

# PULMONARY EMBOLISM TREATMENT

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Ideally choosing the intervention is a multi-disciplinary discussion (e.g. PERT team)

**Diagnosis and risk assessment**

Physical exam, CT scan, POCUS, EKG, labs (VBG, lactate, troponin, BNP), & **calculate risk score** using an online calculator

**Exam:** Tachypnea, JVD, loud P2, S3/4 gallop, diaphoresis, fever, hemoptysis  
**EKG:** Sinus tach, QR in V1, RBBB, TWI V1-4, STE V1-4, S1Q3T3  
**CT:** reflux of contrast into IVC, PA > 30 mm, PA > Ao, RV bowing; saddle PE not associated with increased mortality  
**POCUS:** RV/LV diameter > 0.9, McConnell Sign, septal flattening, dilated IVC, decreased TAPSE, clot in transit  
**PE Mimics:** post MI VSD, non-thrombotic PE (fat, air, tumor, septic, foreign matter, etc.), chronic PE, severe PAH

**Risk prognostication based on scores and clinical features:**

	LOW	INTERMEDIATE	HIGH risk
<b>Bova score</b>	0 - 2 (3.1%)	3 - 4 (6.8%)	5 - 7 (10%)
<b>PESI class</b>	I (<1.6%) II (1.7-3.5%)	III (3.2-7.1%)	IV (4.0-11.5%) V (10.0-24.5%)
<b>RV fxn</b>	Normal RV function	<b>RV dysfunction</b> A4C RV diameter divided by LV diameter >0.9; TAPSE < 16mm, OR AND AND	
<b>Biomarkers</b>	Normal biomarkers	<b>Elevated Cardiac Biomarkers</b> BNP > 90 or N-terminal pro-BNP > 500 Tnl > 0.4 ng/ml or TnT > 0.1 ng/ml	
<b>Hemodynamics</b>	Stable hemodynamics	Transient hypoTN	<b>Massive PE</b> Sustained hypoTN (>15 min), shock or on vasopressors
<b>Treatment</b>	LMWH	UFH	<b>Thrombolysis</b> Embolectomy ECMO

**Anticoagulation**

LMWH SC preferable but use UFH gtt for patients at high risk for requiring thrombolysis (it can be turned off promptly)

**Thrombolysis or intervention**

For patients w/ massive or high risk sub-massive PE

**Optimize hemodynamics**

For patients in shock

**Systemic thrombolysis**

**Catheter directed lysis**

**Embolectomy**

Exclude contraindications. Indications:

- Massive PE (definite indication)
- High-risk submassive PE (risk/benefit)

Std dose alteplase = 100mg IV over 2 hrs  
 Low dose 0.5 mg/kg (up to 50mg IV)  
 2% risk of ICH and 6% risk of other major bleeding with tPA (PIETHO)

Useful in patients who are higher risk for thrombolysis. May be superior to anticoag alone in intermediate risk PE.

May be useful in patients who fail above therapies, who have C/I to thrombolysis, or who require surgery for large RA thrombus

**Optimize Preload**

Most PE patients do not require IVF; Excess preload will worsen RV failure; avoid bolus unless clear evidence of hypovolemia

**Augment contractility**

POCUS  
 Inotrope

If low CO, consider use of milrinone or dobutamine; monitor for hypoTN

**Reduce PVR**

Treat reversible causes

**Pulmonary vasodilators**

Inhaled pulmonary vasodilators (prostacyclins or iNO) can decrease PVR

**Maintain afterload**

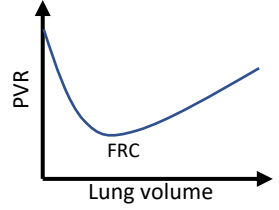
If persistent hypoTN, use a vasopressor that does not increase PAP: vasopressin, epinephrine, NE

**ECMO**

For patients with persistent shock despite thrombolysis; consider VA ECMO

**Optimize oxygenation**

Keep SpO2 > 90% w/ supp O2. Avoid intubation if possible. If intubated; avoid over distension (keep Pplat <30); consider low TV (6-8 cc/kg)



**Optimize ventilation**

Acidosis will increase PVR. Adjust ventilation to correct

