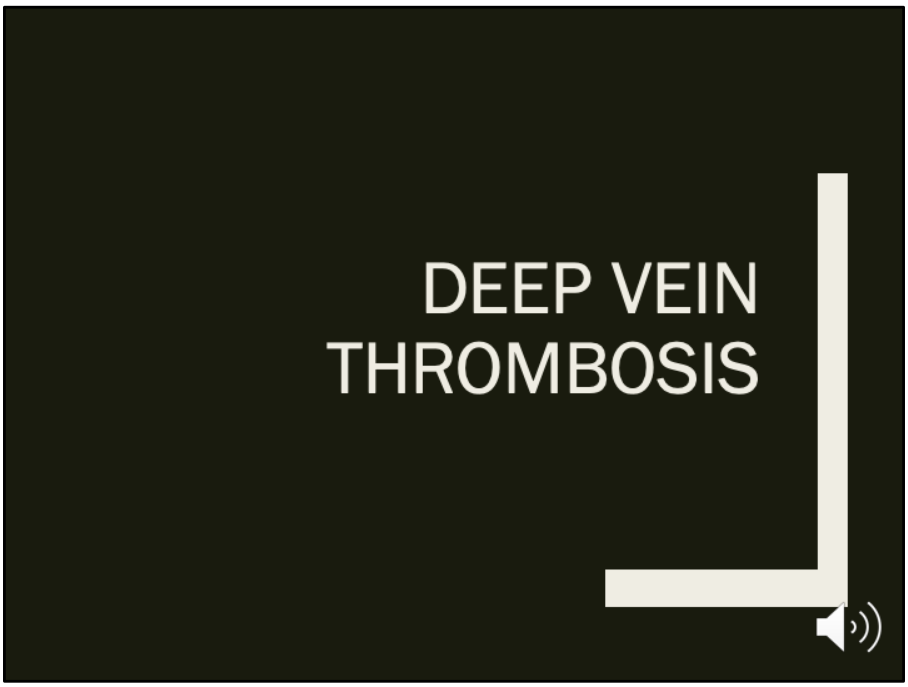

DVT AND PE
FAST 30 SESSION
Bri Kestler, PA-C

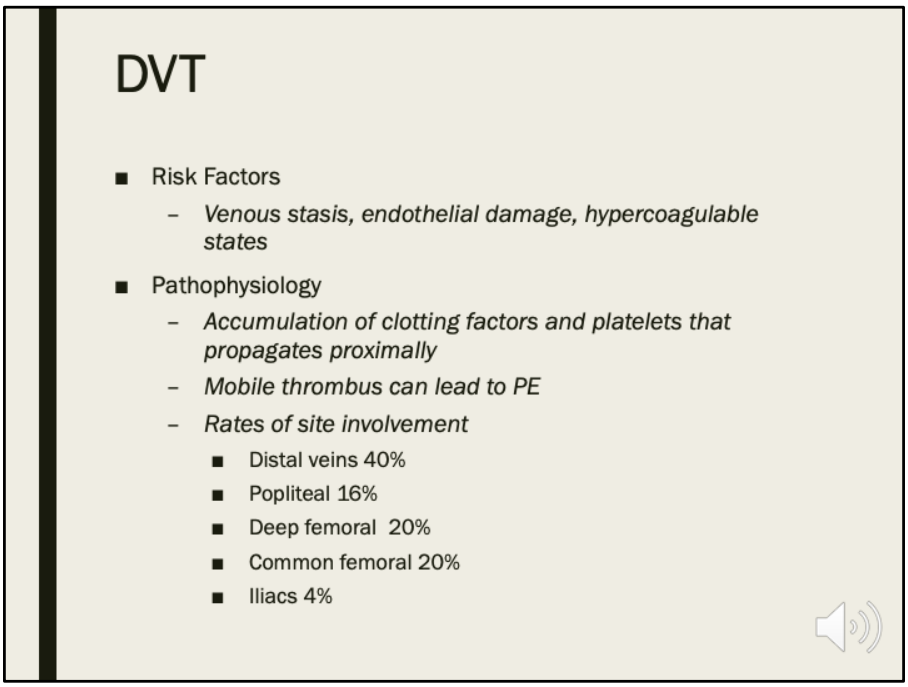
DISCLOSURES

None to report

OBJECTIVES

- Examine the pathogenesis and risk factors of deep vein thrombosis and pulmonary embolisms.
- Use risk stratification scores to guide diagnostic studies and treatment plans in patient's at risk for a deep vein thrombosis and/or pulmonary embolisms.
- Incorporate evidence-based medicine in the diagnosis and treatment of deep vein thrombosis and pulmonary embolisms into clinical practice as applicable.


DEEP VEIN
THROMBOSIS



Venous stasis

Commonly caused by immobility (abdominal or lower extremity surgery and lower extremity casts), obesity, long-haul flights

Endothelial damage

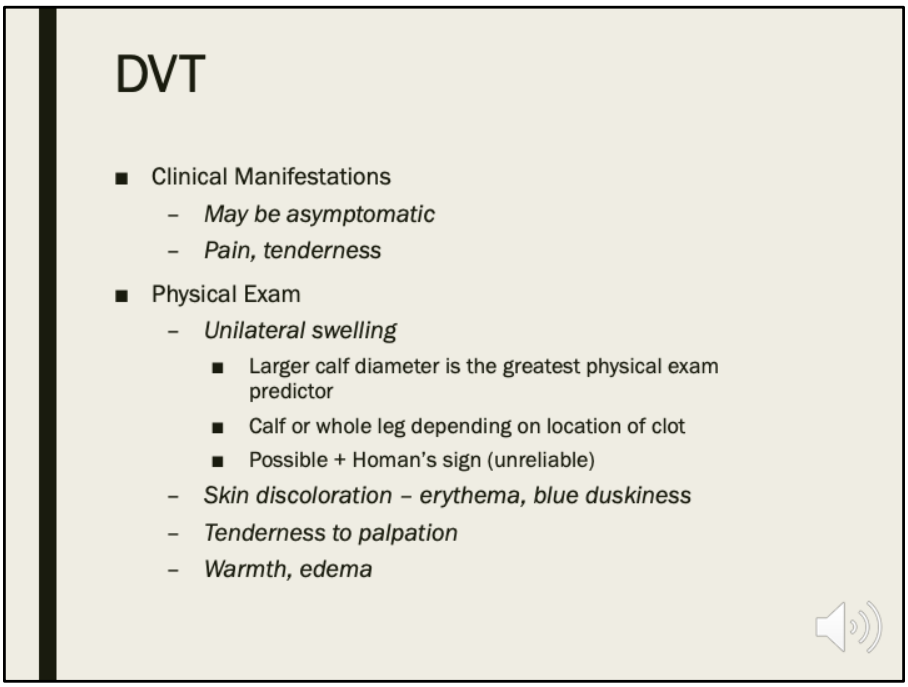
Intravenous catheter placement, chemotherapy, vasculitis. Damage from previous DVT is most common cause of a second DVT

Hypercoagulable state

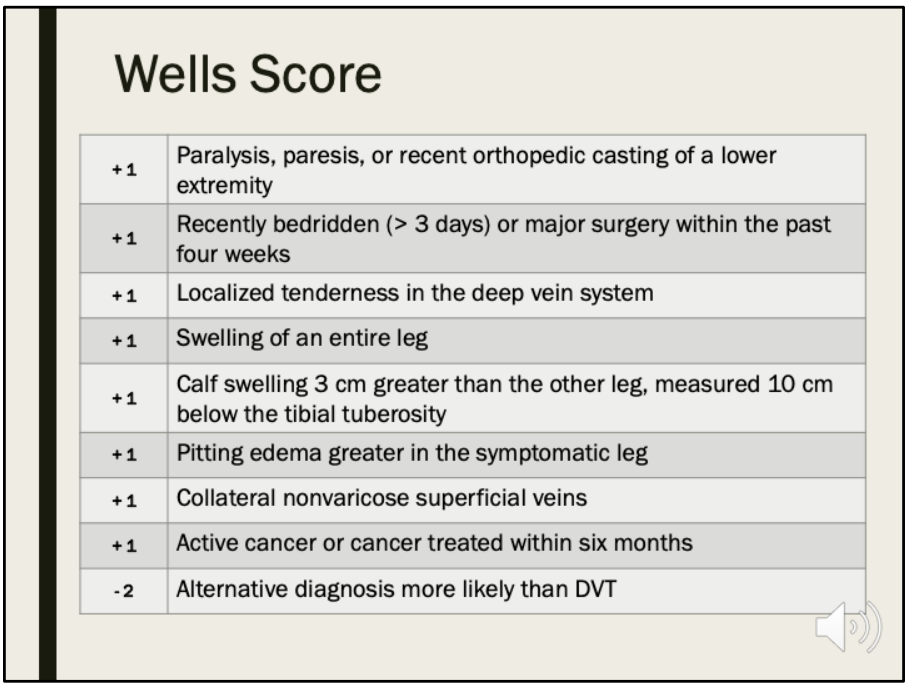
Inherited thrombophilias (factor V leiden mutation, antiphospholipid antibody, protein C or S deficiency), pregnancy, hormone replacement, oral contraceptives

This clot creates an obstruction to venous blood flow and the blood on the proximal side becomes stagnant allowing the clot to lengthen in a proximal direction.

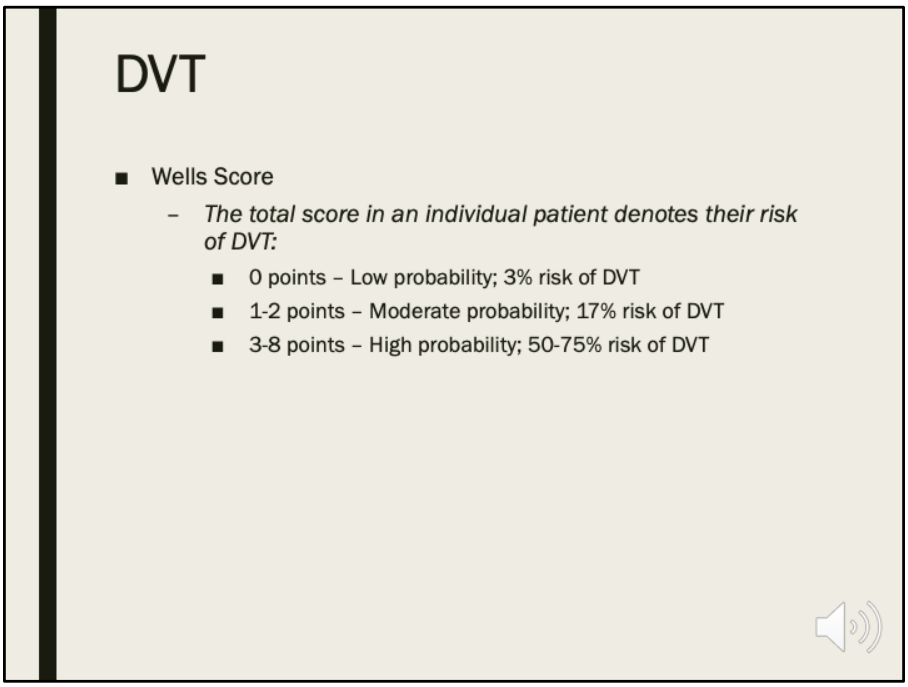
If any portion of this clot that breaks free from the main body can travel to to the right heart and into the pulmonary circulation causing a pulmonary embolism.



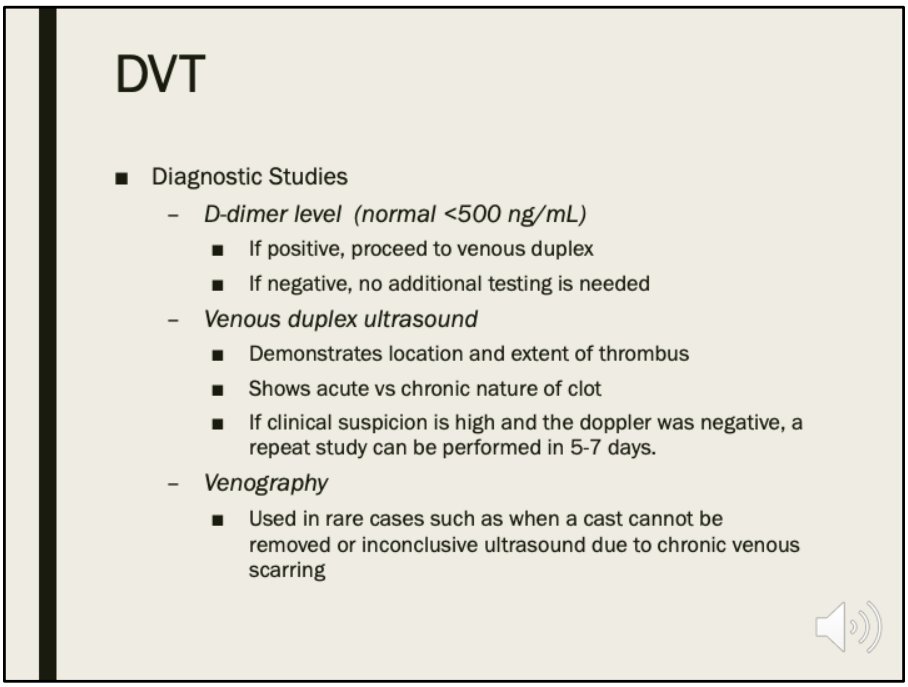
Typically present with non-specific symptoms of leg discomfort, throbbing or aching, or a sensation of warmth
Pain increases with ambulation and weight bearing



If there is a suspicion of a DVT a clinical probability scoring set can be used to determine the patient's risk.

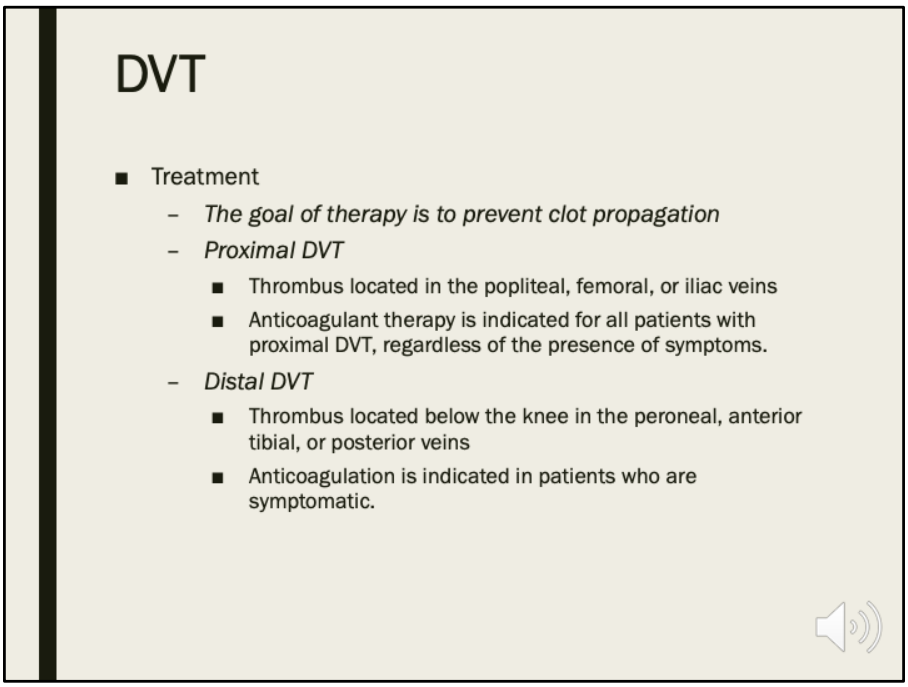


Wells score has a high negative predictive value in patients with a low probability score for DVT (99.7%), but a lower negative predictive value in high risk patients (82%)

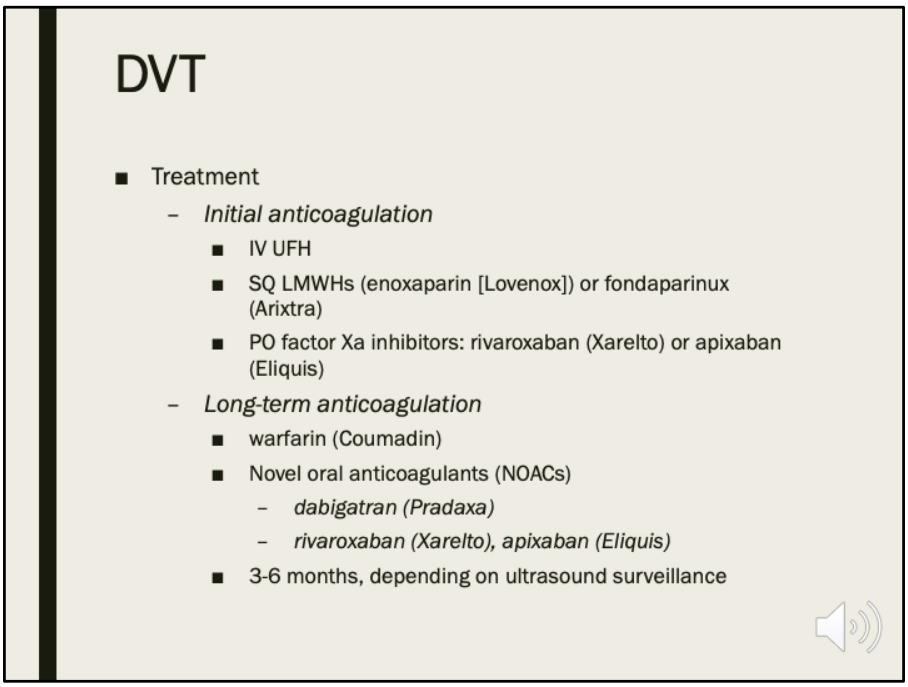


D-dimer is a fibrin degradation product and is used as a surrogate marker of fibrinolysis. It is expected to be elevated during a thrombotic event, but can also be elevated in various conditions, such as pregnancy, postoperative state, and malignancy. Because of this a D-dimer test has a low specificity but a high sensitivity. Used in patient with low probability due to its greater negative predictive value

Ultrasound is the initial study in patients with moderate to high probability, or a secondary test in a low probability patient with an elevated D-dimer.



Distal DVTs are most common in posterior tibial and peroneal veins, with anterior tibial and intramuscular vein DVTs uncommon findings



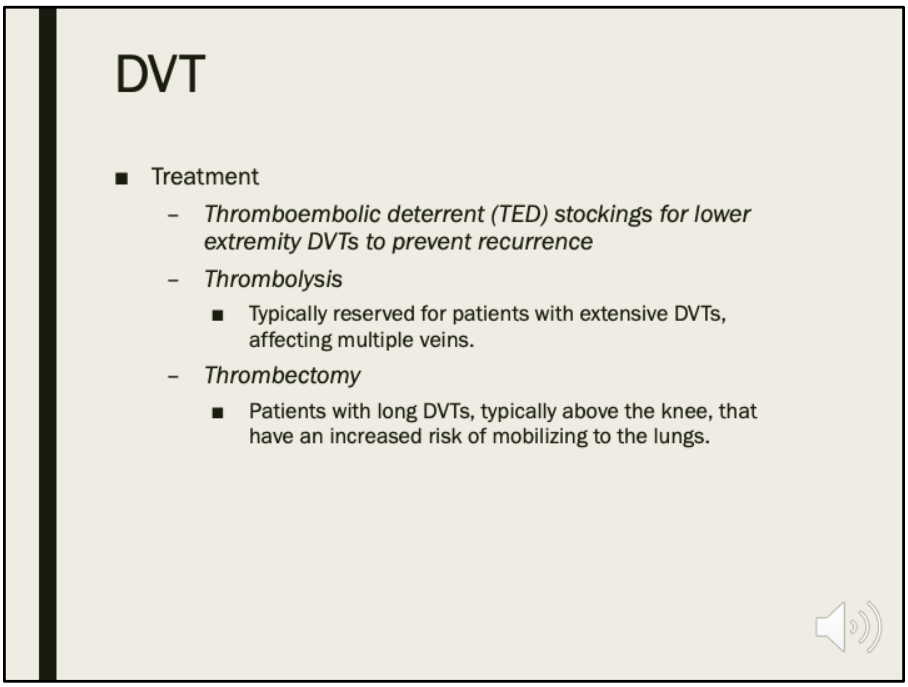
Long-term

Warfarin dose to keep INR between 2-3. Warfarin requires bridge therapy

Bridging therapy for dabigatran should be considered for patients at high risk of thrombosis; low-risk patients do not require bridging

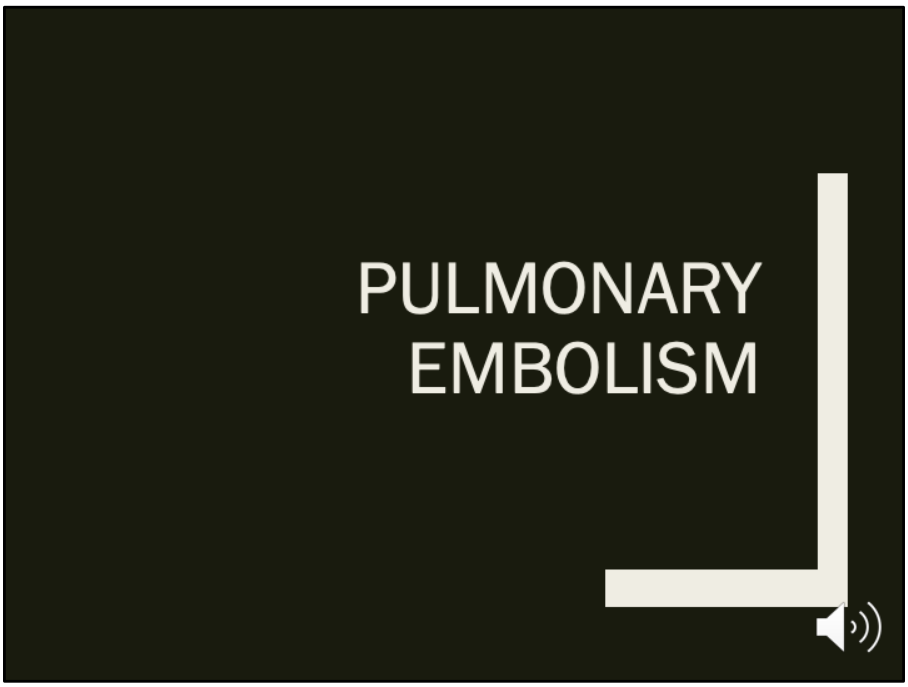
Oxabans do not require bridging therapy

Plan for minimum of 3 months with extension of anticoagulants possible if venous duplex still shows clot burden



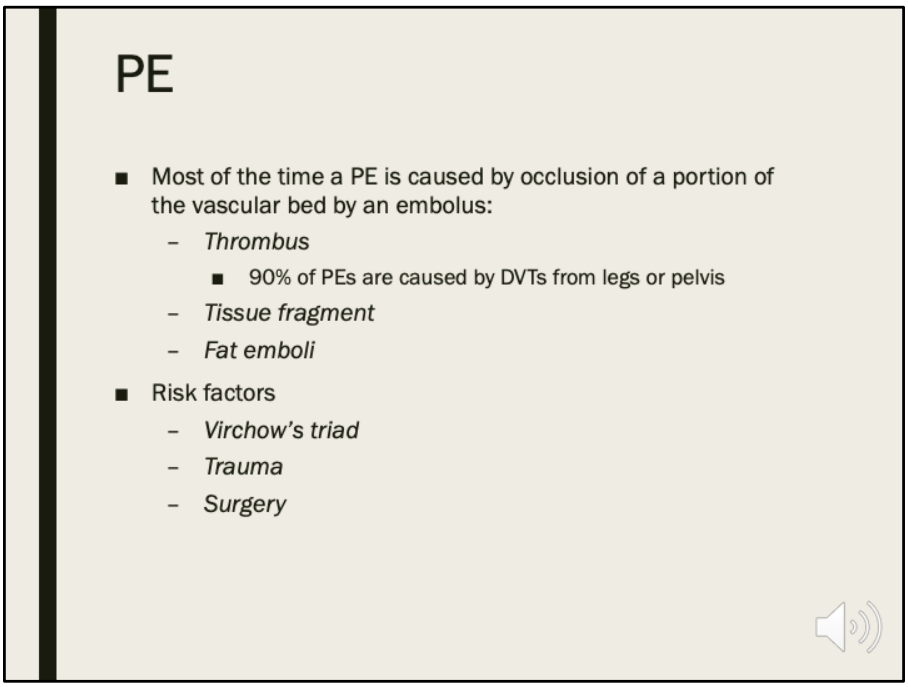
Thrombolytics approved for DVTs include streptokinase, urokinase and tissue plasminogen activator. Thrombolytics are usually introduced via local IV or catheter directed infusion can be performed by an interventional radiologist.

Thrombectomy – vein is accessed proximal to the DVT and fogarty catheters are passed through the thrombus into the distal vein. When the fogarty catheter is removed the clot comes with it and can be removed from the vein.

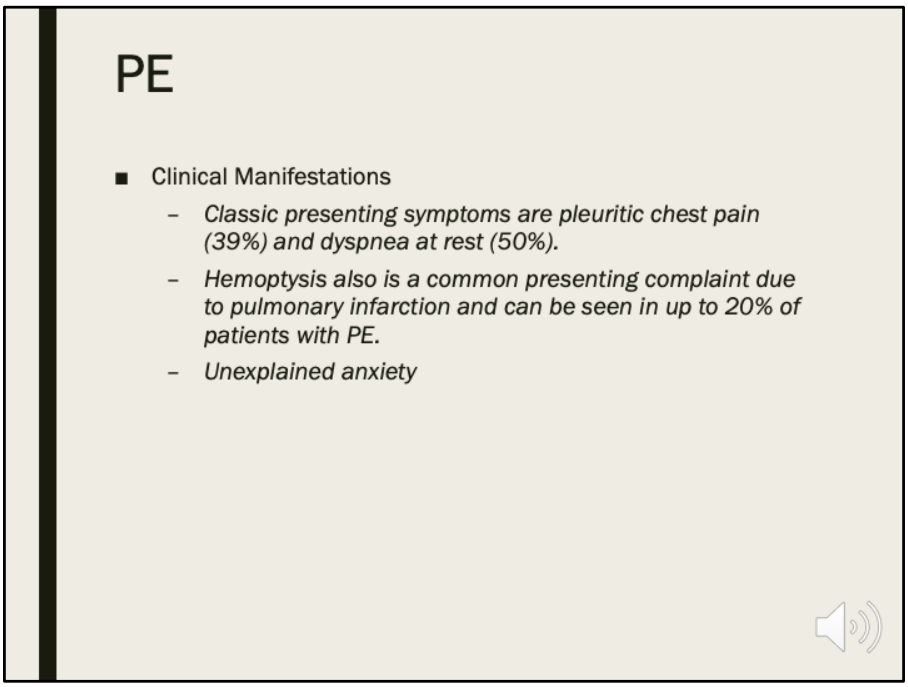

PULMONARY
EMBOLISM

PE

- Pathophysiology
  - *Blood flow through the lungs can be disrupted by several disorders that result in occlusion of the vessels, an increase in pulmonary vascular resistance, or destruction of the vascular bed.*
  - *Widespread vasoconstriction, due to release of neurohumoral substances, further impedes blood flow to the lungs.*
  - *The effect of the embolus depends on the extent of pulmonary blood flow obstruction, the size of the affected vessels, and the nature of the embolus.*
  - *Results can vary between minimal functional significance to life threatening changes in ventilation-perfusion ratios.*



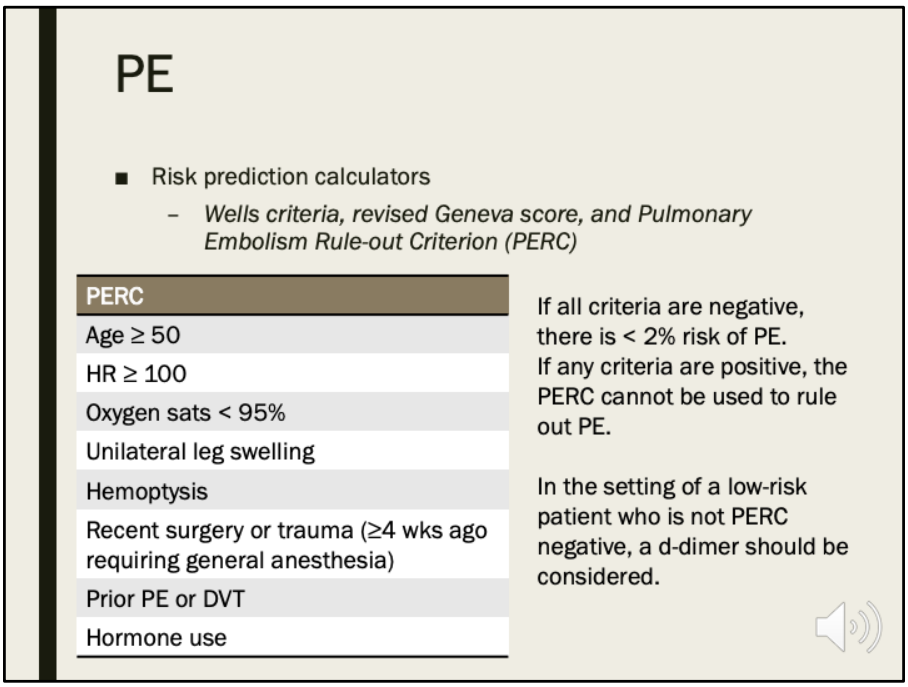
90% of PEs originate from DVTs of pelvic or lower extremity veins, and approximately 50% of DVTs may lead to a silent PE.
Trauma – pulmonary contusions, high impact trauma, trauma to the pulmonary vessels via indwelling catheters



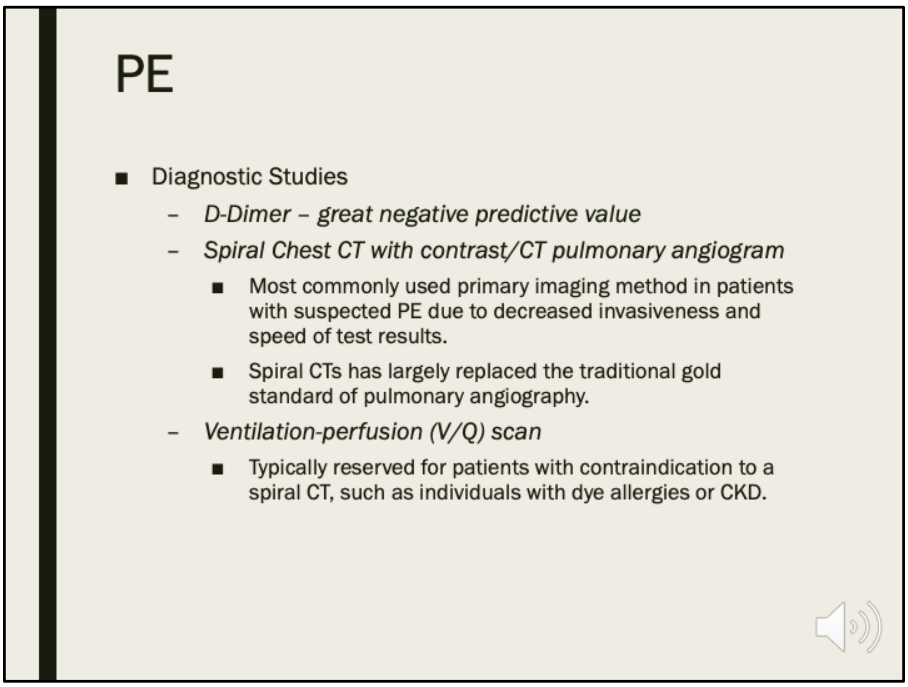
Diagnosis of PE can be challenging because symptoms are nonspecific.

PE

- Physical Exam
  - *Tachycardia, tachypnea and/or hypoxia with a new or increasing oxygen requirement from baseline*
  - *Lung sounds are often unremarkable though the patient may appear to be in respiratory distress*
  - *Low-grade fever is less common*
  - *Right ventricular dysfunction*
    - Hypotension and changes associated with shock
    - Elevated jugular venous pressure with a hepatojugular reflex
    - Pleural friction rub, RV heave, or a loud P2 may be noted if there is significant right heart failure



Each aims to provide an objective method for estimating pretest probability of having a PE into low, intermediate, and high categories.
Of these prediction calculators, the Wells criteria has been most extensively studied and well validated. Prevalence of PE is only 1.3% in patients determined to be in the low-risk category based on Wells score.
The PERC has 8 criterion for patient consideration.



D-dimer

In combination with a low pretest probability for PE, a normal D-dimer has been shown to rule out PE due to its high sensitivity (80%–100%) and negative predictive value up to 99%.

Spiral CT

Single detector spiral CT has a sensitivity of ~85–90% and a specificity between 88–95%.

Even when it is negative, it can be helpful in identifying other etiologies responsible for hypoxic respiratory failure, such as interstitial lung disease, pneumonia, or effusion.

When spiral CTs was compared with conventional pulmonary angiography in a meta-analysis, the rate of venous thromboembolism diagnosis after a negative spiral CT was no different from that of pulmonary angiography.

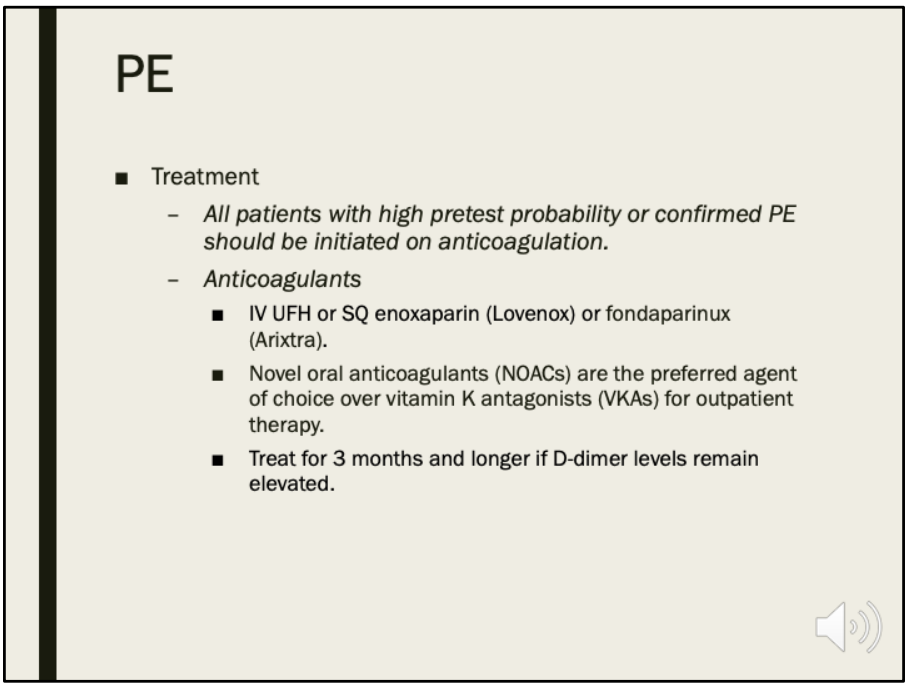
Limitations of the method include a decreased sensitivity for the detection of small isolated clots in the peripheral pulmonary arterial bed, and a potentially reduced image quality in patients with coexistent cardiopulmonary disorders.

V/Q scan

High sensitivity and high specificity. V/Q scan is more sensitive in diagnosing chronic PE than spiral CT(97.4% vs 51%).

PE

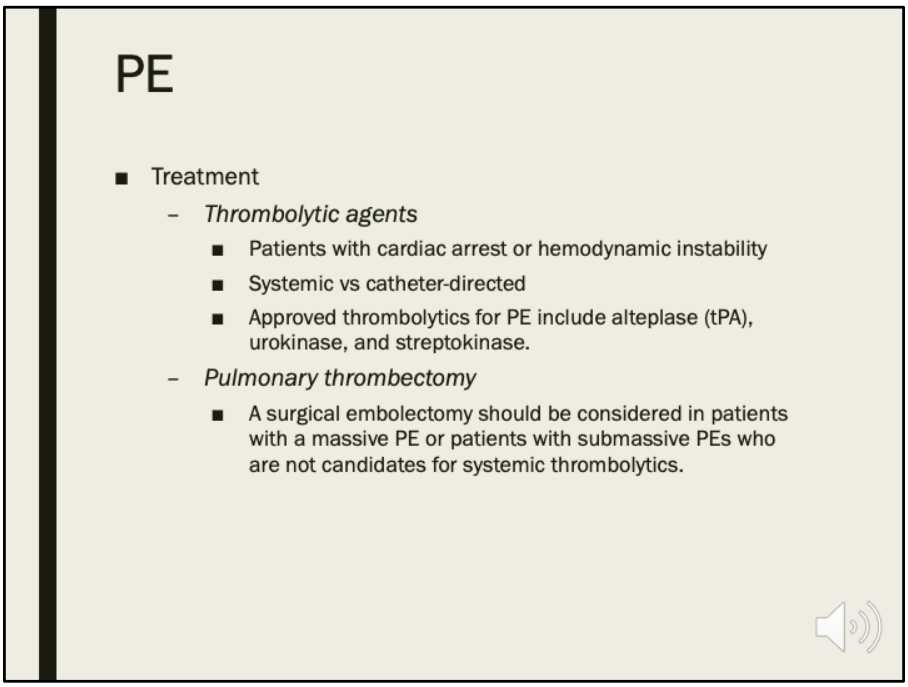
- Classifications
  - *American Heart Association (AHA) and American College of Chest Physicians (ACCP)*
    - Massive PE is persistent hypotension of SBP < 90 mm Hg lasting more than 15 minutes or requiring inotropic support, pulselessness, or bradycardia less than 40 beats per minutes.
    - Submassive PE is a PE without systemic hypotension (SBP >90 mm Hg) but with RV dysfunction. RV dysfunction is based on either imaging (spiral CT or transthoracic echocardiogram) or elevated biomarkers (BNP or troponin).
    - Low-risk PE is an acute PE without hemodynamic instability and without RV dysfunction.



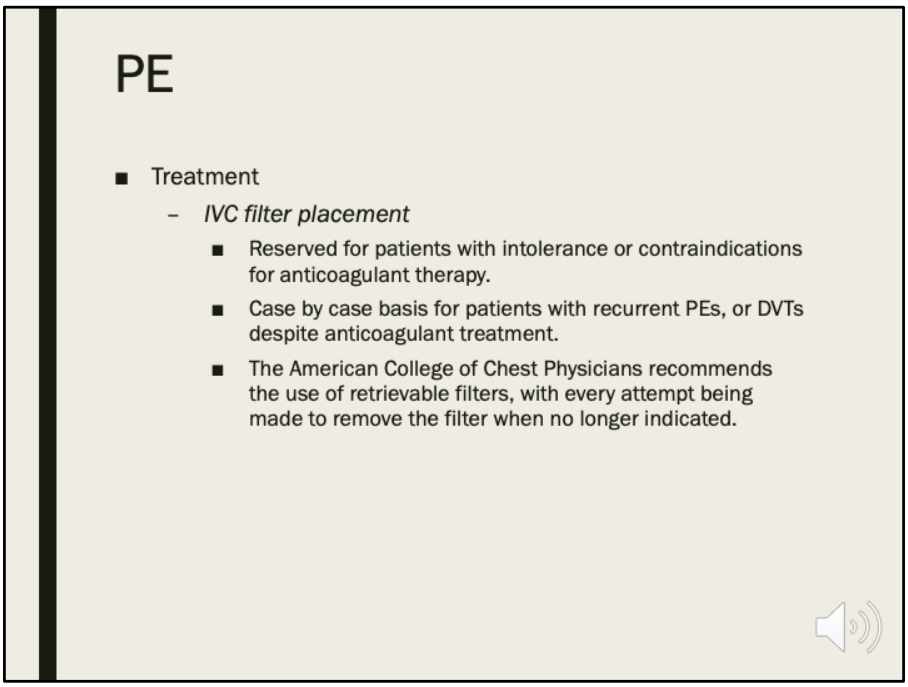
Empiric early anticoagulation has been associated with decreased mortality for patients with acute PE.
When untreated, VTE can have a mortality up to 25% but decreases to 1% to 5% with treatment.
PEs accounts for approximately 5% to 10% of deaths in hospitalized patients.

Anticoagulanta

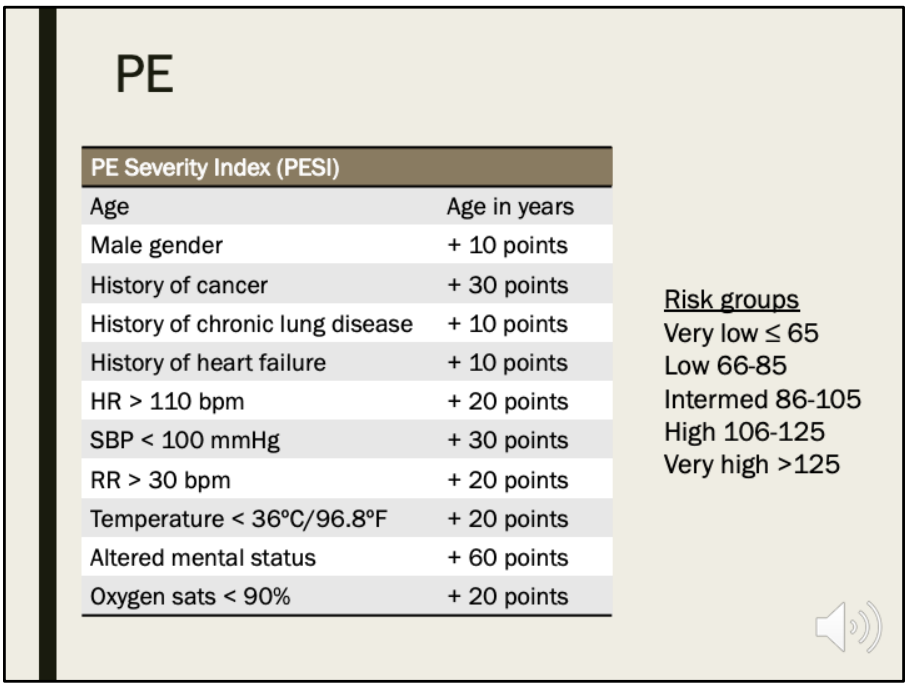
Initial meds - Studies have shown there is no difference between using either of these, but LMWH is favored due to ease of monitoring.



For patients who present with cardiac arrest or hemodynamic instability, it is widely accepted that reperfusion strategies should be initiated.
Systemic thrombolysis, however, is not without risk; studies show a 20% risk of major bleeding events and a 3% risk of intracranial hemorrhage after receiving thrombolytics.



Studies have shown limited benefit of IVC filters in patients with acute PE or DVT to prevent future recurrent VTE events.



The PE severity index (PESI) is commonly use to predict short-term morbidity and mortality with PE.
These scores were derived from 11 patient factors associated with a 30-day mortality.
Patients are risk stratified and management strategies are tailored to the risks of adverse outcomes.
The PESI has a high sensitivity and negative predictive value of 95-99% for predicting short-term outcomes.
Multiple studies have demonstrated that patients with low PESI scores had mortality less than 1% compared with high PESI group patients who had a 24% 30-day mortality.

If the patient is considered very low (≤ 65) or low risk (66-85) by the PESI score. They have an overall low risk of mortality or severe morbidity and OP management can be considered if clinically appropriate and social factors allow for it.

If the patient is considered intermediate (86-105), high (106-125) or very high risk (>125) by the PESI than higher levels of care, such as ICU placement, should be considered due to overall high risk of mortality and severe morbidity.

RESOURCES

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RESOURCES

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