

Diagnosis and Treatment of DVT: New Guidelines

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The incidence of deep vein thrombosis (DVT) increases with age and is often associated with comorbidities such as congestive heart failure and chronic lung disease. Recognizing early signs and symptoms of DVT can help prevent life-threatening pulmonary embolism. Low-molecular-weight heparin LMWH is the agent of choice for treating DVT and is now listed as a key drug type in the Medicare Part D model guidelines.

Treatment of any disease starts with the correct diagnosis or, ideally, the identification of preventable risk factors, and deep vein thrombosis (DVT) is no different. Virchow's triad of stasis, vessel-wall injury, and hypercoagulable states are all important predictors of risk for DVT (see *Risk Factors for DVT*), and additional comorbidities should also be considered.¹ These comorbidities include congestive heart failure, cancer with acute infection, acute respiratory failure, and acute infectious disease (see *DVT Comorbidities*).² Additional risk factors that have been identified for DVT as well as for pulmonary emboli (PE) include prior history of DVT/PE, age older than 40 years, chronic lung disease, admission to an intensive care unit, ischemic (nonhemorrhagic) stroke, obesity, and thrombophilia (hematologic disorders that promote thrombosis).³ Within these groups exist subgroups of patients at even greater risk, including patients with a left-ventricular ejection fraction (LVEF) of less than 20%.⁴ Estimates of the prevalence

of DVT (see *Incidence of DVT*) in patients hospitalized with respiratory conditions were as high as 25% in one study.⁵ In a similar study, the incidence of DVT/PE as a result of infectious disease was reported to be 15.5%.⁶

Recognition of developing DVT requires stringent attention to early signs and symptoms (see *Signs and Symptoms of DVT*), including dyspnea, pleuritic chest pain, cough, leg swelling, hemoptysis, tachypnea, and tachycardia.⁷ Certain signs and symptoms of DVT—such as tenderness (Homan's sign), swelling, and induration with redness and warmth—must be monitored. Continuing education of the entire healthcare provider team is required to maintain awareness of these risk factors, signs, and symptoms. In addition, practice reminders need to be integrated into the traditional work flow so that these issues are constantly evaluated and assessed. These are the only ways that the gap between appropriate treatment and unrecognized patients can be narrowed.⁸

Risk Factors for DVT^{1,10}

- Prior history of DVT/PE
- Age >40 years
- Chronic lung disease
- Admission to an intensive care unit
- Ischemic stroke and congestive heart failure
- Obesity
- Thrombophilia
- Left-ventricular ejection fraction (LVEF) <20%
- Prolonged immobility
- Surgery or trauma
- Malignancy
- Estrogenic medications such as hormone therapy (tamoxifen [Nolvadex])

DVT Comorbidities²

- Congestive heart failure
- Cancer with acute infection
- Acute respiratory failure
- Acute infectious disease

Diagnosis of DVT/PE

The American College of Physicians and American Academy of Family Physicians released clinical practice guidelines for the diagnosis and management of venous thromboembolism (VTE) in January 2007. Lead author Dr. Amir Qaseem emphasized that strong evidence supports the use of predic-

Incidence of DVT¹⁰

- 117 cases per 100,000 persons
- Rises markedly in persons 60 years and older
- May be as high as 900 cases per 100,000 in patients 85 and older
- 50% of all cases of DVT occur in hospitalized patients and nursing home residents

Signs and Symptoms of DVT

- Dyspnea
- Pleuritic chest pain
- Cough
- Leg swelling
- Hemoptysis
- Tachypnea
- Tachycardia
- Homan's sign
- Swelling
- Induration with redness and warmth

tion rules, such as the Wells prediction rule (Table 1). These prediction rules help determine risk categories. In turn, the risk categories are the basis of interpretation of subsequent tests, including D-dimer or ultrasound (see *Diagnostic Guideline Recommendations*).⁹

Treatment Guidelines

The goals of treatment for DVT include halting clot formation and preventing recurrence of thrombi and PE. About 30% of DVT patients have a thrombophilia.¹⁰

The mainstay of treatment was once unfractionated heparin followed by warfarin (Coumadin). Studies have shown that low molecular-weight heparin (LMWH) is

at least as effective as unfractionated heparin in preventing complications and reducing the risk of recurrences, and it offers several advantages. It has a longer biologic half-life and can be administered subcutaneously once or twice daily, dosing is fixed, and laboratory monitoring is not required. In addition, some adverse effects of unfractionated heparin, such as thrombocytopenia, are less

likely to occur with LMWH.¹⁰

Because of the unique characteristics of LMWH, the United States Pharmacopeia (USP) in 2007 classified LMWH as a key drug type in the Medicare Part D model guidelines. As a result, prescription plans that follow the USP Model Guidelines must now include at least 1 medication from this new key drug type in their formularies.¹¹

Once a patient is diagnosed with

Table 1.

Wells Prediction Rule for Diagnosing DVT

Clinical Characteristic	Score
Active cancer with ongoing treatment or palliative care	1
Paralysis, paresis, or recent plaster immobilization of the lower extremities	1
Recently bedridden for more than 3 days or major surgery within the past 12 weeks that required general or regional anesthesia	1
Localized tenderness along a deep venous system	1
Swollen leg (entire)	1
Calf swelling in symptomatic leg that is 3 cm larger than in asymptomatic leg	1
Pitting edema in symptomatic leg only	1
Collateral superficial veins	1
Another diagnosis that is at least as likely as CVT	-2

Low risk, ≤ 0 ; intermediate risk, 1-2; high risk ≥ 3

Source: Wells PS, Anderson DR, Bormanis J, et al. Value of assessment of pretest probability of deep-vein thrombosis in clinical management. *The Lancet*. 2002;350:1795-1798.

Diagnostic Guideline Recommendations⁹

- Prediction rules, such as the Wells prediction rules for DVT (the standard), should be used to estimate pretest probability of DVT and PE and then used as the basis of interpretation of subsequent tests.
- Low pretest probability of DVT or PE: High-sensitivity D-dimer is recommended. If negative, the likelihood of VTE is low.
- Intermediate to high pretest probability of DVT in the lower extremities: Ultrasound is recommended.
- Intermediate or high pretest probability of PE: Diagnostic imaging studies are recommended ordered.

PROVIDER ACTION

Impact to You

The prevalence of DVT is very high among the Medicare population with reports of as high as 25% among patients hospitalized with respiratory conditions and 16% among those with infectious disease.

What You Need to Know

Identifying the comorbidities that put patients at risk for DVT is required for prevention and treatment of DVT. These comorbidities include congestive heart failure, cancer with acute infection, acute respiratory failure, and acute infectious disease, as well as other risk factors such as age older than 40 years, chronic lung disease, admission to an intensive care unit, ischemic (nonhemorrhagic) stroke, obesity, and thrombophilia.

What You Need to Do

Successfully treat DVT through careful assessment of those at high risk, early diagnosis, and appropriate therapies to ensure positive outcomes.

acute DVT, LMWH is the agent of choice for initial therapy.³ Outpatient anticoagulant therapy is recommended for 3 to 6 months for VTE and for more than 12 months for recurrent VTE. For certain patients with DVT, LMWH is safe for long-term therapy and may be preferred in patients with cancer.⁹ Compression stockings should be routinely used to prevent post-thrombotic syndrome beginning with 1 month of diagnosis of DVT and continuing for 1 year.⁹ Intermittent pneumatic leg compression is also a useful adjunct to anticoagulation and an alternative when anticoagulation is contraindicated.⁹

In the end, successful treatment of DVT requires early diagnosis of those patients at risk, including the use of prediction rules and appropriate diagnostic tests, followed by appropriate treatments to ensure successful outcomes. **MPM**

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