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Original Contribution

## Multicenter Evaluation of the YEARS Criteria in Emergency Department Patients Evaluated for Pulmonary Embolism

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### Abstract

#### Background

It may be possible to safely rule out pulmonary embolism (PE) in patients with low pre-test probability (PTP) using a higher than standard D-dimer threshold. The YEARS criteria, which includes three questions from the Wells PE Score to identify low PTP patients and a variable D-dimer threshold, was recently shown to decrease the need for imaging to rule out PE by 14% in a multicenter study in the Netherlands. However, the YEARS approach has not been studied in the United States.

#### Methods

Prospective, observational study of consecutive adult patients evaluated for PE in 17 U.S. emergency departments. Prior to diagnostic testing, we collected the YEARS criteria: "Does the patient have clinical signs or symptoms of DVT?",

"Does the patient have hemoptysis?", "Are alternative diagnoses less likely than YEARS" with YEARS (+) being any "yes" response. A negative D-dimer was  $<1000$  mg/dL for YEARS (-) patients, and  $<500$  mg/dL for YEARS (+) patients. We calculated test characteristics and used Fisher's exact test to compare proportions of patients who would have been referred for imaging and patients who would have had PE "missed."

## Results

Of 1789 patients, 84 (4%) had PE, 1134 (63%) were female, 1038 (58%) were White and mean age was 48 years. Using the standard D-dimer threshold, 940 (53%) would not have had imaging, with 2 (0.2%, 95% CI: 0.02%, 0.60%) "missed" PE. Using YEARS adjustment, 1204 (67%, 95% CI: 65%, 69%) would not have been referred for imaging, with 6 (0.5%, 95% CI: 0.18%, 1.1%) "missed" PE, and using "alternative diagnoses less likely than PE" adjustment, 1237 (69%, 95% CI: 67%, 71%) would not have had imaging with 6 (0.49%, 95% CI: 0.18%, 1.05%) "missed" PE. Sensitivity was 97.6% (95% CI: 91.7%-99.7%) for the standard threshold, and 92.9% (95% CI: 85%-97%) for both adjusted thresholds. NPV was nearly 100% for all approaches.

## Conclusions

D-dimer adjustment based on pre-test probability may result in a reduced need for imaging to evaluate possible PE, with some additional "missed" PE but no decrease in NPV.

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