverse drug reactions in patients with multiple morbidities or frailty.

If, after discussion with the patient or carer, there are good reasons for not following a guideline, it is good practice to record these and communicate them to others involved in the care of the patient.

| | |
|---|---|
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| **Lead Author:** | Colin Church |
| **Approval Group:** | NHSGGC Thrombosis Committee |

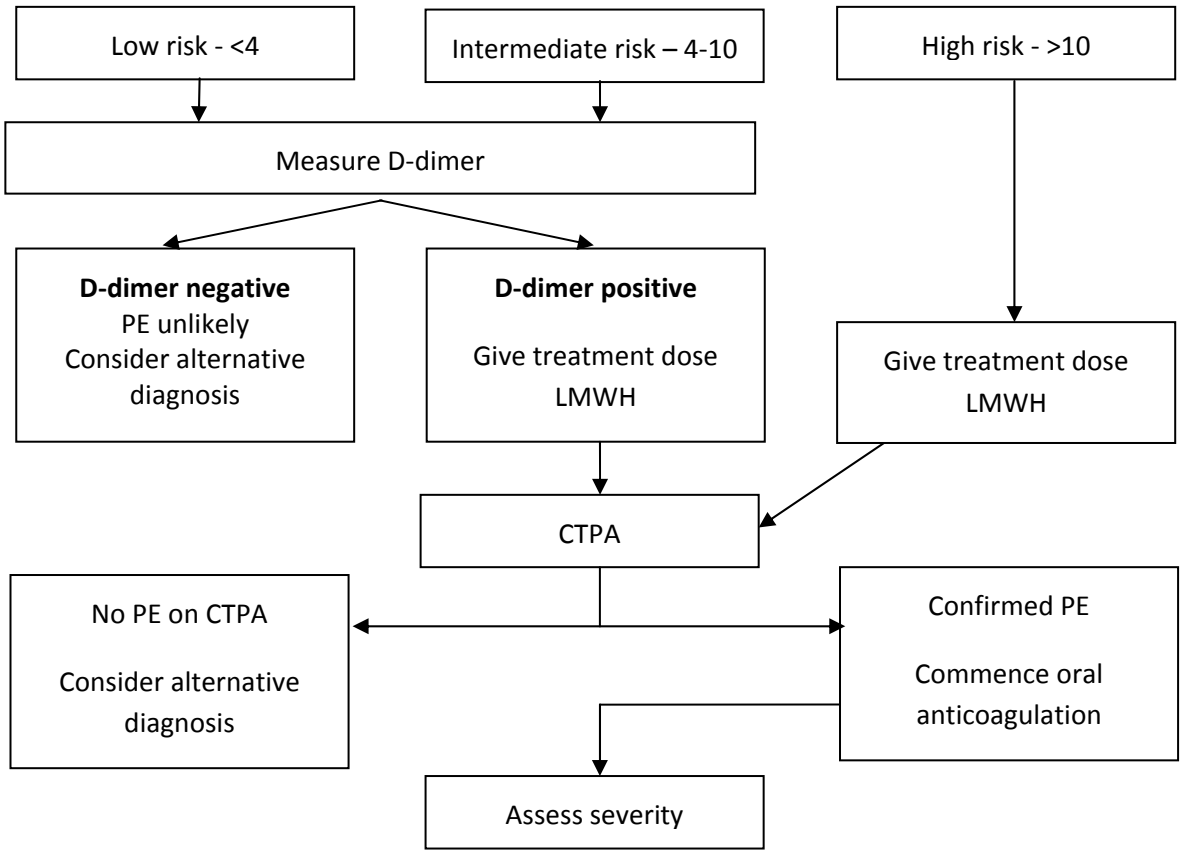
**Important Note**:

The Intranet version of this document is the only version that is maintained.
Any printed copies should therefore be viewed as 'Uncontrolled' and as such, may not necessarily contain the latest updates and amendments.

# Guideline for Investigation and Management of Pulmonary Embolism

Individuals with suspected pulmonary embolism should be assessed for the need for imaging to confirm or exclude the diagnosis. In general, those who develop symptoms suggestive of PE during an admission will all require radiological imaging (e.g. CTPA). In contrast, those presenting from the community (and who will have a lower likelihood of having a PE) can be triaged for imaging according to their D-dimer level and pre-test clinical probability score (revised Geneva score) as below.

| Revised Geneva Score | |
|---|---|
| **Age > 65** | +1 |
| **Previous VTE** | +3 |
| **Surgery or lower limb fracture in last month** | +2 |
| **Current malignancy** | +2 |
| **Unilateral lower limb pain** | +3 |
| **Haemoptysis** | +2 |
| **Pain on limb palpation** | +4 |
| **Heart rate** | |
| **75-94** | +3 |
| **≥95** | +5 |
| **TOTAL** | |



**Assessing Severity**

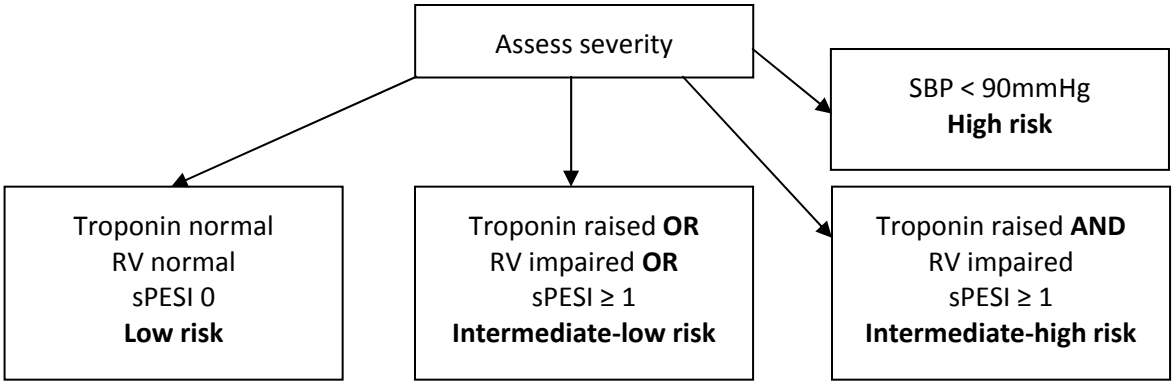
Clinical shock – sustained hypotension

Myocardial damage / necrosis – troponin level

RV Impairment – assessed by evidence of right heart strain on CTPA or echo

Risk of early mortality – sPESI score

| Simplified Pulmonary Embolism Severity Index (sPESI) | |
|---|---|
| **Age > 80** | +1 |
| **History of cancer** | +1 |
| **History of chronic cardiorespiratory disease** | +1 |
| **Heart rate ≥ 110** | +1 |
| **Systolic BP < 100mmHg** | +1 |
| **$O_2$ Saturation < 90%** | +1 |




Manage according to risk stratification as follows:

| Risk Stratification and Management | |
|---|---|
| **Low risk** | **Anticoagulation/early discharge on DOAC*** |
| **Intermediate-low risk** | **Anticoagulation** |
| **Intermediate-high risk** | **Anticoagulation with observation for clinical deterioration** |
| **High risk** | **See below for management of massive PE** |

* if appropriate, consider for ambulatory management of PE as an out-patient

# Management of massive pulmonary embolism

## Definition:

Acute pulmonary embolism with sustained hypotension

- systolic blood pressure <90 mmHg for 15 minutes or requiring inotropic support
    - not related to cause other than PE:
        - arrhythmia, LV dysfunction, sepsis or hypovolaemia.

## Investigations:

- CTPA for formal diagnosis of PE is preferable.
    - If not possible due to clinical condition, urgent bedside echocardiogram to assess for RV dysfunction should be sought.

## Management:

- Should be monitored and treated in Level 2 care area (Resus/HDU/CCU/ICU)
- If PE confirmed or highly likely, consider thrombolysis.
- Contraindications to thrombolysis include:
    - prior intracranial haemorrhage
    - ischaemic stroke within 3 months
    - suspected active bleeding
    - recent surgery within 3 weeks

In massive PE, it may be that consideration has to be given to the risk of deterioration and death without thrombolysis, even in the presence of contraindications.

## Treatment:

- Alteplase is considered thrombolytic of choice in massive PE.
- For standard thrombolysis of massive PE:
    - **10mg alteplase IV over 2 minutes**
    - followed by **90mg alteplase over 2 hours**
    - N.B. max dosing is 1.5mg/kg for patients <65 kg
- Unfractionated heparin (UFH) must be given in addition to above therapy:
    - **5000 units IV bolus followed by continuous infusion of UFH**
    - Aim for APPT 1.8 – 2.8
    - If patient has already had treatment dose LMWH within 12 hours of thrombolysis, the IV UFH bolus dose should be omitted.
- In peri-arrest situation, consider giving stat dose of 50mg alteplase followed by further 50mg as infusion.

- If alteplase is not available consider using other systemic thrombolytics (for example tenecteplase)

**Other interventions**

Should thrombolysis be absolutely contraindicated or thrombolysis does not lead to clinical improvement, consideration should be given to other treatment options.

- Discuss with local interventional radiology services with regards to **catheter directed thrombolysis**.
- If not available, consider transfer to other hospital where facilities are available.
- Alternatively, discuss with cardiothoracic surgery about **surgical embolectomy**.
- Recent thrombolysis is NOT a contraindication to potential cardiac surgery but needs careful multidisciplinary approach with involvement of anaesthetics and haematology.

**Ongoing management**

Patient should be monitored and treated in Level 2 area for at least first 24 hours. Refer to respiratory physicians for ongoing inpatient care. Heparin infusion is treatment of choice for 48 hours after thrombolysis. After this, patient can be changed over to LMWH/oral anticoagulant therapy. In severely unwell patients , extracorporeal membrane oxygenation support (usually VA-ECMO) can be considered as a supportive therapy.

**Follow up**

For intermediate-high and high risk patients with confirmed PE, follow up should be arranged including consideration of echocardiogram at 3 months. Referral should be made to appropriate respiratory services.

## Submassive pulmonary embolism (Intermediate High risk)

Patients may present with significant symptoms and/or large volume of clot on CTPA while not meeting criteria for 'massive PE'. Submassive PE can be defined as acute PE without systemic hypotension but with evidence of right ventricular dysfunction (on echo or CTPA) and myocardial necrosis (raised troponin/BNP level).

There is no accepted guideline on the best course of management for these patients but there is recognition that these patients have a higher mortality than patients with 'low risk PE'. Therefore, clinical judgement is required as well as involving senior members of the medical staff. Anticoagulation with LMWH in the first instance should be first line. There should also be close monitoring in case of clinical worsening despite anticoagulation.

Recommendations for treatment in the deteriorating patient:

1. If systemic BP < 90mmHg, refer to massive PE guideline.
2. If patient intermediate-high risk and clinically deteriorating (e.g. progressive hypoxaemia), there may be a role for the following:
    - Full dose thrombolysis
    - Low dose thrombolysis
        - Alteplase 10mg IV bolus followed by 40mg infusion over 1 hour.
    - Catheter-directed intervention (via local interventional radiology)

Recent meta-analysis of studies in recanalisation procedures in PE has shown that low dose thrombolysis provides the lowest chance of dying from PE and lowest chance of bleeding from thrombolysis. However all modalities should be considered guided by ease of access and clinical state.

### Follow up

For intermediate-high and high risk patients with confirmed PE, follow up should be arranged including consideration of echocardiogram at 3 months. Referral should be made to appropriate respiratory services.

Lead Author: Colin Church

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