

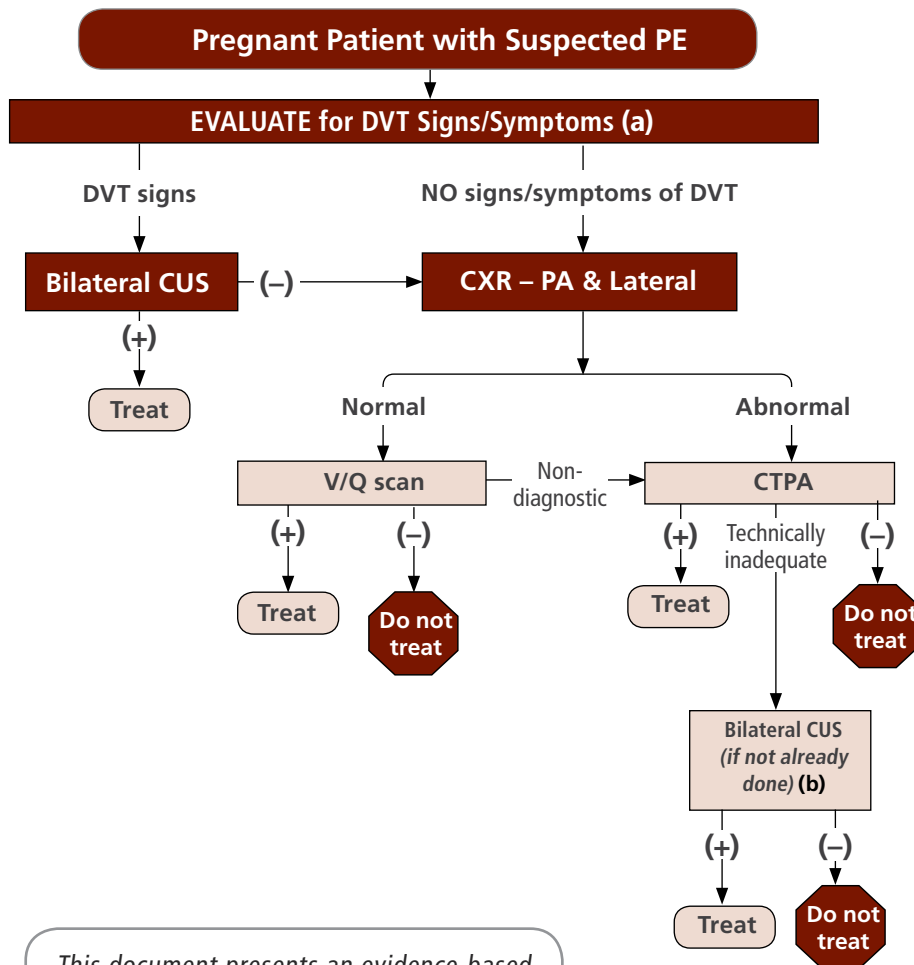


APPROPRIATE USE GUIDELINES FOR

Evaluation of Suspected Pulmonary Embolism in Pregnancy

Pulmonary embolism (PE) in pregnancy, although infrequent, is nevertheless the leading cause of maternal deaths in the US.¹ Accurate and rapid diagnosis is critical to prevent mortality. Evaluating for PE in pregnancy is a challenge, because the physiological changes of pregnancy can overlap with the signs and symptoms of PE or deep vein thrombosis (DVT).

This care process model recommends an evidence-based protocol to evaluate suspected PE in pregnant patients (see the algorithm below). Based on recognized guidelines² and expert consensus, it represents a collaborative effort including Intermountain's Cardiovascular, Intensive Medicine, and Women and Newborn Clinical Programs; Intermountain's Imaging Service; and Intermountain Medical Center's Thrombosis Clinic, Department of Medicine, and Department of Emergency Medicine.



ABBREVIATIONS

- CTPA: CT pulmonary angiogram
- CUS: Venous compression ultrasound
- CXR: Chest x-ray
- DVT: Deep venous thrombosis
- V/Q scan: Ventilation/perfusion lung scan

ALGORITHM NOTES

(a) DVT signs/symptoms include leg pain, tenderness, edema, redness, and warmth. In pregnancy, thrombosis is more common on the left side in the first trimester, and is restricted to the femoral or iliac veins in over 50% of cases.^{3,4}

(b) Bilateral CUS after a technically inadequate CTPA. A repeat CTPA should be performed only if a review of prior study suggests a technical cause that can be remedied or improved. A positive CUS may preclude the need for further tests that involve radiation. Consider repeating the CUS twice, on days 3 and 7. While serial ultrasound has not been directly studied in suspected PE, this strategy excludes suspected DVT (the most common etiology of PE) in pregnant patients.⁵

See page 2 for key points that provide background and support for this algorithm.

This document presents an evidence-based approach that is appropriate for most patients. It should be adapted to meet the needs of individual patients and situations and should not replace clinical judgment.

► Key Points

- **PE pretest probability scoring systems are not suggested in pregnancy.** Clinical prediction guidelines such as the Geneva or Wells criteria have not been validated in pregnant women. Therefore, clinicians must rely on their judgment.² While pregnancy is a strong risk factor for PE, only a small minority of pregnant women evaluated for PE will actually have the disease. This is likely due to the fact that symptoms of PE overlap with those of normal pregnancy.
- **D-dimer testing is not recommended in pregnancy.** Retrospective studies and case reports of false negative D-dimers in pregnant women with documented PE suggest that a negative D-dimer cannot rule out PE in pregnancy.² In addition, a majority of pregnant women have an elevated D-dimer test in the 2nd and 3rd trimester.
- **Concerns about radiation are heightened in pregnant patients.** Clinicians must consider radiation exposure both to the fetus and to the mother. Radiation doses from CTPA and V/Q scans to the fetus are very similar and low (about 1 mSv)^{2,6} and nearly equivalent to the background radiation to the fetus during a typical pregnancy. This is far below the 50 mSv threshold of concern for altered growth or abnormal brain development, but may still be associated with the slight excess risk of childhood cancer of 1 in 100,000.⁷ The exposure to the developing maternal breast tissue from a typical CTPA at 10 to 60 mSv, however, is significantly higher than the typical 0.28 mSv dose from a V/Q scan.^{2,8} The higher-dose CTPA, therefore, puts the mother at higher risk for a radiation-induced breast cancer than would a lower-dose V/Q scan. For this reason, and the technical factors described below, V/Q is the preferred test for pregnant patients with suspected PE.
- **Starting with bilateral CUS, if DVT signs are present, allows you to treat without any workup involving radiation if the bilateral CUS results are positive.** A negative CUS does not exclude PE, as PE can commonly be present without DVT.
- **Starting with a chest x-ray if no DVT signs are present, or if the bilateral CUS is negative, allows you to decide between a V/Q scan and a CTPA.** If the chest x-ray is negative and the patient has no history of asthma or COPD, a V/Q scan is preferred.
- **CTPA results are more often indeterminate in pregnancy and, conversely, V/Q scans are more often diagnostic.** Approximately 17% to 36% of CTPAs are nondiagnostic in pregnancy, largely because the physiologic changes related to pregnancy can lead to poor arterial enhancement on CTPA. On the other hand, because pregnant patients are often young and healthy, V/Q scans are more often diagnostic (up to 94% of the time in patients with normal chest x-rays and no asthma or COPD).²

► References

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► Additional Resources

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A CPM on suspected PE in nonpregnant patients is also available. Click the picture to open it.

