

Anticoagulation for prevention of venous thromboembolism

Original article by: [Michael Tam](#)

Note: updated in June 2009 with the eighth edition (from the seventh) evidence-based clinical practice guidelines from the American College of Chest Physicians.

Prophylaxis against [deep venous thrombosis](#) (DVT) and [venous thromboembolic](#) (VTE) disease is an important part of modern medical and surgical treatment for the unwell or bed bound patient. There is high quality research with high grade evidence for many recommendations.

For the majority of patients, the following is usually appropriate:



heparin 5000 units subcutaneously bd (tds for high risk)

or

enoxaparin 40 mg subcutaneously daily

+/-

graduated compression stockings

A few pointers

Graduated compression stockings do help prevent DVTs but work better in conjunction with low dose unfractionated [heparin](#) (LDUH) or [low molecular weight heparin](#) (LMWH) (1). Unless there is a particular contraindication against the usage of either agent, then stockings should probably not be used alone unless the patient is of specific low risk. There is good evidence that both an anticoagulant and stockings should be used together after major surgery (2).

Although it may seem obvious, compression stockings don't work if they are not worn by the patient.

Although there is good evidence that [fondaparinux sodium](#) (Arixtra) is superior to both LDUH and LMWH for thromboprophylaxis in major orthopaedic surgery, you will rarely see it used in NSW Public Hospitals due to cost.

Stratification of risk

The [risk stratification](#) that a patient will develop venous thromboembolic disease has been quite clearly defined by the [American College of Chest Physicians](#) (ACCP) in their conferences on antithrombotic and thrombolytic therapy. (3)

Low

- Surgical parameters:
 - Uncomplicated minor surgery in patients younger than 40 years with no clinical risk factors; require general anaesthesia less than 30 minutes.
- Thromboembolic event (%)
 - Calf vein thrombosis: 2
 - Proximal vein thrombosis: 0.4
 - Clinical PE: 0.2
 - Fatal PE: 0.002

Moderate

- Surgical parameters:
 - Any surgery in patients aged 40-60 years with no additional risk factors.
 - Major surgery in patients younger than 40 years with no additional risk factors; require general anesthesia longer than 30 minutes.
 - Minor surgery in patients with risk factors.
- Thromboembolic event (%)
 - Calf vein thrombosis: 10-20
 - Proximal vein thrombosis: 2-4
 - Clinical PE: 1-2
 - Fatal PE: 0.1-0.4

High

- Surgical parameters:
 - Major surgery in patients older than 60 years without additional risk factors.
 - Major surgery in patients aged 40-60 years with additional risk factors.
 - Patients with myocardial infarction.
 - Medical patients with risk factors.
- Thromboembolic event (%)
 - Calf vein thrombosis: 20-40
 - Proximal vein thrombosis: 4-8
 - Clinical PE: 2-4
 - Fatal PE: 0.4-1

Highest

- Surgical parameters:
 - Major surgery in patients older than 40 years with prior venous thromboembolism, malignant disease, or hypercoagulable state.
 - Patients with elective major lower extremity orthopedic surgery, hip fracture, stroke, multiple trauma, or spinal cord injury
- Thromboembolic event (%)
 - Calf vein thrombosis: 40-80
 - Proximal vein thrombosis: 10-20
 - Clinical PE: 4-10
 - Fatal PE: 0.2-5

The most recent recommendations

The Eighth ACCP Conference on Antithrombotic and Thrombolytic Therapy was held in 2008. The expansive and full recommendations of the ACCP are available from the supplement to the journal *Chest* in June of that year. A summary of the key recommendations for the prevention of venous thromboembolism (4) follows.

- Aspirin is not recommended to be used alone as thromboprophylaxis for any patient group (Grade 1A).

- For low risk general surgery patients (without additional thromboembolic risk factors):
 - early and frequent ambulation **only** (Grade 1A)
 - Including:
 - low-risk gynaecologic patients (Grade 1A)
 - gynaecologic patients undergoing entirely laparoscopic procedures (Grade 1B)
 - non-major vascular surgery (Grade 2B)
 - transurethral or other low risk (non-open) urologic surgery (Grade 1A)
 - entirely laparoscopic procedures in patients without additional thromboembolic risk (Grade 1B)
 - knee arthroscopy (Grade 2B)

- For moderate-risk general surgery patients, prophylaxis with:
 - low-dose unfractionated heparin (LDUH) (5000 units bd) *or*
 - low-molecular-weight heparin (LMWH) (< or = 3400 units once daily) *or*
 - fondaparinux (each Grade 1A).

- For higher risk general surgery patients, thromboprophylaxis with:
 - LMWH (> 3400 units daily) *or*
 - LDUH (5000 units **tds**) *or*
 - fondaparinux (each Grade 1A).

- For high-risk general surgery patients with multiple risk factors, it is recommended to combine pharmacologic methods with optimal use of a mechanical method:
 - LMWH (> 3400 units daily) *or*
 - LDUH (5000 units **tds**) *or*
 - fondaparinux **and**
 - properly fitted graduated compression stockings and/or intermittent pneumatic compression devices (Grade 1C).

- For general surgery patients with a high risk of bleeding:
 - properly fitted graduated compression stockings or intermittent pneumatic compression devices (Grade 1A).
 - pharmacologic thromboprophylaxis be substituted or added when bleeding risk decreases (Grade 1C).

- For patients undergoing elective total hip one of the following is recommended:
 - LMWH (started 12 hours before surgery or 12-24 hours after surgery) *or*
 - fondaparinux (2.5 mg started 6-24 hours after surgery), *or*
 - warfarin [INR target, 2.5; range, 2.0 to 3.0] started preoperatively or the evening of the surgical day (all Grade 1A).
 - Do not use aspirin, dextran, LDUH, graduated compression stockings or venous foot pump as the sole method of thromboprophylaxis (all Grade 1A).
 - thromboprophylaxis for at least 10 days (Grade 1A).
 - thromboprophylaxis extended up to 35 days recommended (Grade 1A) with:
 - LMWH (Grade 1A) *or*
 - warfarin (Grade 1B) *or*

- fondaparinux (Grade 1C)

- For patients undergoing hip fracture surgery:
 - fondaparinux (Grade 1A) *or*
 - LMWH (Grade 1B) *or*
 - warfarin [target INR, 2.5; range, 2.0 to 3.0] (Grade 1B) *or*
 - LDUH (Grade 1B) **and**
 - thromboprophylaxis for at least 10 days (Grade 1A).
 - thromboprophylaxis extended to 35 days recommended (Grade 1A) with:
 - fondaparinux (Grade 1A) *or*
 - LMWH (Grade 1C) *or*
 - warfarin (Grade 1C)

- All major trauma patients should receive thromboprophylaxis if possible (Grade 1A).
 - in absence of major contraindication, LMWH (Grade 1A)
 - in presence of major contraindication, mechanical thromboprophylaxis with intermittent pneumatic compression device or possibly with graduated compression stockings alone can be used (Grade 1B)

- Acutely ill medical patients who have been admitted to the hospital with congestive heart failure or severe respiratory disease, or who are confined to bed and have one or more additional risk factors:
 - LMWH (Grade 1A) *or*
 - LDUH (Grade 1A) *or*
 - fondaparinux (Grade 1A).

- For patients in the intensive care unit, all patients should be assessed for their risk of VTE. Accordingly, most patients should receive thromboprophylaxis (Grade 1A).

- For long distance travellers (flights > 8 hours):
 - general measures (avoidance of constrictive clothing around the lower extremities or waist, maintenance of adequate hydration, and frequent calf muscle contraction) (Grade 1C)
 - aspirin is **not recommended** for VTE prevention (Grade 1B)
 - those with additional risk factors for VTE, general measures and:
 - below-knee graduated compression stocking providing 15-30 mmHg of pressure at the ankle (Grade 2C) *or*
 - single prophylactic dose of LMWH injected prior to departure (Grade 2C).

Reference articles

(1) Amaragiri SV, Lees TA. Elastic compression stockings for prevention of deep vein thrombosis. *The Cochrane Database of Systematic Reviews* 2000, Issue 1. Art. No.: CD001484. [download [PDF](#) :: 197 Kb]

(2) Wille-Jørgensen P, Rasmussen MS, Andersen BR, Borly L. Heparins and mechanical methods for

thromboprophylaxis in colorectal surgery. *The Cochrane Database of Systematic Reviews* 2004, Issue 1. Art. No.: CD001217. [download [PDF](#) :: 283 Kb]

(3) Tang WH. Perioperative DVT Prophylaxis [electronic article]. *EMedicine*. Last updated October 13, 2004. [[Link](#)]

(4) Geerts WH, Berquist D, Pineo GF, et al. (2008) Prevention of venous thromboembolism: American College of Chest Physicians evidence-based clinical practice guidelines (8th edition) *Chest* 133 (suppl): 381S–453S. [[PDF](#) :: 756 Kb]

Updated: Michael Tam (27 June 2009)

[Please read the disclaimer](#)