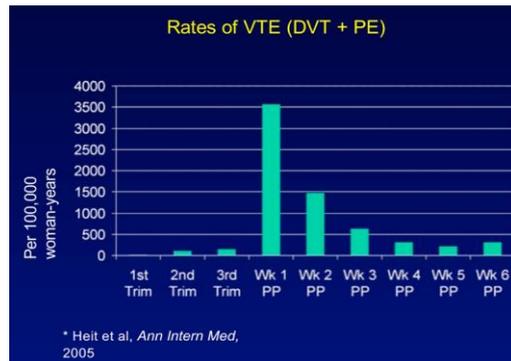


## Clinical update no. 535

17 April 2019

There are 2 new studies to guide workup of suspected pulmonary embolus in pregnancy.

Anecdotally, all pregnant women feel short of breath. The threshold to workup PE is unclear, though prompted by some combination of dyspnoea, chest pain, other risk factors and likely alternate diagnosis.



Risk increases substantially post-partum. Overall risk still low prior to delivery (2:1,000). Risk is 25x higher if prior DVT, 10x post LSCS, and 6x with IVF. Pre-eclampsia is in the differential and must be ruled out first.



There is some data on the PERC rule modified for pregnancy. Of those worked up for PE, vital signs did not distinguish those with PE v those with another cause of symptoms. In pregnancy a HR of 105 bpm can replace the standard PERC of 100. As well, the threshold d-dimer is 2.5x normal by the third trimester, 2x in the second and 1.5x in the first.

ORIGINAL RESEARCH *Annals of Internal Medicine*

### Diagnosis of Pulmonary Embolism During Pregnancy

A Multicenter Prospective Management Outcome Study

Marc Righini, MD; Hella Robert-Ebadi, MD; Antoine Elias, MD, PhD; Olivier Sanchez, MD, PhD; Emmanuelle Le Moigne, MD; Jeanne Schmidt, MD; Catherine Le Gall, MD; Jacques Cornuz, MD, PhD; Drahomir Augesky, MD, MSc; Pierre-Marie Roy, MD, PhD; Céline Chausser, MD, PhD; Olivier T. Rutshamm, MD; Pierre-Alexandre Pulenti, MD; and Grégoire Le Gal, MD, PhD; for the CT-PE-Pregnancy Group\*

*Ann Intern Med*. 2018;169:766-773.

A prospective validation of an algorithm to work up suspected PE in pregnancy.

PE was ruled out if low/intermediate probability (Geneva score) and -ve d-dimer (<0.5 mg/L).

If d-dimer >0.5 mg/L a duplex US was done, and anticoagulation given if +ve.

If US -ve then CT-PA was done. V/Q was done if CT-PA was inconclusive. If a -ve workup then withholding anticoagulation was safe.

PE was diagnosed in 7%. 99% had low/mod. pretest probability (among those with high probability there was a +ve workup in 10%).

12% had -ve d-dimer (< 0.5/L) and required no further workup (25% d-dimer -ve in 1<sup>st</sup> trimester; 4% in 3<sup>rd</sup>).

US diagnosed 5 of the 28 cases, but when done US was +ve for DVT in only 2%, i.e. a low yield investigation, especially if no signs.

Of the CT-PAs done, 85% were -ve, 5.6% +ve, and 6.7% inconclusive (unusually high).

Of note a higher d-dimer cutoff in 3<sup>rd</sup> trimester is likely safe but was not tested. There was noncompliance with the algorithm with imaging often done when not indicated, reflecting underlying risk aversion.

EDITORIAL

*Annals of Internal Medicine*

### Diagnosing Pulmonary Embolism During Pregnancy: Which Test Is Best?

Both CTPA and V/Q scanning result in relatively low radiation exposure to the fetus. Maternal radiation exposure (particularly to the breast) is lower with V/Q scanning.

More research is needed to establish pretest probability rules tailored to pregnant women as well as optimal D-dimer levels by trimester.

THE NEW ENGLAND JOURNAL OF MEDICINE

ORIGINAL ARTICLE

### Pregnancy-Adapted YEARS Algorithm for Diagnosis of Suspected Pulmonary Embolism

for the Artemis Study Investigators\*

N ENGL J MED 380:12 NEJM.ORG MARCH 21, 2019

Pulmonary embolism is a leading cause of maternal death.

This was prospective evaluation of the YEARS criteria and d-dimer to workup of PE in pregnancy. It was an extension of the previous YEARS study in non pregnant patients, adding duplex US for DVT prior to CT-PA if symptoms of DVT.

Order D-dimer test and assess presence of the three YEARS criteria:

1. Clinical signs of deep-vein thrombosis
2. Hemoptysis
3. Pulmonary embolism as the most likely diagnosis

Pulmonary embolism was ruled out if

- No criteria present & d-dimer <1.0 mg/L
- ≥1 criteria present & d-dimer < 0.5 mg/L

If not ruled out then duplex US was done if symptoms of DVT. If US +ve then patient treated with no further workup. Otherwise CT-PA was done.

Primary outcome was VTE at 3mth.

**Results:** PE was diagnosed in 4% of 510 women evaluated. At 3 mth a single DVT and no PE was diagnosed in those with a -ve workup. A CT-PA was safely avoided in 39% overall by using this approach by using d-dimer and US for DVT prior to CT-PA (more so in the 1<sup>st</sup> trimester, with CT-PA avoided in 65%, compared to 32% avoided in the 3<sup>rd</sup>).

**Table 1. Demographic and Baseline Characteristics of Pregnant Patients with Suspected Pulmonary Embolism.\***

| Characteristic                                    | Patients (N=498) |
|---|------------------|
| Mean age (±SD) — yr                               | 30±5.8           |
| Median duration of pregnancy (IQR) — wk           | 25 (17–31)       |
| Trimester of pregnancy — no. (%)                  |                  |
| First: 0 to 12 wk 6 days of gestation             | 74 (15)          |
| Second: 13 wk 0 days to 26 wk 6 days of gestation | 193 (39)         |
| Third: 27 wk 0 days to 42 wk of gestation         | 231 (46)         |
| YEARS criteria — no. (%)                          |                  |
| Patients who met no criteria                      | 252 (51)         |
| Patients who met one to three criteria            | 246 (49)         |
| Clinical signs of deep-vein thrombosis            | 47 (19)          |
| Hemoptysis  | 19 (7.7)         |
| Pulmonary embolism as the most likely diagnosis   | 218 (89)         |

There were clinical signs of DVT in 19%, and when done DVT was confirmed in 7% of those (3/43 scans confirmed DVT; 1.4% of total cohort). It is a very low yield investigation even with signs of DVT.

A further 79 patients had US in absence of signs of DVT, and was +ve in a single case.

In conclusion, the pregnancy-adapted YEARS diagnostic algorithm safely ruled out acute pulmonary embolism in pregnant patients

Two coroners cases highlight the difficulty in diagnosis of PE in low risk patients.

FINDING INTO DEATH WITH INQUEST

[https://www.coronerscourt.vic.gov.au/sites/default/files/2018-12/elizabethmarygorman\\_370312.pdf](https://www.coronerscourt.vic.gov.au/sites/default/files/2018-12/elizabethmarygorman_370312.pdf)

I find that Elizabeth Mary Gorman aged 35 years, died at the Royal Melbourne Hospital on 5 September, 2012,

From, 1(a) PULMONARY THROMBOEMBOLUS AND PULMONARY INFARCTION

CONTRIBUTING FACTORS (ELEVEN WEEKS GESTATION)

A coroners report of death from DVT/PE at 11 weeks gestation noted chest pain initially attributed to rib pain from vomiting. There was no dyspnoea. Initial HR 105 bpm settled to 80, with normal RR and BP, with chest wall tenderness. Ambulance was called to home the next day with HR 160 and unrecordable BP, followed by cardiac arrest while being assessed. Thrombolysis was given followed by surgical thrombectomy and ECMO, with death some hours later.

Expert opinion concluded that PE was unlikely based on symptoms at initial presentation, and that workup and diagnosis of PE is complex.

STATE CORONER'S COURT OF NEW SOUTH WALES

<http://www.coroners.justice.nsw.gov.au/Documents/KLINE%20Stephen%20-%20Findings%20-%20Final.pdf>

An inquest into death from PE of a low risk burns patient while under police guard in hospital and handcuffed to the bed. Recommendations highlighted error related to the eMR and electronic prescribing (eMeds).

I that, in consultation with the NSW Ministry of Health, consideration be given to requesting that the developer of the eMeds software system ensure that users of the system are readily able to distinguish between medication that is actively being administered to a patient and medication that has been cancelled, irrespective of the on-screen information

|  |                                       |
|--|---------------------------------------|
| <b>VENOUS THROMBOEMBOLISM (VTE) RISK ASSESSMENT TOOL</b>                                   | LOCATION / WARD                       |
|  | COMPLETE ALL DETAILS OR AFFIX PATIENT |
| For use in adult patients (>16 years) admitted to a NSW public hospital or health service. |                                       |

[www.cec.health.nsw.gov.au/\\_data/assets/pdf\\_file/0010/458821/Venous-Thromboembolism-VTE-Risk-Assessment-Tool.pdf](http://www.cec.health.nsw.gov.au/_data/assets/pdf_file/0010/458821/Venous-Thromboembolism-VTE-Risk-Assessment-Tool.pdf) - risk assesment involves a 2 page checklist detailing 21 risk factors to be done on all patients.

These updates are a review of current literature at the time of writing. They do not replace local treatment protocols and policy. Treating doctors are individually responsible for following standard of care.