

# Age-adjusted versus cut-off for D-dimer to exclude pulmonary embolism audit

**Authors:** Tamer Shalaby Boutrus,<sup>A</sup> Ibrahim Benshaban,<sup>A</sup> Joby Landa,<sup>A</sup> Shaheryar Khan<sup>A</sup> and Michael Hannides<sup>A</sup>

## Aim

The aims in our trust were to change the cut-off of 500 µg/L to age adjusted D-dimer (AAD) in patients who are aged 50 years or above, improve the documentation of pre-test probability in clinical notes and encourage our radiology department to mention the presence or absence of right ventricular heart strain in their reports.

## Method

We retrospectively reviewed 400 computed tomography pulmonary angiographies (CTPAs) for patients aged 50 years or more; comparing age, gender, laboratory D-dimer, AAD, CTPA result and pre-test probability.

The D-dimer result was interpreted according to our conventional cut-off (500 µg/L), in addition, an age-adjusted cut-off was analysed, which is considered negative if D-dimer was lower than a patient's age (in years) × 10.<sup>1</sup>

## Results

Of the 400 scans, 300 matched the criteria for the study. Pre-test probability was documented in 50/300 (16.6%) and D-dimer checked in 173/300 (57.6%) patients.

From 173 patients, 36 (20.8%) patients had a finding of pulmonary embolism (PE), all should have had the scan in accordance with AAD recommendations (100%).

One-hundred and thirty-seven patients had D-dimer over 500 µg/L but negative for PE and 24 (17.5%) patients had D-dimer over 500 µg/L but below AAD were all negative on imaging for PE (100%).

D-dimer was not checked in 127/300 and 22 (18.6%) patients had finding of PE.

Fifty-eight out of 300 patients had imaging findings of PE, only 37 (63.7%) patients had a mention of right heart strain within the imaging report.

We presented the findings in grand round and delivered multiple teaching sessions to junior doctors and specialist nurses.

Re-audit of 100 CTPAs for patients aged 50 years or more were reviewed; 23 (23%) were found to be positive on imaging for PE. Of the 23, three (13%) patients would not have been suitable for imaging if the AAD was the only factor considered when referring

the patient for imaging. However, the pre-test probability was not reviewed for these patients and this could have been the indications for referring these patients for imaging.

Eleven (11%) patients were negative for PE and under AAD and would not have been referred for imaging if the principals of the AAD guidelines had been applied (assuming low probability score).

## Conclusion

This audit highlighted the importance of documentation and full consideration of patients prior to referring for imaging. Initial audit found that, if AAD theory had been applied, then it would have prevented 24 patients from having CTPA.<sup>2</sup> However, the re-audit demonstrated that 23 patients would not have fit the criteria for AAD, even though three patients were positive for PE on imaging.

Overall, there was poor documentation regarding pre-test probability score and low assurance within the radiology reports regarding right heart strain, in keeping with the NCEPOD report.<sup>3</sup>

Without robust documentation it has been difficult to assess the validity of the use of AAD in line with national guidelines.<sup>4</sup> Further work is required to ensure robust documentation and improvement of training and then re-audit. ■

## References

- 1 Righini M, Van Es J, Den Exter PL *et al.* Age-Adjusted D-Dimer Cutoff Levels to Rule Out Pulmonary Embolism: The ADJUST-PE Study. *JAMA* 2014;311:1117–24.
- 2 Douma RA, le Gal G, Söhne M *et al.* Potential of an age adjusted D-dimer cut-off value to improve the exclusion of pulmonary embolism in older patients: a retrospective analysis of three large cohorts. *BMJ* 2010;340:c1475.
- 3 National Confidential Enquiry into Patient Outcome and Death. *Know the Score: A review of the quality of care provided to patients aged over 16 years with a new diagnosis of pulmonary embolism.* NCEPOD, 2019
- 4 National Institute for Health and Care Excellence. *Venous thromboembolic diseases: diagnosis, management and thrombophilia testing: NICE guideline [NG158].* NICE, 2020.

**Author:** <sup>A</sup>Royal Bolton Hospital, Bolton, UK