

Diagnosis and Treatment of Deep Venous Thrombosis and Pulmonary Embolism

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Preface

The Agency for Healthcare Research and Quality (AHRQ), through its Evidence-based Practice Centers (EPCs), sponsors the development of evidence reports and technology assessments to assist public- and private-sector organizations in their efforts to improve the quality of health care in the United States. The reports and assessments provide organizations with comprehensive, science-based information on common, costly medical conditions and new health care technologies. The EPCs systematically review the relevant scientific literature on topics assigned to them by AHRQ and conduct additional analyses when appropriate prior to developing their reports and assessments.

To bring the broadest range of experts into the development of evidence reports and health technology assessments, AHRQ encourages the EPCs to form partnerships and enter into collaborations with other medical and research organizations. The EPCs work with these partner organizations to ensure that the evidence reports and technology assessments they produce will become building blocks for health care quality improvement projects throughout the Nation. The reports undergo peer review prior to their release.

AHRQ expects that the EPC evidence reports and technology assessments will inform individual health plans, providers, and purchasers as well as the health care system as a whole by providing important information to help improve health care quality.

We welcome written comments on this evidence report. They may be sent to: Director, Center for Practice and Technology Assessment, Agency for Healthcare Research and Quality, 6010 Executive Blvd., Suite 300, Rockville, MD 20852.

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Structured Abstract

Objectives. Venous thromboembolism (VTE), thrombosis in the venous vasculature, causes considerable morbidity and mortality, and diagnosis and treatment are challenging. In this report we sought to summarize evidence on the following questions: 1) What are the efficacy and safety of low molecular weight heparin (LMWH) compared to unfractionated heparin (UFH) for treatment of deep venous thrombosis (DVT)? 2) What are the efficacy and safety of LMWH compared to UFH for treatment of pulmonary embolism (PE)? 3) What are the efficacy, safety, and cost-effectiveness of outpatient versus inpatient treatment of DVT with LMWH or UFH? 4) What is the optimal duration of treatment for DVT and PE? 5) How accurate are clinical prediction rules used for the diagnosis of DVT or PE? 6) What are the test characteristics of ultrasonography for diagnosis of DVT? 7) What are the test characteristics of helical computerized tomography (CT), magnetic resonance imaging (MRI), and magnetic resonance angiography (MRA) for diagnosis of PE? 8) What are the test characteristics of D-dimer for diagnosis of VTE?

Search Strategy. The Johns Hopkins University Evidence-based Practice Center (EPC) team searched electronic databases for literature from January 1966 to April 2002. The team identified additional articles by hand-searching relevant journals and reference lists, and by querying experts.

Selection Criteria. Paired investigators reviewed the abstracts of identified citations to select original studies and systematic reviews that addressed the questions, reported on human subjects, and were written in English. Each question had additional eligibility criteria.

Data Collection and Analysis. Paired reviewers assessed the quality of each eligible study and abstracted data.

Main Results. The search identified 64 original studies and 29 systematic reviews that addressed the questions. Results were as follows: 1) The evidence indicated that LMWH was more efficacious than UFH in reducing thrombus extension and recurrence in patients with DVT, with less risk of major bleeding and death. 2) Evidence was limited but supported the efficacy and safety of LMWH for the treatment of PE. 3) LMWH for outpatient treatment of DVT was safe and effective in carefully selected patients. LMWH was either cost-saving or cost-effective compared with inpatient treatment with UFH. 4) The evidence indicated that the optimal duration of oral anticoagulation after a first DVT is between three and six months. A longer duration may be necessary for patients with thrombophilic risk factors or PE. 5) Clinical prediction rules had high negative predictive values for excluding DVT, and moderately high predictive values for excluding PE. 6) Ultrasonography had high sensitivity and specificity for diagnosing proximal DVT, but was less accurate for diagnosis of calf vein thrombosis. 7) Helical CT was fairly sensitive and had high specificity for detecting PE. MRA was accurate in detecting PE of the lobar and segmental branches of pulmonary arteries. 8) The literature was too varied to make conclusions about the accuracy and role of D-dimer for diagnosis or exclusion of VTE.

Conclusions. Relatively strong evidence exists to support the efficacy, safety, and cost-effectiveness of LMWH for treatment of DVT, as an inpatient or outpatient therapy. Moderate evidence exists to define the optimal duration of oral anticoagulation for patients with DVT. Less evidence exists regarding duration of treatment for PE. Strong evidence indicates that ultrasonography is accurate for diagnosing proximal DVT, while moderate evidence exists to support a role for clinical prediction rules for diagnosis of DVT or PE, and for helical CT or MRA for diagnosis of PE.

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