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Woller SC, Stevens SM, Adams DM, et al. Assessment of the safety and efficiency of using an age-adjusted D-dimer threshold to exclude suspected pulmonary embolism. Chest. 2014; 146(6):1444-1451.

CLINICAL QUESTION: Can unnecessary imaging be avoided by using an age-adjusted D-dimer without compromising patient safety.

INTRODUCTION: Using D-dimer in conjunction with pretest probability, as determined by clinical decision rules, has high sensitivity for venous thromboembolism. However, the specificity of D-dimer is low, and since D-dimer levels increase with age, there are an increased number of false positives and unnecessary CT pulmonary angiography (CTPA) studies performed in the elderly. This study investigates both the efficiency and safety of adopting guidelines for age-adjusted D-dimer threshold.

METHODS: This was a retrospective review of records of 923 patients aged >50 who underwent CTPA for suspected PE and had both a low calculated Revised Geneva Score (RGS) and a D-dimer performed. Age-adjusted D-dimer threshold was calculated by multiplying patient's age by 10 ng/mL. A false-negative was defined as PE found on initial CTPA or within 90 days in a person who had a negative initial D-dimer finding.

RESULTS: Of 104 patients with a negative conventional D-dimer and an RGS ≤ 10, no PE was observed within 90 days (false-negative rate, 0%; 95% CI, 0%-2.8%). Of 273 patients with a negative age-adjusted D-dimer result and an RGS ≤ 10, four PEs were observed within 90 days (false-negative rate, 1.5%; 95% CI, 0.4%-3.7%). There was an 18.3% (95% CI, 15.9%-21.0%) absolute reduction in the proportion of patients aged > 50 years who would require CTPA by using an age-adjusted D-dimer threshold compared to the conventional D-dimer threshold.

LIMITATIONS: This was a retrospective review of patient records. RGS was determined by chart review and symptoms were considered absent if not recorded. Additionally, the study only included patients who underwent CTPA rather than all patients presenting with suspected PE, and therefore the study is subject to selection bias.

DISCUSSION: The use of age-adjusted D-dimer threshold did reduce imaging among the studied population of persons age >50 with low-risk RGS score. However, when compared to baseline set by conventional D-dimer threshold (0% false negative), there was an increased in the false-negative rate (1.5%) which represents PE that would have been missed due to incorrectly ruling out the diagnosis based on age-adjusted D-dimer thresholds. Additional studies are needed to investigate other formulas for calculating age-adjusted thresholds, as well as testing via prospective study. However, this study does support the improved efficiency of an age-adjusted D-dimer and shows that it is probably safe. Future studies may change the way D-dimer is used in PE rule-out in the elderly population.

Additionally, the Well's Score for PE rule-out is used more commonly, whereas this study identified a low-risk population based on an RGS ≤ 10. Although the RGS is very similar to the Well's Score, additional studies would necessary to validate an age-adjusted threshold in conjunction with Well's Score.