



A Computerized Handheld Decision-Support System to Improve Pulmonary Embolism DiagnosisA Randomized Trial

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Background: Testing for pulmonary embolism often differs from that recommended by evidence-based guidelines. Objective: To assess the effectiveness of a handheld clinical decision-support system to improve the diagnostic work-up of suspected pulmonary embolism among patients in the emergency department. Design: Cluster randomized trial. Assignment was by random-number table, providers were not blinded, and outcome assessment was automated. (ClinicalTrials.gov registration number: NCT00188032) Setting: 20 emergency departments in France. Patients: 1103 and 1768 consecutive outpatients with suspected pulmonary embolism. Intervention: After a preintervention period involving 20 centers and 1103 patients, in which providers grew accustomed to inputting clinical data into handheld devices and investigators assessed baseline testing, emergency departments were randomly assigned to activation of a decision-support system on the devices (10 centers, 753 patients) or posters and pocket cards that showed validated diagnostic strategies (10 centers, 1015 patients). Measurements: Appropriateness of diagnostic work-up, defined as any sequence of tests that yielded a posttest probability less than 5% or greater than 85% (primary outcome) or as strict adherence to guideline recommendations (secondary outcome); number of tests per patient (secondary outcome). Results: The proportion of patients who received appropriate diagnostic work-ups was greater during the trial than in the preintervention period in both groups, but the increase was greater in the computer-based guidelines group (adjusted mean difference in increase, 19.3 percentage points favoring computer-based guidelines [95% CI, 2.9 to 35.6 percentage points]; $P = 0.023$). Among patients with appropriate work-ups, those in the computer-based guidelines group received slightly fewer tests than did patients in the paper guidelines group (mean tests per patient, 1.76 [SD, 0.98] vs. 2.25 [SD, 1.04]; $P < 0.001$). Limitation: The study was not designed to show a difference in the clinical outcomes of patients during follow-up. Conclusion: A handheld decision-support system improved diagnostic decision making for patients with suspected pulmonary embolism in the emergency department. Primary Funding Source: French National Hospital Clinical Research Project.

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