Non-High Risk Pulmonary Embolism

Confirmed or suspected pulmonary embolism (PE) without cardiac arrest, shock, or hypotension

**Treatment**
- Immediate anticoagulation if no contraindication
  - Low molecular weight heparin, unfractionated heparin or novel oral anticoagulant (NOAC)
  - NOAC preferred for low risk PE (see below) in most cases
  - Low molecular weight heparin suggested over unfractionated heparin for most patients
  - Unfractionated heparin if renal dysfunction (CrCl < 30) or weight > 150 kg
  - NOAC contraindicated if renal dysfunction (CrCl < 30) or INR raised due to liver disease
  - Argatroban or bivalrudin if suspected or confirmed heparin-induced thrombocytopenia

**Risk Stratification**
- Calculate Simplified Pulmonary Embolism Severity Index (sPESI)
- Patients with sPESI=0 are low risk, with 0.6-1.1% 30 day mortality
- Consider additional risk stratification using biochemical markers
  - If sPESI=0, biomarkers may be obtained at the discretion of the clinician but are not required
  - If sPESI>0 or hospital admission planned, obtain BNP and troponin
- Consider bedside ultrasound to assist in evaluation
- Hyponatremia predicts mortality and readmission, consider biomarkers and hospital admission if Na<135
- Formal echo obtained as inpatient if BNP/troponin elevated

**Low Risk PE (Mortality 1%)**
- Same-day initiation of NOAC (or heparin and vitamin K antagonist if contraindication exists)
- Consider observation in CDU under low-risk PE protocol or discharge home for patients with sPESI=0 and, if obtained, negative biomarkers
- Hospital admission for patients with sPESI>0 or thought to be inappropriate for CDU or discharge
  - Order BNP and troponin for admitted patients.
- Thrombolysis, catheter embolectomy, and surgical embolectomy are not recommended
- Can consider clinical surveillance (weekly bilateral lower extremity ultrasound) as opposed to anticoagulation in subsegmental PE if at low risk for recurrent PE (see below) and mild symptoms

**Intermediate Risk PE (Mortality 3-15%)**
- Routine thrombolysis is not recommended
- Catheter directed or systemic thrombolysis may be considered after evaluating contraindications, if low risk of bleeding complications and clinical evidence of adverse prognosis such as:
  - New hemodynamic instability
  - Worsening hypoxemia
  - Severe RV dysfunction or myocardial necrosis
- Consider placement of IVC filter
- Admit to ICU if thrombolysis administered
- Consider level of care based on clinical picture, hemodynamic stability, anticipated clinical course, physician judgment

**Simplified Pulmonary Embolism Severity Index:**
- Assign 1 point for each of the following:
  - Age > 80
  - Cancer (history or active)
  - Chronic lung or heart disease
  - HR >/= 110 bpm
  - SBP<100 mmHg
  - O2 saturation <90%
- sPESI score=0 : Low risk 30 day mortality 0.6-1.1%
- sPESI score ≥1 : high risk 30 day mortality 9-11%

**Evidence of right heart strain or myocardial necrosis by any studies obtained?**

**Tenecteplase dosing and tips:**
- <60 kg: 30 mg IV once
- 60-69 kg: 35 mg IV once
- 70-79 kg: 40 mg IV once
- 80-89 kg: 45 mg IV once
- >90 kg: 50 mg IV once
  - Administer IV push over 5 seconds
  - Continue heparin gtt during administration
  - Flush IV line with 10 mL saline before and after administration
  - Tenecteplase is not compatible with dextrose.

1. Negative biomarkers have excellent NPV for mortality (NT-proBNP<300 has 100% NPV for adverse outcome in several studies, negative troponins associated with good outcome) however data varies on whether biomarkers improve risk stratification in the patient who is already low-risk by clinical criteria.
2. Right heart strain: echocardiography suggesting RV dysfunction rate ≥ (Increased RV:LV size, RVSP>40mmHg, TAPSE <2.0 cm), RV:LV size >0.9 on CT, elevated BNP, EKG changes (new RBBB, anteroseptal TWI, anteroseptal ST changes). Myocardial injury: elevated troponin
3. Low risk for recurrent PE if not hospitalized/immobilized, no active cancer and do have a reversible risk factor for their PE such as recent surgery