The value of clinical assessment in the diagnosis of deep vein thrombosis: systematic review and meta-analysis

Steve Goodacre,1 Fiona Sampson,1 Alex Sutton2
1Medical Care Research Unit, University of Sheffield
2Department of Health Sciences, University of Leicester

Background
Clinical diagnosis should be based upon systematic evaluation of the scientific evidence. We aimed to systematically review the literature to determine the diagnostic accuracy of clinical features and clinical scores in patients presenting with suspected deep veins thrombosis (DVT).

Methods
We sought to identify all diagnostic cohort studies of patients with suspected DVT who had clinical features recorded, or a clinical score calculated, and who underwent diagnostic testing for DVT. We searched the following electronic databases (1966-2004): Medline, EMBASE, CINAHL, Web of Science, Cochrane Database of Systematic Reviews, Cochrane Controlled Trials Register, Database of Reviews of Effectiveness, and the ACP Journal Club. The bibliographies of all retrieved articles were scanned for potentially relevant articles that were not identified by the original search.

Titles and abstracts were screened by two independent reviewers (FS and SG). Full copies of all selected articles were retrieved and reviewed by the same two reviewers. We included studies published in English, French, Spanish or Italian, but excluded studies published in other languages. Quality was assessed against validated criteria.

Statistical Analysis
Pooled likelihood ratios for clinical features were calculated using a random effects model (MetaDisc statistical software). Meta-analysis of clinical scores used ordinal logistic regression, including a random study effect coefficient (WinBUGS software). Meta-regression was used in order to explore the influence of study covariates on diagnostic performance of the Wells score and potentially explain a proportion of the between study heterogeneity (NLMINEd procedure in SAS).

Results

Potentially relevant studies identified and screened for inclusion, n = 3320
Potentially suitable studies to be included in the meta-analysis, n = 70
Of the 49 papers:
• 29 reported clinical features
• 54 reported a clinical score
• 4 reported both
Among the studies reporting clinical probability scores:
• 21 reported Wells score
• 4 reported unstructured, empirical assessment by experienced clinicians
Figure 1 shows the pooled likelihood ratios for each clinical feature. Figure 2 shows the individual study estimates and pooled estimates of sensitivity and specificity for Wells score using two different thresholds for diagnosis: a) high versus intermediate and low risk, b) high and intermediate versus low risk.

Figure 1: Diagnostic value of clinical features for DVT

Figure 2: Performance of Wells score for detecting all DVTs for high versus intermediate and low, and high and intermediate versus low thresholds represented on the ROC plane with 95% CI

Results of meta-analysis of Wells clinical risk score for DVT
This table shows pooled estimates of how Wells score and unstructured clinical assessment categorise patients with and without DVT, and likelihood ratios for high and low categories.

How does Wells score work in practice?
A typical population of patients with suspected DVT (prevalence: 15% proximal, 4% distal) will be categorised by Wells score as follows: 20% will be high risk, 39% will be intermediate risk, and 41% will be low risk. The prevalence of DVT in each category will be:

What factors affect the performance of Wells score?
Meta-regression identified the following as potentially important covariates, associated with improved diagnostic performance:
• Lower mean subject age (p=0.009)
• Exclusion of persons with a previous history of DVT (p=0.016)
• Higher study quality (reference standard blind to Wells score) (p=0.03)

Conclusions
Clinical features, used in isolation, have limited value in diagnosing DVT. The likelihood of DVT is slightly raised by:
• Past history of DVT
• Known malignancy
• Recent surgery
• Difference in calf diameter
Wells score accurately stratifies patients with proximal but not distal DVT to high, intermediate and low risk categories. Unstructured, empirical clinical assessment may be as accurate as Wells score, but is less easily reproducible.

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