# Best approach in d-dimer algorithm to exclude pulmonary thromboembolism: a comparative study

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**Background:** Ruling out pulmonary embolism (PE) through a combination of clinical assessment and Ddimer is crucial to avoid excessive computed tomography pulmonary angiography (CTPA), and different algorithms should be considered as an alternative to the fixed cutoff to achieve that goal.

**Purpose:** To compare sensitivity, specificity, and reduction in CTPA requests of 4 algorithms to rule out PE: fixed Ddimer cutoff, age-adjusted, YEARS and PEGeD.

**Methods:** Retrospective study of consecutive outpatients who presented to the emergency department and underwent CTPA for PE suspicion from April 2019 to February 2020. The clinical-decision algorithms were retrospectively applied.

In fixed and age-adjusted cutoffs, high probability patients are directly selected for CTPA and the others perform CTPA if Ddimer ≥500µg/L or age x10 µg/L within patients over 50 years, respectively. YEARS includes 3 items (signs of deep vein thrombosis, haemoptysis and whether PE is the most likely diagnosis): patients without any YEARS items and Ddimer ≥1000ng/mL or with ≥1 items and Ddimer 500ng/mL perform CTPA. In the PEGeD, patients with high clinical probability or with intermediate and Ddimers >500µg/L or low probability and Ddimer >1000 µg/L are selected for CTPA.

**Results:** We enrolled 409 patients and PE was confirmed by CTPA in 125 patients. Compared with a fixed Ddimer cutoff, age-adjusted was associated with a significant increased of specificity ($p < 0.001$), correctly avoiding 29 CTPAs, without losing sensitivity. YEARS resulted in a marked increase in specificity, compared to the fixed cutoff, but with an impairment of sensitivity($p = 0.002$). PEGeD had the worst sensitivity, associated with 11 more false negatives (FN) than the fixed cutoff. Despite the lack of difference between PEGed and YEARS strategies regarding sensitivity, YEARS had a significantly higher specificity ($p < 0.001$) and allowed to correctly avoid a higher number of CTPA(55 vs 63), compared to the fixed cutoff. Results are summarized in table 1.

**Conclusion:** Compared to fixed d-dimer cutoff, all algorithms were associated with an increased specificity. Age-adjusted cutoff was the only that is not associated with a significant decrease in sensitivity when compared to fixed cutoff, allowing to safely reduce the need to perform CTPA.

| | Sens(%) | Spec(%) | Correctly avoid CTPAs(n) | FN(n) |
|---|---|---|---|---|
| Fixed cutoff | 95 | 29 | 85 | 6 |
| Age-adjusted | 93 | 40 | 114 | 9 |
| YEARS | 87 | 52 | 148 | 16 |
| PEGeD | 86 | 49 | 140 | 17 |