

# B06: Pulmonary Embolism

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## Introduction

A pulmonary embolism occurs when the pulmonary arterial circulation becomes blocked by material originating elsewhere in the body, either fat, air, or a thrombus. The occlusion causes a variety of symptoms resulting from a combination of poor pulmonary circulation, poor gas exchange and oxygen transport, and right ventricular strain; these can include chest pain, shortness of breath, cough, hypotension, and syncope.

## Essentials

- For hemodynamically normal and stable patients with signs and symptoms of a pulmonary embolism, no specific therapies are required beyond monitoring, supplemental oxygen as required, and transport to hospital. Hemodynamically compromised or otherwise unstable patients require a similar approach, but consideration must be made to the logistics of transport and the provision of en route care.
- When transporting a hemodynamically compromised patient with a suspected pulmonary embolism, paramedics should plan their transport strategy with regards to the need for effective chest compressions should the patient progress to cardiac arrest. This may require additional resources, but paramedics should not wait for additional resources to arrive before initiating transport – consider intercepts en route.
- Patients with strong suggestion of pulmonary embolism, and who are in cardiac arrest, should be transported as soon as possible, with an emphasis on effective chest compressions and early notification to the receiving facility.
- Under most circumstances, paramedics should not cease resuscitation of patients with suspected pulmonary embolism until contact with appropriate physician resources has been made.

## General Information

The severity of symptoms caused by a pulmonary embolism can be extremely variable. Patients can be asymptomatic, or near death. Emboli can develop acutely, or over a longer term; there can be a clear precipitating event, or the origin of the thrombus can be uncertain. As a result, the diagnosis of pulmonary embolism can be very complex, is often subtle, and remains – even with imaging and laboratory tests – one of the most difficult diagnoses in medicine.

In the prehospital environment, the provisional diagnosis of pulmonary embolism should be reserved for those cases that unequivocally point towards that conclusion – either because of significant history findings, or as a result of clinical presentation. Suspicion will be vastly more common than certainty. History findings that should prompt a consideration of pulmonary embolism include

- Malignancy
- Pregnancy or other hormonal change (e.g., birth control)
- Recent stroke
- Recent hospitalization or restriction of movement
- Recent traumatic spinal cord injury
- Recent joint replacement
- Known thrombophilia
- Known venous thromboembolism

Common signs and symptoms of pulmonary embolism can include

- Shortness of breath at rest or on exertion
- Pleuritic chest pain
- Cough
- Orthopnea

- Calf or thigh pain or swelling
- Wheezing
- Syncope

Patients with pulmonary embolisms may present with significant hemodynamic compromise, which can progress to cardiac arrest. The possibility of a pulmonary embolism should be entertained when other causes of hemodynamic instability do not adequately account for the patient's presentation. Suspicion should be further raised when the symptoms develop suddenly and without warning.

There is no specific prehospital treatment for a pulmonary embolism. Care is primarily supportive, aimed at optimizing oxygenation and ventilation while supporting blood pressure and ensuring rapid transport to hospital.

If a patient with a suspected pulmonary embolism suffers a cardiac arrest, early consultation with both CliniCall and the receiving hospital should be made to discuss a resuscitation and potential reperfusion strategy. Thrombolysis is an option for patients whose cardiac arrests are likely due to embolic events; transport should be prioritized, with a focus on ensuring high-quality CPR during patient movement to the maximum extent possible.

## Interventions

### First Responder

- Provide airway management as required
  - [→ B01: Airway Management](#)
- Provide supplemental oxygen as required to maintain  $\text{SpO}_2 \geq 94\%$  (caution: may not be achievable)
  - [→ A07: Oxygen and Medication Administration](#)
- In cardiac arrest: begin chest compressions
  - [→ PR06: High Performance CPR](#)

### Emergency Medical Responder – All FR interventions, plus:

- Provide rapid transport
- Consider ACP intercept where available

### Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider supraglottic airway for decreased levels of consciousness when unable to ventilate using pharyngeal airways
  - [→ PR08: Supraglottic Airways](#)

### Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Intubation as required. Avoid intubation strategies that depress blood pressure.
  - [→ PR18: Anesthesia Induction](#)
  - [→ PR23: Awake Intubation](#)

### Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Norepinephrine
- Heparin
- Thrombolysis

## References

1. Stein PD, et al. Clinical, laboratory, roentgenographic, and electrocardiographic findings in patients with acute pulmonary embolism and no pre-existing cardiac or pulmonary disease. 1991. [\[Link\]](#)

