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Title **Measurement of the Clinical and Cost Effectiveness of Non-Invasive Diagnostic Testing Strategies for Deep Vein Thrombosis**

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Aim

- To estimate the diagnostic accuracy of non-invasive tests for proximal deep vein thrombosis (DVT) and isolated calf DVT in patients with suspected DVT or high-risk asymptomatic patients, and identify factors associated with diagnostic variations.
- To identify practical diagnostic algorithms for DVT, and estimate their diagnostic accuracy, clinical effectiveness, and cost effectiveness.

Conclusions and results

Individual clinical features are of limited diagnostic value, with most likelihood ratios being close to one. Wells clinical probability score stratifies proximal, but not distal, DVT into high, intermediate, and low risk. Unstructured clinical assessment by experienced clinicians may have similar performance to Wells score. In patients with clinically suspected DVT, D-dimer has 90% sensitivity and 55% specificity for DVT, although performance varies. D-dimer specificity depends on pretest clinical probability, being higher in patients with a low clinical probability of DVT. Plethysmography and rheography techniques have modest sensitivity for proximal DVT, poor sensitivity for distal DVT, and modest specificity. Ultrasound has 95% sensitivity for proximal DVT, 65% sensitivity for distal DVT, and specificity of 94%. CT scanning has sensitivity of 95% for all DVT (proximal and distal combined) and specificity of 97%. MRI scanning has sensitivity of 92% for all DVT and specificity of 95%. The diagnostic performance of all tests is worse in asymptomatic patients.

The most cost-effective algorithm discharged patients with a low Wells score and negative D-dimer without further testing, and then used plethysmography alongside ultrasound to diagnose the remaining patients. The cost effectiveness of this algorithm depended on certain assumptions. Plethysmography and venography are limited in the UK, so implementation would involve reorganizing services.

Two algorithms offered high net benefit and would be feasible in most hospitals, without substantial reorganization. Both involved a combination of Wells score, D-dimer, and above-knee ultrasound. For willingness-to-pay thresholds of GBP 10 000 or 20 000 the optimal strategy involved discharging patients with a low or intermediate Wells score and negative D-dimer, ultrasound for those with a high score or positive D-dimer, and repeat scanning for those with positive D-dimer and a high Wells score but negative initial scan. A similar strategy, but repeat ultrasound after a negative initial scan, was optimal at thresholds of GBP 30 000 and above.

Recommendations

Diagnostic algorithms based on a combination of Wells score, D-dimer, and ultrasound (with repeat if negative) are cost effective and feasible. Use of repeat scanning depends upon our threshold for willingness-to-pay for health gain. Further diagnostic testing of patients with a low Wells score and negative D-dimer is unlikely to be cost effective.

Methods

Diagnostic test data and diagnostic algorithms were sought from electronic database searches, 1966–2004; diagnostic test data were sought from bibliographies and manufacturers of assays and instruments; and a postal survey of UK hospitals identified current practice, test availability, and additional diagnostic algorithms. (See full report for details).

Further research/reviews required

1. Evaluate costs and outcomes of using the optimal diagnostic algorithms in routine practice.
2. Develop and evaluate algorithms for specific patient groups with suspected DVT.
3. Evaluate the role of plethysmography.
4. Methodological research on incorporating meta-analytic data into decision-analysis modeling.

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