ACute Evaluation and Treatment of Pulmonary Embolism (ACE-PE Team) - Protocols
Acute PE (CT Diagnosis)

Stable Patient

Low Risk PE
sPESI score = 0

Intermediate risk PE
sPESI score > 0

Unstable Patient

High risk (massive)
PE: SBP < 90 mm hg

RV function *and Troponin

Both normal

Early discharge with outpatient F/U *

Admit to Med-Surg floor for monitoring

One or both abnormal

Intermediate care unit
*(can consider med-surg floor for some patients)

MICU/CVCC

ED evaluation based on clinical presentation with additional use of Wells, Geneva, PERC and/or D-dimer as needed for evaluation and diagnosis.

Testing in ED:
After Dx of PE
Troponin
BNP
Coags
CXR/CT
Lactate
Echo (if available)

sPESI score: (1 point for each)
• Age > 80
• *History of Ca
• Cardiopulmonary disease
• HR > 110 bpm
• SBP < 100 mm hg
• SaO2 < 90%

* RV dysfunction: CT based criteria for RV:LV ratio > 1:0

* Emergent ACE-PE Consult *Evaluation in 30 min

* Urgent ACE-PE Consult *Evaluation within 6 hours

* For patient with known cancer, please inform oncology team.

* F/U in Thrombosis Clinic in 3 months

ED EVALUATION ALGORITHM
Acute PE (CT Diagnosis)

Low Risk PE
sPESI = 0

Intermediate Risk
(sPESI >0)

High Risk PE

Echo and Troponin

No RV dysfunction
Negative troponin

A/C

RV dysfunction AND/OR positive troponin

A/C and or rescue reperfusion if needed

Early D/C with outpatient F/U

Primary Reperfusion

TREATMENT ALGORITHM I: Overview

Echo Criteria For RV Dysfunction
- RV:LV ratio: >1.0 (Increased basilar or mid RV linear dimension at end diastole)
- TAPSE < 17 (M-mode assessment between end-diastole and peak systole)

sPESI score (1 point for each)
- Age > 80
- History of Ca
- Cardiopulmonary disease
- HR >110 bpm
- SBP < 100 mm hg
- SaO2 < 90%

Early D/C with outpatient F/U
High Risk PE

Consider for systemic thrombolysis OR emergent surgical embolectomy

NO Contraindications to Systemic thrombolytic therapy

Primary Reperfusion with Alteplase 100 mg IV over 2 hrs

Followed by UFH
• Start 3 hrs after alteplase infusion
• Aim for APTT 1.5-2X

Monitor in MICU/CVCC
• If clinical deterioration, consider for CDT

Consider for emergent surgical embolectomy (consider for catheter directed treatment (CDT) if not a candidate for emergent embolectomy or Systemic Thrombolytics

High Risk/ Massive PE =
Acute PE with sustained hypotension (systolic blood pressure 90 mm Hg for at least 15 minutes or requiring inotropic support, not due to a cause other than PE, such as arrhythmia, hypovolemia, sepsis, or left ventricular [LV] dysfunction), pulselessness, or persistent profound bradycardia (heart rate 40 bpm with signs or symptoms of shock).

Major Contraindication to lytic therapy*
• Active Internal bleeding
• History of recent stroke
• Recent IC or IS surgery or serious head trauma (3 months)
• Known intracranial tumor, AVM, aneurysms
• Bleeding diathesis
• Current severe uncontrolled HTN

Other Factors to Consider
• Age > 75
• Pregnancy
• Recent puncture of non-compressible artery
• Recent major surgery (within 3 months)
• Prolonged CPR (>10 min)

TREATMENT ALGORITHM: HIGH RISK PE

*Additional contraindications according to the American Heart Association and American College of Cardiology Foundation (AHA [Jaff 2011]; ACCF/AHA [O’Gara 2013]):
Active bleeding (excluding menses)
Any prior intracranial hemorrhage
Suspected aortic dissection
Ischemic stroke within 3 months except when within 4.5 hours
Significant closed head or facial trauma within 3 months with radiographic evidence of bony fracture or brain injury
INTERMEDIATE RISK PE

Intermediate risk PE

No RV dysfunction Negative troponin

A/C

- Enox 1 mg/kg Q12 with VKA (INR 2.0-3.0)
- UFH (PE protocol) with VKA (INR 2.0-3.0)

OR

- Rivaroxaban (15 mg BID for 3 weeks followed by 10mg QD) OR Apixaban (10 mg PO BID for 7 days followed by 5 mg BID) can be considered as alternatives for acute treatment

RV dysfunction and/or positive troponin

Consider Rescue Reperfusion

- Persistent hypoxemia (SaO2 <90 on room air or desaturation)
- Persistent hypotension (SBP <100 mm hg)
- Elevated lactate (> 2)
- Presentation with syncope
- Age < 65
- Low bleeding risk
- Large bilateral thrombus burden

Rescue Reperfusion

CDT

- CDT:EKOS: total dose of 24 mg over 24 hr (per protocol)
- Other CDT: Mechanical Thrombectomy; Local infusion

OTHER*

- Half dose lytics: Alteplase 50 mg IV over 2 hrs; Start heparin 3 hrs after. Target aPTT 1.5-2.0 X ULN
- Full dose lytics

A/C

- Enox 1 mg/kg Q12
- UFH (PE protocol)

OR

- Rivaroxaban (15 mg BID for 3 weeks followed by 10mg QD) OR Apixaban (10 mg PO BID for 7 days followed by 5 mg BID) can be considered as alternatives for acute treatment

*Limited evidence of efficacy with systemic lytic therapy
Acute PE Follow-Up

Low Risk PE
- Monitor clinically for 48-72 hrs.
  - Trend biomarkers
  - Limited 2D echo for RV function and PA pressures prior to D/C
  - LE duplex and work-up for cause if none apparent
- Outpatient F/U*

Intermediate Risk PE
- Monitor clinically for 48-72 hrs.
  - Trend biomarkers
  - Limited 2D echo for RV function and PA pressures prior to D/C
  - LE duplex and work-up for cause if none apparent
- Outpatient F/U in PE clinic in 3 months
  - 2D echo in 3 months (if elevated PAP or RV dysfunction present at the time of D/C)

High Risk PE
- Monitor in ICU for 48-72 hrs
  - Trend biomarkers including lactate, troponin, BNP
  - Limited 2D echo for RV function and PA pressures prior to D/C
  - LE duplex and work-up for cause if none apparent
- Outpatient F/U in PE clinic in 3 months

*PCP in 2-4 weeks
F/U in Thrombosis Clinic in 3 months