

PREVENTION AND TREATMENT OF VENOUS THROMBOEMBOLISM

International Consensus Statement 2013 Guidelines According to Scientific Evidence

Developed under the auspices of the:

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European Venous Forum

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International Union of Angiology and

Union Internationale du Phlebologie

Cost-Effectiveness of Prevention & Treatment of VTE

Chapter 24

General Information

- **In selecting and evaluating studies in this section, studies in which the data for comparative effectiveness of approaches is based on randomized trials and/or systematic reviews of such trials and which follow the established guidelines for valid cost-effectiveness analysis are included¹⁻³**
 - ▶ The perspective of analysis is that of the government health system or private insurance payer, unless stated otherwise

1. Weinstein MC, et al. JAMA 1996; 276:1253-8.
2. Weinstein MC, Stason WB. N Engl J Med 1977; 296:716-21.
3. Drummond MF, et al. JAMA 1997; 277:1552-7.

Cost-Effectiveness

Primary Prevention

- **An approach is considered to be cost-effective if it is associated with an incremental cost per Quality-Adjusted-Life-Year (QALY) of less than the \$ 50,000, or £20,000-30,000^{1,2}**
- **In medium and high-risk patients, the evidence establishes unequivocally that the use of primary prevention with antithrombotic drugs or intermittent pneumatic compression is cost-effective compared to no prophylaxis³⁻¹⁰**

1. Chapman RH, et al. Med Decis Making 2000; 20:451-67.

2. www.nice.org.uk/niceMedia/pdf/GuidelinesManualChapter8.pdf

3. Salzman EW, Davies GC. Ann Surg 1980; 191:207-18.

4. Hull RD, et al. Can Med Assoc J 1982; 127:990-5.

5. Oster G, et al. Am J Med 1987; 82:889-99.

6. Oster G, et al. JAMA 1987; 257:203-8.

7. Bergqvist D, et al. World J Surg 1988; 12:349-55.

8. Bergqvist D, et al. Acta Chir Scand Suppl 1990; 556:36-41.

9. Schadlich PK, et al. Pharmacoeconomics 2006; 24:571-91.

10. Deitelzweig SB, et al. Thromb Haemost 2008; 100:810-20.

Cost-Effectiveness

Primary Prevention

- **Primary prevention is also cost-effective compared with the use of case-finding (screening) of DVT¹**
 - ▶ Several studies have evaluated the cost-effectiveness of primary prophylaxis using different anticoagulant drugs in patients having hip or knee replacement surgery or surgery for fractured hip²⁻⁶

1. Hull RD, et al. Can Med Assoc J 1982; 127:990-5.
2. Sullivan SD, et al. Pharmacoeconomics 2004; 22:605-20.
3. Bjorvatn A, Kristiansen F, et al. Am J Cardiovasc Drugs 2005; 5:121-30.
4. Sullivan SD, et al. Value Health 2006; 9:68-76.
5. McCullagh L, et al. Pharmacoeconomics 2009; 27:829-46.
6. Wolowacz SE, et al. Clin Ther 2009; 31:194-212.

Cost-Effectiveness

Comparisons of Primary Prevention

- **2 based in the US healthcare system and 1 study in the Norwegian system found¹⁻³**
 - ▶ Prophylaxis using fondaparinux was marginally less expensive than prophylaxis using enoxaparin
 - ▶ The conclusions were sensitive to the price difference between the drugs and the type of surgery
- **A study based on the UK National Health Service found dabigatran was cost-saving compared with enoxaparin⁴**

1. Sullivan SD, et al. Pharmacoeconomics 2004; 22:605-20.
2. Bjorvatn A, Kristiansen F. Am J Cardiovasc Drugs 2005; 5:121-30.
3. Sullivan SD, et al. Value Health 2006; 9:68-76.
4. Spangler EL, et al. J Vasc Surg 2010; 52:1537-45 e1-2.

Cost-Effectiveness

Comparisons of Primary Prevention

- **A study from the perspective of the Canadian health system found rivaroxaban to be a cost-effective alternative to enoxaparin¹**
- **Available evidence from studies in 3 different health systems indicates that both dabigatran and rivaroxaban are cost-effective alternatives to enoxaparin¹⁻³**
- **The available evidence is inconclusive regarding the relative cost-effectiveness of rivaroxaban and dabigatran²**

1. Diamantopoulos A, et al. *Thromb Haemost* 2010; 104:760-70.

2. McCullagh L, et al. *Pharmacoeconomics* 2009; 27:829-46.

3. Wolowacz SE, et al. *Clin Ther* 2009; 31:194-212.

Cost-Effectiveness

Extended Prophylaxis

- **Cost-effectiveness of extended prophylaxis (28 to 35 days) after hip replacement or hip fracture surgery has been evaluated in multiple studies¹⁻⁵**
- **2 Canadian studies evaluated extended prophylaxis with low-molecular-weight heparin by comparison to warfarin or no extended prophylaxis^{2,3}**
 - ▶ Dranitsaris et al. reported the incremental cost of 35 days of prophylaxis with dalteparin was between Cdn \$ 31,200 to 40,100 per QALY³
 - ▶ Skedgel et al. found an incremental cost of Cdn \$ 106,454 per QALY for extended LMWH prophylaxis²

1. Lundkvist J, et al. Eur J Health Econ 2007; 8:313-23.

2. Skedgel C, et al. J Bone Joint Surg Am 2007; 89:819-28.

3. Dranitsaris G, et al. Am J Cardiovasc Drugs 2009; 9:45-58.

4. Capri S, et al. Intern Emerg Med 2010; 5:33-40.

5. Kapoor A, et al. Pharmacoeconomics 2010; 28:521-38.

Cost-Effectiveness

Extended Prophylaxis

- **Two studies, one from Sweden and one from Italy, both using a 5 year time horizon, suggest that fondaparinux is a cost-effective alternative to enoxaparin for extended prophylaxis, and may be cost-saving at the 5 year time point^{1,2}**
- **A Canadian study which found rivaroxaban to be cost-effective relative to enoxaparin in hip replacement patients included a duration of prophylaxis of 35 days³**

1. Lundkvist J, et al. Eur J Health Econ 2007; 8:313-23.
2. Capri S, et al. Intern Emerg Med 2010; 5:33-40.
3. Diamantopoulos A, et al. Thromb Haemost 2010; 104:760-70.

Cost-Effectiveness

Limitations of Application of Economic Analyses

- **Limitations of applying cost-effectiveness analyses**
 - ▶ Studies do not incorporate the differences in values and preferences which may exist between surgeons or patients for avoiding bleeding relative to preventing thromboembolism
 - ▶ Do not account for preferences of surgeons or patients

Cost-Effectiveness

Cost Effectiveness of Primary Prevention

- **From the perspective of US Medicare reimbursement:**
 - ▶ Combined use of short-term (2 weeks) IPC and serial Doppler ultrasonography for the duration of hospitalization is more cost-effective than prophylactic placement of an IVC filter¹
- **Dalteparin (5000 U or 2500 U daily) compared with UFH for prophylaxis in abdominal surgery²**
 - ▶ Both dalteparin regimens were cost-effective using an incremental cost-effectiveness threshold of \$ 50,000 per QALY gained
 - ▶ sensitivity analysis indicated that there was substantial uncertainty in the cost-effectiveness results

1. Chiasson TC, et al. PLoS Med 2009; 6:e1000098.

2. Heerey A, Suri S. Pharmacoeconomics 2005; 23:927-44.

Cost-Effectiveness

Cost Effectiveness of Primary Prevention

- **4 studies of the cost-effectiveness of prophylaxis in medical patients with either LMWH or UFH have been reported¹⁻⁴**
 - ▶ All 4 studies were consistent
 - ▶ Prophylaxis with LMWH is more cost-effective than with UFH
- **Cost-effectiveness of prophylaxis during pregnancy with once daily LMWH has been evaluated⁵**
 - ▶ Primary prevention is cost-effective for “high risk” women with a prior idiopathic VTE or a known thrombophilic condition if the risk of bleeding is 1% or lower

1. McGarry LJ, et al. Am J Manag Care 2004; 10:632-42.

2. Schadlich PK, et al. Pharmacoeconomics 2006; 24:571-91.

3. Shorr AF, et al. Blood Coagul Fibrinolysis 2007; 18:309-16.

4. Deitelzweig SB, et al. Thromb Haemost 2008; 100:810-20.

5. Johnston JA, et al. Am J Med 2005; 118:503-14.

Cost-Effectiveness

Cost Effectiveness of Secondary Prevention

- **Cost-effectiveness of anticoagulant therapy has been evaluated¹⁻⁴**
 - ▶ Cost-effectiveness of IV thrombolytic therapy, catheter-directed thrombolytic therapy and/or thrombus removal, or insertion of a vena cava filter have not been evaluated
- **2 studies compared the cost-effectiveness of IV UFH with SQ LMWH for treatment of patients with DVT^{1,2}**
 - ▶ Findings are consistent and indicate that LMWH is cost-effective
 - ▶ Hospitalization is the major driver of cost
- **LMWH is cost-effective for treatment of DVT out of hospital^{5,6}**
 - ▶ LMWH for initial therapy is a cost saving approach if 8% or more of patients are treated entirely as outpatients, or >13% have reduced hospital stays¹

1. Gould MK, et al. Ann Intern Med 1999; 130:789-99.
2. Hull RD, et al. Arch Intern Med 1997; 157:289-94.
3. Connock M, et al. Health Technol Assess 2007; 11:iii-iv, ix-66.
4. Hull RD, et al. JAMA 1984; 252:235-9.
5. Koopman MM, et al. N Engl J Med 1996; 334:682-7.
6. Levine M, et al. N Engl J Med 1996; 334:677-81.

Cost-Effectiveness

Patient Monitoring

- **The UK Health Technology Assessment Programme concluded:¹**
 - ▶ Patient self-monitoring is unlikely to be more cost-effective than specialized anticoagulation clinics
 - ▶ Patient self-monitoring may improve quality of life for some patients who travel frequently or have difficulty travelling to the clinic
- **Approaches to improve quality of life include specialized anticoagulation clinics and patient self monitoring**

Cost-Effectiveness

LMWH for Secondary Prevention

- **LMWH therapy, given in fixed doses without anticoagulant monitoring, is an effective and safe approach for treatment of VTE for 3-6 months¹⁻³**
- **LMWH is preferred in cancer patients with VTE because it is markedly more effective than vitamin-K antagonist treatment^{1,2}**
- **LMWH is also effective in the broad spectrum of VTE patients without cancer and is associated with an improvement in the patient's perceived quality of life³**

1. Lee AY, et al. N Engl J Med 2003; 349:146-53.

2. Hull RD, et al. Am J Med 2006; 119:1062-72.

3. Hull RD, et al. Am J Med 2007; 120:72-82.

Cost-Effectiveness

New Oral Anticoagulants for Secondary Prevention

- Dabigatran and rivaroxaban have been evaluated for the treatment of VTE, including long-term therapy for 3-12 months^{1,2}
- These drugs do not require laboratory monitoring
- Their cost-effectiveness remains to be evaluated

1. Schulman S, et al. N Engl J Med 2009; 361:2342-52.

2. Bauersachs R, et al. N Engl J Med 2010; 363:2499-510.

Cost-Effectiveness

Routine Laboratory Screening

- **The role of laboratory screening for thrombophilia in guiding clinical decisions about an extended or indefinite duration of anticoagulant therapy has been debated**
- **The relative cost-effectiveness of routine screening for thrombophilia, versus targeted screening based on patient and family history, requires further studies¹**