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*Editorial* PURLS: Translating research into reality PAGE 981

## Is it DVT? Wells score and D-dimer may avert costly workup

### Practice changer

Use a combination of Wells score and D-dimer test to exclude deep vein thrombosis in low- to intermediate-risk outpatients with suggestive symptoms.<sup>1</sup>

#### Strength of recommendation (SOR)

A: Based on one good meta-analysis

Goodacre S, Stevenson M, Wailoo A, Sampson F, Sutton AJ, Thomas S. How should we diagnose suspected deep-vein thrombosis? *QJM* 2006; 99:377-388.

### FAST TRACK

**Workups range from the accurate but costly (contrast venography) to the cheap but unreliable (clinical assessment)**

#### PURLS methodology

This study was selected and evaluated using FPIN's Priority Updates from the Research Literature Surveillance System methodology. The criteria and findings leading to the selection of this study can be accessed at [www.fjponline.com/purls](http://www.fjponline.com/purls).

### ILLUSTRATIVE CASE

Your patient is a 47-year-old man who has had pain and swelling in his right leg since yesterday. He has no history of cancer, recent travel, surgery, or blood clots. There has been no known trauma. You observe some tenderness in the calf, and no swelling. A Homan's sign is negative.

How would you assess for deep venous thrombosis?

### BACKGROUND

#### ■ What are costs, benefits of different strategies?

Wouldn't it be nice to be able to rule out deep vein thrombosis (DVT) with a simple history and blood test?

Most patients with suggestive symptoms do not have DVT, but workups for

this dangerous condition "range from the accurate but expensive (contrast venography) to the cheap but unreliable (clinical assessment)," noted the researchers who conducted this extensive analysis, seeking a cost-effective strategy to put into practice throughout the United Kingdom's National Health Service.<sup>1</sup> The NHS Health Technology Assessment R&D Program funded the study.

Until now, there has been little clear direction from formal comparisons. Although recent studies<sup>2</sup> suggest that combinations of simple diagnostic tests may reduce the need for expensive, definitive tests, none explicitly weigh the costs and benefits of the different strategies; despite a large amount of published data, practice varies considerably.<sup>1,3</sup>

### CLINICAL CONTEXT

#### ■ Guidelines conflict

While some clinical resources now recommend the Wells criteria and D-dimer as useful tools in the initial workup of suspected DVT,<sup>4,5</sup> others still recommend compression ultrasound or impedance plethysmography (IPG) as the initial or confirmatory test in all patients with suspected acute DVT.<sup>6</sup> These noninvasive tests do provide reassurance that there is no DVT, but they are costly and less convenient than the Wells score and a D-dimer.

**Current guidelines** give conflicting recommendations.

• The most recent American Thoracic Society guidelines, from 1999, recommend imaging with ultrasound or impedance plethysmography for all patients with suspected DVT.<sup>7</sup>

• In contrast, the Institute for Clinical Systems Improvement (ICSI) 2006 guidelines recommend first determining the clinical pretest probability of DVT using the Wells score, and then using a D-dimer test to determine which patients with a low probability test need to proceed to ultrasound. This algorithm recommends ultrasound for all patients with either a moderate or high Wells score.<sup>8</sup>

### Variety of D-dimer tests, range of sensitivities

One meta-analysis of 12 studies compared a highly sensitive ELISA D-dimer assay to the less sensitive SimpliRED D-dimer assay. In studies using the highly sensitive ELISA assay, in patients with negative D-dimer and low or moderate Wells score, the 3-month incidence of DVT was 0.5%. However, using the SimpliRED assay, while the 3-month incidence of DVT was 0.5% with negative D-dimer and low Wells score, it was 3.5% with negative D-dimer and intermediate Wells score.<sup>7</sup>

### STUDY SUMMARY

#### Seeking convenience and economy

This systematic review, meta-analysis, and decision analysis sought the most practical, cost-effective strategy to detect DVT. The researchers compared the findings of 18 studies of diagnostic strategies (or algorithms) that combined Wells score (TABLE), D-dimer, ultrasound, or venography, and that followed up patients with negative results for at least 3 months. They developed a decision analysis model to compare the algorithms in a hypothetical cohort of 1000 outpatients with suspected DVT.

Applying the estimated sensitivity and specificity of each algorithm to the



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### WHAT'S NEW?

## This evidence is definitive

This PURL may be old news to you if you have been watching the evolution of DVT risk scoring and the role of D-dimer. This is one of those approaches for which the evidence grows over time and the adoption spreads slowly. We felt that the cumulative evidence, especially this decision analysis,<sup>1</sup> clearly points to the most current Wells score and the D-dimer as the approach of choice for initial evaluation of suspected DVT. This more definitive evidence and the variability of practice both reported in the literature and described by our clinician reviewers led us to decide that this study is a priority update and a practice changer—even if it is a slow practice changer.

hypothetical population, they determined the proportions of patients with and without DVT who would receive treatment and which patients would suffer events relating to DVT or treatment, and then estimated lifetime health outcomes (quality-adjusted life years [QALYs]) and costs of testing and treatment.

Using thresholds for willingness to pay of £10,000, £20,000, and £30,000 per QALY, the study identified 2 optimal diagnostic strategies, both of which incorporated D-dimer testing and Wells score. While one strategy starts with Wells score and the other starts with D-dimer, both recommend that patients with a combination of a negative D-dimer test and an intermediate or low Wells score can be safely discharged without further testing.

One weakness of this study is that the authors made the assumption that ultrasound results are independent of Wells score or D-dimer. While it is unlikely that ultrasound results are related to D-dimer results, there is some evidence that ultrasound is more accurate in patients with higher Wells scores. However, if this true, the authors would have underestimated the cost-effectiveness of the favored strategies. Also, they did not include algorithms that involved plethysmography.

### FAST TRACK

**Whether you start with Wells score or D-dimer, the combination of negative D-dimer and low or intermediate Wells score indicates no further testing**

CONTINUED

## TABLE

### Wells score estimates probability of deep vein thrombosis

The elements of the Wells score should be ascertained in the usual evaluation of a patient with suspected DVT.

#### 1 POINT EACH FOR:

Active cancer  
Paralysis, paresis, recent plaster immobilization of lower limb  
Recently bedridden for >3 days or major surgery in past 4 weeks  
Localized tenderness along distribution of deep venous system  
Entire leg swollen  
Calf swelling >3 cm compared to asymptomatic leg  
Pitting edema  
Collateral superficial veins

#### -2 POINTS FOR:

Alternative diagnosis as likely or more likely than that of DVT

#### PROBABILITY:

High	>3 points
Intermediate	1 or 2 points
Low	<0 points

### FAST TRACK

The Wells score used in this meta-analysis (TABLE) is the most recent, most accurate, and best studied

#### CAVEATS

### One strategy doesn't fit all

The authors stress that their results are most applicable to outpatients with a suspected first DVT.<sup>1</sup>

- **D-dimer levels can be elevated** in pregnancy, myocardial infarction, cancer, trauma, and postsurgery. These recommendations do not apply to patients with any of these conditions, patients on anticoagulation therapy, intravenous drug abusers, or patients with recurrent DVT.

- **In practices where D-dimer testing is not feasible**, ultrasound remains an effective approach to suspected DVT.

#### CHALLENGES TO IMPLEMENTATION

### Haven't memorized the Wells score? No problem

As simple as it seems to add up the Wells score, most of us are not likely to recall the scoring system unless we use it often enough to have memorized it. Lack of immediate access to scoring systems in the context of a hectic schedule is a barrier to adoption.

Fortunately, many handheld and Web-based electronic knowledge resources are available for easy retrieval of the Wells DVT score. Some will even dynamically calculate the score for you.

Ideally, scoring systems such as this need to be integrated into electronic health records for easy access at the point of patient care.

#### Which Wells score?

There are several other scoring systems for estimating DVT risk, but the Wells DVT score is the best studied. To add to the confusion, Wells and his colleagues have made continuous improvements over time, such that there are several versions of the Wells DVT score.

In a quick Google search, we found six versions in which either the criteria or the interpretation was different, not to mention multiple other systems. The one used in this meta-analysis<sup>1</sup> and described in this PURL is the most recent, most accurate and best studied. ■

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