Embolie Pulmonaire

Règles cliniques pour le diagnostic & la prise en charge

IMPEC Improving emergency care

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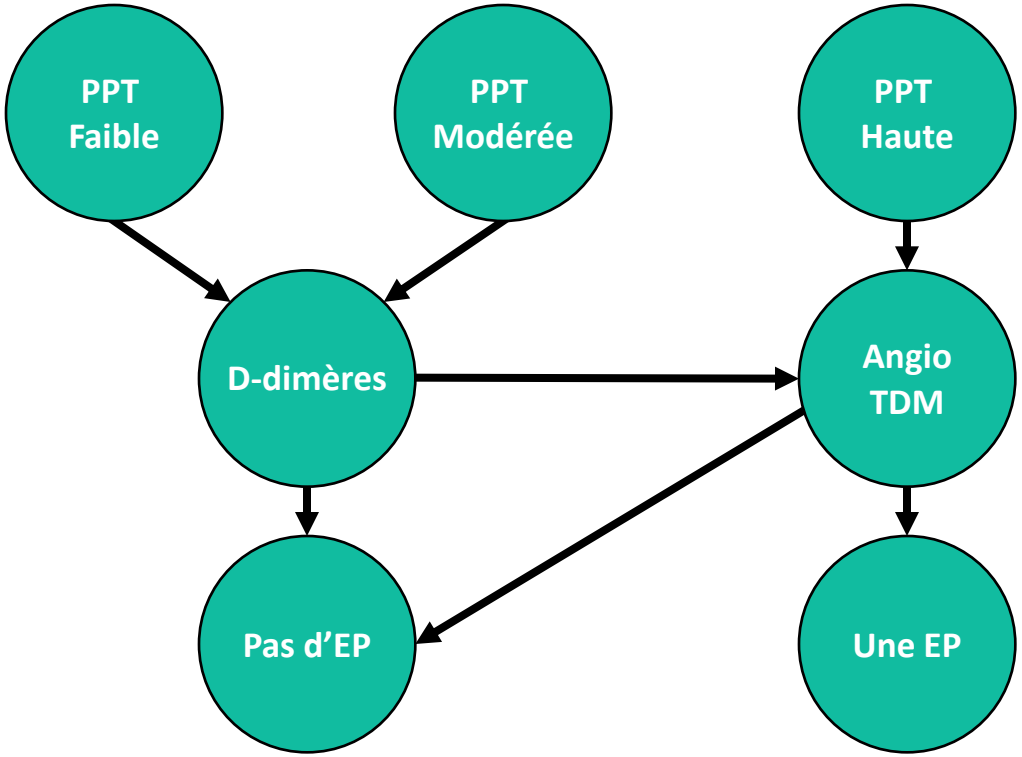
Conflits d’intérêts

Stratégie diagnostique



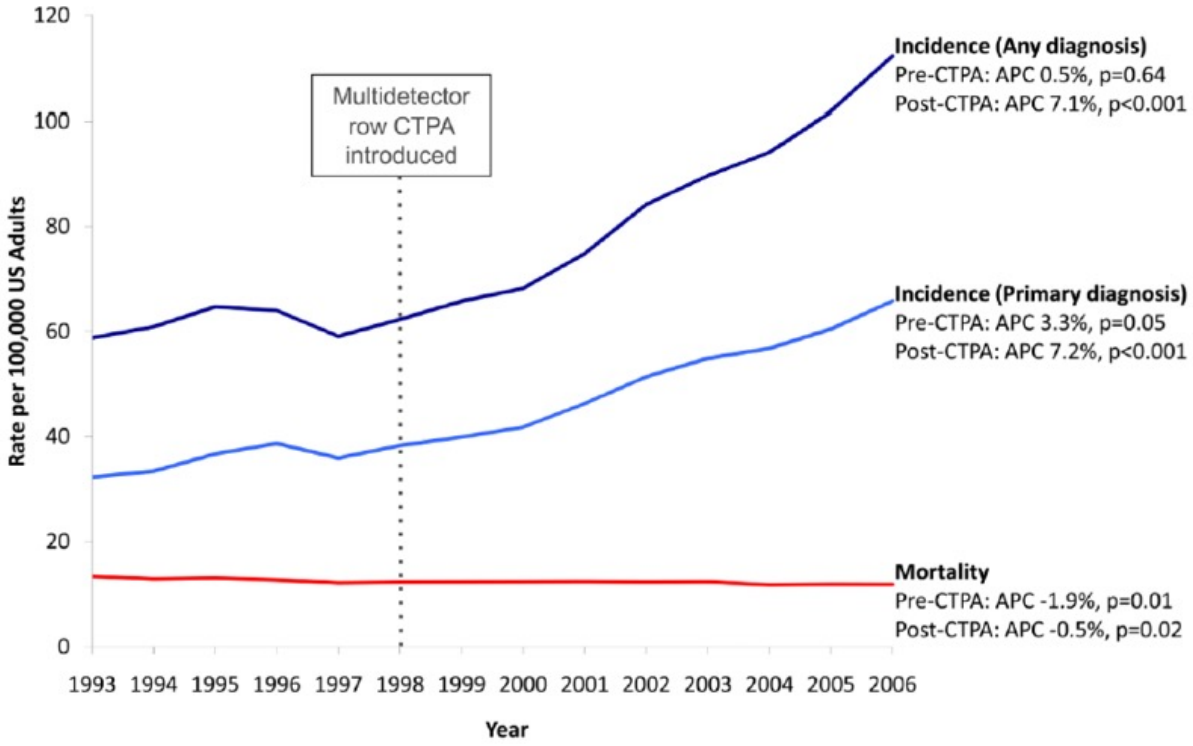
Le probleme

NAME OF DECEASED
R. U. Next
CASE NO. 4390182
AGE 45
SEX Male
RACE NZ Maori
WEIGHT 138kg
CAUSE OF DEATH Complications
TYPE II THE SILENT KILLER

Le mythe

Une EP ratée => un patient tué

When a test is too good



Wiener et al, JAMA Int med 2011

Overdiagnosis

On diagnostique + d'EP
sans amélioration pronostique

Pourquoi une telle explosion de diag?

Patient Stories

Steve Brenner

Steve Brenner passed away from a pulonary embolism in August of 2016. His wife, Michele Brenner, shares his story: My husband, Steve Brenner, died of a massive pulmonary embolism on...

MORE >

Peter Donati

Peter is an avid athlete, who enjoys swimming and running, a family man, and a professional. After experiencing a PE, he found himself with a lot of questions about...

MORE >

Bart Coyne

Bart Coyne, a heart transplant patient, experienced deep vein thrombosis (DVT) and pulmonary embolism (PE) in April 2017. Here is his story about how a positive attitude and the support...

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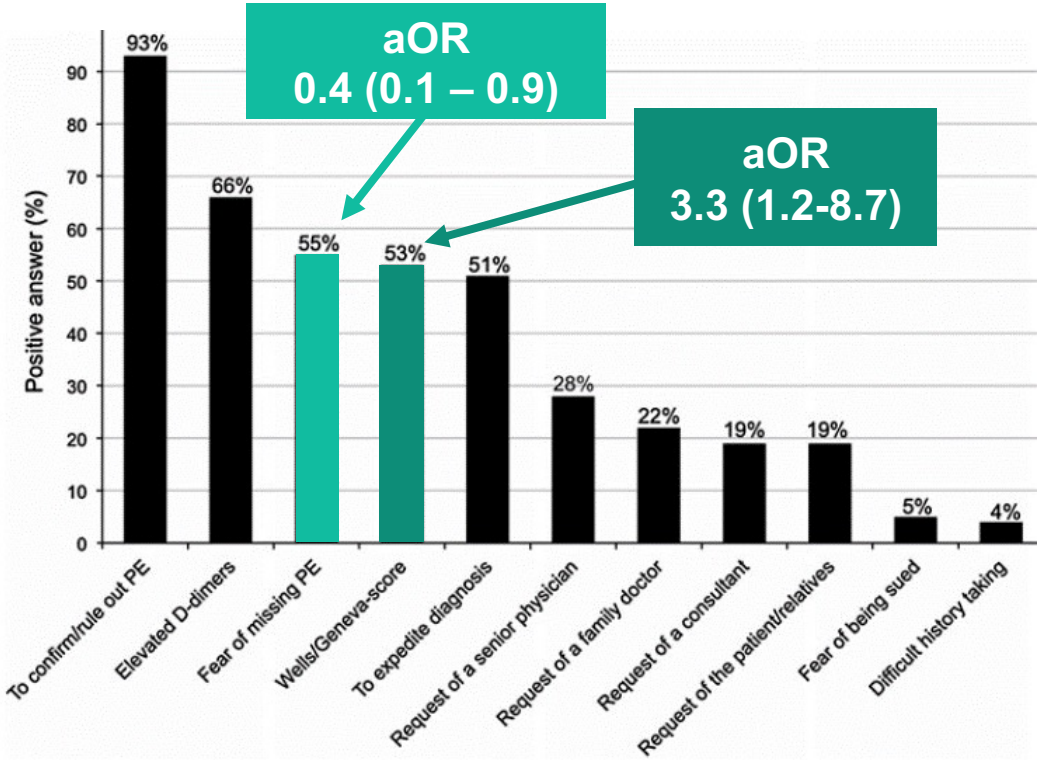
Fear directed stategy



Rohacek et al. Ordering CTPA to exclude PE : defense vs evidence. Intensive Care Med 2012

Scanner guidé par

- D-dimeres: Bonne VPN
- VPN dépend de la prévalence
- Bien pour l'exclusion sauf en cas de haute prévalence!

Pre test probability
(clinical probability)

Clinical probability

wells

Table 1. Wells clinical prediction score (14)

Characteristics	Score
Previous pulmonary embolism or deep vein thrombosis	1.5
Heart rate > 100 beats/minute	1.5
Recent surgery or immobilization	1.5
Clinical signs of deep vein thrombosis	3
Alternative diagnosis less likely than pulmonary embolism	3
Hemoptysis	1
Cancer	1
Interpretation: Low probability: 0-1 points Intermediate probability: 2-6 points High probability: 7 or more	

Geneve

Variable	Score
Age 65 years or over	1
Previous DVT or PE	3
Surgery or fracture within 1 month	2
Active malignant condition	2
Unilateral lower limb pain	3
Haemoptysis	2
Heart rate 75–94 beats per minute	3
Heart rate 95 or more beats per minute	5
Pain on deep palpation of lower limb and unilateral edema	4

0–3 Points indicates low probability.
4–10 Points indicates intermediate probability.
11 Points or more indicates high probability.

Clinical probability

gestalt

La Gestalt est une approche humaniste et existentielle. Elle intègre comment nous créons du sens dans l'instant présent, c'est à dire la globalité de notre corps, nos pensées et nos émotions. Elle permet de créer des choix pour une vie meilleure.

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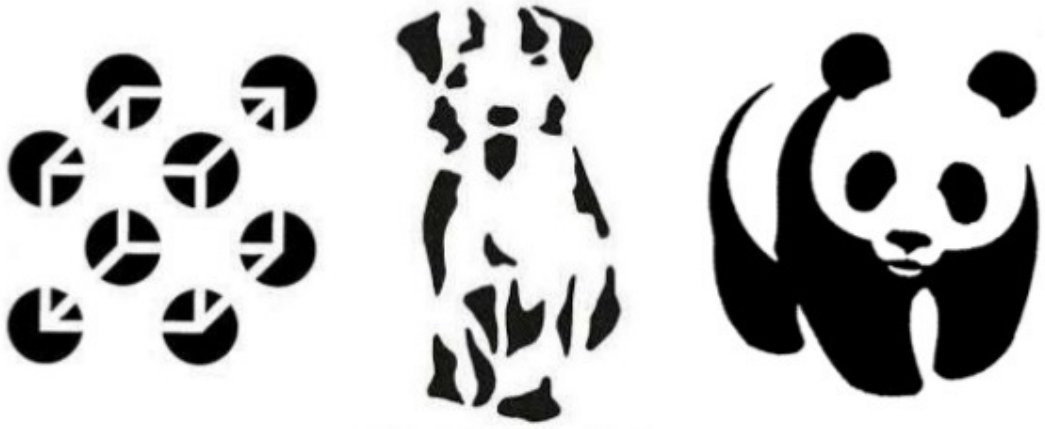
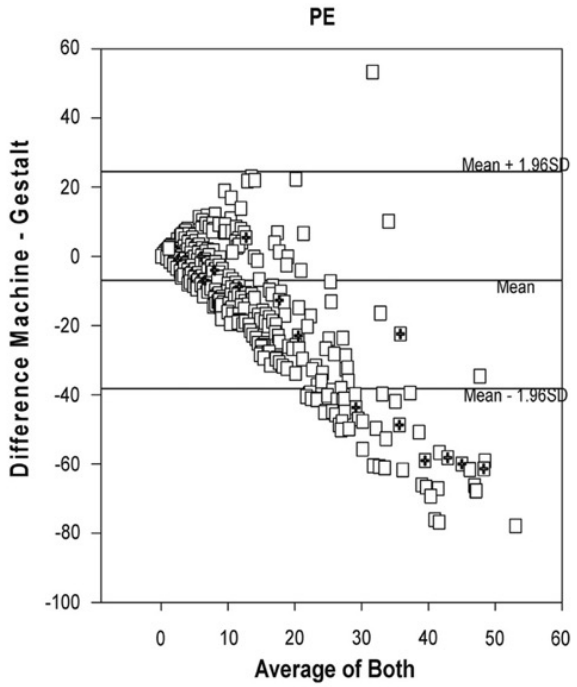
Gestalt

« The whole is not the sum of its parts, but greater »



Le jugement clinique ne saurait être remplacé par un score.
Mais devrait être utilisé en association à un système validé.

Gestalt

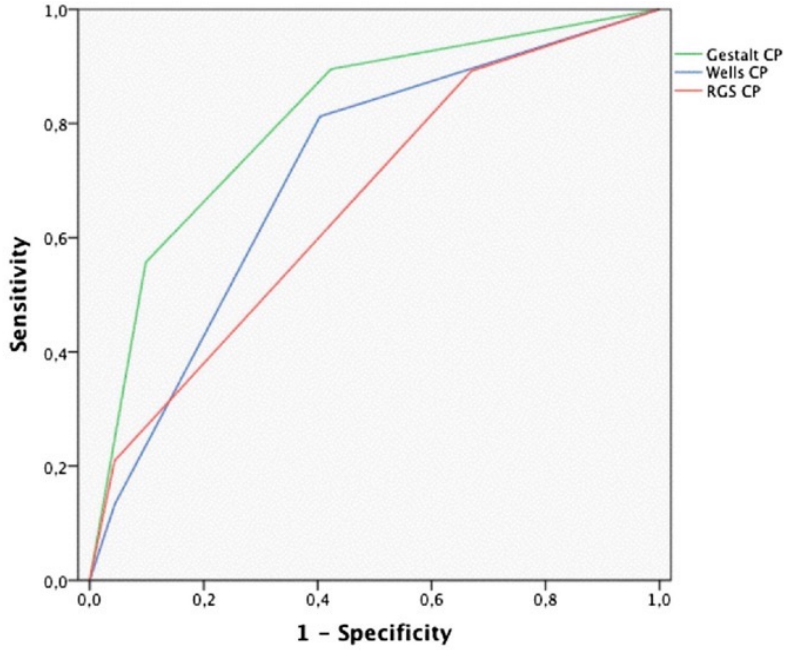


AUC Gestalt pour EP
0.81

Consultant ~ intern

Kline et al. Ann Emerg Med2014

Same Same



ROC: receiver operating characteristic **CP:** clinical probability **RGS:** revised Geneva score

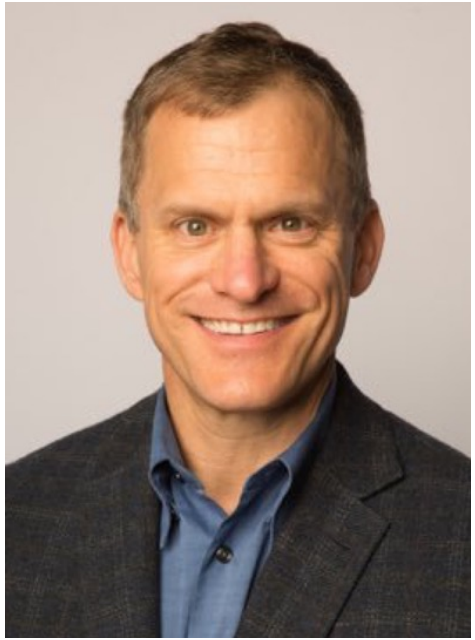
Penaloza et al. Ann Emerg Med 2013

Comment reduire le recours a l'angioTDM

Pas beaucoup de possibilités

- Ne pas prescrire de D-dimères
- Modifier le seuil

Le gourou et sa philosophie



L'EP tue mais le scan aussi

- Irradiation
- AKI
- Faux positifs

Comment réduire le nb de scan demandés

Sans tuer trop de malades…

La balance

$$T_t = (P_{pos/nd} \times R_{rx} + R_t)(P_{pos/nd} \times R_{rx} + P_{pos/d} + B_{rx})$$

$$T_t = (0.1 \times 0.017 + 0.00006)/(0.1 \times 0.017 + 0.85 \times 0.15)$$
$$= 1.8\%$$

Risques > bénéfices si prevalence <1.8%

Safety d’une stratégie

SSC Scientific and Standardization Committee

Max failure rate dépend de la prévalence
En gros : < 1.8% c’est safe.

Dérivation du score PERC

- Age < 50
- HR< 100
- Sat > 94%
- No oestrogen
- No recent surgery
- No Hx of thrombosis
- No hemoptysia
- No sign of DVT

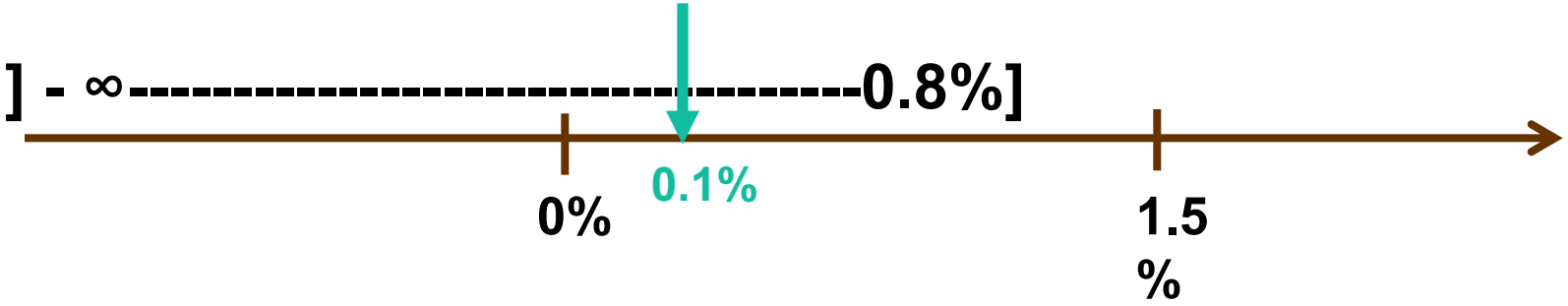
25% PERC negatif:
1.4% d'EP

Kline et al. JTH 2004

Validation score PERC

- Etude PROPER sur 14 service d'urgences en France
- 1916 suspicion d'EP : Stratégie PERC vs Usual care

Characteristics	No. (%) PERC	No. (%) Control	Mean Difference, % (95% CI)	Number Needed to Treat	*P* Value
Per-protocol population, No.[a]	847	902			
Thromboembolic event at 3 mo (primary outcome)	1 (0.1)	0	0.1 (−∞ to 0.8)[b]		



Résultats principaux

Intention-to-treat population, No.[a]	962	954			
CTPA performed	129 (13)	220 (23)	9.7 (6.1 to 13.2)	10	<.001
Length of ED stay, median (IQR), h:min	4:36 (3:16 to 6:21)	5:14 (3:50 to 7:18)	−00:36 (−1:08 to −0:04)		<.001
Hospital admission	121 (13)	152 (16)	3.3 (0.1 to 6.6)	30	.04
Anticoagulation therapy introduced	21 (2)	33 (3)	1.3 (0.3 to 2.9)	78	.09
Hospital readmission at 3 mo	43 (4)	62 (7)	2.1 (−0.1 to 4.3)	48	.051
All-cause death at 3 mo	3 (0.3)	2 (0.2)	0.1 (−0.5 to 0.7)		>.99

Réduction scan: RRT 42% (29 – 52) / NNT = 10

Conclusion

La règle PERC marche

Suspicion EP + Proba faible + PERC à 0 = 0 EP

Seuil D-dimères

Age-Adjusted D-Dimer Cutoff Levels to Rule Out Pulmonary Embolism
The ADJUST-PE Study

Monter le seuil des D-dimères sans rater trop d'EP?

Test du seuil Age x 10

Righini et al. JAMA 2014

Ajusté à l'âge

337 patients Ddimeres > 500 mais < âgex10

1 seule EP non fatale (taux d'erreur 0,3%)

Righini et al. JAMA 2014

Aller plus loin

EP diagnostic + probable
Hemoptysie
Signes de TVP

NON →

Seuil D-dimères 1000 et pas 500

Simplified diagnostic management of suspected pulmonary embolism (the YEARS study): a prospective, multicentre, cohort study

Réduction de 14% des TDM, <1% d'EP ratées

Le règle YEARS

Validation 2019
Combiné avec PERC

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JAMA Network

QUESTION Among ED patients with suspected pulmonary embolism (PE) not ruled out by the PE rule-out criteria (PERC) rule, does a diagnostic strategy that combines the YEARS rule and age-adjusted D-dimer threshold safely exclude the diagnosis of venous thromboembolism?

CONCLUSION In this cluster-randomized crossover noninferiority trial studying PERC-positive patients with suspected PE, YEARS rule combined with age-adjusted D-dimer threshold did not lead to an inferior rate of thromboembolic events vs a conventional diagnostic strategy.

POPULATION

823 Women
591 Men

Adults who had a low clinical risk of PE not excluded by the PERC rule or a subjective clinical intermediate risk of PE

Mean age: **55** years

LOCATIONS

18 Emergency departments in France and Spain

INTERVENTION

18 Centers randomized
1414 Patients randomized
1271 Patients analyzed

726
Intervention
Diagnostic strategy involved both an assessment of the YEARS criteria and D-dimer testing

688
Control
D-dimer testing with the threshold set at the age-adjusted level

PRIMARY OUTCOMES

Venous thromboembolism at 3 months

FINDINGS

Patients with venous thromboembolism at 3 months

Intervention	Control
1 of 648 patients	5 of 623 patients
0.15%	**0.80%**
(95% CI, 0.0% to 0.86%)	(95% CI, 0.26% to 1.86%)

Noninferiority margin, 1.35%

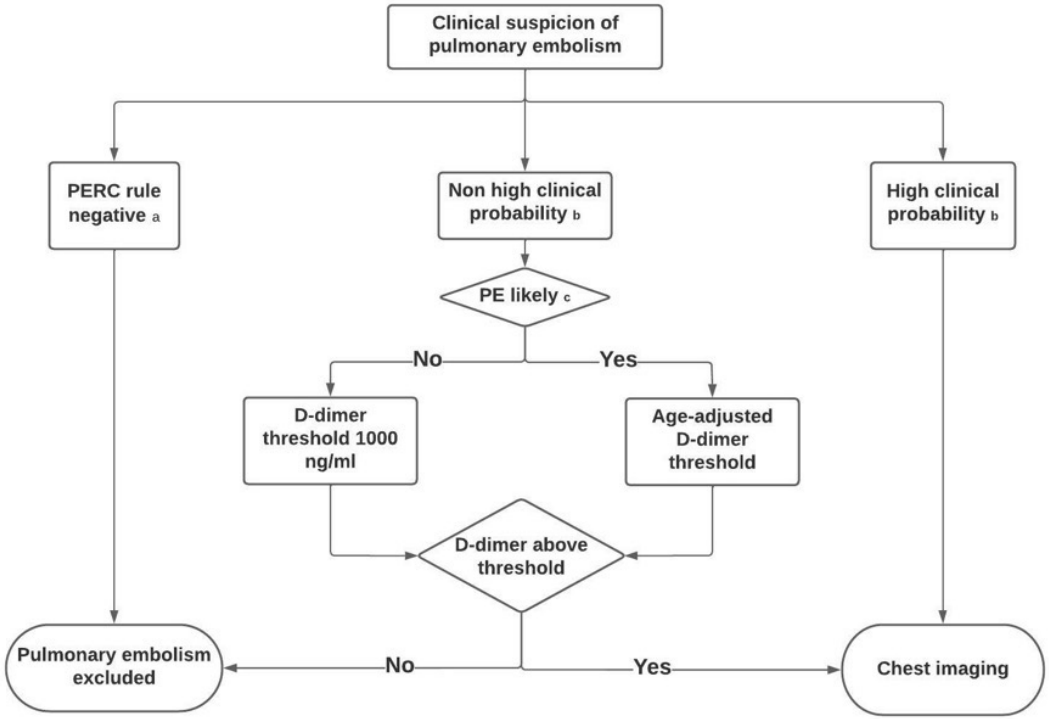
The results were within the noninferiority margin:

Adjusted difference, **−0.64%**
(1-sided 97.5% CI, −∞ to 0.21%)

© AMA

Freund Y, Chauvin A, Jimenez S, et al. Effect of a diagnostic strategy using an elevated and age-adjusted D-dimer threshold in thromboembolic events in emergency department patients with suspected pulmonary embolism: a randomized clinical trial. *JAMA*. Published December 7, 2021. doi:10.1001/jama.2021.20750

Stratégie globale



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Comparaison stratégies diagnostiques

	Failure rate	Confidence Interval		Chest imaging	Yield
		95% low	95% high		
YEARS	**0.75%**	0.51%	1.10%	**543 (16.3%)**	28%
PEGeD	**0.87%**	0.61%	1.25%	**504 (15.1%)**	30%
MODS	**0.78%**	0.53%	1.14%	**528 (15.9%)**	28%

La mauvaise interprétation

On n’a pas retrouvé de cause à ces chutes, probablement sur des malaises.
Donc malaise = suspicion d’EP.
Age 68 ans donc PERC = 1.
D-Dimères à 1100,
donc AngioTDM.

La mauvaise interprétation

Non EP n'est pas le diagnostic
Le plus probable donc
Je fais D-dimères et seuil à 1000

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C’est fini

- S’intéresser au malade > examiner le malade
- Avoir une approche Bayesienne
- Faire confiance à son impression
- PERC c’est bien, mais dans un sens!
- Et si j’ai une faible probabilité, alors D-dimères à 1000

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Merci

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