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Prevention Of Venous Thromboembolism (VTE) In Medical And Surgical Inpatients

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Dr S Mills Consultant Anaesthetist

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**Review Date:** 01/08/2009

**Does this document meet with the Race Relation Amendment Act (2000) Age Discrimination Act, Disability Discrimination Act and Gender Equality Regulations?** Not Applicable
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1 PURPOSE.
The aim of this guideline is to ensure the prevention of venous thromboembolism (VTE) in Medical and Surgical inpatients according to current best practice

2 SCOPE.
The guideline applies to all Medical and Surgical staff working within Blackpool Fylde and Wyre Hospitals NHS Trust

3 GUIDELINE

3.1 INTRODUCTION

- Approximately 10% of hospital deaths are attributed to pulmonary embolism
- Pulmonary Embolism (PE) is the most common preventable cause of hospital death
- The prevention of symptomatic Deep Vein Thrombosis (DVT) and PE are important since they are associated with considerable acute morbidity and long term clinical and financial sequelae
- “Appropriate use of prophylaxis to prevent Venous Thromboembolism in patients at risk” is the highest ranked patient safety intervention according to a systematic review undertaken by the Agency for Healthcare Research and Quality.
- Most symptomatic VTE associated with hospital admissions occur after hospital discharge
- Aspirin is NOT recommended as the sole VTE prophylaxis for any patient group (grade 1A evidence)
- The guidelines contain evidence-based recommendations from the sources listed at the end of the document

GENERAL RECOMMENDATIONS

Mechanical prophylaxis: Thrombo-Embolic Deterrent (TEDs) or Flowtron boots

- All inpatients having surgery should be offered TEDs (preferably of the above knee type)
- TEDs or Flowtron boots should be considered for all patients at high risk of bleeding or in whom the use of tinzaparin is contraindicated
- TEDs/Flowtron boots may be considered as an adjunct to tinzaparin prophylaxis

Heparin Prophylaxis

- Should be considered in all hospitalised patients according to the guidelines that follow
- Contraindications to the use of tinzaparin can be found in Appendix 1
3.2  RISK FACTORS FOR VENOUS THROMBOEMBOLISM

Immobilisation, bed rest, limb paralysis

Surgery

Trauma (major or lower extremity)

Age > 40 years

History of Venous Thromboembolism

Family history of VTE in a first degree relative ie parent or sibling

Idiopathic or acquired thrombophilia

Cancer and cancer treatment (hormones, chemotherapy, radiotherapy)

Oestrogen-containing oral contraception or Hormone Replacement Therapy (HRT)

Selective oestrogen response modifiers (SERMs) eg raloxifene

Acute medical illness

Cardiac or respiratory failure

Recent Myocardial Infarction or stroke

Inflammatory bowel disease

Obesity (Body Mass Index > 30)

Pregnancy and the post-partum period (up to six weeks after delivery)

Nephrotic syndrome

Myeloproliferative disorders

Smoking

Varicose veins

Central venous catheter

Prolonged travel (> 3 hours according to National Institute for Clinical Excellence (NICE)

Paroxysmal nocturnal haemoglobinuria
3.3 SURGICAL PATIENTS

3.3.1 GENERAL SURGERY

- **Low Risk**
  Minor surgery in patients < 40 years with no additional risk factors
  **Recommendation:** Early mobilisation, no specific prophylaxis

- **Moderate Risk**
  Minor surgery in patients aged 40-60 years or with additional risk factors
  Major surgery in patients < 40 years with no additional risk factors
  **Recommendation:** TEDs + Tinzaparin 3500 U once daily

- **Higher risk**
  Surgery in patients > 60 years or with additional risk factors
  Major surgery > 40 years or with additional risk factors
  **Recommendation:** TEDs + Tinzaparin 4500 U once daily

- **Highest risk**
  Surgery in patients with multiple risk factors (eg age > 40, cancer, previous VTE)
  **Recommendation:** TEDs + Tinzaparin 4500 U once daily
  +/- Flowtrons until ambulatory

**Timing Of Prophylaxis**

- Prophylaxis may be commenced pre or shortly postoperatively (there is insufficient evidence to show a clear advantage by starting preoperatively and NICE suggests that starting postoperatively may shorten the preoperative inpatient time to the benefit of the patient)

**Duration Of Prophylaxis**

- Prophylaxis should be continued until the patient is ambulatory
- The exception is **major cancer surgery** when tinzaparin should be continued for one month (American College of Chest Physicians ACCP recommendation—(See Appendix 2)
### 3.3.2 ORTHOPAEDICS AND TRAUMA

- **Elective Total Hip Replacement (THR)**

  **Recommendation:** TEDs + Tinzaparin 4500 U once daily (commenced 12 hrs preoperatively, 12-24 hrs postoperatively or 4-6 hrs postoperatively at 2500 U first dose increasing to 4500 U the following day)
  **Duration:** 4 weeks (NICE and ACCP recommendation)

- **Elective Total Knee Replacement**

  **Recommendation:** TEDs + Tinzaparin 4500 U once daily commenced as for THR
  **Duration:** 2 weeks (ACCP recommendation)

- **Knee Arthroscopy**

  - **Routine arthroscopy with no patient risk factors**
    **Recommendation:** No routine prophylaxis other than early mobilisation
  - **Prolonged/complicated procedure or multiple VTE risk factors**
    **Recommendation:** Tinzaparin 3500 U once daily

- **Hip Fracture Surgery**

  **Recommendation:** TEDs + Tinzaparin 4500 U once daily commenced as for THR. If surgery is likely to be delayed then LMWH should be commenced on the day of admission
  **Duration:** 4 weeks (NICE and American College of Chest Physicians (ACCP) recommendation)

- **Elective spine surgery:**

  - **Without patient risk factors**
    **Recommendation:** No routine prophylaxis other than early mobilisation
  - **With patient risk factors**
    **Recommendation:** TEDs + Tinzaparin 3500 U once daily
    Or Flowtron boots

**Additional Points In Orthopaedic Patients**

- Mortality or fatal PE should NOT be considered to be the only important outcome. Symptomatic VTE is associated with a burden of illness due to the VTE and its’ treatment as well as financial implications for the hospital and Primary Care Trust.
• The timing of commencement of VTE prophylaxis is a balance between the risk of bleeding and the (very small) reduction in VTE associated with starting preoperatively. Both pre and postoperative options are acceptable.

• **Aspirin** is NOT recommended as the sole VTE prophylaxis for either elective or trauma patients (grade 1A evidence)

• If there is a contraindication to tinzaparin then mechanical prophylaxis is recommended as per manufacturers guidelines (see appendix)

**Trauma**

Trauma patients with at least one risk factor for VTE

**Recommendation:** TEDs + Tinzaparin 3500 U once daily
Flowtrons if Low Molecular Weight Heparin (LMWH) contraindicated

**Additional Points**

• LMWH should be commenced as soon as primary haemostasis has been achieved

• Contraindications to early initiation of tinzaparin in trauma include:
  The presence of Intracranial bleeding (head injury without frank haemorrhage is not a contraindication)
  Ongoing and uncontrolled bleeding
  Uncorrected major coagulopathy
  Incomplete spinal cord injury associated with perispinal haematoma

• Doppler Ultrasound Screening should be considered in high-risk patients who have received suboptimal prophylaxis. High risk patients might include:
  Spinal cord injury
  Lower extremity or pelvic fracture
  Major head injury
  Indwelling femoral venous line

• Thromboprophylaxis should be continued until hospital discharge

• **Inferior Vena Caval filters** are not recommended as primary prophylaxis

• **Inferior Vena Caval filter insertion** is indicated in the presence of proven proximal DVT when either full anticoagulation is contraindicated or major surgery is planned in the near future
3.3.3 GYNAECOLOGY

- **Brief procedure <30 minutes duration** (including laparoscopic surgery)
  
  **Recommendation:** No specific prophylaxis other than early mobilisation.

- **Brief procedure <30 minutes duration** (including laparoscopic surgery) with patient risk factors
  
  **Recommendation:** TEDs + Tinzaparin 3500 U once daily until ambulatory

- **Major surgery for benign disease without patient risk factors**
  
  **Recommendation:** TEDs + Tinzaparin 3500 U once daily until ambulatory

- **Major cancer surgery or major surgery for benign disease with patient risk factors**
  
  **Recommendation:** TEDs + Tinzaparin 4500 U once daily until (at least) hospital discharge – see below

**Additional Points**

- Patients at particularly high risk (cancer surgery, previous VTE, age >60) should continue prophylaxis for 2 to 4 weeks after discharge (ACCP recommendation)
3.3.4 OBSTETRICS

Guidelines for thromboprophylaxis in obstetric patients are already available in delivery suite.

3.3.5 LAPAROSCOPIC SURGERY

- Laparoscopic surgery with no additional patient risk factors
  **Recommendation**: TEDs + early mobilisation

- Laparoscopic surgery with additional patient risk factors
  **Recommendation**: TEDs + Tinzaparin 3500 U once daily until ambulatory

3.3.6 UROLOGY

- **Transurethral and other simple procedures without patient risk factors**
  **Recommendation**: No specific prophylaxis other than early mobilisation.

- **Transurethral and other simple procedures with patient risk factors**
  **Recommendation**: TEDs + Tinzaparin 3500 U once daily until ambulatory

- **Major, open urologic procedures**
  **Recommendation**: TEDs + Tinzaparin 3500 U once daily until ambulatory
3.3.7 VASCULAR

- Vascular surgery without patient risk factors
  **Recommendation:** No specific prophylaxis other than early mobilisation.

- Vascular surgery with patient risk factors
  **Recommendation:** Tinzaparin 3500 U once daily until ambulatory

- Abdominal aortic and major lower limb surgery
  **Recommendation:** Tinzaparin 4500 U once daily until ambulatory

3.3.8 CARDIAC AND THORACIC

Minor thoracic surgery without patient risk factors
**Recommendation:** No specific prophylaxis other than early mobilisation.

Minor thoracic surgery with patient risk factors
**Recommendation:** TEDs + Tinzaparin 3500 U once daily until ambulatory

Major cardiac or thoracic surgery
**Recommendation:** TEDs + Tinzaparin **4500 Units** once daily

Additional points

- Patients undergoing major cardiothoracic surgery appear to have a similar risk of VTE to major general or gynaecological surgery patients
- In patients undergoing major cardiac surgery, the addition of Flowtron boots reduces the risk of pulmonary embolism
- There is no evidence on which to base recommendations for the duration of prophylaxis
3.3.9 HEAD AND NECK, ENT SURGERY

- There is little evidence on which to base recommendations
- In general, specific prophylaxis is not recommended in non-major surgery in the absence of additional patient risk factors
- Major cancer surgery

**Recommendation:** TEDs + Tinzaparin 3500 U once daily until ambulatory

3.3.10 OPHTHALMIC

There is no evidence on which to base recommendations
3.4 SPINAL CORD INJURY (New Page)

- All patients with spinal cord injury (SCI) should have thromboprophylaxis
  
  **Recommendation:** TEDs + Tinzaparin 3500 U once daily when primary haemostasis is achieved

- Flowtron boots should be used when tinzaparin is contraindicated

- Tinzaparin or a Vitamin K antagonist should be continued into the rehabilitation phase

- Inferior Vena Caval Filter is not recommended as primary prophylaxis

**Additional Points**

- Without prophylaxis, SCI patients have the highest incidence of DVT among all hospitalised groups. Asymptomatic DVT occurs in 60 – 100% of SCI patients

- PE is the third commonest cause of death in this patient group
3.5 MEDICAL PATIENTS

- Acutely ill Medical Patients admitted with:
  - Congestive heart failure
  - Severe respiratory disease

- Confined to bed and have one or more additional risk factors including:
  - Active cancer
  - Previous personal VTE
  - Acute neurological disease
  - Inflammatory bowel disease
  - Sepsis

Recommendation: TEDs + Tinzaparin 3500 U once daily

Additional points

- 70 – 80% of fatal PEs occur in non-surgical patients

- Hospitalisation with an acute medical illness is associated with an eight-fold increased relative risk for VTE and accounts for nearly a quarter of all VTE events within the general population

- If risk factors are present but there is a contraindication to anticoagulant prophylaxis then TEDs or Flowtron boots should be used
3.6 COMBINED ORAL CONTRACEPTIVE PILL (cOCP), HRT OR RALOXIFENE IN THE PERIOPERATIVE PERIOD

Patients can reduce the overall risk of perioperative DVT to that of non-users by stopping these medications 4 weeks prior to surgery.

Minor Surgery without Immobilisation

**Recommendation:** cOCP, HRT and Raloxifene do not need to be stopped (even in major surgery *without* immobilisation)

- In the presence of additional patient risk factors
  **Recommendation:** TEDs  
  Tinzaparin 3500 U

Major Surgery with Prolonged Immobilisation

- Patients should be *advised* to stop cOCP, HRT and Raloxifene at least four weeks before surgery
- Arrange adequate contraception where appropriate
- If patients choose to continue their medication:
  **Recommendation:** TEDs + Tinzaparin 3500 U +/- Flowtrons

4 ATTACHMENTS.
Appendix 1 Additional Management Points  
Appendix 2 References  
Appendix 3 Acknowledgements

5 ELECTRONIC AND MANUAL RECORDING OF INFORMATION.
Database for Policies, Procedures, Protocols and Guidelines  
Archive/Policy Co-ordinators office  
Held By: Directorate/Department/Author  
Held in format: Electronic and/or hard copy

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Appendix 1 Additional Management Points

A. Mechanical Prophylaxis

i. Graduated Elastic Compression Stockings – TEDs

- Should be properly fitted and preferably of the above knee type

**Contraindications:**
- Massive leg oedema
- Heart failure
- Severe peripheral arterial disease
- Severe peripheral neuropathy
- Major leg deformity
- Dermatitis

ii. Intermittent Pneumatic Compression - Flowtron Boots

- Should be used continuously (preferably until ambulatory and for a period of at least 72 hours)

**Contraindications:**
- Severe arteriosclerosis or other ischaemic vascular diseases
- Known or suspected DVT/PE or phlebitis
- Severe congestive cardiac failure
- Local wound or inflammatory/infective condition

B. Tinzaparin

i. Contraindications to the use of tinzaparin (from the manufacturer)

- Known hypersensitivity to tinzaparin
- Generalised haemorrhagic tendency
- Uncontrolled severe hypertension
- Active peptic ulcer
- Septic endocarditis
- Thrombocytopenia in patients with a positive in vitro aggregation test in the presence of tinzaparin.

ii. Heparin-Induced Thrombocytopenia (HIT)

- Two types: **Type I** Acute, transient fall. Probably secondary to platelet aggregation
- **Type II** Immune mediated, it usually occurs 7 to 11 days (up to 20 days) after commencing heparin. May cause bleeding or thromboembolic effects
• Check platelet count on day 5 after commencement then every 7 days
• If the platelet count falls by more than 50% of the baseline, discontinue tinzaparin and seek advice from a Haematologist

iii. Dosing of Tinzaparin and renal impairment

• Severe renal impairment (Serum Creatinine >400µ mol /L) may necessitate laboratory monitoring of anti factor Xa activity

• The innohep® (Tinzaparin) Summary of Product Characteristics (SPC) recommends that care should be taken when innohep® is administered to patients with severe renal insufficiency and in such patients a reduction in the dose should be considered. Unfortunately, there is little data on the use of tinzaparin in these patients and therefore it is not possible to offer any suggestions for dose adjustments. However, it would be prudent to measure anti-Xa levels and adjust the tinzaparin dose according to the results.
• Peak anti-Xa levels are usually about 1 to 1.2 anti-Xa unit/ml. These are seen 3 to 4 hours after a subcutaneous dose is given. Much above this level and accumulation may be seen.

iv. Reversibility of Tinzaparin

• Protamine sulphate 1mg per 100 anti-Xa units tinzaparin administered should be given over 10 minutes. This neutralises approximately 65% to 85% of the anti-Xa activity almost immediately. This can be administered at any time up to and including 3 hours after tinzaparin administration.

• A partial return of tinzaparin’s anti-Xa, anti-IIa and APTT activities (to 76%, 58% and 44% of original is seen 3 hours after reversal. Repeat protamine doses or an infusion may be required. Suggested timescales for repeat injections are 30-60 minutes after first injection and if necessary every 60 minutes thereafter until APTT normalises.

• If protamine sulphate is first administered later than three hours after tinzaparin administration, an adjustment in dosage may be considered to reflect decreasing tissue levels of tinzaparin. Volunteer data shows peak plasma levels occurring 4-6 hours post sc administration.

v. Inferior Vena Caval Filters (IVCF)

• IVC filters are not recommended as primary prophylaxis

• IVCF insertion is indicated in the presence of proven proximal DVT when either full anticoagulation is contraindicated or major surgery is planned in the near future.
Appendix 2 References


2. Venous Thromboembolism: the prevention of venous thromboembolism (deep vein thrombosis and pulmonary embolism) in patients undergoing orthopaedic surgery and other high-risk surgical procedures. NICE guideline, draft for consultation, October 2006

3. Prophylaxis of Venous Thromboembolism: Scottish Intercollegiate Guidelines Network, Published October 2002 and reviewed in 2005


Acknowledgements
I would like to thank Dr Paul Cahalin (Consultant Haematologist) and Dr Mohammad Paracha for their contributions to these guidelines.