Clinical decision support increases diagnostic yield of computed tomography for suspected pulmonary embolism

Angela M. Mills, Ivan K. Ip, Curtis P. Langlotz, Ali S. Raja, Hanna M. Zafar, Ramin Khorasani

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ABSTRACT

Objective: Determine effects of evidence-based clinical decision support (CDS) on the use and yield of computed tomographic pulmonary angiography for suspected pulmonary embolism (CTPE) in Emergency Department (ED) patients.

Methods: This multi-site prospective quality improvement intervention conducted in three urban EDs used a pre/post design. For ED patients aged 18+ years with suspected PE, CTPE use and yield were compared 19 months pre- and 32 months post-implementation of CDS intervention based on the Wells criteria, provided at the time of CTPE order, deployed in April 2012. Primary outcome was the yield (percentage of studies positive for acute PE). Secondary outcome was utilization (number of studies/100 ED visits) of CTPE. Chi-square and statistical process control chart assessed pre- and post-intervention differences. An interrupted time series analysis was also performed.

Results: Of 558,795 patients presenting October, 2010-December, 2014, 7,987 (1.4%) underwent CTPE (mean age 52 +/- 17.5 years, 66% female, 60.1% black); 34.7% of patients presented pre- and 65.3% post-CDS implementation. Overall CTPE diagnostic yield was 9.8% (779/7,987 studies positive for PE). Yield increased a relative 30.8% after CDS implementation (8.1% vs. 10.6%; p=0.0003). There was no statistically significant change in CTPE utilization (1.4% pre- vs. 1.4% post-implementation; p=0.25). A statistical process control chart demonstrated immediate and sustained improvement in CTPE yield post-implementation. Interrupted time series analysis demonstrated the slope of PE findings versus time to be unchanged before and after the intervention (p=0.9). However, there was a trend that the intervention was associated with a 50% increased probability of