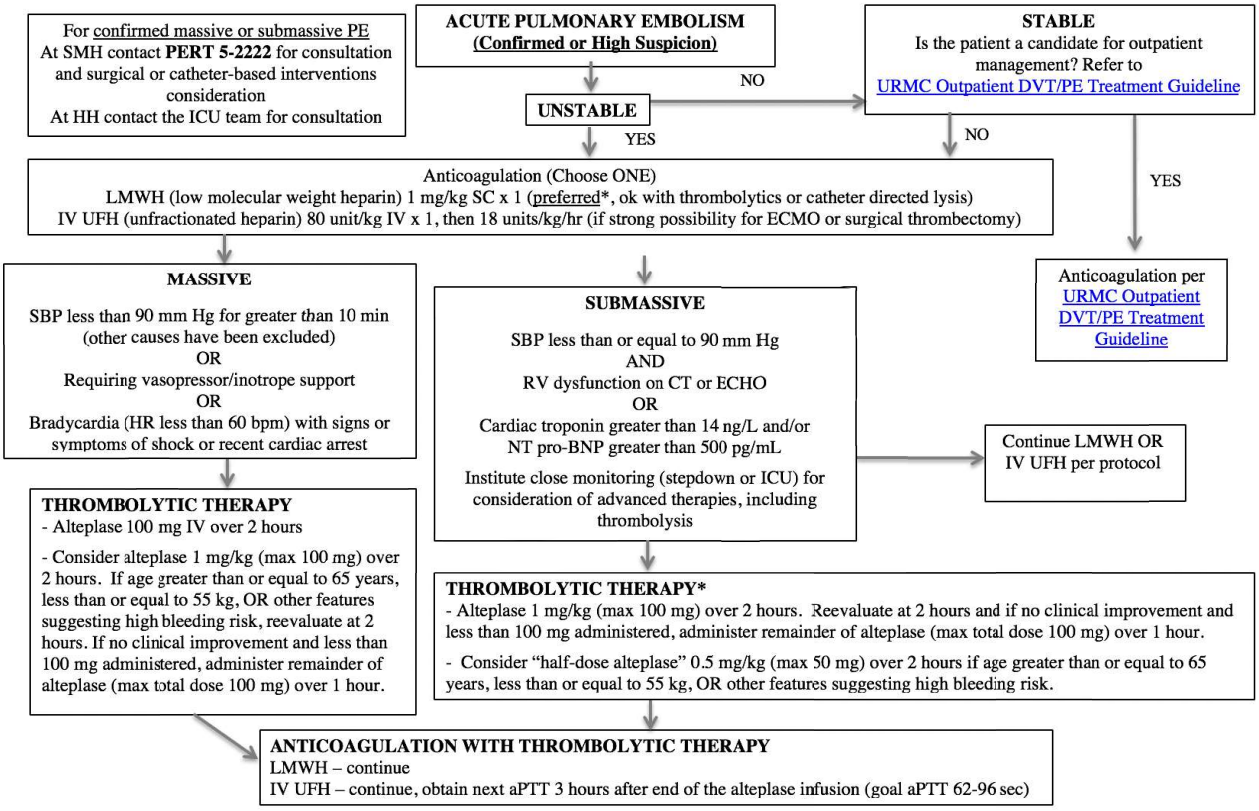
**Origination:** *10/1/2003*
**Last Approved:** *3/10/2020*
**Last Revised:** *3/10/2020*
**Next Review:** *3/10/2023*
**Owner:** *Nicole Acquisto*
**Policy Area:** *SMH Guidelines*
**References:**
**Applicability:** *University of Rochester - Strong Memorial Hospital*

# Management of Acute Pulmonary Embolism in Adults




## PERT (Pulmonary Embolism Response Team) at SMH

- Criteria for activation is a *confirmed* massive or submassive PE
- Team should be contacted through the page office at 5-2222 to be paged as a "PERT alert"
- Team members often include the pulmonary-critical care fellow on-call, pulmonary-critical care attending, cardiology fellow on-call, cardiology attending, and pharmacist

| Massive PE | Submassive PE |
|---|---|
| • VTE or PE by imaging | • VTE or PE by imaging |
| • SBP less than 90 mm Hg for greater than 10 minutes or vasopressor/inotrope-dependence | • Right heart strain (CT imaging or echocardiography) OR cardiac TnT greater than 14 ng/L and/or NT-proBNP greater than 500 pg/mL |
| • Hypotension due to another medical issue | |

| Massive PE | Submassive PE |
|---|---|
| excluded | |

# Anticoagulation Considerations

- LMWH (refer to URMC LMWH Guidelines)
- UFH (refer to URMC IV UFH protocol for DVT/PE)
- Anticoagulation should not be delayed while awaiting diagnostic confirmation of PE if suspicion is strong
  - LMWH or IV unfractionated heparin bolus should be given first prior to giving fibrinolytic therapy even if this causes a minor delay in time to fibrinolytic therapy
- History of HIT: fondaparinux or bivalirudin (refer to URMC Fondaparinux Guideline or URMC Bivalirudin Guideline)
- *Obstetrical patients (especially those near term) may need adjustment of PE treatment to take into consideration risks of anticoagulation during delivery
  - Maternal-Fetal-Medicine (MFM) consultation is recommended
  - In general, UFH IV are preferable over LMWH or fondaparinux
  - With the expectation of rare cases, warfarin, oral direct thrombin inhibitors and oral Xa inhibitors are not appropriate agents in pregnancy and should only be used with the guidance of the MFM team

# Fibrinolytic Contraindications

## Absolute contraindications:

- High risk of bleeding or active bleeding in the following sites: intraperitoneal, retroperitoneal, pulmonary, uterine, bladder
- History of intracranial hemorrhage
- Known intracranial neoplasm, arteriovenous malformation, or aneurysm
- Significant head trauma in the preceding 7 days
- Intracranial surgery within 3 months
- Chest, abdominal, intracranial or spinal surgery within the previous 14 days
- Ischemic stroke within 3 months
- Suspected aortic dissection



## Relative contraindications:

- Anticoagulation with therapeutic warfarin or direct oral anticoagulants
- Age greater than 75 years
- *Pregnancy
  - Fibrinolytics are not contraindicated in pregnancy, but carries a risk of pregnancy loss and/or bleeding
  - For pregnant patients where this therapy is being considered after 12 weeks gestation the MFM team should be involved. The team should be prepared for the potential need for fetal monitoring/delivery
  - If this therapy is indicated and could be life-saving for the mother, it should not be withheld solely due to pregnancy
- Traumatic or prolonged cardiopulmonary resuscitation
- Recent internal bleeding within 2-4 weeks
- Severe uncontrolled hypertension (SBP greater than 180mmHg or DBP greater than 110 mmHg)
- Dementia
- Ischemic stroke greater than 3 months prior
- Major surgery within 3 weeks
- Non-compressible vascular punctures

## Cardiac Arrest

- There is a lack of prospective data indicating benefit with the use of thrombolytics in this setting, please weigh risks and benefits
- Tenecteplase would be the preferred agent given as a single bolus dose over 5 seconds (see dose table)

**Tenecteplase Dose (concentration 5 mg/mL):**

| Patient Weight (kg) | Tenecteplase (mg) | Volume to be Administered (mL) |
|---|---|---|
| Less than 60 kg | 30 mg | 6 mL |
| Greater than or equal to 60 to less than 70 kg | 35 mg | 7 mL |

| Patient Weight (kg) | Tenecteplase (mg) | Volume to be Administered (mL) |
|---|---|---|
| Greater than or equal to 70 to less than 80 kg | 40 mg | 8 mL |
| Greater than or equal to 80 to less than 90 kg | 45 mg | 9 mL |
| Greater than or equal to 90 kg | 50 mg | 10 mL |

# Monitoring Post-Fibrinolytics

Vital signs and neurological assessments (24 hours of close monitoring):

- Every 15 minutes x 2 hour, then every 30 minutes x 6 hours, then hourly x 16 hours

Observe closely for the following clinical changes and notify provider if any occur:

- Acute hypertension
- Severe headache
- Nausea or vomiting
- Neurologic deterioration
- Mental status changes
- Arrhythmias

Minimize bleeding risk:

- Arterial sticks, venipunctures, placement of nasogastric tubes, indwelling bladder catheters, intra-arterial pressure catheters, and other invasive procedures that are medically indicated should not be delayed; those procedures that are not time sensitive may be delayed until 24 hours after tenecteplase administration
- If an arterial or venous puncture is needed for acute medical management, apply pressure for 30 minutes at completion and assess for persistent bleeding
- Intramuscular injections/nonessential handling of the patient should be avoided for first few hours

Coagulation tests or measures of fibrinolytic activity may be unreliable during fibrinolytic therapy

Bleeding:

- Major bleeding (requiring blood transfusion or leading to hemodynamic compromise) 4.7%
  - Hematoma (1.7%), gastrointestinal tract bleeding (1%), less than 1% urinary tract, puncture site (including cardiac catheter site), retroperitoneal, and respiratory tract
- Minor bleeding 21.8%
  - Hematoma (12.3%), urinary tract (3.7%), puncture site (including cardiac catheter site) (3.6%), pharyngeal (3.1%), gastrointestinal tract (1.9%), and epistaxis (1.5%)
- Refer to the Clinical Practice Guideline for the Management of Bleeding Complications Following IV Thrombolytic Therapy

Allergic reaction:

- Rare (less than 1 %): Anaphylaxis, angioedema, laryngeal edema, rash, and urticaria

Others reported:

- Cholesterol embolization, cardiogenic shock, arrhythmias, atrioventricular block, pulmonary edema, heart failure, cardiac arrest, recurrent myocardial ischemia, myocardial reinfarction, myocardial rupture, cardiac tamponade, pericarditis, pericardial effusion, mitral regurgitation, thrombosis, embolism, and electromechanical dissociation

# Statement

Guidelines are intended to be flexible. They serve as reference points or recommendations, not rigid criteria. Guidelines should be followed in most cases, but there is an understanding that, depending on the patient, the setting, the circumstances, or other factors, guidelines can and should be tailored to fit individual needs.

## Attachments

No Attachments

## Approval Signatures

| Step Description | Approver | Date |
|---|---|---|
| Final Approval to Post | Ann Ottman | 3/10/2020 |
| Clinical Council | Ann Ottman | 2/18/2020 |
| Therapeutics Committee | Travis Dick | 1/13/2020 |
| Policy Owner | Nicole Acquisto | 1/3/2020 |

## Applicability

University of Rochester - Strong Memorial Hospital