Use and efficiency of two advanced imaging-reducing strategies in the diagnostic evaluation of suspected antenatal pulmonary embolism

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BACKGROUND

Advanced imaging to diagnose pulmonary embolism (PE) during pregnancy increases costs, ionizing radiation exposure, and risk of overdiagnosis. D-dimer (DD) can safely exclude PE and compression ultrasonography (CUS) can diagnose deep vein thrombosis (DVT), both reducing advanced imaging needs. How these 2 advanced imaging-reducing strategies are employed in community antenatal PE diagnostics is unknown.

METHODS

DESIGN, SETTING, SUBJECTS, and OUTCOMES: We undertook a retrospective cohort study across 21 U.S. community hospitals from 10/2021 to 3/2023. We included pregnant adults who underwent DD, CUS, or advanced imaging for suspected PE. The main outcome was avoidance of advanced imaging, measured by the number needed to test (NNT) to avoid 1 advanced imaging study using low-to-intermediate DD values (<1.0 mg/L) or a positive CUS. Variables associated with DD testing were reported as adjusted relative risks (aRRs) using quasi-Poisson regression.

DATA COLLECTION: Extraction of structured variables from electronic databases combined with manual chart review.

RESULTS

Among 720 outpatients, median age was 30.2 years (IQR 26.0-35.0); 268 (37.2%) were in the third trimester. **DD** was obtained in 534 (72.4%) patients. Advanced imaging was not…

CONCLUSIONS

D-dimer use was efficient and safe but could be expanded across settings and patients. Clinician education should emphasize the value of D-dimer in L&D settings and among third-trimester patients and those with signs and symptoms of DVT.

Ultrasonography efficiency was low but could be improved with symptom-driven use, as recommended by society guidelines.

APPENDIX

- This study was generously funded by the Kaiser Permanente Northern California Community Health Program.
- The full manuscript will be published in the fall.
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RESULTS (CONT.)

…pursued in 96.1% (149/154) of those with low (<0.5 mg/L) and 45.8% (82/179) with intermediate (≥0.5<1.0 mg/L) DD values, yielding an NNT of 2.3 (524/231), 95% CI 2.0, 2.6. No 90-day venous thromboembolism or death occurred following rule-outs. Adjusted RRs are presented in the Table.

Table. Adjusted RRs of DD testing during antenatal PE diagnostics

Characteristic	Adjusted RR	P value
Age ≥40 years (vs <40 years)	1.00 (0.80, 1.23)	>0.99
Gestational age, trimester		0.015
First (<14 weeks)	—	
Second (14-27 weeks)	0.99 (0.88, 1.11)	
Third (≥28 weeks)	0.85 (0.75, 0.97)	
Clinical findings		
Syncope or presyncope (vs none)	0.98 (0.82, 1.15)	0.79
Unilateral DVT sxs (vs none)	0.67 (0.54, 0.82)	<0.001
Max HR ≥110 bpm (vs <110)	1.05 (0.95, 1.16)	0.36
Lowest pulse ox <95% (vs ≥95%)	1.11 (0.88, 1.36)	0.37
Site of evaluation		<0.001
Emergency department	—	
Labor and Delivery	0.27 (0.20, 0.35)	
Outpatient clinic	0.12 (0.03, 0.29)	
Non-consent to recommended advanced imaging	1.01 (0.88, 1.16)	0.86

CUS was obtained in 229 (31.8%) patients, diagnosing DVT in 3 (1.3%). Advanced imaging was not pursued in 2 of these, yielding an NNT of 115 (229/2), 95% CI 32, 417. CUS use and results varied by DVT symptoms. Among 55 with DVT symptoms, 46 (83.6%) underwent CUS, which was positive in 3 (yield 6.5%). Among 665 without symptoms, 183 (27.5%) underwent CUS, which was negative in all (yield 0%). NNT would have been lower (23 [46/2]; 95% CI 7-170) if CUS was not used in patients without DVT symptoms.