The cost-effectiveness of diagnostic algorithms for deep vein thrombosis.

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Introduction: Deep vein thrombosis (DVT) has an annual incidence of around 1 per 1,000. DVT can lead to potentially fatal pulmonary embolus and long-term complications such as post-thrombotic syndrome. Anticoagulant treatment reduces the risk of adverse outcomes but carries a small risk of haemorrhage. As around 15% of patients who present to the emergency department with clinical suspicion of DVT are diagnosed with DVT, accurate and cost-effective diagnosis is essential. Diagnostic strategies use combinations of cheap, simple but less accurate tests such as clinical risk scores and D-dimer blood tests to select patients for further testing with more expensive, accurate modalities. The optimal diagnostic strategy for DVT remains unclear. We therefore aimed to estimate the diagnostic accuracy and cost-effectiveness of algorithms used to test patients with clinically suspected DVT.

Methods: Algorithms were identified by postal survey of emergency departments and literature review. The accuracy of each constituent diagnostic test was estimated by systematic review and meta-analyses. A decision-analytic model was then used to estimate the overall accuracy of each algorithm and the outcomes of testing and treatment, valued as quality-adjusted life-years (QALYs). The net benefit of using each algorithm was estimated using cost-utility analysis, assuming thresholds of willingness to pay of £20,000 and £30,000 per QALY.

Results: The most cost-effective algorithms used D-dimer to discharge low-risk patients. If we are willing to pay up to £20,000 per QALY the most cost-effective and practical strategy is to discharge patients with a low or intermediate clinical risk score and negative D-dimer, ultrasound for those with a high score or positive D-dimer, and repeat ultrasound for those with positive D-dimer and high clinical risk score, but negative initial scan. If we are willing to pay £30,000 per QALY the optimal strategy would also offer repeat ultrasound for all patients with a negative initial scan.

An alternative strategy using plethysmography alongside ultrasound, with venography for discordant cases, appears to be very cost-effective, but depends upon assumptions of test independence being met and ability to provide plethysmography at relatively low cost.

Conclusions: Diagnostic algorithms based on combinations of clinical risk scores, D-dimer and ultrasound are among the most cost-effective. Further diagnostic testing for patients with a low clinical risk score and negative D-dimer is unlikely to represent a cost-effective use of resources. Cost-effectiveness of repeat ultrasound depends upon our threshold for willingness to pay for health gain. The role of plethysmography needs further evaluation.