

# E•QUAL | EMERGENCY QUALITY NETWORK

## Clinical Policy: Suspected Acute Venous Thromboembolic Disease

# Presenters



Stephen J. Wolf, MD

# Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients Presenting to the Emergency Department With Suspected Acute Venous Thromboembolic Disease



From the American College of Emergency Physicians Clinical Policies Subcommittee (Writing Committee) on Thromboembolic Disease:

Stephen J. Wolf, MD (Subcommittee Chair; Committee Co-Chair)

Sigrid A. Hahn, MD, MPH

Lauren M. Nentwich, MD

Ali S. Raja, MD, MBA, MPH

Scott M. Silvers, MD

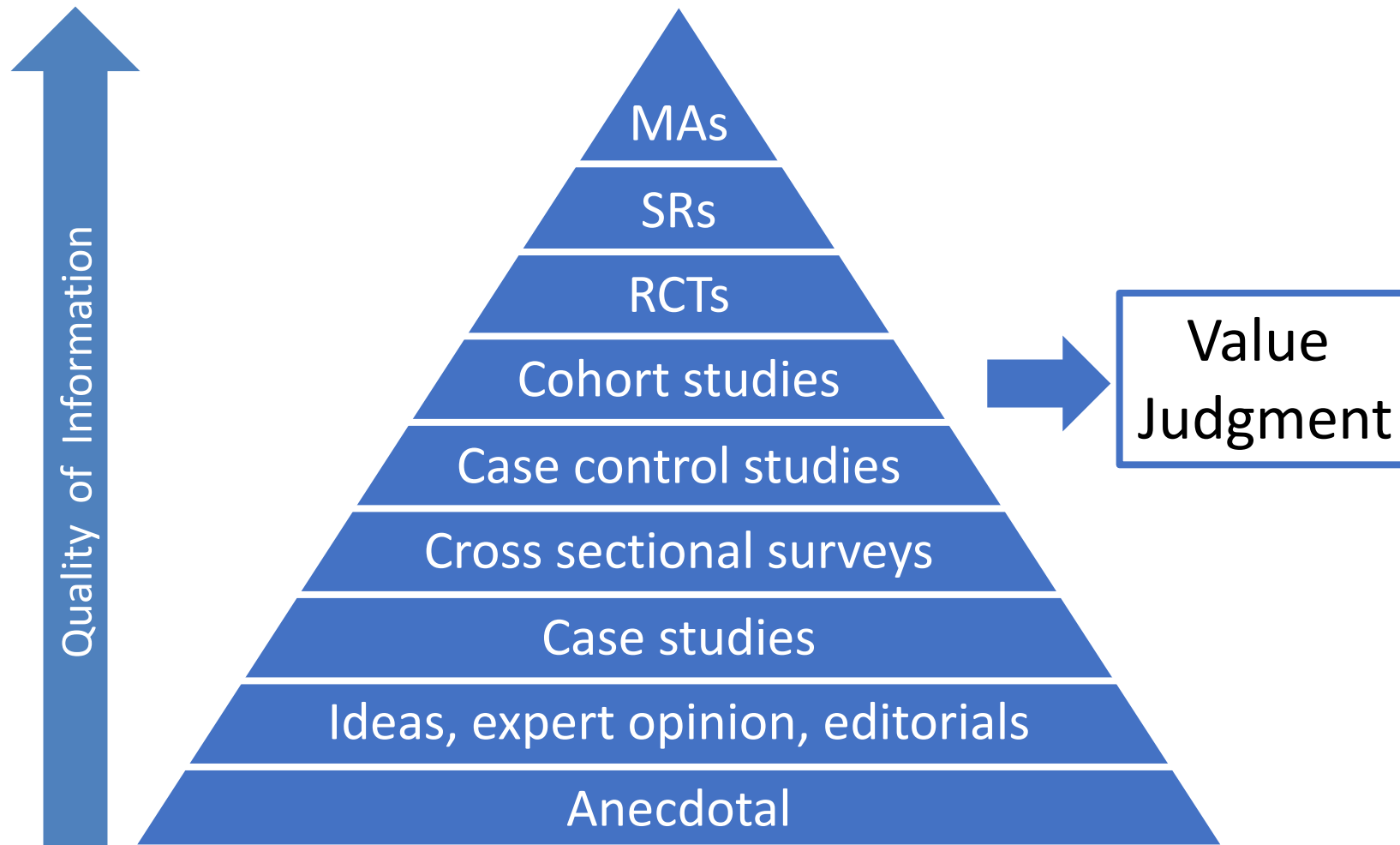
Michael D. Brown, MD, MSc (Committee Co-Chair)



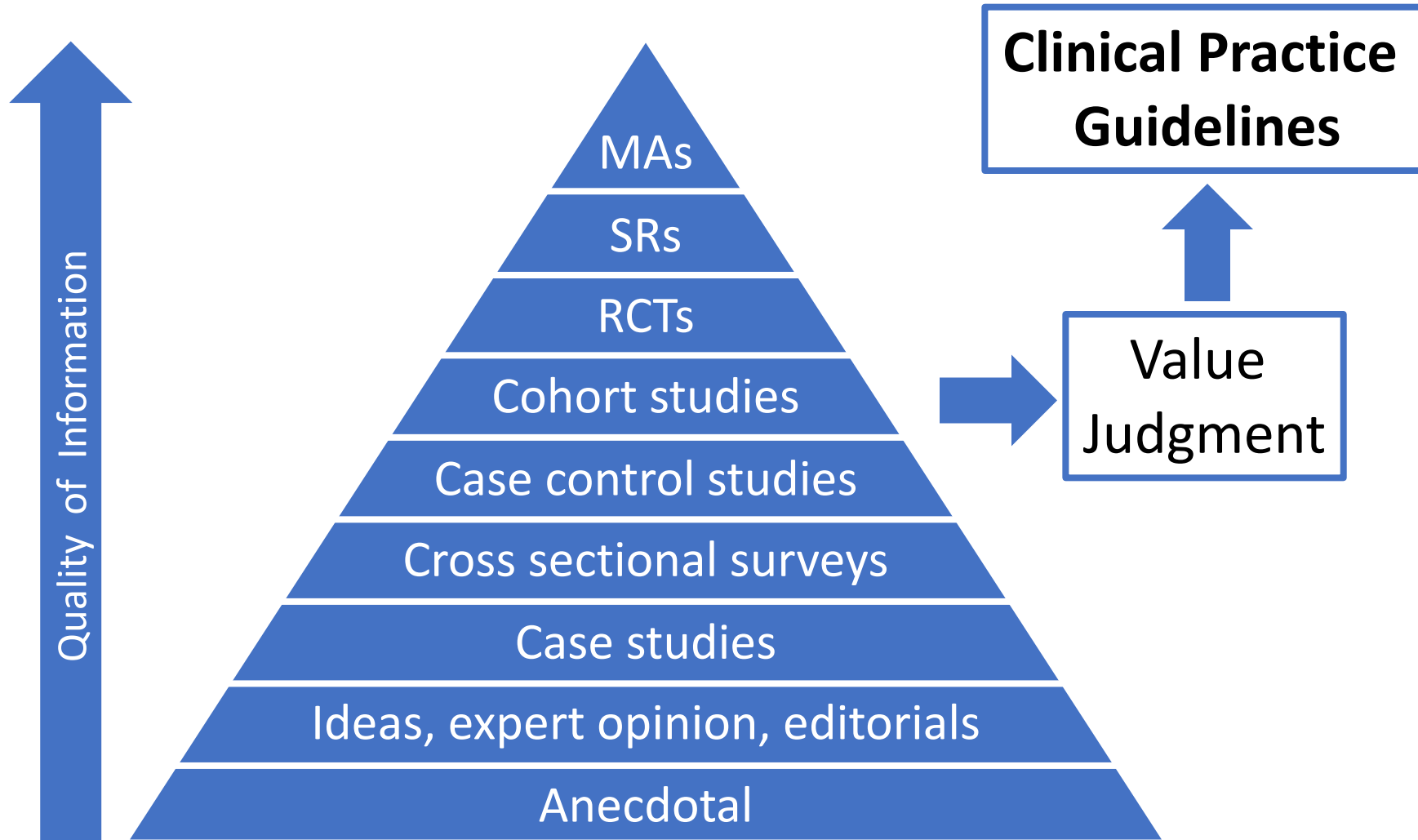
ADVANCING EMERGENCY CARE 

**Stephen J Wolf, MD, FACEP**  
**Department of Emergency Medicine**  
**Denver Health Medical Center**  
**University of Colorado School of Medicine**

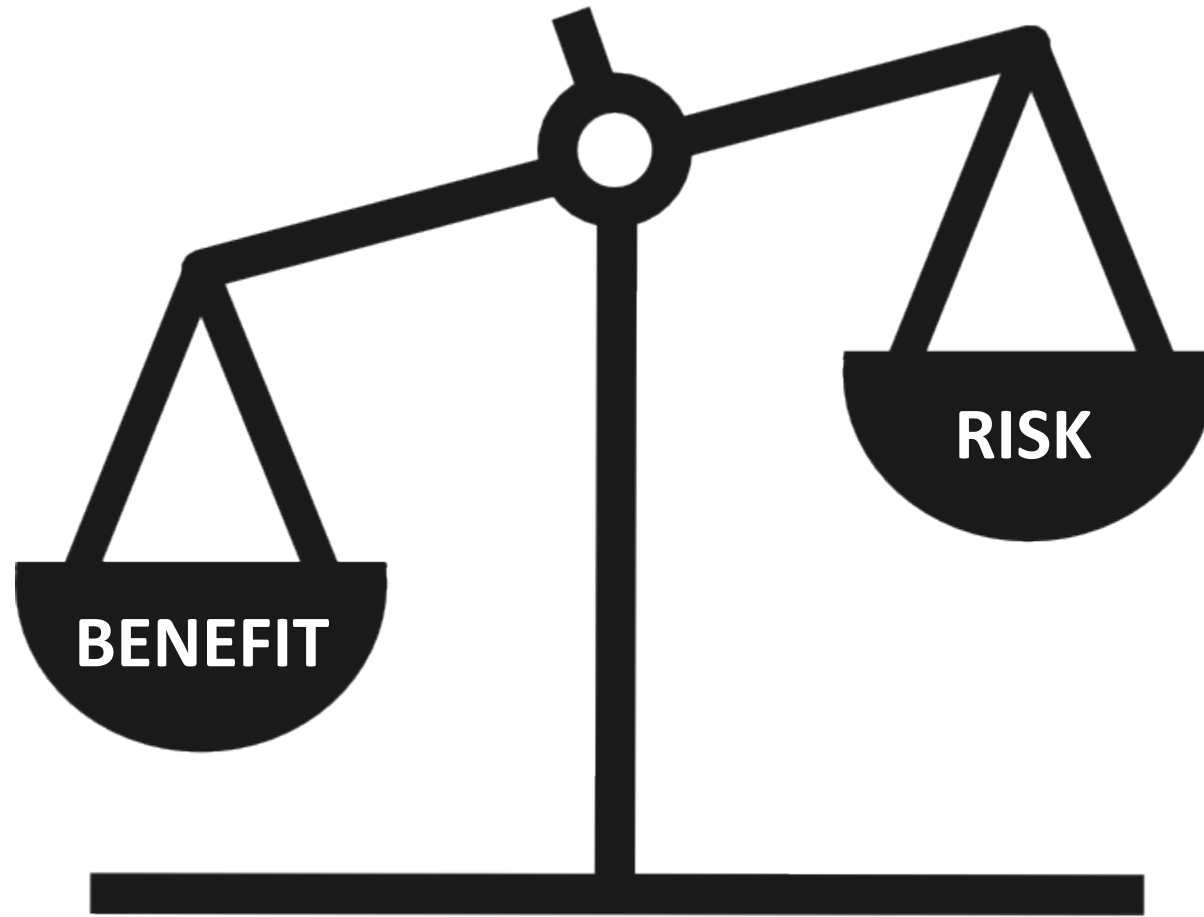
# Hierarchy of Evidence



# Value-Based Evidence



# Clinical Policies Committee



# IOM Standards for Trustworthiness

Establishing Transparency

Management of Conflicts of Interest

Group Composition

Systematic Review Intersection

Evidence Foundations for and Rating Strength of Recommendations

Articulation of Recommendations

External Review

Updating

# ACEP's Process

Topic selection

Subcommittee appointed

Critical questions developed

Literature search & grading

Subcommittee writing

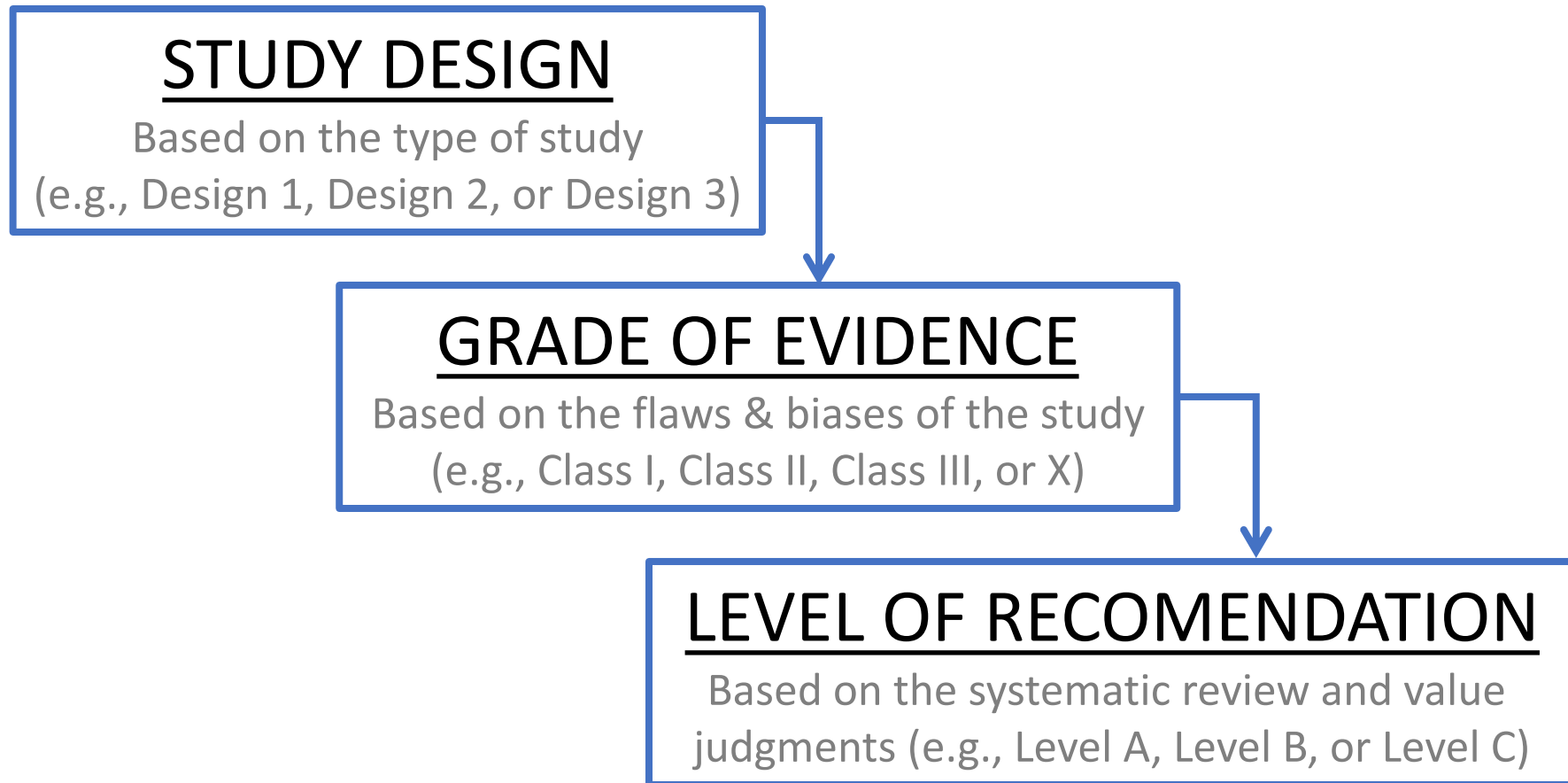
Oversight committee input

Expert review & open comment

Board approval & dissemination



# Getting from Point A to B



How trustworthy are ACEP  
Clinical Policies for imaging  
recommendations?

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[Acep.org/ClinicalPolicies](https://www.acep.org/ClinicalPolicies)

[@ACEPNation](https://twitter.com/ACEPNation)

# Critical Questions: VTE

## Diagnostic Questions

- In adult patients with suspected acute PE, can a clinical prediction rule be used to identify a group of patients at very low risk for the diagnosis of PE for whom no additional diagnostic workup is required?
- In adult patients with low to intermediate pretest probability for acute PE, does a negative age adjusted D-dimer result identify a group of patients at very low risk for the diagnosis of PE for whom no additional diagnostic workup is required?

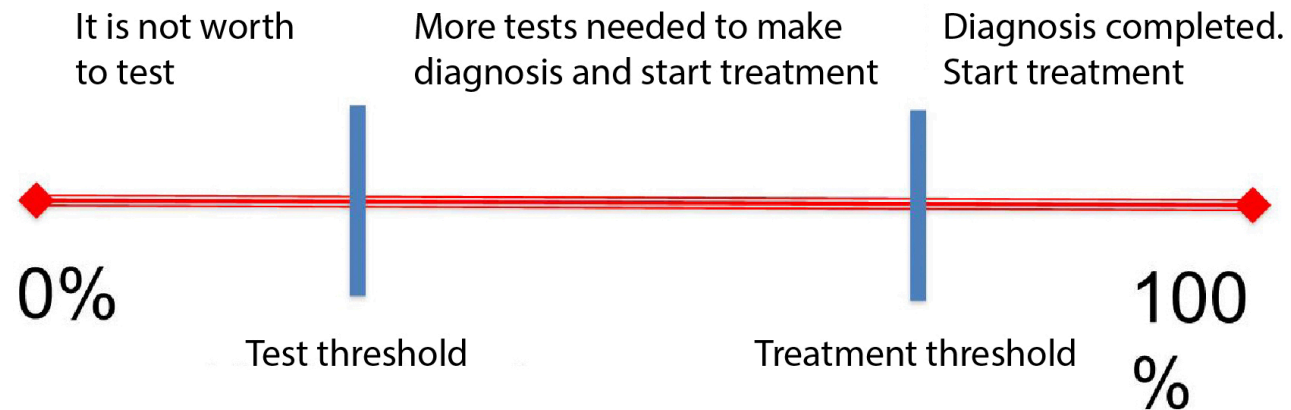
# Critical Questions: VTE

## Management Questions

- In adult patients with subsegmental PE, is it safe to withhold anticoagulation?
- In adult patients diagnosed with acute PE, is initiation of anticoagulation and discharge from the ED safe?
- In adult patients diagnosed with acute lower-extremity DVT who are discharged from the ED, is treatment with a NOAC safe and effective compared with treatment with LMWH and VKA?

# EMB & Stewardship

## Diagnostic Likelihood



## Testing Threshold for VTE

*In consideration of the cost of evaluation, the risk of false positives, and the risk of complications related to testing, studies have supported using a predefined posttest probability threshold of less than 2.0% to exclude the diagnosis of VTE.*

Why 2%? My colleagues always say they want to miss the bad stuff less than 1% of the time



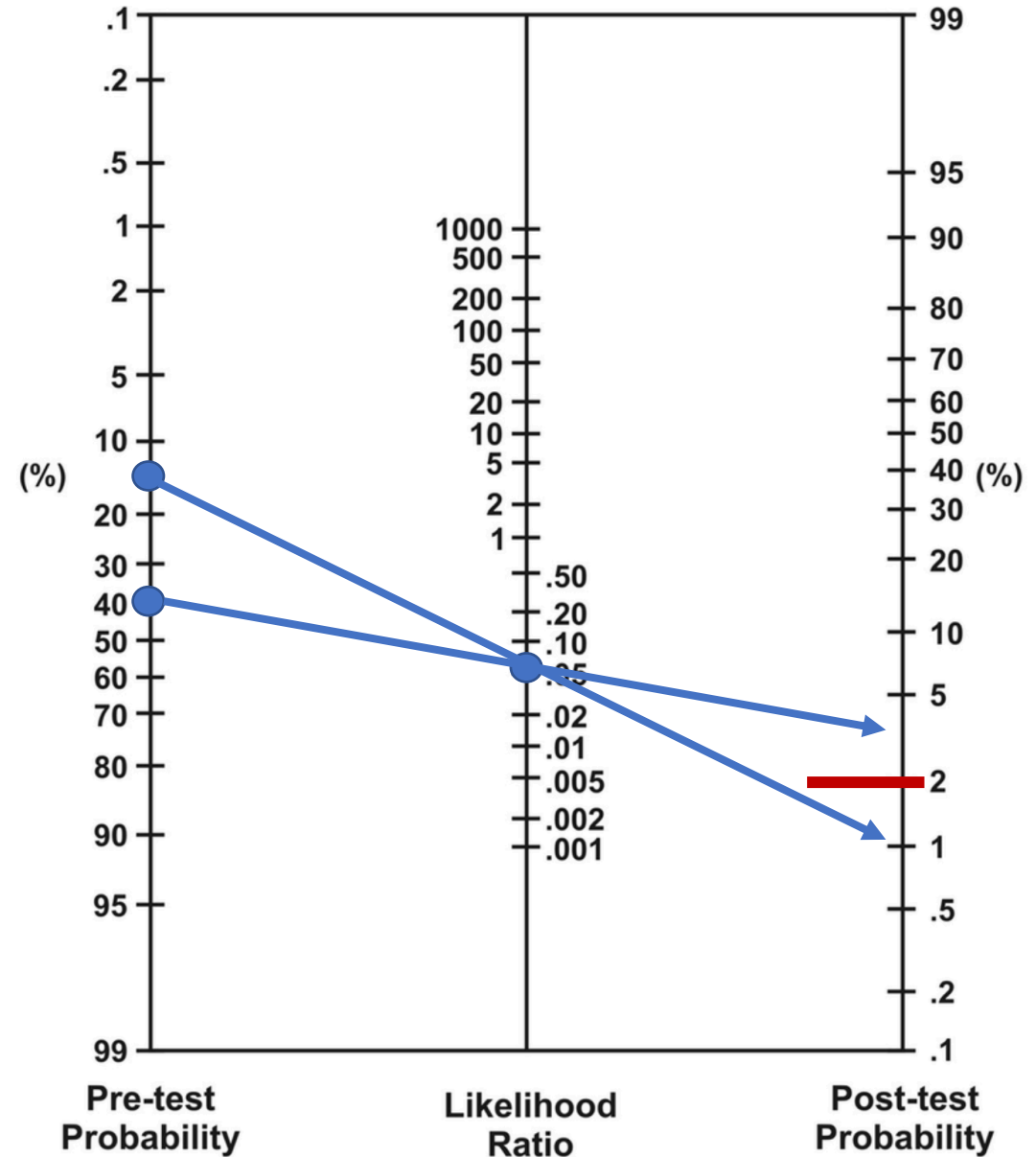
Pretest Probability (PTP)

X

Negative LR



Post-Test Probability  
(Goal < 2%)



# Critical Question

In adult patients with suspected acute PE, can a **clinical prediction rule** be used to identify a group of patients at very low risk for the diagnosis of PE for whom **no additional diagnostic workup** is required?

47 identified > 19 graded

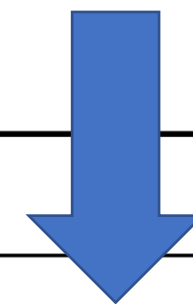
4 Class II, 4 Class III, 11 Class X

# Pulmonary Embolism Rule-out Criteria (PERC)

1. Age < 50 year
2. Pulse Rate < 100 beats/min
3. SaO<sub>2</sub> > 94% (at sea level)
4. No Recent Trauma or Surgery
5. No Unilateral Leg Swelling
6. No Previous PE or DVT
7. No Hormone Use
8. No Hemoptysis

# PERC Performance

Clinical Policy



**Table 1.** PERC performance.

Study Cohorts	Class	Pretest Probability	N	PE (%)	PERC Determination	PERC Performance			
						Sensitivity (95% CI), %	Specificity (95% CI), %	Negative LR (95% CI)	Posttest VTE (%) (95% CI)
<b>Low-Risk Cohorts</b>									
Kline et al <sup>24</sup>	II	Low	1,427	114 (8)	Prospective	96 (90-99)	27 (25-30)	0.16 (0.07-0.38)	1.4 (0.4-3.2)
Kline et al <sup>26</sup>	II	Low	5,425	163 (3)	Prospective	97 (96-99)	22 (21-23)	0.12 (0.07-1.19)	1.3 (0.8-1.9)
Hugli et al <sup>27</sup>	II	Low	587	57 (10)	Retrospective	79 (67-88)	33 (29-37)	0.63 (0.04-1.06)	6.4 (3.7-6.8)
Wolf et al <sup>31</sup>	III	Low	60	1 (2)	Retrospective	100 (25-100)	22 (12-35)	0 (*)	0 (0-24.7)
Penaloza et al <sup>30</sup>	III	Low	399	26 (7)	Retrospective	100 (99-100)	9 (6-11)	0 (*)	0 (0-5)
<b>Undifferentiated-Risk Cohorts</b>									
Kline et al <sup>26</sup>	II	All	8,138	561 (7)	Prospective	96 (94-97)	25 (24-26)	0.17 (0.11-0.25)	1.0 (0.6-1.6)
Hugli et al <sup>27</sup>	II	All	1,675	357 (21)	Retrospective	97 (94-98)	16 (14-18)	0.21 (0.12-0.37)	5.4 (3.1-9.3)
Wolf et al <sup>31</sup>	III	All	120	16 (12)	Retrospective	100 (79-100)	16 (10-24)	0 (*)	0 (0-17.6)
Crichlow et al <sup>29</sup>	III	All	152	18 (12)	Prospective	100 (78-100)	10 (6-17)	0 (*)	0 (0-23.2)
Penaloza et al <sup>30</sup>	III	All	959	286 (30)	Retrospective	99 (97-100)	10 (8-13)	0.13 (0.05-0.36)	5.4 (1.7-12.5)
Bozarth et al <sup>28</sup>	III	All	719	32 (5)	Retrospective	97 (94-100)	12 (10-15)	0.26 (0.04-1.82)	1.2 (0-6.5)

CI, confidence interval; LR, likelihood ratio; PE, pulmonary embolism; PERC, pulmonary embolism rule-out criteria; VTE, venous thromboembolism;

\*Undefined given 100% sensitivity

# Critical Question

In adult patients with suspected acute PE, can a clinical prediction rule be used to identify a group of patients at very low risk for the diagnosis of PE for whom no additional diagnostic workup is required?

## **Level B Recommendation**

*For patients who are at low risk for acute PE, use the PERC to exclude the diagnosis without further diagnostic testing.*

Clinical prediction rules are easy  
to misapply – where do you see  
cracks in the evidence  
translation?

# Critical Question

In adult patients with low to intermediate pretest probability for acute PE, does a negative **age-adjusted D-dimer** result identify a group of patients at very low risk for the diagnosis of PE for whom no additional diagnostic workup is required?

59 identified > 42 graded

3 Class II, 7 Class III, 32 Class X

# Age-Adjusted D-Dimer Goal

Improve diagnostic efficiency

Reduce unnecessary testing

Reduce test-related complications

Steward health care resources



# Age-Adjusted D-Dimer

## **Important note**

*D-dimer assays are reported as either the concentration of DDU or as FEU, depending on the calibration for the assay. The 2 numeric values are easily convertible because the mass of one FEU equals approximately half of one DDU (ie, 1 FEU=2DDU).*

## **Strategies:**

Fixed age-adjusted cutoff

Incremental age-adjusted cutoff

**Table 2.** D-dimer performance in VTE patients older than 50 years using a CDD versus AADD.

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Douma et al <sup>46</sup>	III	Wells	Unlikely	Age $\times 10^{\dagger}$	NR	NR	2/983 (0.2; 0.1-0.7)	7/1,093 (0.6; 0.3-1.3)	46 (43-48)	51 (49-53)
Douma et al <sup>46</sup>	III	RGS	Non-high	Age $\times 10^{\dagger}$	NR	NR	0/561 (0; 0.0-0.7)	2/663 (0.3; 0.1-1.1)	34 (32-37)	40 (38-43)
Sharp et al <sup>48</sup>	III	NR	Any	1,000 <sup>†</sup>	98 (96-99)	84 (81-87)	10/16,660 (0.1; 0.0-0.1)	80/23,146 (0.3; 0.3-0.4)	54 (53-54)	74 (74-75)
Friz et al <sup>50</sup>	III	NR	Any	1,000 <sup>†</sup>	100 (97-100)	96 (91-99)	0/8 (0; 0-36.9)	4/61 (6.6; 1.8-15.9)	2 (1-3)	13 (10-16)
Kline et al <sup>51*§</sup>	III	sRGS or Wells	Any	1,000 <sup>†</sup>	94 (88-97)	92 (86-96)	8/152 (5.3; 2-10.1)	10/185 (5.4; 2.6-9.7)	22 (19-26)	27 (24-31)

AADD, age-adjusted D-dimer; CDD, conventional D-dimer; CI, confidence interval; CPR, clinical prediction rule; NR, not reported; PTP, pretest probability; RGS, revised Geneva score; sRGS, simplified revised Geneva score.

\*Multiple CPRs were used; for simplicity, only results for Wells are presented.

<sup>†</sup>D-dimer value reported in FEUs.

<sup>‡</sup>D-dimer value reported in DDUs;

<sup>§</sup>Applied AADD to patients older than 70 years.

# Critical Question

In adult patients with low to intermediate pretest probability for acute PE, does a negative age adjusted D-dimer result identify a group of patients at very low risk for the diagnosis of PE for whom no additional diagnostic workup is required?

## **Level B Recommendation**

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.

In your opinion, does the research suggest D-Dimer testing increases or decreases CT imaging use?

# Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients Presenting to the Emergency Department With Suspected Acute Venous Thromboembolic Disease



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