

Pulmonary Embolism Diagnostics:
Removing the Guesswork
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Financial Disclosures



Battle Plan

- Epidemiology
- Pretest Probability
- ACEP 2018 Guideline
- YEARS

Why it Matters:

Rates have **DOUBLED** in 10 years

Hypercoagulability

Risk Factors for VTE

- | | |
|-------------------------|------------|
| Age | Obesity |
| Pregnancy | Cancers |
| Inflammatory Conditions | Inherited |
| Recent Surgery/Trauma | Immobility |
| Indwelling Catheters | Smoking |
| Travel | CHF |
| Stroke | Estrogen |

Pleuritic Pain

Syncope

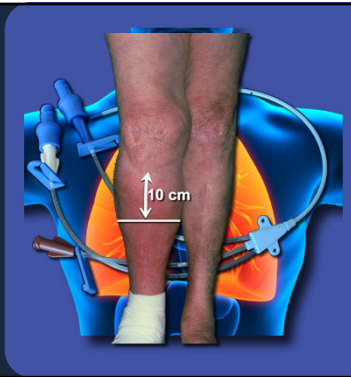
Hemoptysis
Dyspnea

Presenting Symptoms

Presenting Vitals



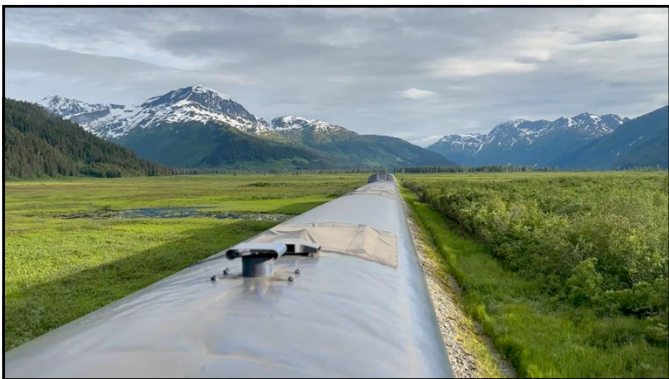
Presenting Exam









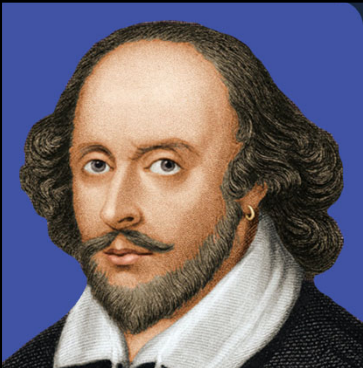


What is our obligation to the patient?

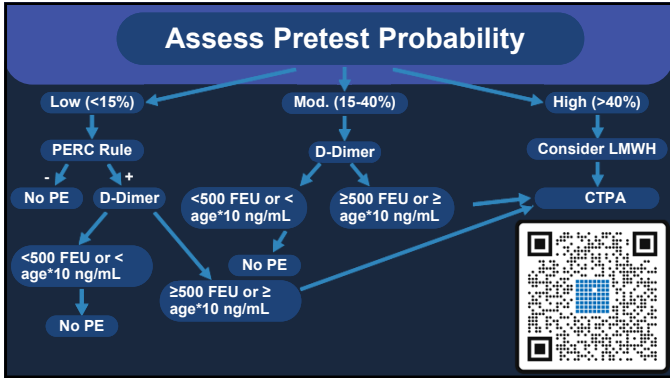
Safe short term care/disposition

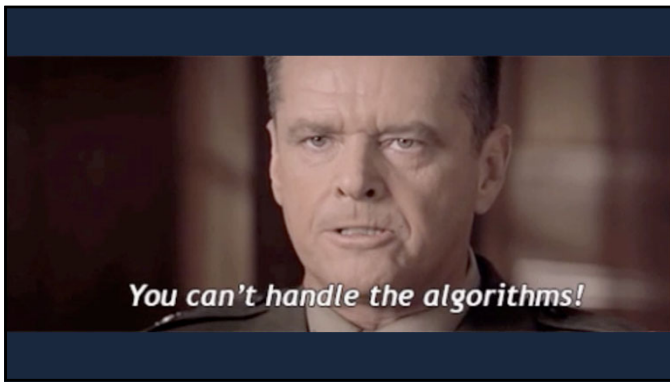
What is an acceptable miss rate?

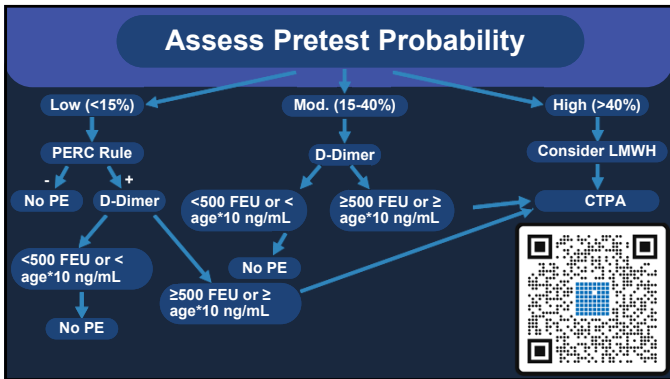
SSC of the ISTH: 2%

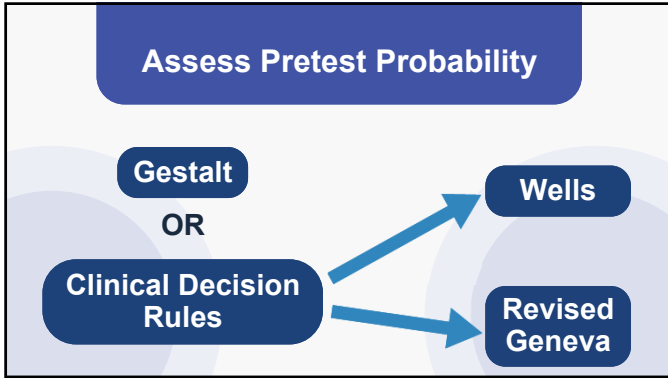


**To Scan...
...or Not to Scan?**

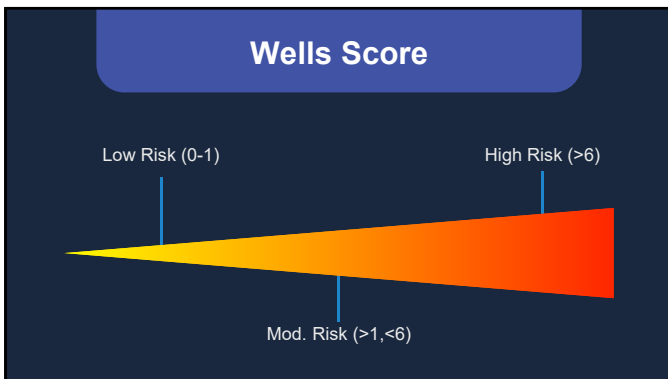


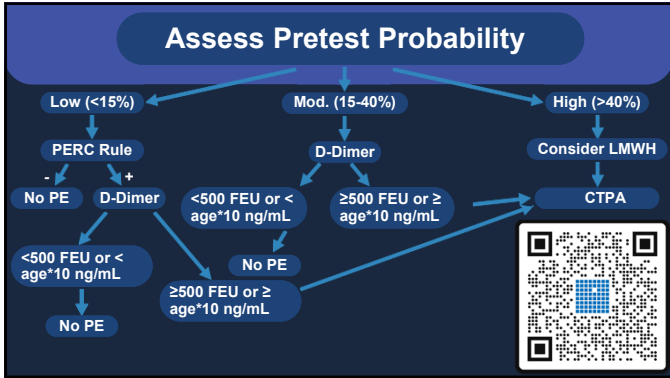






Wells Score		
Clinical Signs/Symptoms of DVT	NO	YES +3
PE is #1 Dx or Equally Likely	NO	YES +3
Heart Rate is >100	NO	YES +1.5
Immob. x 72 Hr/Surgery 4 Wks	NO	YES +1.5
Prior PE or DVT	NO	YES +1.5
Hemoptysis	NO	YES +1
Malignancy (6 months)	NO	YES +1

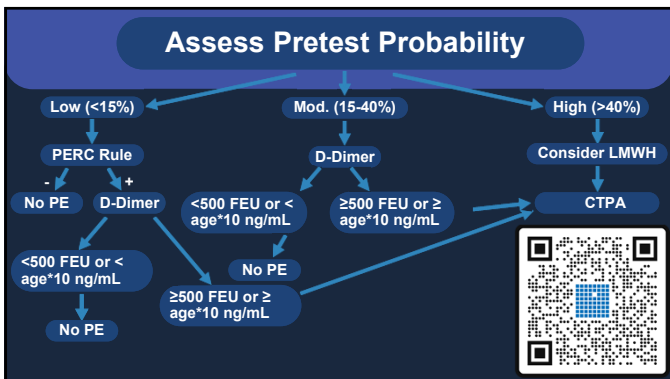




The Low Risk Patient

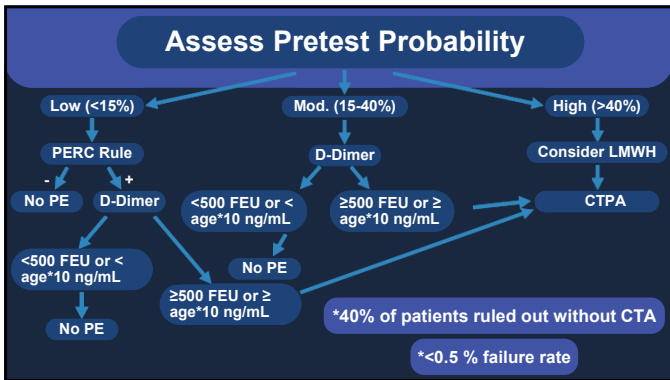
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“For patients who are at **low risk** for acute PE, use the Pulmonary Embolism Rule-out Criteria (PERC) to exclude the diagnosis without further diagnostic testing”



PERC Rule

Age ≥ 50 Years	NO	YES +1
HR ≥ 100	NO	YES +1
Sat on Room Air < 95%	NO	YES +1
Unilateral Leg Swelling	NO	YES +1
Hemoptysis	NO	YES +1
Recent Surgery/Trauma (4 Wks)	NO	YES +1
Prior PE or DVT	NO	YES +1
Hormone Use	NO	YES +1




D-Dimer

→ D-Dimer Proteins

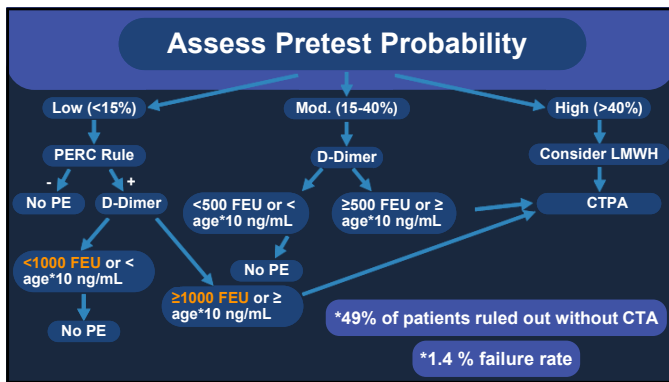
POTENTIAL FALSE POSITIVES

Age >70	Liver Disease
Pregnancy	Rheumatoid Arthritis
Active Malignancy	Infection
Surgery in Last 7 Days	Trauma

Risk Adjusted D-Dimer



Units	FEU	DDU
Standard Cutoff	500	250
Low Risk Cutoff	1000	500
Mod Risk Cutoff	500	250




PEGeD Validation

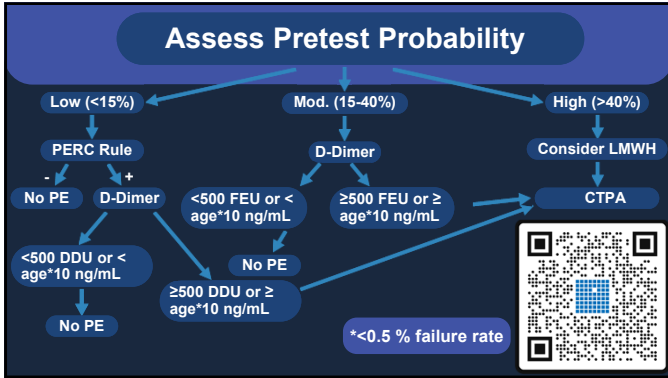
Conducted in Europe

PE Prevalence >20%

3 month f/u



*Reported 8.7% failure rate of dimer adjustment



The Low/Moderate Risk Patient

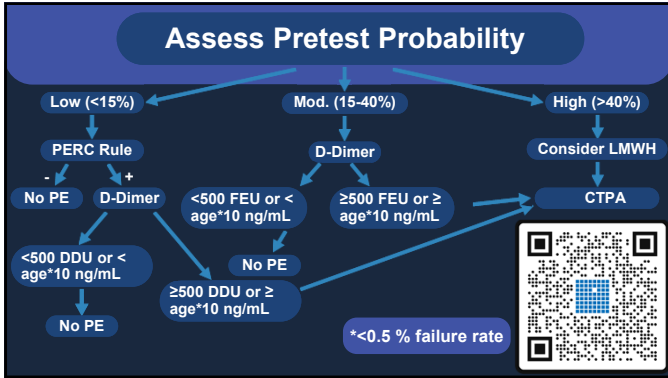
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"In patients older than 50 years deemed to be **low or intermediate risk** for acute PE, clinicians may use a negative **age-adjusted D-dimer*** result to exclude the diagnosis of PE.

*For highly sensitive D-dimer assays using fibrin equivalent units (FEU) use a cutoff of age×10 µg/L; for highly sensitive D-dimer assays using D-dimer units (DDU), use a cutoff of age×5 µg/L"

Age Adjusted D-Dimer

Units	FEU	DDU
Cutoff	500	250
Age Adjusted	X 10	X 5
80 YO Patient	800	400



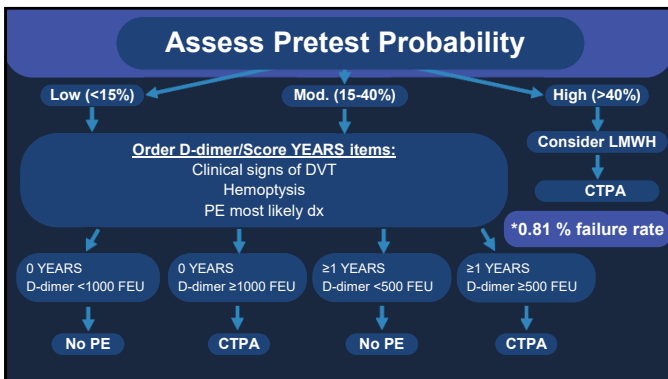
What about YEARS?

Clinical signs of DVT


PE Most Likely Dx

Hemoptysis

If acute PE is suspected with low or moderate probability, order D-dimer testing and score the presence of the three years items




Limitations of YEARS

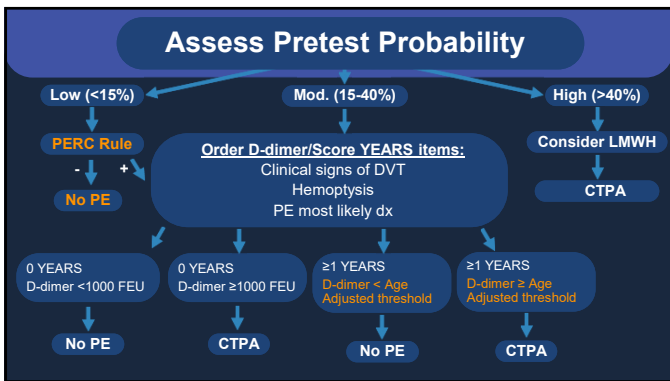


- D-Dimer results prior to YEARS assessment
- Dutch population
- No control for comparison


YEARS + Age Adjusted D-Dimer



- Multicenter Study
- Control Group
- 1,400 Patients
- Failure rate was <0.15%
- 60% no CTA



Limitations of YEARS + Age Adjusted Dimer



- Mostly French patients
- 2.6% missing primary outcome data
- Complexity of approach

Takeaways

- Assess pretest probability
- PERC/Age Adjusted Dimer
- ACEP 2018 Guideline
- YEARS (more to come)

References

- <https://pubmed.ncbi.nlm.nih.gov/34874418/>
- <https://pubmed.ncbi.nlm.nih.gov/28549662/>
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