Preventing Deadly Errors in Patients with Shortness of Breath

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Let's
Review

Minimize The Risk

High risk patients / complaints / situations
What are the “can’t miss” diagnoses?
What shouldn’t we be fooled by?


WHAT
IF
?

Take a cognitive pause…

S

- What is the most **SERIOUS** thing this could be?

P

- What is the most **PROBABLE** thing this is?

I

- What is the most **INTERESTING** thing this could be, or…
- Could this be an **atypical or uncommon presentation of a common condition**?

T

- Are there any **TREATMENTS** needed right now,
- And what **TESTS** do I need to order?

The "STOPS"

Stop 1

- SPIT the differential diagnosis

Stop 2

- Anything not fit? Adjust your differential
- Need more info? Go back and get it
- Decide what you think might be wrong with the patient
- Order appropriate treatments and tests

Stop 3

- Review the response to treatments and test results
- Decide on a diagnosis
- Does everything fit? If not, reassess differential and diagnosis

Stop 4

- Determine the patient's disposition
- Challenge your decision
  - Why are you right? Could you be wrong? Possible condition in evolution?

- Pulmonary Embolism
- Acute Coronary Syndrome
- Congestive Heart Failure
- Pneumothorax
- Sepsis
- Severe asthma/COPD
- Metabolic acidosis
- Anemia

- Anchoring on something “benign”
  - Anxiety, “viral illness”
- Not considering PE
  - No risk factors, no CP, normal pulse ox; wheezing on exam
- Missing ACS
  - Dyspnea may be the only sign in older patients, women, diabetics
- Missing CHF
  - Wheezing is not always asthma

- Not respecting the VS
  - Persistent tachycardia
  - Not taking the RR yourself
  - Not noting the way someone is breathing
  - Not watching VS trends

- Failure to recognize impending respiratory failure
  - Increasing PaCO2
  - Increased work of breathing
  - Speaking in phrases instead of sentences
  - Tiring out

- Seeing a normal CXR… and calling it a day
- Letting normal labs reassure you
  - E.g., normal blood gas in PE

- Not keeping deep differential for SOB in “low-risk” patients
  - Myocarditis
  - PE
  - PTX

Don’t Be Fooled by “Normal”

- Normal O2 sat
- Normal CXR
- Young person
- No risk factors
- No chest pain
- History of anxiety
- Patient “looks comfortable”

Before Discharge

- Beware diagnosing “anxiety” or “panic attack”
- Normal oxygen saturation despite significant c/o SOB?
  - Reassess
- Normal CXR in the persistently or significantly symptomatic patient?
  - Reassess
- Assuming SOB = lungs (remember heart, acidosis, anemia)

Before Discharge

- Was that wheezing really from asthma?
  - Remember CHF, PE
- “They’re young and healthy”
- “The patient didn’t look that sick…”
- Beware discharging a patient who is still SOB

- If there was an abnormal vital sign, exam finding, or test result, did I explain it?
- Does anything not fit with my working diagnosis?

Before You Click "Discharge"

- Symptoms better? (Not just vitals)
- Diagnosis clear?
- Able to exclude life threats?
- Ambulates without desaturation or distress?
- Follow-up plan documented?

- DO NOT discharge a patient with persistent dyspnea without a clear diagnosis or documented improvement

Take a cognitive pause…

“If the patient gets sicker or dies within the next 24 hours, what diagnosis will I wish I had ruled out?”

“I get short of breath when I walk”

“I can’t breathe when I walk”

- 82-year-old female presents with three weeks of increasing shortness of breath while walking. For the past two days she’s been too tired to take her usual walk around the neighborhood and for the last several hours she’s felt short of breath without exertion. She denies CP, dizziness, nausea. She has never had this problem before this last three weeks.
- PMH: HTN, controlled on meds.

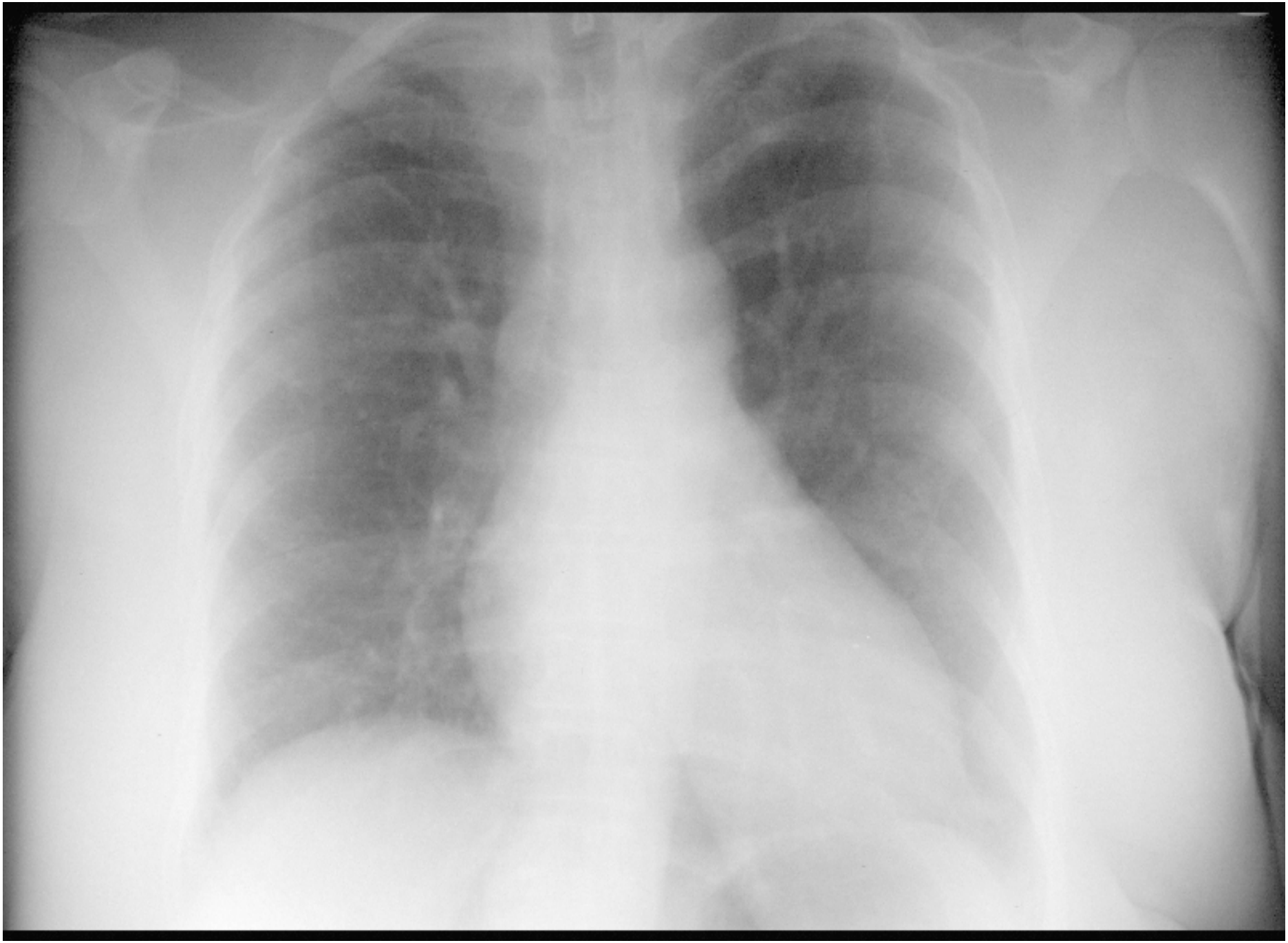
- Anything else you want to know on her history?

“I can’t breathe when I walk”

- Vitals: Normal except RR 20. Oxygen saturation normal.
- HEENT normal; “no JVD”
- Lungs – occasional wheeze, otherwise clear
- Heart sounds normal
- Normal abdomen
- No peripheral edema

- Now what?


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II



“I can’t breathe when I walk”

- Ultrasound of the lungs shows B lines bilaterally*
- BNP elevated
- Troponin normal

- Dx: New heart failure


“I am so anxious!”

“I’m so anxious!”

- 27-year-old female brought to the ER by a friend for severe anxiety attack and asthma. Patient states she’s had her allergies and asthma kick up for the past several days and is taking her albuterol with some relief. States the albuterol makes her anxiety worse and she’s requesting Xanax.
- PMH: Asthma since a child; never hospitalized. Severe anxiety currently seeing a therapist. No meds.

“I’m so anxious!”

- Exam: Normal except HR 125, sinus. RR 22, unlabored. O2 sat 99% on RA.
- Appears very anxious and tearful.
- HEENT normal. Neck no JVD. Lungs with mild scattered wheezing, no rales, no consolidation.
- Heart, abdomen normal.

- Anything else you want to know?

“I’m so anxious!”

- A CXR was ordered at triage…


Lt PA Upright X6


Lt. Lateral

“I’m so anxious!”

- What do you want to do now?

- Give her Xanax and albuterol and see what happens?
- A d-dimer?
- An EKG?
- Something else?

D-Dimer Testing: Issues

- Only order after you have risk stratified the patient
- ***Do not order*** *if there is* ***no likelihood –OR- a high likelihood*** *that the patient has a PE*

Validated Decision Aids

- Multiple decision aids have been created to assist providers in risk stratification for PE
  - e.g., Wells, Revised Geneva, PERC; YEARS
  - Important concept – physician gestalt tests well against other decision aids
- It is prudent to use a validated risk stratifier to start
  - Can “override” with clinical judgment

Wells Risk Prediction Score for PE

Clinical feature	Points
Clinical symptoms of DVT	3
Other diagnosis less likely than PE	3
Heart rate greater than 100	1.5
Immobilization or surgery within past 4 weeks	1.5
Previous DVT or PE	1.5
Hemoptysis	1
Malignancy	1

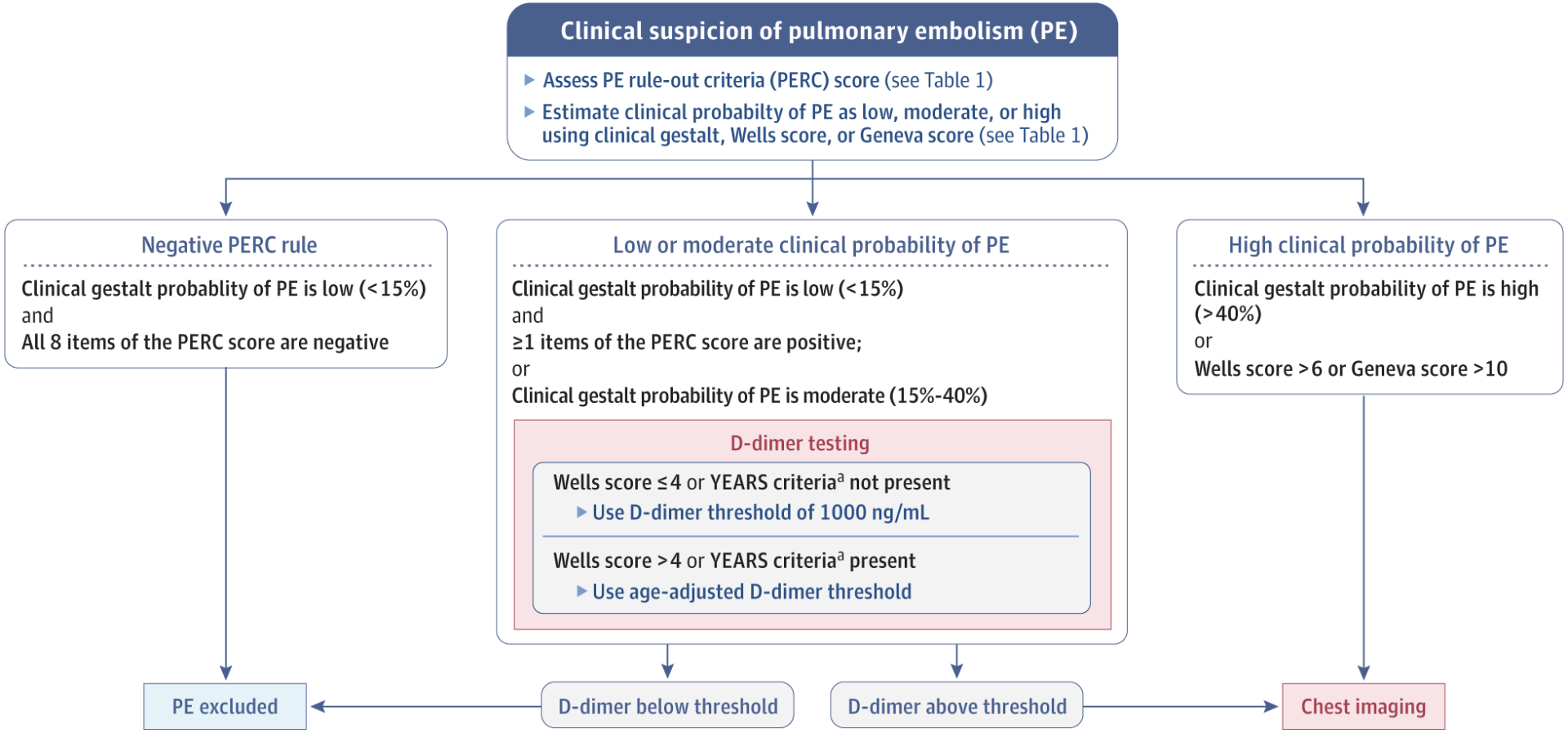
- Risk score interpretation (probability of PE)
  - >6 points: high risk (78.4%)
  - 2 to 6 points: moderate risk (27.8%)
  - <2 points: low risk (3.4%)
- Simplified Probability Score
  - > 4: PE likely
  - 4 or less: PE unlikely

The PERC Rule

- Pulmonary Embolism Rule-Out Criteria
  - Clinician **must first classify the patient as low risk** (15% or less risk of having a PE)
    - Use Gestalt or Wells < 2
  - Then, if ***all*** of the other criteria are met, the *patient has a less than 2% chance* of having a PE
    - Age < 50 years
    - Pulse < 100 bpm
    - RA SaO2 < 95%
    - No unilateral leg swelling
    - No hemoptysis
    - No recent trauma or surgery
    - No prior PE or DVT
    - No hormone use

Using PERC:
- Less CTs (by 10%)
- Shorter ED stays
- Less admissions

Pulmonary Embolus Diagnostic Algorithm



- Freund, JAMA, 10/22

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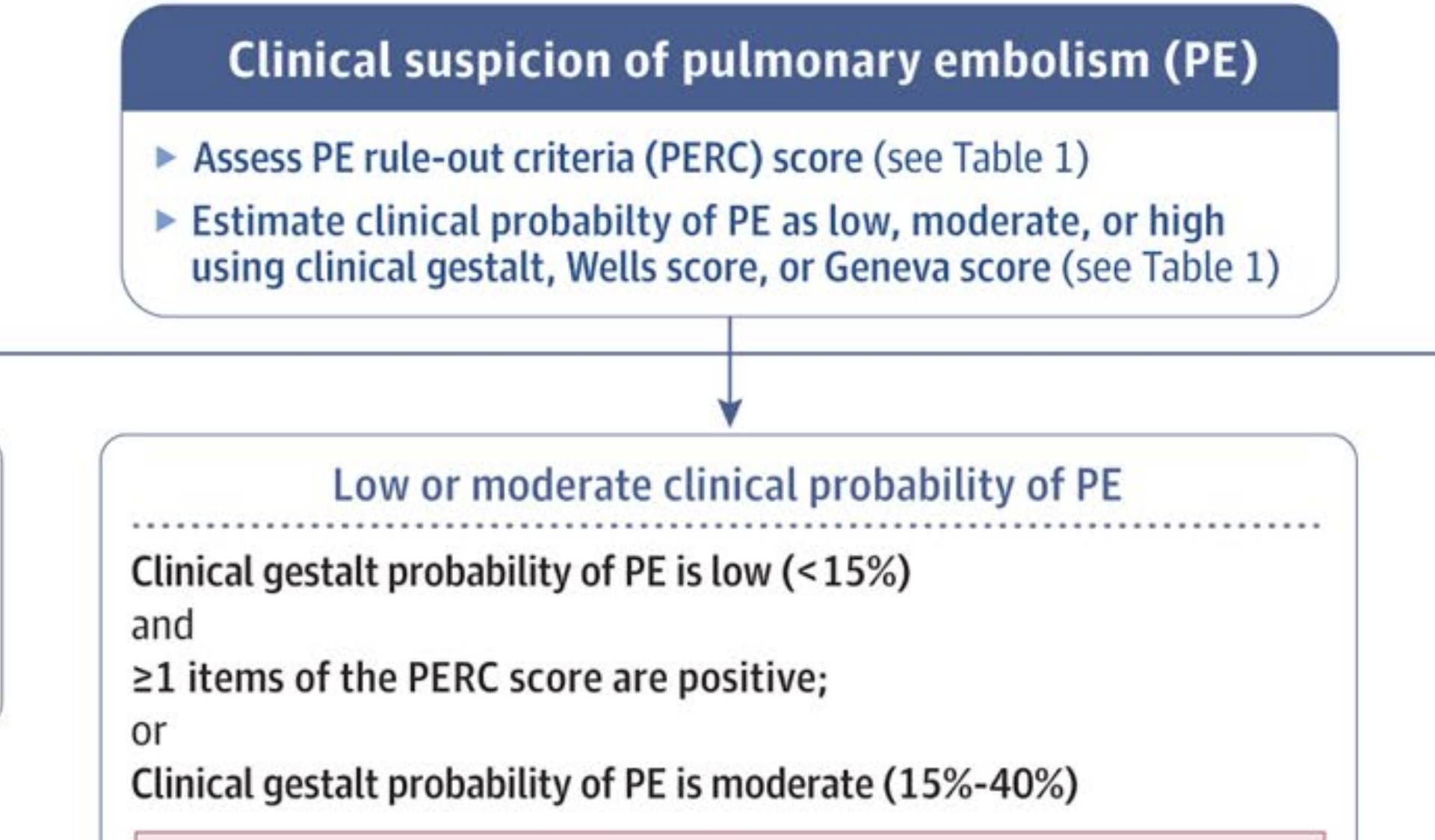

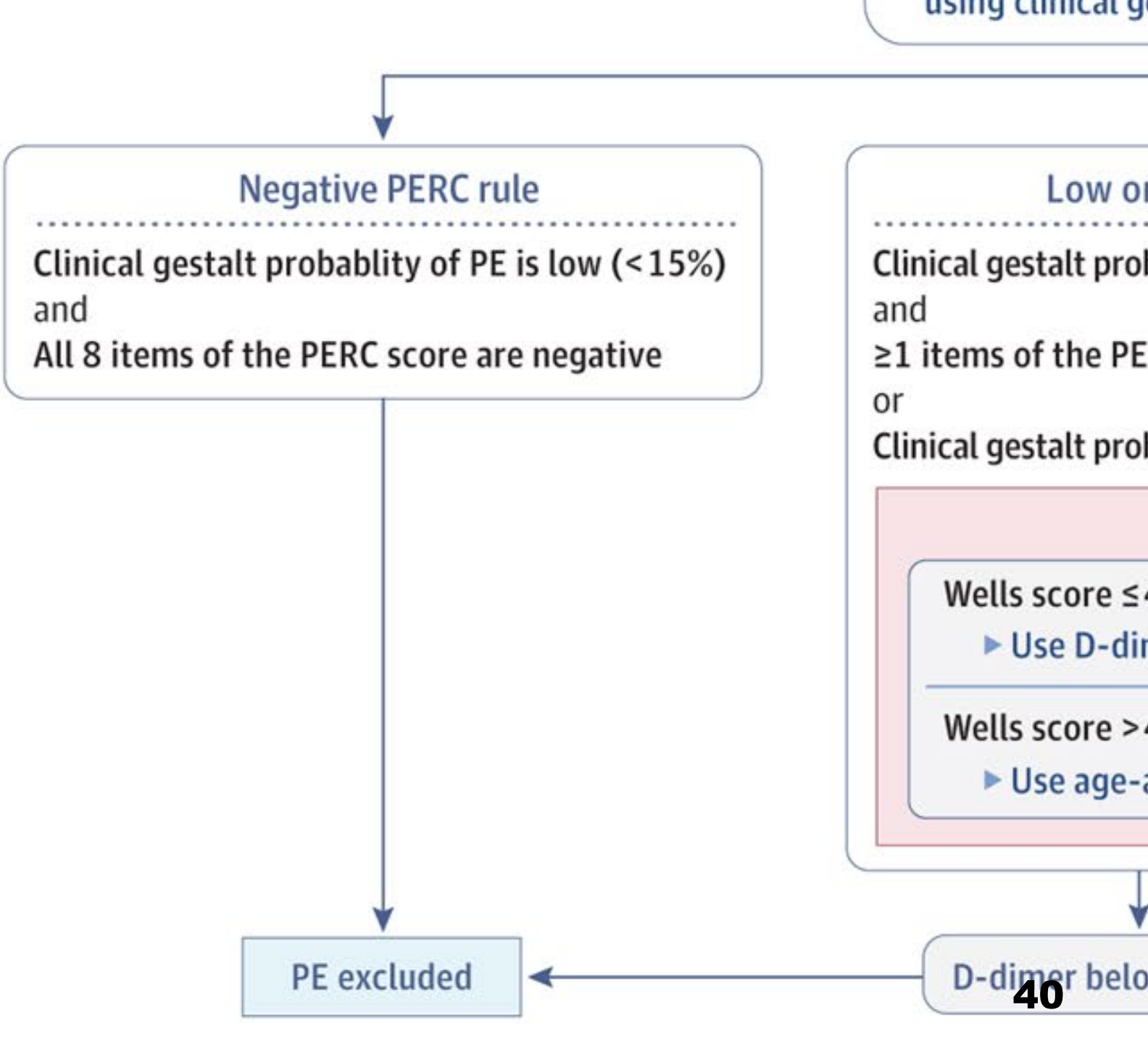
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Clinical gestalt probablity of PE is low (<15%)
and
All 8 items of the PERC score are negative
Low or
Clinical gestalt prob
and
≥1 items of the PE
or
Clinical gestalt prob
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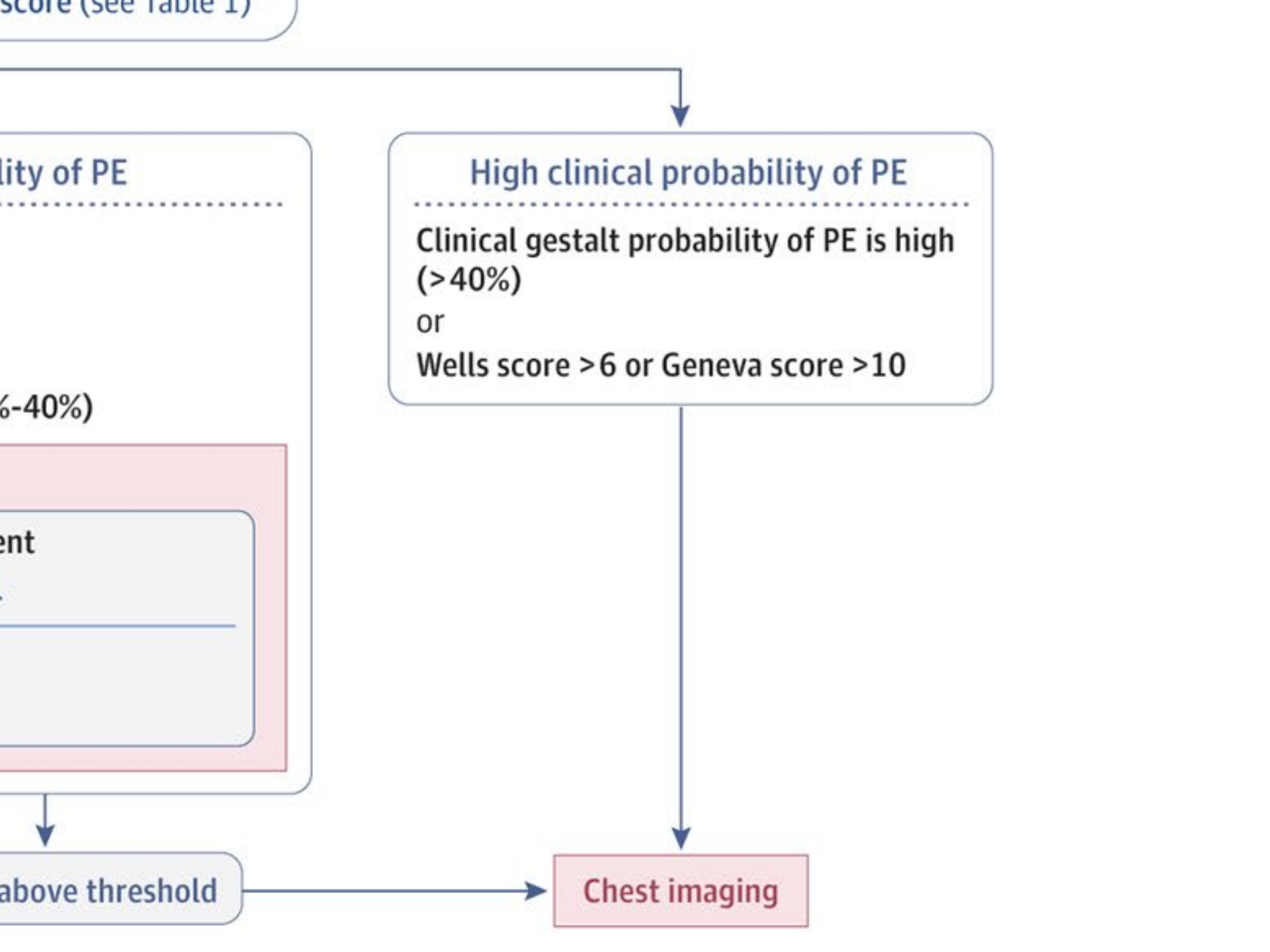
▶ Use D-dim
Wells score >
▶ Use age-a
PE excluded
D-dimer belo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above threshold
High clinical probability of PE
Clinical gestalt probability of PE is high (>40%)
or
Wells score >6 or Geneva score >10
Chest imaging

using clinical gestalt, Wells score, or Geneva score (see Table 1)

Low or moderate clinical probability of PE

Clinical gestalt probability of PE is low (<15%)
and
≥1 items of the PERC score are positive;
or
Clinical gestalt probability of PE is moderate (15%-40%)

D-dimer testing

Wells score ≤4 or YEARS criteria[a] not present
▶ Use D-dimer threshold of 1000 ng/mL

Wells score >4 or YEARS criteria[a] present
▶ Use age-adjusted D-dimer threshold

D-dimer below threshold

D-dimer above threshold

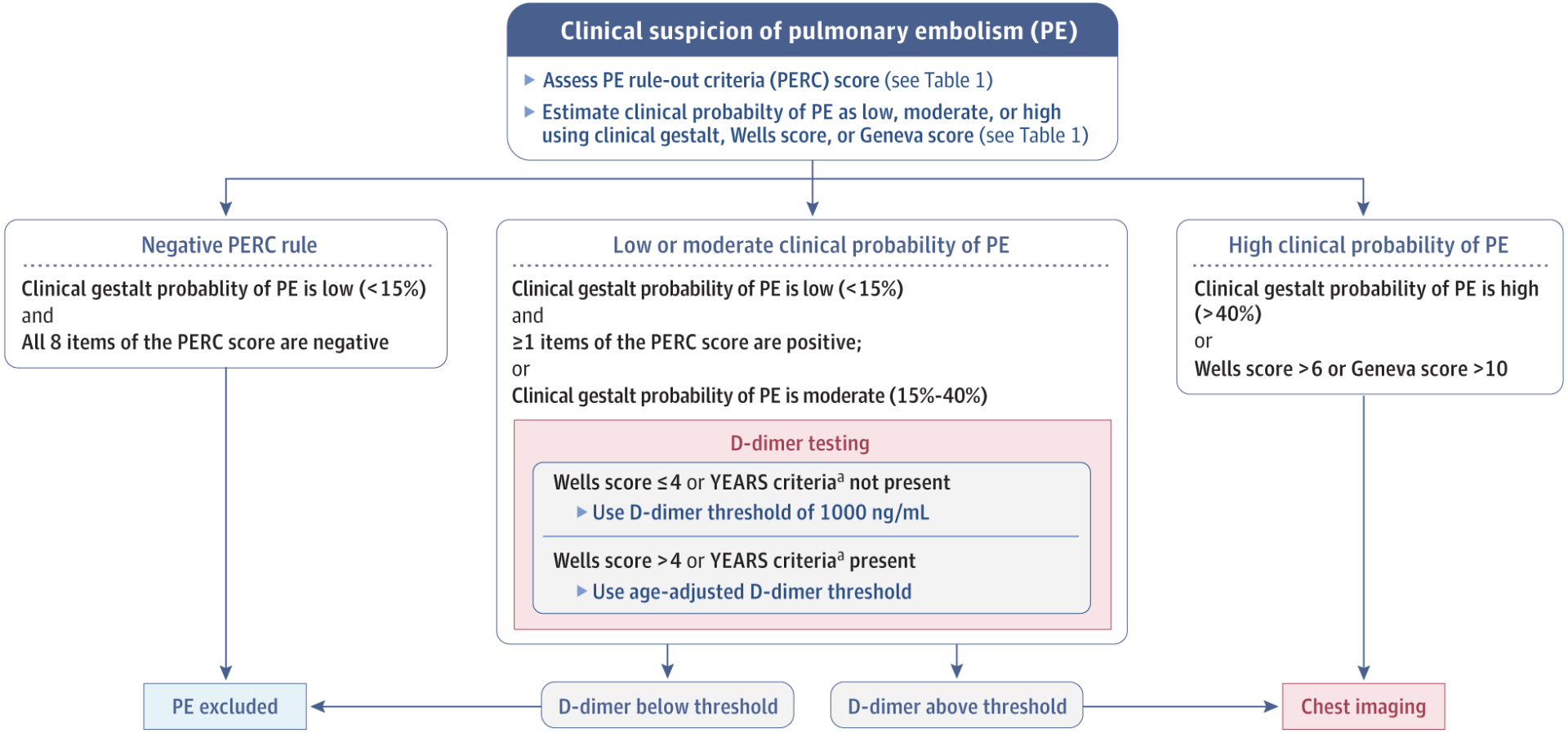
Pulmonary Embolism: YEARS Items

- YEARS Items
  - Clinical signs of DVT
  - Hemoptysis
  - PE the most likely diagnosis

“I’m so anxious!”

- Exam of the patient’s legs is normal – no evidence of DVT
- The patient’s d-dimer comes back at 650

Pulmonary Embolus Diagnostic Algorithm



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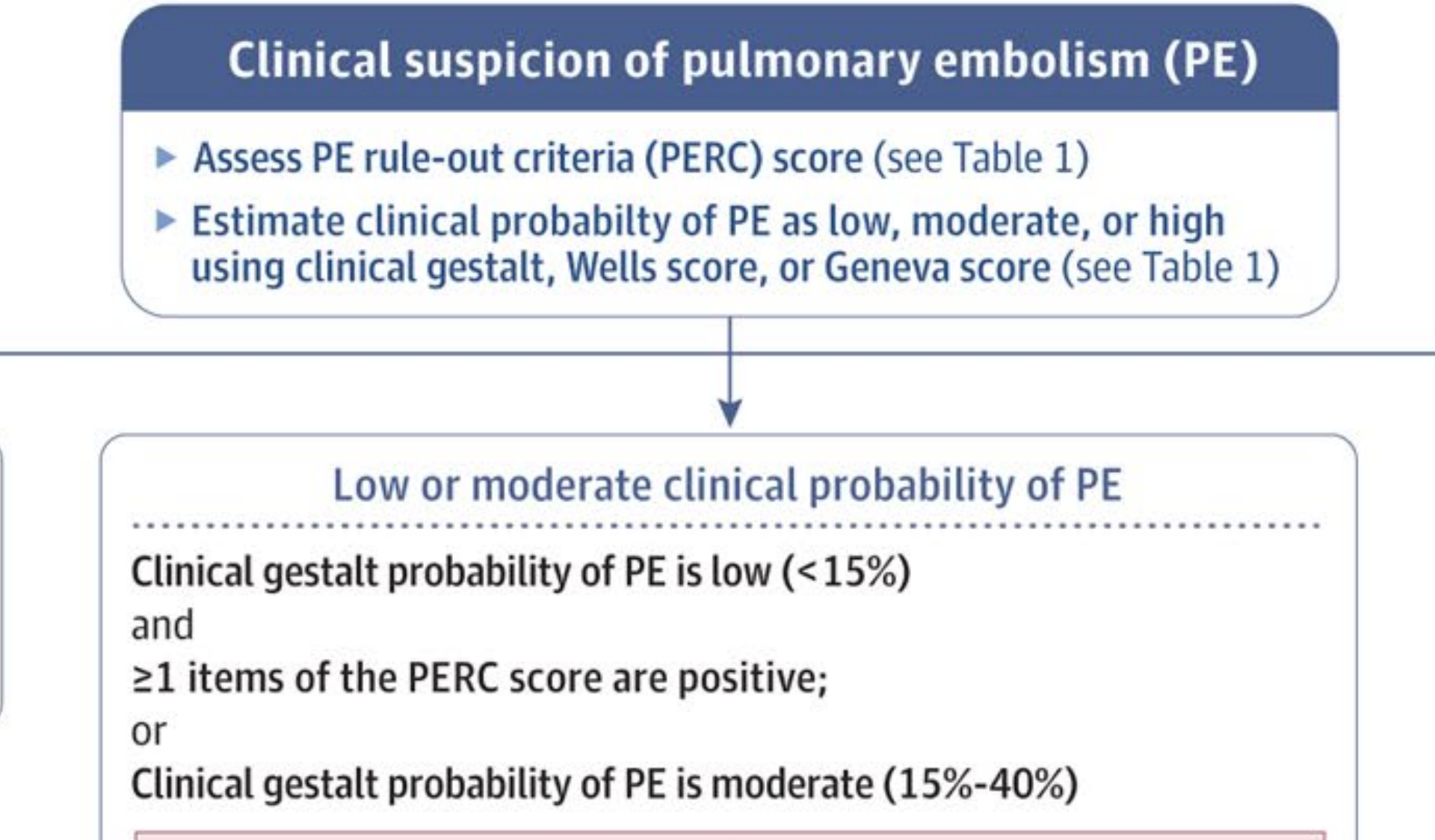

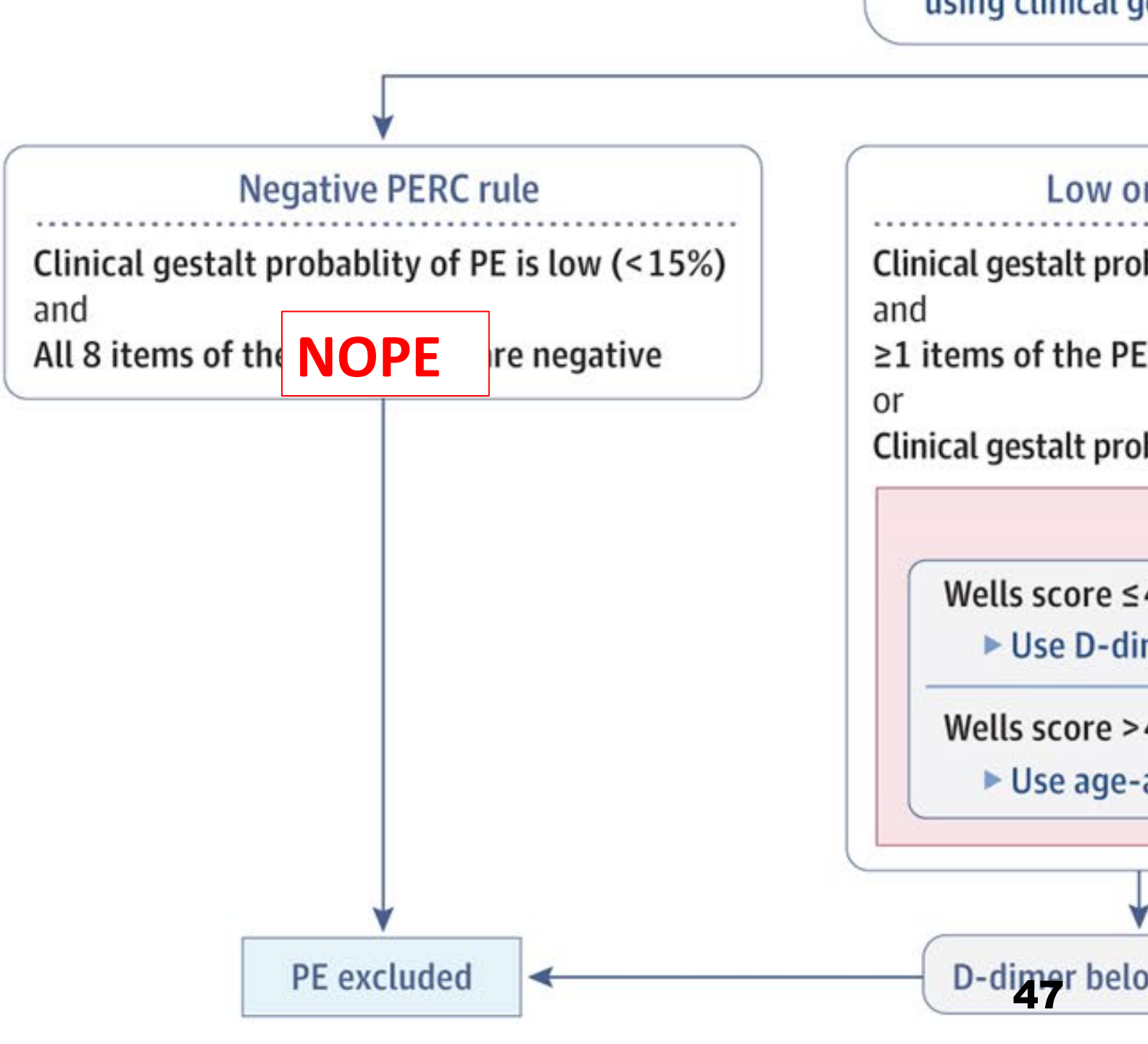
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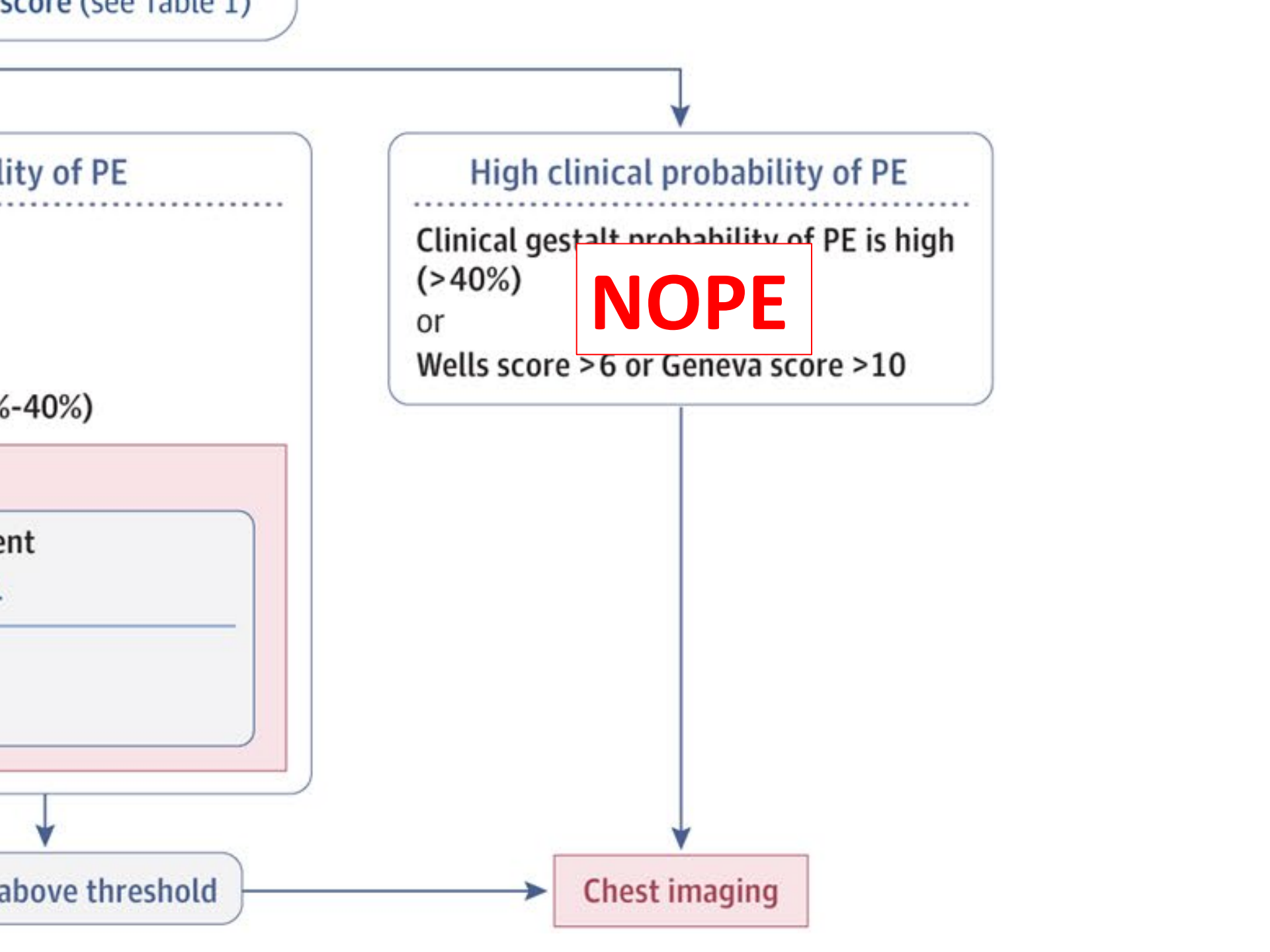
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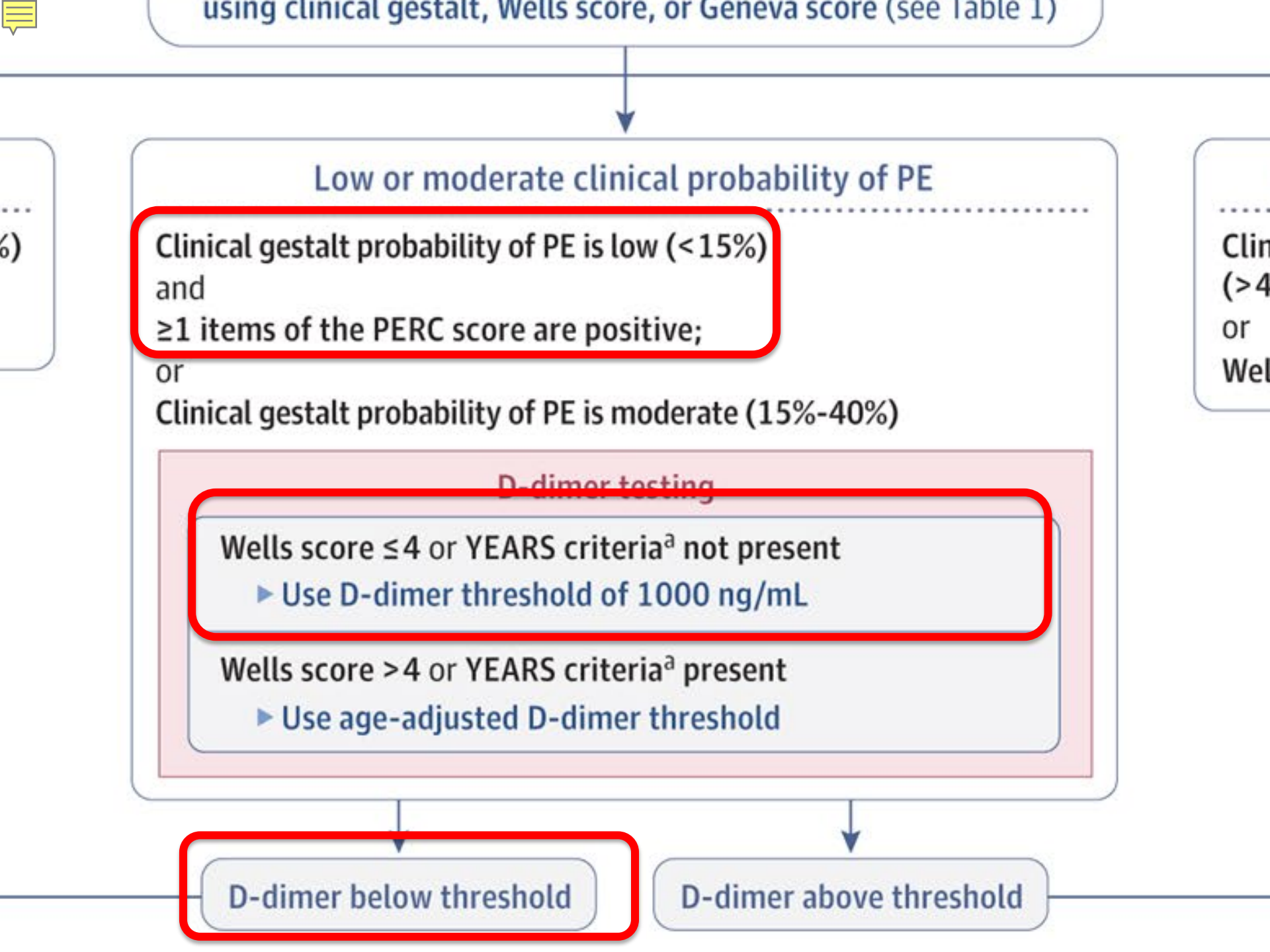
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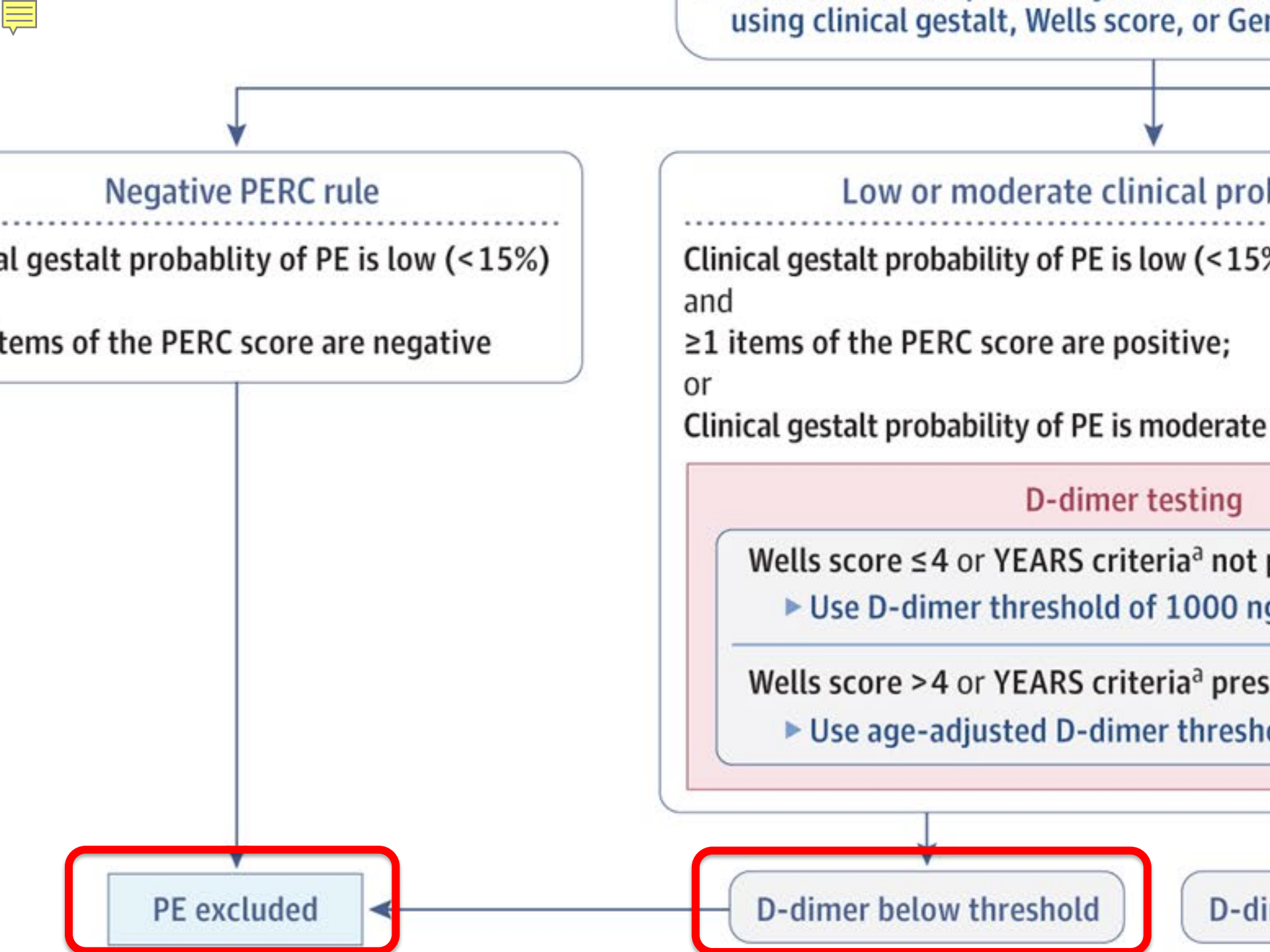
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“I just want to go home”

“I just want to go home”

- 32-year-old male with long history of mental health issues brought by police to the ED for wandering the streets. Patient denies any complaints and states he “just wants to go home.” Denies PMH, denies any medications, denies drug or alcohol use. Denies SI or HI.
- Anything else you want to know?

“I just want to go home”

- Vitals: Normal except RR 22. Oxygen saturation normal.
- Unkempt. Cooperative. No abnormalities found on exam. Oriented to person, place, situation.
- The police want to take him over to the psych emergency department in your hospital.

- What do you do now?

“I just want to go home”

- After normal POC glucose and hemoglobin checks, patient sent over to the psych ED.
- You finish your shift and head home

- The next day, when you arrive for your shift…

“I just want to go home”

- “Remember that patient you saw yesterday???”
- 12 hours later an intern from the psych ED calls for medical consult in the psych ED as patient now confused and RR noted to be 40.
- Evaluation in the psych ED shows patient now agitated, disoriented, temp 101. HR, BP normal, RR 40. Oxygen saturation normal.

- What do you do now?

“I just want to go home”

- Patient brought back to the medical ED.
- Labs sent
- CBC – normal
- BMP – Normal except anion gap of 25 and HCO3 of 12
- What test do you need now?
- VBG – 7.24. O2 95, CO_2 8

- What now?

CORE IM

ANION GAP ACIDOSIS

Glycols
- Ethylene
- Propylene

Methanol

Alcohols

Oxoproline
- TylenOl

Aspirin
- Other salicylates (e.g. bismuth)

OTCs

L-lactate
- Type A: Ischemic
- Type B: Non-ischemic
  - Mitochondrial dysfunction
  - Overproduction
  - Poor clearance

D-lactate
- Short gut

Renal
- Uremia
- Organic acids

Ketones
- Starvation
- Alcohol
- Diabetes

Metabolic

“I just want to go home”

- Serum salicylate level comes back at 95 mg/dL
- The patient is developing somnolence and does not appear to be protecting his airway.
- What do you do now?


DANGER
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- Don’t let a negative CXR make you feel better
- Remember cardiac causes of shortness of breath
  - Especially older patients, women
- Rethink “benign” diagnoses
- Remember acidosis as a cause of shortness of breath
- Have a reproducible approach to PE

Shortness of Breath Pearls


Thank
You