

Thrombolysis for suspected or confirmed Massive Pulmonary Embolism causing cardiac arrest

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The current version of any policy, procedure, protocol or guideline is the version held on trust public folders. It is the responsibility of all staff to ensure that they are following the current version

Signed



Chair of Trust Policy Group

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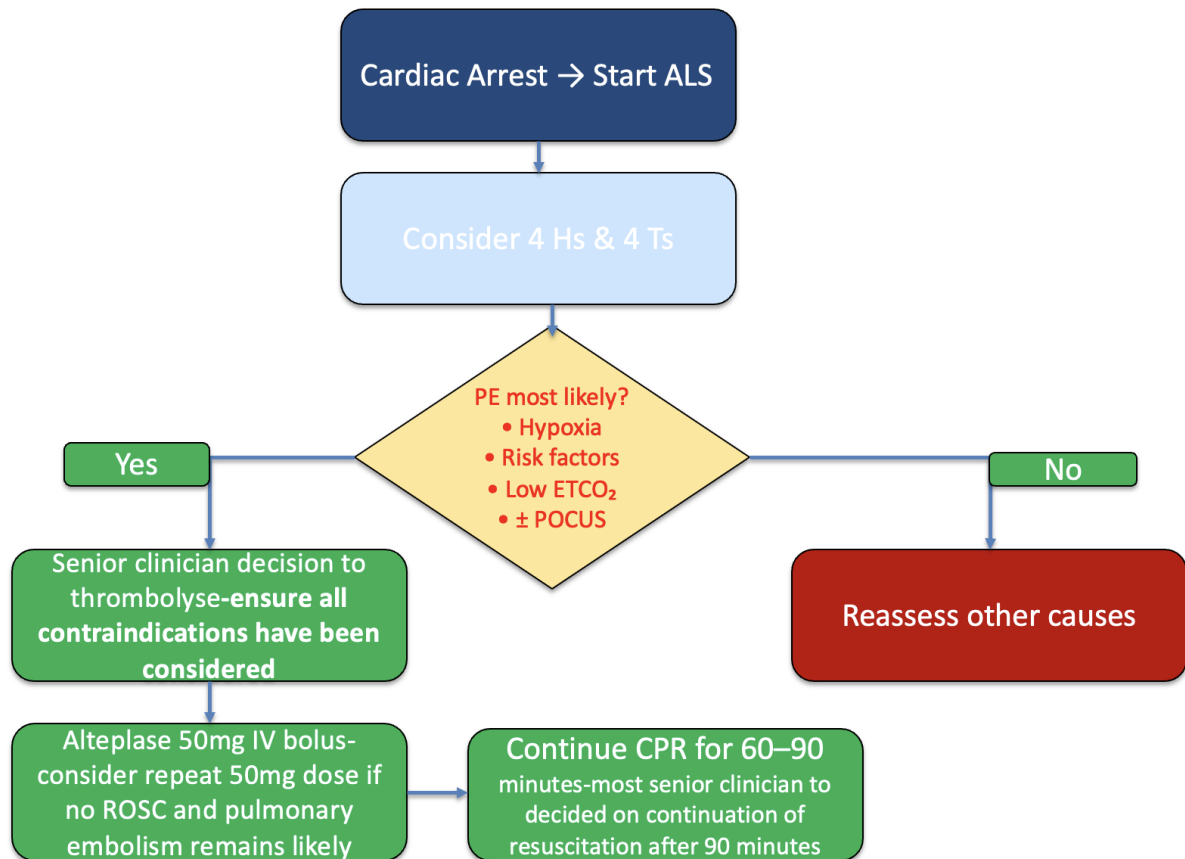
Version control

Include details of when the document was last reviewed and summary of amendments:

Version number	Purpose / changes	Author	Date changed
1.0	New policy	Matthew Ibrahim	April 2026

1. Quick reference guide

Thrombolysis in Suspected Pulmonary Embolism during Cardiac Arrest



2. Introduction

Pulmonary embolism (PE) is a significant cause of cardiovascular morbidity and mortality in the United Kingdom and represents a potentially reversible cause of cardiac arrest. It is estimated that venous thromboembolism (VTE), including PE, affects approximately 1 in 1,000 people annually in the UK, with PE responsible for a substantial proportion of these cases (Campbell et al., 2003; Makowska et al., 2024).

Massive (high-risk) PE is associated with mortality rates exceeding 15%, rising significantly in patients presenting with haemodynamic instability or cardiac arrest (Konstantinides et al., 2020; Mojaddedi et al., 2024). Among patients with cardiac arrest, PE is recognised as one of the leading reversible causes, particularly in those presenting with pulseless electrical activity (PEA) (Perkins et al., 2021)

Survival from pulmonary embolism-related cardiac arrest is poor but may improve with early intra-arrest thrombolysis (Kataria et al., 2021). Observational evidence suggests that early intra-arrest thrombolysis administration is associated with improved return of spontaneous circulation, supporting prompt treatment when PE is suspected (Feldes et al., 2024; Javaudin et al., 2019; Yamamoto, 2018).

Despite this, variation exists in clinical practice regarding the timing and use of thrombolysis in suspected PE cardiac arrest, and delays in treatment may reduce the likelihood of return of spontaneous circulation (ROSC). National and international guidelines therefore emphasise the importance of early recognition and prompt treatment of PE as a reversible cause during advanced life support (Greif et al., 2025; Konstantinides et al., 2020).

This policy provides clear, standardised guidance to support clinicians in the timely recognition and management of suspected PE cardiac arrest, improving patient outcomes and reducing variation in care.

The Trust is committed to treating people with dignity and respect in accordance with the Equality Act 2010 and Human rights Act 1998. Throughout the production of this policy due regard has been given to the elimination of unlawful discrimination, harassment and victimisation (as cited in the Equality Act 2010).

3. Purpose

The purpose of this policy is to provide evidence-based guidance for the safe and effective use of thrombolytic agents during cardiac arrest secondary to suspected or confirmed pulmonary embolism, aligned with contemporary UK and international guidance, by providing clear, evidence-based guidance to support clinicians.

4. Scope

- Adults ≥18 years
- Emergency Department and ward/departmental in-hospital cardiac arrests
- All clinicians involved in Advanced Life Support (ALS)

5. Definitions and abbreviations

Massive (high risk) Pulmonary Embolism- Massive (high-risk) pulmonary embolism is defined as PE causing haemodynamic instability, including cardiac arrest, obstructive shock, or persistent hypotension (Campbell et al., 2003)

Pulseless Electrical Activity (PEA)-PEA is a cardiac arrest rhythm that is characterised with electrical activity normally associated with a cardiac output, however no cardiac output is felt

Venous Thromboembolism (VTE)- Includes deep vein thrombosis (DVT) and pulmonary embolism.

Advanced Life Support-providing advanced resuscitation care, including, but not limited to, defibrillation, advanced vascular access and advanced airway management

6. Duties

6.1 Chief Executive

Accountable officer with overall responsibility for ensuring that the Trust has sufficient resources to ensure this policy is adhered to.

5.2 Chief Medical Officer

The Medical Director is responsible for ensuring clinicians adhere to this policy.

5.3 Lead Resuscitation Practitioner

The Lead Resuscitation Practitioner is responsible for ensuring the clinical accuracy of this policy and the subsequent periodic policy updates. The Lead Resuscitation Practitioner will also be responsible for the auditing of the adherence to this policy.

5.4 Resuscitation Committee

The Resuscitation Committee is responsible for the approval of this policy.

7. Process

7.1 Indications:

Thrombolysis should be considered during cardiac arrest when:

- PE is suspected or confirmed as the cause and no alternative cause has been identified that is more likely than a PE
- No absolute contraindication exists

7.2 Contraindications:

In cardiac arrest due to suspected massive pulmonary embolism, the risk–benefit balance generally favours thrombolytic treatment. Although standard contraindications to thrombolysis should be considered where feasible, in the setting of a cardiac arrest, many become relative because untreated PE-related cardiac arrest carries an extremely high mortality, reported up to 90–95% (Kürkciyan et al., 2000; Laher & Richards, 2018; Wang et al., 2019).

Examples of relative contraindications include, but not limited to:

- Previous intracranial haemorrhage
- Recent major surgery
- active bleeding

7.3 Suggestive clinical features of a PE:

Clinical features suggestive of a PE induced cardiac arrest include, but not limited to:
PEA/Asystole

- Hypoxia leading to cardiac arrest
- Known VTE risk factors (recent surgery, malignancy, immobility)
- Low End-tidal CO₂ despite effective chest compressions
- Evidence of right ventricular strain if echocardiogram is available (Greif et al., 2025; Konstantinides et al., 2020).

7.4 Thrombolysis for suspected PE in cardiac arrest

Thrombolysis for suspected PE in cardiac arrest should be administered as early as possible once PE is considered the most likely reversible cause, as delays reduce the likelihood of return of spontaneous circulation (ROSC) (Javaudin et al., 2019; Kataria et al., 2021). The most senior clinician present leads decision-making relating to thrombolysis.

7.5 The role of Ultrasound in decision making:

Point Of Care Ultrasound (POCUS) may support clinical decision making and PE diagnosis. Findings suggestive of PE include:

- Right Ventricular distention
- Right Ventricular dysfunction

These findings are not specific and must be interpreted in clinical context (Long et al., 2026).

7.5.1 Thrombolysis should be administered within 10–15 minutes of cardiac arrest, where clinical suspicion is high (Feltès et al., 2024; Wang et al., 2019), however this time frame must not override clinical judgement.

7.6 Dosing and special considerations:

7.6.1 The recommended thrombolytic in Massive PE induced cardiac arrest is Alteplase, with an initial dose of 50mg IV bolus (Konstantinides et al., 2020; Summers et al., 2019). A repeat dose of alteplase may be considered in the absence of return of spontaneous circulation where pulmonary embolism remains the most likely cause. Evidence for repeat dosing is limited and based on observational data and expert consensus.

Standard PE regimen (100 mg over 2 hours) is not appropriate in cardiac arrest due to time constraints. Caution must be used for patients weighing <50kg and clinicians should consider risk v benefit in this situation.

7.6.2 Following the administration of Alteplase, standard resuscitation as per current Resuscitation Council (UK) guidelines must continue. The administration of Alteplase should not delay therapies like defibrillation.

7.6.3 Continue resuscitation for between 60-90 minutes post thrombolysis before considering terminating the resuscitation (Greif et al., 2025). To facilitate prolonged resuscitation, mechanical compression devices should be utilised.

7.7 Storage of Alteplase:

Alteplase is currently located within the following clinical areas:

- Adult Assessment Unit
- Adult Emergency Department
- ITU
- Fleming Ward
- Emergency cupboard
- Main Theatres

7.7.1 The clinical areas listed above must ensure Alteplase is readily available and are responsible for ensuring this medication is in-date and replenished immediately either when used or expired.

7.8 Post Return of Spontaneous Circulation (ROSC) care:

7.8.1 If ROSC is achieved, the patient may require transfer to Critical Care, Cardiology or an external tertiary centre. The most senior clinician looking after the patients' care should instigate transfer processes and liaise with the receiving location. Appropriate imaging should be considered e.g. CTPA, CT Head etc post ROSC. CTPA is the preferred imaging modality where feasible.

7.8.2 Following ROSC post thrombolysis, the patient should receive an unfractionated heparin infusion when bleeding risk is deemed to be acceptable, to prevent recurrence (Konstantinides et al., 2020).

7.8.3 If thrombolysis is either completely contraindicated or unsuccessful, consider alternative therapies that may include, surgical embolectomy, catheter-directed thrombectomy or Extracorporeal CPR (ECMO) where available (Campbell et al., 2003; Greif et al., 2025; Kataria et al., 2021; Konstantinides et al., 2020).

8. Documentation

The decision to thrombolysis a patient must be documented within the medical notes within Alexhealth. The senior clinician responsible for deciding to thrombolyse must document the indications for thrombolysis and the considerations regarding contraindications, along with the time the patient was thrombolysed and the dose of Alteplase used.

9. Training

All staff who either regularly respond to adult cardiac arrests within the Trust will undertake either an Immediate Life Support (ILS) or Advanced Life Support (ALS) course, dependent on their clinical specialty and expected role within a cardiac arrest. Awareness of this policy will be highlighted during mandatory resuscitation education and where relevant during local

training/scenario practice.

Simulation facilitated education should be encouraged as a medium for Trust staff to enhance decision making and should be encouraged.

10. Monitoring compliance with this document

The table below outlines the trust's monitoring arrangements for this document. The trust reserves the right to commission additional work or change the monitoring arrangements to meet organisational needs.

Aspect of compliance or effectiveness being monitored	Method of monitoring	Individual responsible for the monitoring	Monitoring Frequency	Group or committee who receive the findings	Group or committee or individual responsible for
Duties	To be addressed by the monitoring activities below.				
Number of patients who receive thrombolysis for suspected PE cardiac	Review of reported incidents	Lead Resuscitation Practitioner	Quarterly.	Cardiac Arrest Review Panel	Resuscitation Committee & Lead Resuscitation Practitioner
Compliance to thrombolysis administered within 10-15 minutes following cardiac arrest	Review of reported incidents	Lead Resuscitation Practitioner	Quarterly	Cardiac Arrest Review Panel	Resuscitation Committee & Lead Resuscitation Practitioner
Where a lack of compliance is found, the identified group, committee or individual will identify required actions, allocate responsible leads, target completion dates and ensure an assurance report is represented showing how any gaps have been addressed.					

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12. Related Trust policies

- Resuscitation Policy
- VTE Policy

Appendix 1 – Equality impact assessment

The organisation aims to design and implement services, policies and measures that meet the diverse needs of our service, population and workforce, ensuring that none are placed at a disadvantage over others. The equality impact assessment tool is designed to help you consider the needs and assess the impact of your policy.

Name of document:	Thrombolysis for suspected or confirmed Massive Pulmonary Embolism causing cardiac arrest		
Completed by:	Matthew Ibrahim		
Job title:	Lead Resuscitation Practitioner	Date:	22/04/2026

	Yes/No
1. Does the document/guidance affect one group less or more favourably than another on the basis of: ▪ Age ▪ Gender ▪ gender reassignment ▪ marriage and civil partnership ▪ pregnancy and maternity ▪ race ▪ religion or belief ▪ sex ▪ sexual orientation or disability (e.g. learning disabilities, physical disability, sensory impairment and mental health problems)	No
2. Are there relevant considerations with regard to any of these groups? ▪ Looked after children and young people ▪ Carers of patients and unpaid family members ▪ People without a home or living, or staying in temporary accommodation ▪ People involved in the criminal justice system /on probation, ex-offenders ▪ People with addictions and/or substance misuse issues ▪ People or families on a low income ▪ People with poor literacy or health literacy poor language skills or poor understanding of health services ▪ People living in deprived areas ▪ People living in remote, rural and island locations Refugees, asylum seekers or those experiencing modern slavery	No
3. If yes, specify which characteristic and in which way?	N/A

4.	If you have identified potential discrimination, are there any exceptions valid, legal and/or justifiable?	N/A
5.	Is the impact of the document/guidance likely to be negative?	No
6.	If so, can the impact be avoided?	N/A
7.	What alternative is there to achieving the document/guidance without the impact?	N/A
8.	Can we reduce the impact by taking different action? If yes, provide details:	N/A

If you have identified a potential discriminatory impact of this procedural document or the answer to any of the above is Yes, please refer it to the Head of Equalities or the Head of Patient Experience, extension 01279 962 365 or paht.pals@nhs.net together with any suggestions as to the action required to avoid/reduce this impact. In this case, ratification of a procedural document will not take place until approved by the Head of Patient Experience.

Date of approval by head of patient experience:

Evidence of approval must be available if requested

Data Protection Impact Assessments (DPIAs) are a tool which can help organisations identify the most effective way to comply with their data protection obligations and meet individual's expectations of privacy. The first step in the DPIA process is identifying the need for an assessment.

The following screening questions will help decide whether a DPIA is necessary. Answering 'yes' to any of these questions is an indication that a DPIA would be a useful exercise and requires senior management support, at this stage the information governance manager must be involved.

Name of document:	Thrombolysis for suspected or confirmed Massive Pulmonary Embolism causing cardiac		
Completed by:	Matthew Ibrahim		
Job title	Lead Resuscitation Practitioner	Date	22/04/2026
			Yes or no
1. Will the process described in the document involve the collection of new information about individuals? This is information in excess of what is required to carry out the process described within the document.			No
2. Will the process described in the document compel individuals to provide information about themselves? This is information in excess of what is required to carry out the process described within the document.			No
3. Will information about individuals be disclosed to organisations or people who have not previously had routine access to the information?			No
4. Are you using information about individuals for a purpose it is not currently used for, or in a way it is not currently used?			No
5. Does the process involve the use of new technology which might be perceived as being privacy intrusive? For example, the use of biometrics.			No
6. Will the process result in decisions being made or action taken against individuals in ways which can have a significant impact on them?			No
7. Is the information about individuals of a kind particularly likely to raise privacy concerns or expectations? For examples, health records, criminal records or other information that people would consider to be particularly private.			No
8. Will the process require you to contact individuals in ways which they may find intrusive			No
If the answer is yes to any of the above questions, please contact the information governance manager, tel: 01279 962533 tracy.goodacre@nhs.net. In this case, ratification of a procedural document will not take place until approved by the information governance manager.			
IG manager approval			
Date of approval			