Thromboprophylaxis Guidelines for Adult Patients in:

Critical Care
General Surgery
Gynaecology
Head and Neck Medicine
Obstetrics
Oncology
Orthopaedics

NGH-GU-187
<table>
<thead>
<tr>
<th>Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Summary</td>
<td>3</td>
</tr>
<tr>
<td>2 Introduction</td>
<td>3</td>
</tr>
<tr>
<td>3 Target Group(s) or Disease Process(es)</td>
<td>4</td>
</tr>
<tr>
<td>4 Professional Group(s)</td>
<td>4</td>
</tr>
<tr>
<td>5 Clinical Guidelines</td>
<td>5</td>
</tr>
<tr>
<td>Risk for developing VTE</td>
<td>6</td>
</tr>
<tr>
<td>Thromboprophylaxis</td>
<td>9</td>
</tr>
<tr>
<td>Mechanical</td>
<td>10</td>
</tr>
<tr>
<td>Pharmacological</td>
<td>12</td>
</tr>
<tr>
<td>Use of aspirin and antiplatelets with thromboprophylaxis</td>
<td>15</td>
</tr>
<tr>
<td>Duration of treatment</td>
<td>15</td>
</tr>
<tr>
<td>Timing of administration of thromboprophylaxis (epidurals)</td>
<td>16</td>
</tr>
<tr>
<td>Medical patients - Risk assessment and thromboprophylaxis</td>
<td>18</td>
</tr>
<tr>
<td>Surgery patients - Risk assessment and thromboprophylaxis</td>
<td>20</td>
</tr>
<tr>
<td>(includes general, vascular, urology, head and neck, gynaecology(non-pregnant), other orthopaedic)</td>
<td></td>
</tr>
<tr>
<td>Day Surgery - Risk assessment and thromboprophylaxis</td>
<td>21</td>
</tr>
<tr>
<td>Orthopaedic patients - Risk assessment and thromboprophylaxis</td>
<td>22</td>
</tr>
<tr>
<td>Obstetric Patients - Risk assessment and thromboprophylaxis</td>
<td>24</td>
</tr>
<tr>
<td>Critical Care Patients - Risk assessment and thromboprophylaxis</td>
<td>24</td>
</tr>
<tr>
<td>6 Roles and Responsibilities</td>
<td>25</td>
</tr>
<tr>
<td>7 Related Trust and or National Guidance</td>
<td>25</td>
</tr>
<tr>
<td>8 References/Bibliography</td>
<td>25</td>
</tr>
<tr>
<td>9 Guidance Development</td>
<td>26</td>
</tr>
<tr>
<td>10 Audit</td>
<td>26</td>
</tr>
<tr>
<td>11 Implementation &amp; Training</td>
<td>26</td>
</tr>
<tr>
<td>Medicines Management Committee Document Tracking Information</td>
<td>27</td>
</tr>
</tbody>
</table>

**Appendices**

Appendix 1 Bridging Anticoagulation
Appendix 2 Patient Information Leaflets
Appendix 3 Combined Risk Assessment tool for Medical and Surgical (all disciplines) patients
Appendix 4 Risk Assessment tool for Total Hip Replacement patients
Appendix 5 Risk Assessment tool for Total Knee Replacement patients
Appendix 6 Risk Assessment tool for Fractured Neck of Femur patients
Appendix 7 Thromboprophylaxis in Antenatal, Interpartum and Post-Partum
Appendix 8 Anticoagulation for Thrombophilia and Thromboembolism in Pregnancy
1. Summary

The Trust Thromboprophylaxis guidelines are for all patients admitted to hospital and fracture clinic. Every patient must be risk assessed on admission to determine the level of risk of them developing a venous thromboembolism (VTE) either pulmonary embolism (PE) or deep vein thrombosis (DVT). The risk assessment takes into account patients' individual risks (e.g., age and obesity) plus the acquired risk on admission to hospital (e.g., surgical procedure).

The guidelines include a risk assessment for each speciality which the patient will be admitted to, with additional information for specific patient groups. Once the appropriate risk assessment has been carried out, guidance is given as to what thromboprophylaxis should be prescribed. Detailed guidance is given for both mechanical (compression stockings) and pharmacological thromboprophylaxis (enoxaparin and rivaroxaban). Specific information about timing of administration and duration of treatment is given as well.

The appendices include additional information to ensure all documents related to thromboprophylaxis are included in the same guidance. These include management of patients on warfarin when they are admitted for surgical procedures (or others which require cessation of anticoagulation). Patient information leaflets which should be given to every patient are included as an appendix. Management of thromboprophylaxis in the ante-natal through to post partum period and anticoagulation of high-risk pregnant women are included and have been updated with the Royal College of Obstetrics and Gynaecology recent guidance.

2. Introduction

Since the last Northampton General Hospital (NGH) Trust-wide Thromboprophylaxis Guidelines1 were produced in May 2005, the Chief Medical Officer has published the Expert Working Group Report on the Prevention of Venous Thromboembolism2 (VTE) in hospitalised patients and NICE (National Institute of Clinical Excellence) have issued Clinical Guidance (No 92) reducing the risk of VTE patients admitted to hospital3 which has replaced Clinical Guidance (No 46) on reducing the risk of VTE in inpatients undergoing surgery4. This new NICE guidance recommends that all patients admitted to hospital are risk assessed for the likelihood of developing a VTE and prescribed thromboprophylaxis accordingly. The nationally mandated Commissioning for Quality and Innovation (CQUIN) measures will, from 2010, include risk assessment and thromboprophylaxis prescribing5.

The Prevention of Venous Thromboembolism Guidelines has also been produced by the American College of Chest Physicians6. All sets of guidance recommend each hospital develops a formal strategy for prevention of VTEs and this must include assessments of patients to identify their risks for developing VTEs. The aim is to improve patient safety and help thousands of lives each year (the evidence suggests that in England around 25,000 people a year die from VTE in hospitals alone7).
3. Target group(s) or disease process(es)

For use throughout the Trust to prevent venous thromboembolism in adult patients admitted to hospital.

Patients that will be covered:

Adults (18 years and older) admitted to hospital as inpatients or formally admitted to a hospital bed for day-case procedures, including:

- Surgical inpatients
- Inpatients with acute medical illness (eg myocardial infarction, stroke, spinal cord injury, severe infection or exacerbation of chronic obstructive pulmonary disease)
- Trauma inpatients
- Patients admitted to intensive care units
- Cancer patients
- Patients undergoing long term rehabilitation in hospital
- Patients admitted to a hospital bed for day case medical or surgical procedures
- Patients attending fracture clinic for lower limb fractures

Within this population, pregnant women admitted to hospital have been identified as a group requiring special consideration. This is taken into account in Appendices 7 and 8.

Patients that will not be covered:

- Patients younger than 18 years
- Patients attending hospital as outpatients
- People presenting to emergency departments without admission
- Elderly or immobile people cared for at home, or in external residential accommodation, unless admitted to hospital
- Patients admitted to hospital with a diagnosis of, or suspected diagnosis of, deep vein thrombosis or pulmonary embolus

4. Professional Group(s)

- All medical staff admitting patients to hospital
- All pre-operative nurses planning patients admission to hospital
- All pharmacists reviewing patients care on the wards
- All fracture clinic nurses
- All anticoagulation nurses who will be involved in the training of doctors and nurses
- All ward staff nurses
5. Clinical Guidelines

Risk Assessment

All patients admitted to hospital must be risk assessed on admission and again within 24 hours of admission, regularly thereafter and whenever the clinical situation changes. This is to ensure that appropriate methods of VTE prophylaxis are used and to identify adverse events resulting from VTE prophylaxis.

The guidelines are divided into the different specialities practiced at NGH, within each there is a risk assessment and details of the prophylaxis needed depending on the risk level. The risk assessment for medical patients and surgical patients (including general, urology, vascular, head and neck, gynaecology [non pregnant] and orthopaedic [excluding THR, TKR and fractured NOF]) is combined so as to allow use within the Trust wide adult admissions documentation. All risk assessment forms are within the guidelines as appendices.

The risk of a patient developing a VTE must be weighed up against the risk of a patient bleeding with pharmacological VTE prophylaxis.

Reducing the risk – General Recommendations

- Ensure adequate fluid intake. Do not allow patients to become dehydrated unless clinically indicated.
- Encourage early mobilisation of patients.
- Consider offering temporary inferior venacaval filter
Explanation of Risks which increase the risk of VTE

Age
There is an exponential increase in risk with age. In the general population:
< 40 years – annual risk 1/10,000
60-69 years – annual risk 1/1,000
> 80 years – annual risk 1/100
This may reflect immobility and coagulation activation.

Obesity
The risk of VTE is increased by three times if BMI>=30kg/m², again this may reflect immobility and coagulation activation.

Varicose Veins
The risk is increased by 1.5 times when a patient with varicose veins undergoes major orthopaedic or general surgery. However the risk of VTE is low after varicose vein surgery.

Immobility
Bed rest greater than 3 days. Lower limb immobility with plaster cast.

Dehydration
Increases the viscosity of the blood.

Previous VTE
Recurrence rate is 5% / year and this is increased by surgery.

Family history of VTE
Unidentified inherited thrombophilias will be risk factors which may be undiagnosed at time of admission.

Surgery
Without prophylaxis the rates of VTE after major orthopaedic surgery are 40 to 60%. Major surgery includes that which is greater than 90 minutes duration.

Pregnancy / post partum
There is a tenfold increase in thrombotic risk throughout pregnancy and the puerperium. The same factors that increase thrombotic risk in non-pregnant patients also increase the risk of thrombosis associated with pregnancy. During pregnancy additional risk factors such as pre-eclampsia and delivery, particularly operative delivery, must be considered. If a patient is admitted to a general ward and is pregnant, the obstetric team must be informed and the appropriate risk assessment carried out.

Thrombophilias
Low coagulation inhibitors (antithrombin, protein C or S)
Activated protein C resistance (e.g. factor V Leiden)
High coagulation factors (I, II, VIII, IX, XI)
Antiphospholipid Syndrome
High homocysteine
All patients with thrombophilias having major surgery should have their care discussed with a Consultant Haematologist. There may be a need for extended thromboprophylaxis.

Other thrombotic states
Malignancy 7 x risk compared to the general population
Heart failure
Recent myocardial infarction / stroke
Acute infection
Inflammatory bowel disease, nephrotic syndrome
Polycythaemia, paraproteinaemia
Bechet’s disease, paroxysmal nocturnal haemoglobinuria

Travel
Greater than 3 hours within four weeks (pre and post) of surgery

Lower limb cast or similar appliance
These inhibit venous return and increase the risk of pooling in the calf veins.

Medicines which increase the risk of VTE

*Oral contraceptives / Hormone Replacement Therapy (HRT) and hormone therapy*
The use of oral contraceptives (oestrogen and oestrogen/progestogen) or HRT confers an increased risk of thromboembolism on all patients\(^8,9,10,11\) regardless of whether they are undergoing a surgical procedure. The management of these patients still remains controversial.

For patients undergoing surgery, or in hospital for an acute medical admission, the following guidelines should be followed:

**Progestogen**
**Progestogen only contraception**
No increased risk is conferred on the patient. Therefore, advise patient to continue the contraceptive and risk assess the patient according to procedure and other thromboembolic or clinical risk factors

**High dose progestogens**
There is evidence of an association of VTE with higher doses of progestogen used for other therapeutic indications (e.g. menstrual disorders) therefore the patient will need at least 20mg enoxaparin (dose dependent on other risk factors)

**Combined oral contraceptives (COCP) and HRT**
It is recommended to advise patients on oestrogen containing oral contraceptives or HRT to stop therapy prior to elective surgery. The benefits will only be seen if therapy is discontinued at least **one month** before surgery. If the patient wishes to stop oral contraceptives, the use of alternative methods of non-oestrogen contraception must be discussed. The risk of postoperative VTE increases from 0.5% to 1% for pill users versus non-users. This small absolute excess risk in COCP users must be balanced against the risks of stopping the pill 4-6 weeks prior to surgery, including unwanted pregnancy, the effects of surgery and anaesthesia on a pregnancy, and the risks of a subsequent termination. These risks should be communicated to the patient and, if it is agreed to stop the COCP, adequate alternative contraception should be arranged until the COCP is restarted. The timing of restarting therapy will involve individual assessment, e.g. postoperative complications or immobility but general advice is to re-start at the first menses occurring at least 2 weeks after full mobilisation

Each case should be judged according to the patient's additional risk factors for VTE and their contraceptive preferences. When considering perioperative prophylaxis in current (or recent) pill users, each case should be judged according to additional risk factors. In emergency surgery, routine VTE prophylaxis should be given as the risk of VTE is greater.

The recommendations are if the patient has not stopped taking the COCP for one month before surgery there is no benefit to stopping it therefore it is recommended that these patients are prescribed enoxaparin 40mg daily. This will also apply for patients undergoing emergency surgery.
Hormone Therapy

Oestrogen Receptor antagonists - Tamoxifen,
Tamoxifen increases the risk of VTE by between two and five-fold. The risk is increased when it is being used in conjunction with chemotherapy. For patients being treated for infertility, tamoxifen should be stopped at least 6 weeks before surgery or long-term immobility (when possible) and re-started only when the patient is fully mobile. For patients with breast cancer, tamoxifen treatment should only be stopped if the risk of tamoxifen-induced thrombosis clearly outweighs the risks associated with interrupting treatment. All patients should receive appropriate thrombosis prophylactic measures (enoxaparin 40mg) and should include graduated compression stockings for the period of hospitalisation with early ambulation. In some patients with breast cancer and multiple risk factors for VTE anticoagulant treatment could be considered.

Aromatase inhibitors
Anastrazole (Arimidex®), Exemestane (Aromasin®), Letrozole (Femara®)
The use of the aromatase inhibitors is associated with approximately half the risk of VTE compared to tamoxifen. No additional precautions need to be taken into account when patients are taking these medicines, however it should be recognised that they will have malignancy as one of their clinical risk factors.

Thalidomide
There is an increased risk of VTE for patients who are taking thalidomide; this risk is greatest in the first five months of treatment. If patients are admitted and require thromboprophylaxis, they should be automatically risk assessed as high risk and be administered enoxaparin 40mg daily.

Explanation of Risk of Bleeding
Risk factors for bleeding must be taken into account when prescribing anticoagulants. Risk factors include:

- Active bleeding
- Acquired bleeding disorders (such as acute liver failure)
- Concurrent use of anticoagulants known to increase the risk of bleeding (refer to Bridging anticoagulation Appendix 1)
- Epidural / spinal anaesthesia (see guidance on page 16)
- Acute stroke (see guidance on page 18)
- Thrombocytopenia (platelets less then $75 \times 10^9$ / L)
- Uncontrolled systolic hypertension (230/120mm Hg or higher)
- Untreated inherited bleeding disorders (such as haemophilia and Von Willebrand’s disease)
- Patients at risk of falls
Thromboprophylaxis

The options available for thromboprophylaxis at Northampton General Hospital are:

- **Mechanical thromboprophylaxis**
  - Anti-embolism stockings (see page 10)
  - Intermittent-pneumatic compression devices or foot impulse devices (may be used in Theatre)
  - Inferior vena caval filter (see page 11)

- **Pharmacological thromboprophylaxis**
  - Low molecular weight heparin – Enoxaparin (see page 12)
  - Oral anticoagulant – Rivaroxaban for use in elective THR, TKR only (see page 14)
  - Unfractionated heparin (for use in bridging anticoagulation – see Appendix 1)

**Patient Information**

Patients should have the opportunity to make informed decisions about their care and treatment, in partnership with their Healthcare Professionals. Good verbal communication regarding thromboprophylaxis should be backed up with the written Patient Information Leaflets (PIL) available:

- Reducing the risk of a blood clot during your hospital admission
- Reducing the risk of a blood clot following lower limb immobilisation

Discussion should also occur as to what the patient needs to continue to do on discharge to prevent a VTE.

For examples of the PILs see Appendix 2
Mechanical VTE Prophylaxis

Offer patients who are assessed to be at risk of VTE and for whom pharmacological VTE prophylaxis is contraindicated one of the following:

- Graduated compression stockings
- Foot impulse devices
- Intermittent pneumatic compression devices

Graduated compression stockings (GCS) (Formerly TED stockings)

GCS should be prescribed on the prescription chart. Thigh or knee length stockings may be used depending on reasons of fit, adherence or surgical site.

Advice for Use

- Measurements should be carried out by Staff Nurse or HCA who have been deemed competent to measure leg size for stocking fit.
- Stockings should be worn day and night until discharged or patients are no longer significantly immobile
- Apply carefully, aligning toe hole under toe.
- Check fitting daily for change in leg circumference
- Do not fold down
- All patients should have their legs measured twice a week. Remove the stockings and wash legs. Re-measure. **Check for pressure ulcers or damage.** Discontinue the use of anti-embolism stockings if there is marking, blistering or discolouration of the skin, particularly over the heels and bony prominences. Patients who develop oedema or post operative swelling must have their legs re-measured and stockings refitted.
- Use cautiously in patients who suffer with incontinence
- Ensure that patients who are discharged with anti-embolism stockings are able to remove and replace them, or have someone available who will be able to do this for them. Once discharged it may be more appropriate to change the stockings twice a week if the patient is personally unable to change them daily.

Patient with Stroke

**Do not offer** mechanical thromboprophylaxis with graduated compression stockings to stroke patients. They have been shown to be ineffective and put the patient at increased risk of cutaneous adverse reactions such as skin ulcers and necrosis.14
Contraindications to graduated compression stockings

- Massive leg oedema
- Pulmonary oedema (e.g. heart failure).
- Peripheral Vascular and Arterial Disease
- Peripheral Neuropathy
- Major Leg Deformity
- Dermatitis
- Post Vascular Surgery, including: angiogram and/or plasty, repair of Abdominal Aortic Aneurysm (AAA), Endovascular Aneurysm Repair(EVAR) reconstructive arterial bypass surgery, carotid endarterectomy, amputation.
- Acute ischaemic foot including rest pain, gangrene, ulceration.
- Fragile ‘tissue paper’ skin
- Pressure sore to heels
- Acute or recent stroke
- Thigh circumferences that exceed the size specified in the fitting instructions for the TEDs being used
- Known allergy to material of manufacture

Intermittent Pneumatic Compression Devices/Foot Impulse Devices

IPC devices periodically compress the calf and/or thigh muscles of the leg (inflation pressures 35-40 mmHg at about 10s/min), and stimulate fibrinolysis. Compression devices are usually applied immediately before or during surgery and are often replaced by GECS following surgery as they can cause discomfort in the conscious patient.

Inferior vena caval filter

Vena caval filters (vc filters) are used to help prevent PE in patients with a VTE who have a contraindication to anticoagulation. The Radiology department at NGH has guidelines on the use of inferior vc filters and these should be referred to along with discussion of the individual case with the Consultant Interventional Radiologist.
Pharmacological Thromboprophylaxis

Further details on pharmacological thromboprophylaxis cautions and interactions – see the specific product characteristics on http://emc.medicines.org.uk

Enoxaparin (Clexane ®) 15

Contra-indications
- Acute bacterial endocarditis
- Active bleeding and bleeding disorders
- Active gastric or duodenal ulceration
- Recent haemorrhagic stroke
- Hypersensitivity to enoxaparin, heparin or its derivatives; or benzyl alcohol
- Thrombocytopenia

Caution
- Renal failure – if the creatinine clearance <30mL/minute or patient is on dialysis, thromboprophylaxis dose should be 20mg. In acute renal failure with rapid rise in urea please consult with Renal Team prior to use.
- Conditions with increased potential for bleeding: impaired haemostasis; history of peptic ulcer; recent ischaemic stroke; uncontrolled severe arterial hypertension - do not use if patients systolic BP is greater than 230/120mm Hg and untreated; diabetic retinopathy, recent neuro- or ophthalmologic surgery.
- Patient considered to be high risk of falls

Monitoring

Platelet Count
There is a risk of antibody-mediated heparin-induced thrombocytopenia. If it occurs it usually happens between the 5th and the 21st day following initiation, but may be delayed with LMWH. Platelets should be routinely checked after 7 days. Patients on long-term enoxaparin need monthly monitoring. If the platelet count is significantly reduced (30 to 50% of the initial value) therapy must be discontinued immediately. It is recommended that platelets are checked for all patients on day 5, 10 and 28. Patient will be given a blood request form if they are will be at home on the days when their platelets need monitoring [with extended thromboprophylaxis].

Potassium
Heparin can suppress adrenal secretion of aldosterone leading to hyperkalaemia, particularly in patients such as those with diabetes mellitus, chronic renal failure, pre-existing metabolic acidosis, raised plasma potassium or taking potassium sparing drugs. Plasma potassium should be measure in patients at risk before starting LMWH therapy and monitored regularly thereafter particularly if treatment is prolonged.

Reversal of Enoxaparin
Enoxaparin is approximately 60% neutralised by protamine.
- Stop enoxaparin administration
- Measure APTT, INR, Fibrinogen, D-dimers and FBC
  The results of these investigations may be confusing but will act as a baseline for subsequent interventions. One would expect D-dimers to be high after fibrinolysis. If the patient is bleeding badly and has a fibrinogen of less than 1 gm/l it may be difficult to control the bleeding without FFP and cryoprecipitate (contains large amounts of fibrinogen).
- Administer protamine by slow IV injection over 10 minutes:
<table>
<thead>
<tr>
<th>Last dose of Enoxaparin</th>
<th>Protamine dose (MAXIMUM 50mg per dose)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;8 hours</td>
<td>1mg per 1mg enoxaparin</td>
</tr>
<tr>
<td>8-12 hours</td>
<td>0.5mg per 1mg enoxaparin</td>
</tr>
<tr>
<td>&gt;12 hours</td>
<td>May not be required - Consult Haematologist</td>
</tr>
</tbody>
</table>

**NOTE:** Contraindicated in patients with fish allergy
Protamine is an anticoagulant in overdose

- Re-check APTT, INR, fibrinogen, D-dimers and FBC-a target fibrinogen level of 1g/L is desirable.
- Investigate again after 3 hours – effects of enoxaparin may still be seen.
- Protamine administration may have to be repeated. See dose above.

**If no response:** discuss with Haematologist regarding the use of cryoprecipitate/FFP/platelets. Tranexamic acid may be used as a last attempt:

*Do not give this without full discussion with Consultant Medical Staff*

Contraindicated in patients with a history of thromboembolic disease

- Dose 10mg/kg body weight by slow IV injection

### Prescribing of Enoxaparin

The prescribing of enoxaparin should be done using the pre-printed section of the prescription chart (see below) (or label) with the dose and risk level clearly stated.

<table>
<thead>
<tr>
<th>Enoxaparin</th>
<th>Duration</th>
<th>Pharmacy:</th>
<th>Dispensing:</th>
</tr>
</thead>
<tbody>
<tr>
<td>For VTE (venous thromboembolism) prophylaxis only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dose: Date:</td>
<td>VTE risk is assessed as ( ) Very high High Moderate Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency: Once daily</td>
<td>Route: Subcutaneous</td>
<td>Prescriber’s signature and bleep:</td>
<td></td>
</tr>
</tbody>
</table>

**Dosing in extremes of body weight**

There is no evidence for the use of low doses of enoxaparin in patients with low body weight. The SPC for enoxaparin states that there may be an increase in enoxaparin exposure in low body weight (<45kg women; <57kg men) and this may lead to a higher risk of bleeding. Careful clinical monitoring is recommended in these patients, however lower doses are not specifically recommended within these guidelines, individual clinical judgement will be required for these patients.

In obese patients, the risk of VTE increases significantly, however this is taken into account in all the different speciality risk assessments. A systematic review of studies showed that enoxaparin once or twice daily was a suitable dose for both surgical and medical obese patients. The suggested dose increases are:

- >100kg increase enoxaparin dose to 40mg BD
- >150kg increase dose to 60mg BD

These doses are dependent on the patient’s renal function being normal.
Rivaroxaban (Xarelto ®)\textsuperscript{17}

Rivaroxaban is licensed for the prevention of VTE in adult patients undergoing elective hip or knee replacement surgery. It is an oral direct inhibitor of factor Xa.

**Contra-indications**

- Clinically significant active bleeding
- Hepatic disease associated with coagulopathy and clinically relevant bleeding risk
- Pregnancy and lactation
- Hypersensitivity to the active substance or any excipients

**Caution**

Renal failure: if the creatinine clearance $<15\text{ml/min}$ do not use Rivaroxaban
if the creatinine clearance 15-29ml/min use with caution (plasma levels may be increased which may lead to an increased bleeding risk).

Hepatic impairment. In cirrhotic patients with moderate hepatic impairment, rivaroxaban plasma levels may be significantly increased which may lead to an increased bleeding risk.

**Interactions**

- Avoid with systemic azole-antimycotics (e.g. ketoconazole) use with caution with fluconazole.
- Avoid with HIV protease inhibitors (e.g. ritonavir)
- Care with concomitant treat of NSAIDs, aspirin, clopidogrel. NSAIDS can be used for short term post-operative analgesia, with additional monitoring for bleeding
- Use with caution with strong CYP3A4 inducers (e.g. rifampicin, carbamazepine, phenytoin, St John’s Wort) as it may lead to a reduced rivaroxaban plasma concentration.

No additional monitoring is required with rivaroxaban.

**Reversal of rivaroxaban**

Overdose following administration of rivaroxaban may lead to haemorrhagic complications due to its pharmacodynamic properties. A specific antidote antagonising the pharmacodynamic effect of rivaroxaban is not available.

The use of activated charcoal to reduce absorption in case of rivaroxaban overdose may be considered.

Appropriate symptomatic treatment, e.g. mechanical compression, surgical interventions, fluid replacement and haemodynamic support, blood product or component transfusion should be considered.

If life-threatening bleeding cannot be controlled by the above measures, administration of recombinant factor VIIa may be considered after discontinuation of rivaroxaban and above symptomatic treatment.

Protamine sulphate and vitamin K are not expected to affect the anticoagulant activity of rivaroxaban.
Use of Aspirin / Clopidogrel and other antiplatelets with thromboprophylaxis

Antiplatelets are not adequate prophylaxis for VTE; consider offering additional VTE prophylaxis to patients who are having antiplatelet agents to treat other conditions and who are assessed to be at increased risk of VTE. Take into account the risk of bleeding and of comorbidities such as arterial thrombosis.

In elective surgery, patients are usually well and their co-morbidities managed such that antiplatelets can be stopped for surgery. If Clopidogrel is being used post-stent insertion or recent stroke/acute coronary syndrome (ACS) it is very unusual they would be considered for elective surgery. If this is the case, discuss withholding clopidogrel with the cardiologists.

- If the risk of VTE outweighs the risk of bleeding, consider offering enoxaparin.
- If the risk of bleeding outweighs the risk of VTE, offer mechanical VTE prophylaxis (such as anti-embolism stockings, intermittent pneumatic compression devices or foot impulse devices).
- In most patients aspirin and clopidogrel (see exception below) are stopped for the duration of enoxaparin thromboprophylaxis.
- If clopidogrel is being used for stent insertion or recent stroke/ACS, discussion with a cardiologist/physician should occur before interrupting therapy.

With prolonged therapy of enoxaparin or rivaroxaban, aspirin/clopidogrel will be stopped temporarily at least until the sutures are removed. Restarting the antiplatelets can be considered after suture removal or after 14 days, provided there are no signs of bleeding into the joint or at the wound site. The withholding of antiplatelets may be continued for the duration of the course of rivaroxaban at the consultant’s discretion.

Medical patients will continue on antiplatelet therapy with enoxaparin thromboprophylaxis unless directed by a clinician.

Duration of Treatment

Continue thromboprophylaxis until the patient is discharged, unless they fall within one of the categories below. The majority of hospital associated, symptomatic thromboembolic events occur after patients have started to ambulate and mobilisation does not provide adequate thromboprophylaxis for hospital patients.

<table>
<thead>
<tr>
<th>Patient category</th>
<th>Total duration of thromboprophylaxis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective total knee replacement</td>
<td>14 days</td>
</tr>
<tr>
<td>Elective total hip replacement</td>
<td>35 days</td>
</tr>
<tr>
<td>Fractured Neck of Femur</td>
<td>28 days</td>
</tr>
<tr>
<td>Other surgical patients (including general surgery, orthopaedics, urology, gynaecology and Head and Neck) with moderate – high risk</td>
<td>Length of stay</td>
</tr>
<tr>
<td>Other surgical patients (as above) with very high risk eg major cancer surgery in the abdomen or pelvis; previous post operative VTE</td>
<td>28 days&lt;sup&gt;3,6&lt;/sup&gt;</td>
</tr>
<tr>
<td>Medical patients with moderate – high / very high risk</td>
<td>Length of stay</td>
</tr>
<tr>
<td>Day Surgery Unit patients moderate</td>
<td>STAT dose only</td>
</tr>
<tr>
<td>Day Surgery unit patients with high / very high risk</td>
<td>STAT dose plus 3-5 days on discharge</td>
</tr>
<tr>
<td>Lower limb casts or appliance with high risk factors</td>
<td>Duration of cast or appliance</td>
</tr>
</tbody>
</table>
Timing of administration of Thromboprophylaxis

The majority of patients are not admitted to hospital the night before the surgical procedure, therefore the option of administering enoxaparin 12 hours or even 2 hours pre-operatively is not possible. Enoxaparin is licensed for initiation pre-operatively however studies have shown that risk of VTE is reduced considerably even if treatment is initiated post-operatively. If administration is to occur pre-operatively, the timing of administration must not be decided until the patient has been assessed by the Anaesthetist and the route of anaesthesia decided. If patients are admitted to hospital the night before surgery they can be administered the prophylactic dose at 18.00.

Medical and other Patients
It is recommended that prescribing and administration of enoxaparin is at 6pm (18.00hrs) unless otherwise directed for a specific reason.

Obstetric patients
It is recommended that administration of enoxaparin is in the morning to allow factor Xa levels to be monitored.

Patients undergoing surgical procedures

TKR and THR patients Rivaroxaban or enoxaparin should be prescribed at 10pm (22.00) unless the patients operation was after 16.00 or the anaesthetist has marked the prescription chart with not to administer for 24 hours. Then the prescription should be for administration at 10am.

All other surgical patients Enoxaparin should be prescribed at 6pm (18.00) unless otherwise directed for a specific reason. In these patients thromboprophylaxis should be initiated after surgery as soon as haemostasis has been achieved and the use of spinal or epidural anaesthesia or analgesia allows. See below for guidance on timing with epidurals.

Use of epidurals
Regional anaesthesia carries a lower risk of VTE than general anaesthesia. Anaesthetists will document on the prescription chart when insertion/removal of the spinal/epidural catheter was traumatic.

Use of epidurals with prophylactic doses of enoxaparin
The use of LMWH for prophylaxis of VTE may increase the risk of vertebral canal haematoma following insertion of spinal or epidural catheters. The peak effect of prophylactic enoxaparin occurs at four to six hours post administration.

Pre-operative doses
Enoxaparin must be given at least 12 hours before the spinal block is administered.

Post operative doses
Following insertion of an epidural or spinal catheter the enoxaparin dose should not be administered for at least 4 hours.

If the insertion of catheter was traumatic, enoxaparin should not be administered for at least 24 hours.

Following removal of an epidural catheter, the enoxaparin dose should not be administered for at least 4 hours.

Following administration of a prophylactic dose of enoxaparin, removal of a catheter should be delayed for 12 hours.
Cautions

- When there is difficulty or bleeding during the block procedure, it is essential that this is recorded and greater vigilance ensured during the postoperative period. It may also be advisable to omit or delay the next dose of enoxaparin.
- If perioperative pharmacological prophylaxis is to be omitted altogether in a patient who would normally receive it, a mechanical method should be used instead. Reasons for omitting thromboprophylaxis should be documented.
- In patients requiring emergency surgery who have already received a dose of enoxaparin, the dose, and the time interval since the last administration should be noted and related to recommendations above.
- Any decision should be based on the balance of risks and benefits and where possible should be discussed with the patient and should be documented fully.

Use of epidurals with therapeutic enoxaparin
Invasive procedure such as lumbar / epidural / spinal puncture in patients on therapeutic doses of enoxaparin require a different approach as the peak levels will be higher and also more importantly the trough level at 24 hours post injection may be higher than with thromboprophylactic doses.

In practice this means that these patients should be converted from a 1.5mg/kg daily dose to a 1mg/kg twice daily dosing regime. This allows lower peak levels to be maintained. It is advised that patients on therapeutic doses of enoxaparin omit the TWO preceding doses prior to insertion of epidurals etc (this allows a greater than 24 hour gap). Obstetric patients are routinely managed in this way. If there is any ongoing risk or the patient is unstable they should have IV unfractionated heparin.

Use of epidurals with Rivaroxaban
As with enoxaparin when neuraxial anaesthesia (spinal/epidural anaesthesia) or spinal/epidural puncture is employed, patients treated with rivaroxaban for prevention of VTE are at risk of developing an epidural or spinal haematoma which can result in long-term or permanent paralysis.

The risk of these events may be increased by the post-operative use of indwelling epidural catheters or the concomitant use of medicinal products affecting haemostasis. The risk may also be increased by traumatic or repeated epidural or spinal puncture. Patients are to be frequently monitored for signs and symptoms of neurological impairment (e.g. numbness or weakness of the legs, bowel or bladder dysfunction). If neurological compromise is noted, urgent diagnosis and treatment is necessary. Prior to neuraxial intervention the physician should consider the potential benefit versus the risk in anticoagulated patients or in patients to be anticoagulated for thromboprophylaxis.

Insertion of epidural
As Rivaroxaban is only administered postoperatively there are no recommendations about insertion of epidurals after rivaroxaban administration.

If traumatic puncture occurs on insertion of the spinal/epidural catheter, the administration of rivaroxaban is to be delayed for 24 hours.

Withdrawal of epidural
Following removal of an epidural or spinal rivaroxaban should not be administered for 6 hours.

An epidural will rarely, if ever be used for post-operative analgesia, however if this did occur, removal of a catheter should be delayed for 12 hours following administration of a prophylactic dose of rivaroxaban.
Risk Assessment and Thromboprophylaxis in Medical patients

Although VTE is most often associated with surgery, 70-80% of hospital-acquired fatal pulmonary embolisms (PEs) occur in medical patients. Apart from being an older cohort, 40% of medical patients have more than one risk factor for VTE, including previous VTE, cancer, stroke, heart failure, chronic obstructive airways disease, sepsis and bed rest. The baseline risk of VTE is estimated to be around 15% for those who are acutely unwell in medical beds, with risks rising to about 50-60% having been reported after severe stroke.

Thromboprophylaxis should be offered to medical patients assessed as at risk until they are no longer significantly immobile or are discharged from hospital. It is assumed that all medical patients are immobile relative to their normal state.

There is no evidence for the use of enoxaparin 20mg in patient with moderate risk factors. The 40mg dose only is licensed for medical thromboprophylaxis unless the patient has renal failure where the dose should be reduced. See page 12.

It is not recommended to offer mechanical thromboprophylaxis (graduated compression stockings) to patients who have contraindications to enoxaparin, for the reasons outlined below. However if patients have contraindications to enoxaparin, graduated compression stockings may be considered appropriate.

Patient with Stroke

Do not offer mechanical thromboprophylaxis with graduated compression stockings to stroke patients. They have been shown to be ineffective and put the patient at increased risk of cutaneous adverse reactions such as skin ulcers and necrosis. 14

Prophylactic enoxaparin can be given to patients when a diagnosis of haemorrhagic stroke has been excluded; the risk of bleeding (haemorrhagic transformation of stroke or bleeding into another site) is assessed to be low and who have

- major restrictor of mobility
- previous history of VTE
- dehydration or comorbidities

Continue enoxaparin until the patients’ mobility is no longer increasing

Review level of mobility in stroke patients with intracranial haemorrhage after four weeks and start thromboprophylaxis unless neurological deterioration or other contraindication.

Patient with Cancer

Patients with cancer have at least a six fold increased risk of VTE compared to those without cancer and active cancer accounts for almost 20% of all new VTE events occurring in the community.

- Do not routinely offer thromboprophylaxis to patients with cancer having oncological treatment who are ambulant
- For patients with cancer having oncological treatment who are expected to be immobile for more than 3 days, consider prescribing enoxaparin 40mg daily
Patients in Palliative Care

- Consider offering enoxaparin 40mg daily to patients in palliative care who have potentially reversible pathology. Take into account potential risks and benefits and the patient’s preferences.
- Take into account potential risks and benefits and the views of patients and their families or carers.
- Do not routinely offer thromboprophylaxis to patients admitted for terminal care or those commenced on an end-of-life care pathway (such as the Liverpool care pathway).
- Regularly review decisions about thromboprophylaxis patients in palliative care, taking into account the views of the patient and the multidisciplinary team.
Risk Assessment and Thromboprophylaxis in patients having Surgery (Not Day Surgery)

This section covers all patients undergoing general, urological, vascular, gynaecological (non-pregnant), head and neck surgery and orthopaedic (not THR, TKR, or fractured NOF).

The following surgical procedures do not require thromboprophylaxis unless there are patient risk factors:

- Varicose vein
- Vascular surgery (see more details below)
- Thyroid surgery
- Breast surgery
- TURP (Trans Urethral Resection of Prostate)
- Urology surgery – see below
- All laparoscopic surgery
- Cataract surgery

**Vascular Surgery**

The routine use of thromboprophylaxis is not recommended due to

1. the risk of VTE appears to be relatively low with modern vascular surgery
2. most vascular surgical patients receive intra-operative anticoagulant and postoperative antiplatelets
3. evidence for the benefits of thromboprophylaxis does not outweigh the risk of adverse effects

If a patient has other risk factors they should be considered for thromboprophylaxis as in the risk assessment

**Urological Surgery**

For urology surgical patients who are actively bleeding or who are at very high risk of bleeding, it is recommended that mechanical thromboprophylaxis alone is initiated. When the bleeding risk decreases enoxaparin can be added in. There is no evidence for extended thromboprophylaxis in urological surgery.

**Gynaecological Surgery**

For patients undergoing major gynaecological surgery for benign disease without additional risk factors, IPC (if being used) thromboprophylaxis should be started before surgery and continued while the patient is not ambulating.

For selected high risk surgery including major cancer surgery or patients who have had a previous VTE, it is recommended that thromboprophylaxis continues until after discharge for 28 days in total.

**Important Considerations**

- Timing of administration must not be decided until after the patient has been assessed by the anaesthetist and the route of anaesthesia decided. This must be clearly documented.
- Ensure the time of epidural catheter insertion and removal is confirmed before administering a dose of enoxaparin.
Risk Assessment and Thromboprophylaxis in patients having Day Surgery

This section covers all patients undergoing general, orthopaedic urological, vascular, gynaecological, head and neck day surgery.

Patient risk factors need to be assessed as the surgical procedures carried out in the Day Surgery Unit (DSU) (except those stated below) rarely confer an increased risk.

- Use of tourniquet on lower limb
- Surgery more than 90 minutes duration (60 minutes if surgery on a lower limb)

If thromboprophylaxis is required in DSU patients, either a stat dose is given after surgery only (at least four hours if an epidural or spinal has been given) or a stat dose is given with a further three to five days given to the patient for self administration at home.
Risk assessment and Thromboprophylaxis in patients having Orthopaedic Surgery

Elective Total Hip Replacement (THR) and Elective Total Knee Replacement (TKR)

Patients undergoing major orthopaedic surgery including THR and TKR have a particularly high risk for VTE, with the risk extending to post discharge if thromboprophylaxis is not continued.

The new oral anticoagulant Rivaroxaban (Xarelto ®) directly inhibits factor Xa, which by interrupting the pathway of blood coagulation cascade, inhibits the thrombin formation and development of thrombi. It is only licensed for use in THR and TKR surgery.

All patients undergoing THR or TKR must be risk assessed before prescribing thromboprophylaxis to ensure the risk of bleeding and other contraindications are taken into account.

Prescribing
All rivaroxaban prescriptions should be written for administration post operatively at **22.00hrs**, it must be started no earlier than 6 hours after the removal of an epidural catheter.

If the patient’s operation involved a traumatic insertion or removal of epidural catheter, the first dose of rivaroxaban will be delayed for 24 hrs post operation. The Anaesthetist will document this on the prescription chart.

Supply
The total duration of treatment for the THR post operatively is 35 days and for TKR 10 days. If a patient is discharged before day 4 (knee) or before day 5 (hip) they will only receive one of the appropriate pack size.

Rivaroxaban will be held as stock (pack size 100) on the elective orthopaedic ward. On day 5 post THR, the patients will receive a labelled pack of 30 rivaroxaban 10 mg tablets and on day 4 post TKR the patients will receive a labelled pack of 10 rivaroxaban 10 mg tablets. Patients will also be given a Xarelto ® Patient Information Leaflet (PIL).

When issuing a TTO prepack, ensure the TTO prepack procedure is followed and documentation is completed.

Discharge
On discharge the patient will take home the remaining supply of Rivaroxaban to complete the full course (14 days, TKR and 35 days THR)
Two pairs of graduated compression stockings are to be supplied for use. No further monitoring is required.
Patients should be given the NORTH Team details to contact if they experience any problems with their anticoagulation.

Patients with contra-indications to Rivaroxaban
These patients should be prescribed enoxaparin for the following durations:
- TKR – Length of stay
- THR – Four weeks total post operative

The first dose of Enoxaparin should be administered pre-operatively, according to the licence. However, there is evidence to support its commencement postoperatively; therefore it is recommended that enoxaparin is initiated at least 4 hours after removal of a spinal or epidural catheter.
Emergency Orthopaedic Surgery

Fracture neck of femurs
Mechanical prophylaxis should be initiated at admission. Enoxaparin should be initiated at admission unless surgery is planned for within 24 hours. For patients with high risk of bleeding the optimal use of mechanical thromboprophylaxis is recommended. Thromboprophylaxis should continue for 28 days post operation.

Discharge
The full supply of enoxaparin will be made on the discharge prescription to take out (TTO). The patient will be taught to administer the medication themselves unless this is not possible, where the North Team will continue until care is taken over by the District Nurse.

All other Orthopaedic Surgery

For patients undergoing knee arthroscopy who do not have additional thromboembolic risk factors, no thromboprophylaxis is recommended other than early ambulation.

If patients have additional thromboembolic risk factors (see combined risk assessment appendix 2) or following a complicated procedure, it is recommended to prescribe enoxaparin 40mg at 18.00. Mechanical thromboprophylaxis should be offered in combination with enoxaparin. Thromboprophylaxis should be continued until discharge unless the patient has other high risk factors for developing a VTE (see risk assessment).

For patients with major trauma or spinal cord injury thromboprophylaxis should only be initiated when the patient has been risk assessed and the benefits of thromboprophylaxis outweigh the risks of bleeding. Risks should be regularly re-assessed. Mechanical thromboprophylaxis should be offered in combination with enoxaparin. Mechanical thromboprophylaxis should be started at administration or as early as clinically possible. Both should be continued until the patient has achieved maximum mobility for their condition.

It is not necessary to routinely offer thromboprophylaxis to patients undergoing upper limb surgery, unless the patient is assessed to be at increased risk of VTE.

Outpatients/Fracture clinic patients with Lower Limb Immobilisation

Patients (not admitted to hospital) with lower limb plaster casts or other appliances which cause immobilisation must be risk assessed for VTE risk. Patients should then be prescribed enoxaparin 40mg OD until the cast/appliance is removed. The anticoagulant nursing service will manage these patients once they have been referred.

All patients must have a patient information leaflet (appendix 2)

If patients are hypertensive (systolic>180), they should be referred back to their GP, for management of blood pressure prior to starting enoxaparin thromboprophylaxis.
Risk Assessment and Thromboprophylaxis in Obstetric patients

Refer to Thromboprophylaxis in antenatal, interpartum and post-partum periods (Appendix 7) and Guidance notes: Anticoagulation of Thromboembolism and Thrombophilia in pregnancy (Appendix 8)

The Thromboprophylaxis in antenatal, interpartum and post-partum periods guidelines have been updated in accordance with the latest Royal College of Obstetrics and Gynaecology Green Top guidance¹⁸

Risk Assessment and Thromboprophylaxis in Critical Care patients

The critically ill represent a specific population of patients who are at substantially increased risk of VTE which contributes significantly to their morbidity and mortality. PE is frequently seen at post mortem in these patients, the incidence being as high as 27%. The incidence of image-proven DVT in critically ill patients ranges from <10% to almost 100% depending upon the screening methods and diagnostic criteria used¹⁹

The risk of VTE in critically care patients should be assessed daily as there may be transient contraindications (e.g. thrombocytopenia, renal insufficiency, bleeding) to thromboprophylaxis and a patients risk/benefit ratio may change.

All patients who are at moderate or high risk should be prescribed enoxaparin 40mg daily at 18.00 unless the bleeding risks outweigh the risk of VTE or there are contraindications to enoxaparin.

For patients who are at high risk of bleeding, the optimal use of mechanical thromboprophylaxis with graduated compressions stockings and / or IPC at least until the bleeding risk decreases. When the high risk of bleeding decreases enoxaparin should be substituted or added to the mechanical thromboprophylaxis.
6. Roles and Responsibilities

For emergency admissions: It is the admitting doctor’s responsibility to assess patients VTE risk and prescribe thromboprophylaxis accordingly.
For elective admissions: It is the POA nurse’s responsibility to risk assess patients VTE risk and the admitting doctor’s responsibility to prescribe thromboprophylaxis accordingly.

7. Related Trust and/or National Guidance

All Trust guidance relating to thromboprophylaxis including management of anticoagulation during surgery is included within this document.

8. References / Bibliography

1 Thromboprophylaxis Guidelines for Adult patients. NGH May 2005
3 NICE Clinical Guidance 92. Venous thromboembolism. Reducing the risk of venous thromboembolism in patients admitted to hospital January 2010
5 NHS Operating Framework 2010. CQUIN Guidance National Indicators. Goal 1. reduce avoidable death, disability and chronic ill health from VTE.
10 Hormone Replacement Therapy and Venous Thromboembolism, RCOG Guidelines No 19, revised Jan 2004
11 Prophylaxis of Venous Thromboembolism. SIGN Publication No 62, published October 2002
12 Tamoxifen SPC AstraZeneca UK Ltd. Last revision of text 19th June 2008
13 Thalidomide SPC Celgene Europe Ltd. Last revision of text 27 Aug 2009
15 Summary of Products Characteristic for Enoxaparin, Sanofi Aventis. Last revision text 04 Feb 2009
17 Summary of Products Characteristic for Rivaroxaban, Bayer HealthCare. Last revision of text 21 May 2009
18 Royal College of Obstetricians & Gynaecologists (2009) Thromboprophylaxis during pregnancy, labour and after vaginal delivery; London RCOG
9. Guidance Development

Trust Thromboprophylaxis Guideline from 2005 has been updated using the ACCP Guidelines 8th edition\(^6\) and NICE Clinical Guideline 92 Reducing the risk of venous thromboembolism in patients admitted to hospital January 2010\(^3\). The guideline was developed with support from the Thrombosis Committee with consultation from all directorates.

10. Audit

- Junior Doctors will audit on a quarterly basis
- Results will be fed back to the Thrombosis Committee
- Collation of results with action plan will then be fed back to individual directorates for action plans to be carried out

Standards

100% of patients will have a risk assessment carried out.
100% of risk assessments will be correct.
100% of prescriptions for thromboprophylaxis will be correct for the risk assessment.
The number of days from admission to assessment will be less than one.

11. Implementation and Training

Junior Doctors

- DOH electronic VTE training module to be added to mandatory training
- In-house – anticoagulant competency package
- BMJ Learning Modules
  - Initiating anticoagulant therapy
  - Maintaining patients on anticoagulants

Nurses and AHP

- Training of anticoagulant nurses who will train with support of the POA nurses
  - Fracture clinic nurses
  - Senior nurses / ward managers
- Training filtered down to ward nurses and all pharmacists
- Planned to be added to one-off mandatory training
<table>
<thead>
<tr>
<th>Title:</th>
<th>Thromboprophylaxis Guidelines for Adult Patients in: Critical care, General Surgery, Gynaecology, Head &amp; Neck, Medicine, Obstetrics, Oncology and Orthopaedics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author:</td>
<td>Rachel Westwood, Lead Clinical Pharmacist, Surgery</td>
</tr>
<tr>
<td>Consultation Process:</td>
<td>Anthea Nieland, Anticoagulant Nurse Practitioner Sonia Swart, Consultant Haematologist Thrombosis Committee</td>
</tr>
<tr>
<td>Authorising Committee:</td>
<td>Medicines Management Committee</td>
</tr>
<tr>
<td>Minute No:</td>
<td>MMC 10/13</td>
</tr>
<tr>
<td>Date of 1st Issue:</td>
<td>September 2004</td>
</tr>
<tr>
<td>Review Date:</td>
<td>February 2010</td>
</tr>
<tr>
<td>Date of Next Review:</td>
<td>February 2012</td>
</tr>
</tbody>
</table>
Bridging Anticoagulation

Perioperative Management of patients on Oral Anticoagulation Therapy

Aim: To assist medical staff and other healthcare professionals in managing patients who are receiving warfarin and require any sort of surgical procedure. This is to ensure that the procedure can be carried out safely, carefully balancing the risks of stopping the anticoagulant against the risks of haemorrhage associated with bridging therapy.

The aim of management is to reduce the patients INR to less than 1.5 on the day of surgery, a level deemed to be safe in the majority of settings.

Additional notes

- Restarting the patient’s usual dose of warfarin post-operatively is safer initially and causes fewer problems once the patient has been discharged from hospital.
- Fast re-loading of warfarin is not ideal in many patients and causes difficulties, especially when there are changes to the patient’s medications or clinical state. However, patients may be fast loaded if they have been on enoxaparin for a prolonged duration.

On discharge

- All patients should be referred back to the anticoagulant team for ongoing anticoagulant monitoring
- All patients must have an INR check within seven days of discharge

Exceptions

Warfarin should be continued throughout surgery for:
- Minor superficial surgery
- Cataract surgery
- Dental extractions
- Joint and soft tissue aspiration
- OGD and colonoscopy (except polypectomy, laser ablations, treatment of varices, stricture, dilation and sphincterotomy).

Major bleeding is rare in spite of continuation of oral anticoagulation for all of the above, therefore there is no need to stop warfarin for patients in therapeutic range (INR <3.0)

Warfarin should be stopped with no additional anticoagulation in:
- Spinal surgery
- Neurosurgery (although this is not carried out at NGH patients may be transferred to another hospital)

Anticoagulation can be restarted at the risk level appropriate for the patient. Even in patients with mechanical heart valves, short periods off anticoagulation can be relatively safe.
Haemodialysis patients on Warfarin for line patency will require additional anticoagulation with unfractionated heparin. Ensure care is discussed with Renal Team pre-operatively.

<table>
<thead>
<tr>
<th>Indication for Anticoagulation</th>
<th>Pre-Operative Action</th>
<th>Post-Operative Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low Risk</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Atrial Fibrillation with no history of embolism or valvular heart disease | Stop warfarin 5 days pre-operatively  
Check INR on admission (INR <1.5 is acceptable) | ![Insert Action Here...] |
| **Moderate Risk**             |                      |                       |
| Atrial Fibrillation with positive history of embolism or valvular heart disease  
Acute venous thromboembolism (longer than 6 weeks ago) – if massive PE or extensive DVT go to very high risk  
Recurrent venous thromboembolism | Stop warfarin 5 days pre-operatively | ![Insert Action Here...] |
| **High Risk**                 |                      |                       |
| Mechanical heart valve        | Stop warfarin 5 days pre-operatively  
3 days before surgery start therapeutic dose of enoxaparin (1.5mg/kg od)  
Stop 24 hours pre-operatively | ![Insert Action Here...] |
| **Very high risk**            |                      |                       |
| Acute venous thromboembolism or arterial emboli (within the last 6 weeks) | Stop warfarin 5 days pre-operatively  
3 days before surgery start therapeutic dose of enoxaparin (1.5mg/kg od)  
24 hours before surgery admit to hospital and start IV heparin according to the anticoagulant chart.  
Monitor APTT after 2-6 hours and as directed on the anticoagulant chart thereafter.  
Stop IV heparin 6 hours before surgery | ![Insert Action Here...] |
Reducing the risk of a blood clot during and after your admission to hospital

Other information
For the benefit of our patients and staff, Northampton General Hospital operates a smoke-free policy. This means that smoking is not allowed anywhere on the trust site, this includes all buildings, grounds and car parks.

Leaflets, information, advice and support on giving up smoking and on nicotine replacement therapy are available from the Stop Smoking helpline on 0845 601 3116, the free national helpline on 0800 1690169, e-mail: smokefree@npct.northants.nhs.uk and local pharmacies.

Car parking is extremely limited and it is essential to arrive early, allowing ample time for parking. Alternatively, you may find it more convenient to arrange to be dropped off and collected.

This information can be provided in other languages and formats including Braille, audio cassette and CD. Contact (01604) 544516 or the Patient Advice & Liaison Service (PALS) on (01604) 545784, e-mail: Pals@ngh.nhs.uk
What happens when I am discharged from hospital?
Your risk of developing a blood clot may persist after you have been discharged from hospital. Some patients will continue to take medications and wear compression stockings at home. All patients should take the following precautions:

- Try to be as mobile as possible (unless you have been advised otherwise) and continue with any exercises that you have been shown
- Drink plenty of fluids to avoid dehydration
- Take painkillers regularly as needed

If you experience any symptoms of a blood clot or bleeding you should contact your GP immediately. If you have severe shortness of breath, chest pain or uncontrolled bleeding you should dial 999 for an ambulance.

Useful websites

www.northamptongeneral.nhs.uk
www.nhs.uk
What is this leaflet for?
This leaflet will help you to understand the risk of developing a blood clot and explain what can be done to help prevent this from happening.

How does a blood clot form?
If you become inactive over a period of time, your blood moves around your body more slowly. This can sometimes lead to blood collecting in the lower parts of your body. This in turn can lead to a blood clot (thrombosis) forming. If a clot forms in the deep veins of the calves, thighs, pelvis or arms it is known as a deep vein thrombosis (DVT).

When can a blood clot occur?
This can occur at any time due to a narrow, blocked or damaged blood vessel as a result of poor circulation, injury, inactivity, severe illness or surgery.

Is a blood clot life threatening?
A blood clot itself is not necessarily life threatening. If a part of it becomes loose and travels to another part of your body, it can then become a problem, this is known as a venous thromboembolism (VTE).

If the blood clot travels to the lungs it is known as a pulmonary embolism (PE). This is a very serious condition that can be fatal if not treated.

Am I at risk?
Anyone who is unwell in hospital, or having surgery may be at risk but some people are more likely than others to develop a blood clot.

Other ways to reduce the risk
You will be encouraged to be as mobile as possible. If appropriate a physiotherapist will assist with your mobility and show you breathing and leg exercises.

What are the signs and symptoms of a blood clot?
- Pain or swelling in your legs
- The skin on your leg is discoloured (red, purple, blue) or feels hot
- Numbness or tingling in your feet
- The veins in your leg appear larger than normal
- Shortness of breath
- Pain in your chest, back or ribs which is worse if you take a deep breath
- Coughing up blood

If you experience any of these symptoms please inform the doctor or nurse immediately.

Information regarding blood clots

What is this leaflet for?
This leaflet will help you to understand the risk of developing a blood clot and explain what can be done to help prevent this from happening.

How does a blood clot form?
If you become inactive over a period of time, your blood moves around your body more slowly. This can sometimes lead to blood collecting in the lower parts of your body. This in turn can lead to a blood clot (thrombosis) forming. If a clot forms in the deep veins of the calves, thighs, pelvis or arms it is known as a deep vein thrombosis (DVT).

When can a blood clot occur?
This can occur at any time due to a narrow, blocked or damaged blood vessel as a result of poor circulation, injury, inactivity, severe illness or surgery.

Is a blood clot life threatening?
A blood clot itself is not necessarily life threatening. If a part of it becomes loose and travels to another part of your body, it can then become a problem, this is known as a venous thromboembolism (VTE).

If the blood clot travels to the lungs it is known as a pulmonary embolism (PE). This is a very serious condition that can be fatal if not treated.

Am I at risk?
Anyone who is unwell in hospital, or having surgery may be at risk but some people are more likely than others to develop a blood clot.

Bleeding: All the medicines used to reduce your blood clot risk may increase your risk of bleeding. You will be monitored for this, but if you experience any bleeding, bruising or skin discolouration please inform the doctor or nurse immediately. You will only be given medication if your risk of developing a blood clot outweighs your risk of bleeding.

Information regarding blood clots

What is this leaflet for?
This leaflet will help you to understand the risk of developing a blood clot and explain what can be done to help prevent this from happening.

How does a blood clot form?
If you become inactive over a period of time, your blood moves around your body more slowly. This can sometimes lead to blood collecting in the lower parts of your body. This in turn can lead to a blood clot (thrombosis) forming. If a clot forms in the deep veins of the calves, thighs, pelvis or arms it is known as a deep vein thrombosis (DVT).

When can a blood clot occur?
This can occur at any time due to a narrow, blocked or damaged blood vessel as a result of poor circulation, injury, inactivity, severe illness or surgery.

Is a blood clot life threatening?
A blood clot itself is not necessarily life threatening. If a part of it becomes loose and travels to another part of your body, it can then become a problem, this is known as a venous thromboembolism (VTE).

If the blood clot travels to the lungs it is known as a pulmonary embolism (PE). This is a very serious condition that can be fatal if not treated.

Am I at risk?
Anyone who is unwell in hospital, or having surgery may be at risk but some people are more likely than others to develop a blood clot.

Information regarding blood clots

What is this leaflet for?
This leaflet will help you to understand the risk of developing a blood clot and explain what can be done to help prevent this from happening.

How does a blood clot form?
If you become inactive over a period of time, your blood moves around your body more slowly. This can sometimes lead to blood collecting in the lower parts of your body. This in turn can lead to a blood clot (thrombosis) forming. If a clot forms in the deep veins of the calves, thighs, pelvis or arms it is known as a deep vein thrombosis (DVT).

When can a blood clot occur?
This can occur at any time due to a narrow, blocked or damaged blood vessel as a result of poor circulation, injury, inactivity, severe illness or surgery.

Is a blood clot life threatening?
A blood clot itself is not necessarily life threatening. If a part of it becomes loose and travels to another part of your body, it can then become a problem, this is known as a venous thromboembolism (VTE).

If the blood clot travels to the lungs it is known as a pulmonary embolism (PE). This is a very serious condition that can be fatal if not treated.

Am I at risk?
Anyone who is unwell in hospital, or having surgery may be at risk but some people are more likely than others to develop a blood clot.

Information regarding blood clots

What is this leaflet for?
This leaflet will help you to understand the risk of developing a blood clot and explain what can be done to help prevent this from happening.

How does a blood clot form?
If you become inactive over a period of time, your blood moves around your body more slowly. This can sometimes lead to blood collecting in the lower parts of your body. This in turn can lead to a blood clot (thrombosis) forming. If a clot forms in the deep veins of the calves, thighs, pelvis or arms it is known as a deep vein thrombosis (DVT).

When can a blood clot occur?
This can occur at any time due to a narrow, blocked or damaged blood vessel as a result of poor circulation, injury, inactivity, severe illness or surgery.

Is a blood clot life threatening?
A blood clot itself is not necessarily life threatening. If a part of it becomes loose and travels to another part of your body, it can then become a problem, this is known as a venous thromboembolism (VTE).

If the blood clot travels to the lungs it is known as a pulmonary embolism (PE). This is a very serious condition that can be fatal if not treated.

Am I at risk?
Anyone who is unwell in hospital, or having surgery may be at risk but some people are more likely than others to develop a blood clot.

Information regarding blood clots

What is this leaflet for?
This leaflet will help you to understand the risk of developing a blood clot and explain what can be done to help prevent this from happening.

How does a blood clot form?
If you become inactive over a period of time, your blood moves around your body more slowly. This can sometimes lead to blood collecting in the lower parts of your body. This in turn can lead to a blood clot (thrombosis) forming. If a clot forms in the deep veins of the calves, thighs, pelvis or arms it is known as a deep vein thrombosis (DVT).

When can a blood clot occur?
This can occur at any time due to a narrow, blocked or damaged blood vessel as a result of poor circulation, injury, inactivity, severe illness or surgery.

Is a blood clot life threatening?
A blood clot itself is not necessarily life threatening. If a part of it becomes loose and travels to another part of your body, it can then become a problem, this is known as a venous thromboembolism (VTE).

If the blood clot travels to the lungs it is known as a pulmonary embolism (PE). This is a very serious condition that can be fatal if not treated.

Am I at risk?
Anyone who is unwell in hospital, or having surgery may be at risk but some people are more likely than others to develop a blood clot.
You are at increased risk if:
- You have a personal or family history of blood clots
- You have cancer or are receiving cancer treatment
- You have long standing heart or lung problems
- You are taking the combined oral contraceptive pill or hormone replacement therapy
- You have inflamed varicose veins (phlebitis)
- You are overweight (body mass index of 30 or more)
- You have poor mobility
- You are over 60 years of age
- You have a disorder that makes your blood more likely to clot
- You have recently had an operation
- You are pregnant
- You have had a baby within 6 weeks

**How can the risk be reduced**
Once you are admitted to hospital a doctor will complete a simple assessment to determine your risk. Patients having planned surgery will have their assessment completed by a nurse before admission to hospital.

There are a number of ways to reduce your chances of developing a blood clot:
- **Compression stockings**: These are tight stockings designed to reduce the risk of blood clots. They do this by squeezing the lower legs and thighs. This helps the blood flow better during periods of inactivity. If you are having surgery you may be given stockings to wear during your admission and some patients may need to continue to wear them for a period following discharge from hospital.
  
  You will be shown how to wear the stocking correctly. They should be removed daily for hygiene purposes and to check the condition of your skin. Please tell the nurse if you experience any discomfort or notice any skin discoloration or blistering.

- **Medication**: You may require a daily injection of heparin. This will help to prevent your blood from clotting inappropriately. Some patients may need to continue the injections for a period following discharge from hospital. You can be shown how to do this yourself, but if you have any difficulties alternative arrangements will be made.

  - If you are discharged with injections you may also need to have some routine blood tests. You will be advised when you need these and given the appropriate forms for you to make an appointment at your GP surgery or blood taking unit
  
  - Patients having planned surgery to replace hips or knees will be given a tablet to take daily. This will be continued for a number of weeks following discharge. You will be given a separate booklet explaining this
Reducing the risk of a blood clot following lower limb immobilisation
**Am I at risk?**

Having a leg immobilised in a cast or appliance can increase the risk of VTE but some people are more likely to develop a blood clot. You are at increased risk if:

- You have a personal or family history of blood clots
- You have cancer or you are receiving cancer treatment
- You are taking the combined oral contraceptive pill or hormone replacement therapy
- You are overweight (body mass index of 30 or more)
- You are pregnant
- You have had a baby within six weeks
- You have a disorder that makes your blood more likely to clot
- You have recently had a major operation

**How can the risk be reduced?**

A doctor or nurse will complete a simple assessment to determine your individual risk. If treatment is required you will be offered a daily injection of heparin (an anticoagulant). This will help to prevent your blood from clotting inappropriately and will be administered every day, for the duration of the cast/appliance.

You can be shown how to do this for yourself, but if you have any difficulties alternative arrangements will be made.

You will also need to have some routine blood tests. You will be advised when you need these and given the appropriate forms for you to make an appointment at your GP surgery or blood taking unit.

Whether you have been prescribed injections or not you should take the following general precautions:

- Try to be as mobile as possible (unless you have been advised otherwise)
- Drink plenty of fluids to avoid dehydration
- Take painkillers regularly, as needed

**What are the signs and symptoms of a blood clot?**

- Pain or swelling in your legs
- The skin on your legs is discoloured (red, purple, blue) or feels hot
- Numbness or tingling in your feet
- The veins of your leg appear larger than normal
- Shortness of breath
- Pain in your chest, back or ribs which is worse when you take a deep breath
- Coughing up blood

**What should I do if I develop signs or symptoms of a blood clot?**

You should contact your GP immediately. If you have severe shortness of breath or chest pain you should dial 999 for an ambulance.
Information regarding blood clots

What is this leaflet for?
This leaflet will help you to understand the treatment for people who are at risk of developing a blood clot following the application of a cast or appliance to immobilise a leg.

How does a blood clot form?
Contained within the calf muscles of each leg there are many veins. As you walk, run or move your feet, the muscles squeeze the veins and blood is propelled towards the heart. This is known as the calf muscle pump.

If your leg is immobilised in a cast/appliance the calf muscle pump is less efficient and this can lead to blood pooling in the veins, which in turn can lead to the formation of a blood clot.

Is a blood clot life threatening?
A blood clot itself is not necessarily life threatening. If a part of it becomes loose and travels to another part of your body, it can then become a problem, this is known as a venous thromboembolism (VTE).

If the blood clot travels to the lungs it is known as a pulmonary embolism (PE). This is a very serious condition that can be fatal if not treated.

Are there any side effects to the treatment?
As with all medicines, the injections can have side effects in some people. The most common effect is that you may be more susceptible to bruising and bleeding. If you notice any bleeding or skin discolouration you should contact your GP immediately. If you experience uncontrolled bleeding you should dial 999 for an ambulance.

Useful websites

www.nhs.uk
www.northamptongeneral.nhs.uk

Other information

Northampton General Hospital operates a smoke-free policy. This means that smoking is not allowed anywhere on the trust site, this includes all buildings, grounds and car parks.

Leaflets, information, advice and support on giving up smoking and on nicotine replacement therapy are available from the Stop Smoking helpline on 0845 6013116, the free national helpline on 0800 1690169, e-mail: smokefree@npct.northants.nhs.uk and local pharmacies.

Car parking at Northampton General Hospital is extremely limited and it is essential to arrive early, allowing ample time for parking. Alternatively, you may find it more convenient to arrange to be dropped off and collected.

This information can be provided in other languages and formats upon request including Braille, audio cassette and CD. Please contact (01604) 544516 or the Patient Advice & Liaison Service (PALS) on (01604) 545784, e-mail: Pals@ngh.nhs.uk
Venous thromboembolism risk assessment for adult patients (excluding day surgery, fractured neck of femur, total hip or knee replacement, and obstetrics). To be used in conjunction with Northampton General Hospital Thromboprophylaxis Guidelines (2010). All patients must be assessed by the admitting team/pre-assessment nurse (excluding medical day cases, and ophthalmology). Compliance will be audited.

**High Risk ✓**
- Age >60 years
- Obesity (body mass index >30kg/m²) - refer to guidelines for increased dose recommendations
- One or more significant co-morbidities (e.g. heart disease; metabolic, endocrine or respiratory pathologies; inflammatory conditions)
- Personal history or first-degree relative with a history of DVT/PE
- Active cancer/cancer treatment
- Dehydration
- Oestrogen containing contraceptive or hormone replacement therapy
- Thrombophilia/myeloproliferative disease
- Pregnancy - use obstetric assessment
- <6 weeks post-partum
- Nephrotic syndrome
- Varicose veins with phlebitis
- Acute surgical admission with inflammatory or infra-abdominal condition
- Any surgical procedure >90 minutes duration or 60 minutes if involves the pelvis or lower limb
- Major trauma or spinal injury - refer to guidelines
- Other: .................................................................

**HIGH RISK one or more: MEDICAL** Prescribe enoxaparin 40mg once daily at 18.00 hours until discharged. **SURGICAL** Prescribe enoxaparin 40mg once daily at 18.00 hours until discharge. Prescribe graduated compression stockings (check contraindications)

**Very High Risk ✓ Extended thromboprophylaxis (surgical patients only)**
- Any surgery for cancer in the abdomen or pelvis
- Any surgery with a previous post-operative DVT/PE
  
  ![Prescribe prophylaxis as high risk and continue for 28 days post-operatively](image)
- Lower limb immobilisation plus one or more of the following:
  - Personal history or first-degree relative with a history of DVT/PE
  - Obesity
  - Active cancer or cancer treatment
  - <6 weeks post partum
  - Oestrogen containing contraceptive or hormone replacement therapies
  - Thrombophilia or myeloproliferative disease
  
  ![Prescribe as high risk and continue for the duration of the cast/appliance](image)
  - Any surgery plus:
    - Previous DVT/PE (other than post-op)
  
  ![Prescribe as high risk and consider extended prophylaxis on an individual patient basis](image)
  - Any surgery plus:
    - Thrombophilia or myeloproliferative disease (other than lower limb immobilisation)
  
  ![Discuss management with haematologist](image)

**Low Risk ✓**
- No risk factors
- Upper limb surgery
- Any superficial surgical procedure

**LOW RISK: MEDICAL** No prophylaxis. **SURGICAL:** Prescribe graduated compression stockings (check contraindications)

**Contraindicated ✓**
- Any surgical procedure >30 minutes duration (not included in high risk category) with no additional risk factors

**MODERATE RISK**: Prescribe enoxaparin 20mg one daily at 18.00 hours until discharge. Prescribe graduated compression stockings (check contraindications)

- Any surgical procedure >90 minutes duration or 60 minutes if involves the pelvis or lower limb
- Major trauma or spinal injury - refer to guidelines
- Other: .................................................................

**Contraindicated: Prescribe graduated compression stockings (check contraindications)**

Abbreviations: DVT = deep vein thrombosis, PE = pulmonary embolism.
Very High Risk

Prescribe Rivaroxaban 10mg once daily at 22.00. The initial dose should be administered no earlier than 6 hours after the removal of an epidural catheter. If the operation is in the afternoon or evening or removal of the catheter was difficult or traumatic the first dose should be initiated the next day. **Continue prophylaxis for 35 days.** Prescribe graduated compression hosiery (check contraindications).

Stop date: …………………………………………………………………………

Contraindicated

☐ Hypersensitivity to Rivaroxaban - refer to guidelines
☐ Renal failure - refer to guidelines
☐ Active bleeding/bleeding disorder
☐ Pregnancy/lactation
☐ Liver disease - refer to guidelines
☐ Previous bleeding post-operatively
☐ Anticoagulant bridging therapy - see appendix 1 of guidelines
☐ Other (specify): ………………………………………………………………………………………………………………………………………………………………………
☐ None

Contraindicated

Prescribe graduated compression hosiery (check contraindications)

Assessed by
Signature: ……………………………………………………………. PRINT name: …………………………………………………………………………………
Position: ……………………………………………………………. Bleep: ……………………… Date: ………………………
Venous thromboembolism risk assessment for adult patients
To be used in conjunction with NGH thromboprophylaxis guidelines (2010)

All patients must be assessed by the admitting orthopaedic team/pre-assessment nurse
Compliance with completing this form will be audited

**Very High Risk**

Prescribe Rivaroxaban 10mg once daily at 22.00. The initial dose should be administered no earlier than 6 hours after the removal of an epidural catheter. If the operation is in the afternoon or evening or removal of the catheter was difficult or traumatic the first dose should be initiated the next day. **Continue prophylaxis for 10 days.**

Prescribe graduated compression hosiery (check contraindications).

Stop date:  

**Contraindicated ✓**

- Hypersensitivity to Rivaroxaban - refer to guidelines
- Renal failure - refer to guidelines
- Active bleeding/bleeding disorder
- Pregnancy/lactation
- Liver disease - refer to guidelines
- Previous bleeding post-operatively
- Anticoagulant bridging therapy - see appendix 1 of guidelines
- Other (specify): ……………………………………………………………………………………………………………………………………………
- None

**Contraindicated**

Prescribe graduated compression hosiery (check contraindications)

---

**Assessed by**

Signature: ………………………………………………….. PRINT name: ……………………………………………………………

Position: ………………………………………………….. Bleep: ……………………….. Date: ……………………………
Venous thromboembolism risk assessment for adult patients
To be used in conjunction with NGH thromboprophylaxis guidelines (2010)

All patients must be assessed by the admitting orthopaedic team
Compliance with completing this form will be audited

**Very High Risk**

Prescribe Enoxaparin 40mg once daily (check guidelines for dose recommendations in obese patients (body mass index >30m²). Enoxaparin should be initiated for all patients at 18.00 hours unless the patient is going for surgery that evening. Monitor for heparin induced thrombocytopenia. **Continue prophylaxis for 28 days post-operatively.**

Prescribe graduated compression stockings (check contraindications).

Stop date: .................................................................

**Contraindicated ✔**

- Renal failure (CrCl<30ml/min) - refer to guidelines
- Active bleeding/bleeding disorder
- Active gastric/duodenal ulceration
- Acute bacterial endocarditis
- Hypersensitivity to Enoxaparin
- Recent haemorrhagic stroke
- Previous heparin induced thrombocytopenia
- Thrombocytopenia
- Anticoagulant bridging therapy - see appendix 1 of guidelines
- Previous bleeding post-operatively
- Uncontrolled severe hypertension
- Other (specify): ..........................................................
- None

**Contraindicated**

Prescribe graduated compression stockings (check contraindications)

---

Assessed by

Signature: ................................................................. PRINT name: .................................................................

Position: ................................................................. Bleep: ........................................ Date: ........................................

---

Northampton General Hospital NHS Trust

FRACTURED NECK OF FEMUR

---
Thromboprophylaxis in the Antenatal; Intrapartum and Postnatal Periods

Document Reference Number:

Ratified By: Obstetric Clinical Effectiveness Group

Date Ratified: 11th November 2009

Date(s) Reviewed: October 2009

Next Review Date: October 2012

Responsibility for Review: Obstetric Clinical Effectiveness Group

Authors:
Sue Lloyd – Consultant Obstetrician
Wesley McCullough – Consultant Obstetrician
Rachel Westwood – Pharmacist
Anthea Nieland – Anticoagulation Nurse Specialist
Christine Ainsworth – Lead Midwife - CNST
CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Introduction &amp; Aims</td>
<td>3</td>
</tr>
<tr>
<td>2 Scope</td>
<td>3</td>
</tr>
<tr>
<td>3 Definitions</td>
<td>3</td>
</tr>
<tr>
<td>4 VTE in Pregnancy; Intrapartum &amp; Postnatal Periods</td>
<td>3</td>
</tr>
<tr>
<td>4.1 Good Practice Points</td>
<td>4</td>
</tr>
<tr>
<td>4.2 Low Molecular Weight Heparin for Thromboprophylaxis</td>
<td>4</td>
</tr>
<tr>
<td>4.2.1 Contraindications to Enoxaparin</td>
<td>4</td>
</tr>
<tr>
<td>4.3 Antenatal Booking Assessment</td>
<td>4</td>
</tr>
<tr>
<td>4.4 Antenatal Admissions to a Maternity Ward</td>
<td>5</td>
</tr>
<tr>
<td>4.5 Assessment of Risk Factors in Labour</td>
<td>6</td>
</tr>
<tr>
<td>4.6 Thromboprophylaxis following Caesarean Section</td>
<td>6</td>
</tr>
<tr>
<td>4.7 Assessment of Risk Factors in the Postnatal Period</td>
<td>7</td>
</tr>
<tr>
<td>4.8 Transfer to the Community Midwife</td>
<td>7</td>
</tr>
<tr>
<td>4.9 Monitoring</td>
<td>8</td>
</tr>
<tr>
<td>4.10 Breastfeeding &amp; Enoxaparin</td>
<td>8</td>
</tr>
</tbody>
</table>

Submission Documents

<table>
<thead>
<tr>
<th>Monitoring &amp; Review</th>
<th>10</th>
</tr>
</thead>
</table>
1 INTRODUCTION & AIMS

Venous thromboembolism (VTE) was the leading cause of direct maternal deaths in the last triennium (Drife et al, 2004). There was evidence in substandard care in over half of cases with most deaths occurring in the post partum period. Of particular note is the number of deaths after vaginal delivery and there has been a steady decline in numbers after caesarean section following the Royal College of Obstetricians and Gynaecologists (RCOG) guidelines for thromboprophylaxis. Substandard care included failure to recognize risk factors, delay in implementing prophylaxis or treatment, inadequate doses administered and failure to appreciate symptoms and signs of VTE. Although rare, VTE is a largely preventable cause of death and serious morbidity.

The RCOG issued guidelines in 2004 for thromboprophylaxis during pregnancy, Labour and after Vaginal Delivery, and the caesarean section guidelines were updated in 2004 (change in doses).

2. SCOPE

This guideline is intended for all staff caring for women within the maternity services and provides information on assessment of women’s risk of VTE. Standardised risk assessment tools and protocols to reduce risk are provided.

It does not cover the management of women who have a confirmed or suspected thrombosis; the guideline Thrombophilia and Thromboembolism in Pregnancy should be followed.

This guideline does not cover the management of women who have had a previous VTE or a thrombophilia – the care of these women is covered in ‘Thrombophilia and Thromboembolism in Pregnancy’.

3. DEFINITIONS

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTE</td>
<td>Venous thromboembolism</td>
</tr>
<tr>
<td>RCOG</td>
<td>Royal College of Obstetricians &amp; Gynaecologists</td>
</tr>
<tr>
<td>LMWH</td>
<td>Low molecular weight heparin</td>
</tr>
<tr>
<td>GCS</td>
<td>Graduated compression stockings</td>
</tr>
<tr>
<td>PPH</td>
<td>Post partum haemorrhage</td>
</tr>
</tbody>
</table>

Thromboprophylaxis – Antenatal, Intrapartum & Postnatal
Version 1

Date of First Issue: Date of Current Issue: Oct 2009
Date for Review: Oct 2012
4. VENOUS THROMBOPROPHYLAXIS IN PREGNANCY; INTRAPARTUM AND POSTNATAL PERIODS

4.1 Good practice points with regard to VTE

All women, regardless of risk factors, should be warned of the symptoms and signs of VTE and advised to seek medical attention if these occur. Information is available on Page 16 of the Antenatal Notes and Page 6 of the Postnatal Notes.

All women should be advised to remain well hydrated and mobile during pregnancy, labour and the puerperium.

4.2 Low Molecular Weight Heparin for Thromboprophylaxis

LMWHs are the treatment of choice for short term thromboprophylaxis. The physiological changes of pregnancy result in an increased volume of distribution of LMWH and decreased half life, so higher weight adjusted doses are necessary (see table below).

Renal Failure – if creatinine clearance is <30ml/min the maximum dose of Enoxaparin is 20mg daily.

<table>
<thead>
<tr>
<th>Prophylaxis</th>
<th>Enoxaparin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight</td>
<td></td>
</tr>
<tr>
<td>&lt; 50kg</td>
<td>20mg daily</td>
</tr>
<tr>
<td>50 – 90 kg</td>
<td>40 mg daily</td>
</tr>
<tr>
<td>91 – 130 kg</td>
<td>60 mg daily</td>
</tr>
<tr>
<td>131 – 170 kg</td>
<td>80 mg daily</td>
</tr>
<tr>
<td>&gt; 170 kg</td>
<td>0.6 mg/kg/daily</td>
</tr>
</tbody>
</table>

4.2.1 Contraindications to Enoxaparin

Active bleeding/bleeding disorder
Renal failure (CrCl<30ml/min)
Active gastric/duodenal ulceration
Recent haemorrhagic stroke
Thrombocytopenia
Previous heparin induced thrombocytopenia
Hypersensitivity to Enoxaparin
Acute bacterial endocarditis
Therapeutic Enoxaparin/Warfarin

4.3 Antenatal Booking Assessment

Women with thrombophilias, previous VTE or family history of VTE should be referred to a consultant to discuss their ongoing management.

4.4 Antenatal Admissions to a Maternity Ward

Any woman admitted during the antenatal period should be risk assessed for VTE using the risk assessment stickers. This should initially be performed by the admitting doctor and repeated by the midwife on a daily basis as the risk may change.

<table>
<thead>
<tr>
<th>Antenatal Risk Factors for Thromboembolism</th>
<th>Tick</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrombophilia (congenital or acquired)</td>
<td></td>
</tr>
<tr>
<td>Previous VTE</td>
<td></td>
</tr>
<tr>
<td>Age &gt; 35</td>
<td></td>
</tr>
<tr>
<td>Smoking</td>
<td></td>
</tr>
<tr>
<td>Booking BMI &gt; 30</td>
<td></td>
</tr>
<tr>
<td>Booking BMI &gt; 40</td>
<td></td>
</tr>
<tr>
<td>Gross varicose veins</td>
<td></td>
</tr>
<tr>
<td>Parity &gt; 3</td>
<td></td>
</tr>
<tr>
<td>Multiple Pregnancy / Assisted Reproductive Therapy</td>
<td></td>
</tr>
<tr>
<td>Recent Long Haul Travel</td>
<td></td>
</tr>
<tr>
<td>Current hyperemesis/ dehydration/ ovarian hyperstimulation syndrome</td>
<td></td>
</tr>
<tr>
<td>Current Pre-eclampsia</td>
<td></td>
</tr>
<tr>
<td>Medical disorders – nephrotic syndrome, significant heart disease, inflammatory disorders, sickle cell disease, paraplegia, myeloproliferative disorders</td>
<td></td>
</tr>
<tr>
<td>Immobility &gt; 3 days bed rest or surgical procedure antenatally</td>
<td></td>
</tr>
<tr>
<td>Acute Infection</td>
<td></td>
</tr>
<tr>
<td>Fracture / recent lower limb fracture</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VTE Risk Score</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Amber</td>
<td>GCS and early mobilisation</td>
</tr>
<tr>
<td>2 or more Amber or 1 Red</td>
<td>GCS and early mobilisation and LMWH as per guidelines</td>
</tr>
</tbody>
</table>

This is a simple tick box system.

- One tick in the amber risk should prompt the use of GCS, early mobilization and the prevention of dehydration
• Two ticks in the amber risks or one tick in the red risks indicates additional thromboprophylaxis is required in the form of LMWH, which should be prescribed as per section 4.2

4.5 Assessment of Risk Factors in Labour

A risk assessment for thromboembolism should be performed for every woman admitted in labour as part of the initial assessment.

The following table is included in the Perinatal Institute’s Birth Record

<table>
<thead>
<tr>
<th>Intrapartum Risk Factors for Thromboembolism</th>
</tr>
</thead>
<tbody>
<tr>
<td>None identified</td>
</tr>
<tr>
<td>Major current illness</td>
</tr>
<tr>
<td>Gross varicose veins</td>
</tr>
<tr>
<td>Age &gt; 35</td>
</tr>
<tr>
<td>Family or personal history</td>
</tr>
</tbody>
</table>

Labouring women who are unwell, immobile or have two or more risk factors should be advised to have GCS fitted and extra care should be taken to avoid dehydration.

LMWH should be avoided until after delivery in the majority of cases however, if a woman is deemed very high risk the Registrar should discuss management with the consultant on call.

High risk women who have been on LMWH in the antenatal period should have an individual management plan documented in their notes.

4.6 Thromboprophylaxis following Caesarean Section

• All women who have a caesarean section should be given prophylaxis in the form of LMWH and GCS

• The anaesthetist will be responsible for prescribing the LMWH, after discussion about contra-indications with the obstetrician delivering.

• After spinal anaesthesia, LMWH should be given 4 hours after the spinal (or after 24 hours if traumatic spinal)

• After epidural anaesthesia, LMWH should be given 6 hours after removal of the epidural catheter

• Early mobilization and avoidance of dehydration is imperative

• Daily LWMH for 3-5 days or until mobility is satisfactory
4.7 Assessment of risk Factors in the Postnatal Period

The risk factors may change following delivery and so a further assessment should be made at this stage. The midwife caring for the woman in the immediate postnatal period should complete the initial risk assessment proforma, which is included in the Perinatal Institute’s postnatal record and contains the following risk factors.

<table>
<thead>
<tr>
<th>Postnatal Risk Factors for Thromboembolism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt; 35</td>
</tr>
<tr>
<td>Para &gt; 3</td>
</tr>
<tr>
<td>BMI &gt; 35</td>
</tr>
<tr>
<td>Immobility prior to labour &gt; 4 days</td>
</tr>
<tr>
<td>Pregnancy induced hypertension / BP &gt; 160/100</td>
</tr>
</tbody>
</table>

- Women who have three or more risk factors should be prescribed GCS and LWMH.
- Postnatal thromboprophylaxis should be given as soon as possible after delivery, except if the woman has had epidural for pain relief in labour or if there is ongoing bleeding or a risk of further haemorrhage.
- In high risk women with, or at risk of, ongoing haemorrhage, GCS should be applied until risk of bleeding is deemed to have subsided, then LWMH can be initiated.
- Women who have had epidural for pain relief in labour should be given LMWH 6 hours after epidural catheter removal
- LMWH should continue for 3 – 5 days or longer if the woman is immobile
- Any postnatal woman requiring an inpatient stay should have risks reassessed on a daily basis as part of the routine postnatal check.

4.8 Transfer to community midwife

- Women who are fit for transfer prior to 3 days, should have LMWH administered following delivery and by the community midwife on the first postnatal visit. It can then be discontinued.
- If a woman is thought to need daily prophylaxis in the community, then the consultant obstetrician should document a management plan in the
postnatal notes and either arrange for the woman to attend postnatal drop in clinics or to self administer LMWH.

4.9 Monitoring

In women with normal renal function monitoring of anti-Xa levels are not required at the doses used for thromboprophylaxis.

Any patient needing to continue on LMWH for more than 7 days requires a full blood count to exclude the rare side effect of heparin induced thrombocytopenia. This is taken by the midwife on Day 7.

4.10 Breastfeeding

Enoxaparin is not a contraindication to breastfeeding. Enoxaparin is a large molecule which is unlikely to pass in to breast milk in clinically significant amounts. Oral bioavailability is poor therefore small amounts which may be present in milk would not be orally absorbed. No adverse effects have been seen in babies due to breastfeeding whilst the mother is taking enoxaparin.

4.11 Signs and symptoms of thromboembolism

The management of women with signs and symptoms of a deep vein thromboembolism in pregnancy is covered in the guideline ‘Thrombophilia and Thromboembolism in Pregnancy’. This guideline must be referred to for further guidance on the management of any woman who displays any of the following signs and symptoms:

Deep vein thrombosis
- Limb pain, tenderness, swelling or inflamed area
- Increase in limb circumference
- Positive Homan’s sign – pain felt in the calf when the foot is dorsiflexed with the leg extended.

Pulmonary embolism
- Shortness of breath
- Chest pain
- Cyanosis
- Reduced O₂ saturations
- Increased respiratory rate
REFERENCES & ASSOCIATED DOCUMENTS


National Institute for Health and Clinical Excellence (2007) Intrapartum Care: Care of healthy women and their babies during childbirth; London

Royal College of Obstetricians and Gynaecologists; Royal College of Anaesthetists; Royal College of Midwives; Royal College of Paediatrics & Child Health (2008) Standards for Maternity Care: Report of a Working Party; London RCOG

Royal College of Obstetricians & Gynaecologists (2007) Thromboembolic disease in pregnancy and the puerperium; London RCOG

Royal College of Obstetricians & Gynaecologists (2004) Thromboprophylaxis during pregnancy, labour and after vaginal delivery; London RCOG

Royal College of Obstetricians & Gynaecologists (2009) Thromboprophylaxis during pregnancy, labour and after vaginal delivery; London RCOG

ASSOCIATED DOCUMENTS
NGH (2008) Thrombophilia and Thromboembolism in Pregnancy
MONITORING & REVIEW

As part of the maternity audit programme, compliance of this guideline will be demonstrated via clinical audit of the following standards:

- All pregnant women admitted to a maternity ward will be risk assessed for VTE
- A postnatal risk assessment will be carried out on all women following delivery and documented in the postnatal records
- All women who have one amber risk factor on antenatal admission assessment will be prescribed GCS
- All women who have two amber or one red risk factor on antenatal admission assessment will be prescribed LMWH
- All women will be prescribed LMWH following birth by caesarean section
- All women with more than three risk factors for VTE following delivery will be prescribed LMWH

The above standards will be audited by midwives and/or obstetricians on an annual basis, and co-ordinated by the Maternity Clinical Effectiveness Group. The process will involve collecting retrospective data from 50 maternity records of women admitted to the maternity unit in the antenatal; intrapartum and postnatal periods. The resultant audit report will be made available to other Directorate Groups for dissemination via the Directorate Governance Group.

Action Plan/Recommendations

In the event of the audit standards not being met; the Maternity Clinical Effectiveness Group will formulate an action plan with recommendations. This plan will be submitted to the Directorate Governance Group for ratification and ongoing monitoring.
Guidance Notes:
Anticoagulation for Thrombophilia and Thromboembolism in Pregnancy

This guidance note contains specific explanatory information and guidance for clinical staff involved in the care of anticoagulated pregnant women with a current or past history of thromboembolism, and those with thrombophilia. It describes the recommended management for patients booked at NGH and should be used in conjunction with other relevant NGH guidance documents.

Background:

Pregnancy is a pro-thrombotic state. Maternal factors such as age (>35 doubles risk), obesity, high parity (>4), positive family history, smoking and lifestyle increase an individual mother’s risk.

Specific complications of pregnancy escalate this risk (eg: dehydration and hyperemesis, bed rest, pre-eclampsia, nephrotic syndrome, surgical interventions, ovarian hyperstimulation syndrome).

All forms of thrombophilia significantly increase the incidence of VTE in pregnancy, adding to the risk already associated with any individual pregnancy itself. Thrombophilias may be congenital or acquired. More than one factor can co-exist.

Thrombophilias of importance in pregnancy include:

Acquired:
+ ve Anticardiolipin antibodies
+ ve Antiphospholipid syndrome
+ ve Lupus Anticoagulant

Congenital:
Factor V Leiden mutation
Prothrombin 20210A variant
Protein C deficiency
Protein S deficiency
Antithrombin III deficiency

The prevalence of the two commonest gene mutations is dependent on ethnicity and country of origin; both are less common in Asians and African populations. Homozygotes are at much greater risk than heterozygotes.

FV Leiden gene variant is inherited as an autosomal dominant trait and is present in around 5% of the UK population. FV L mutation accounts for around 90% of activated protein C resistance (APCR) found in lab clotting tests. FV L heterozygotes have a 5-10% lifetime thrombosis risk. Often this only manifests itself when other key co-factors occur eg: in pregnancy, following surgery etc.

The Prothrombin G20210A gene mutation causes raised levels of prothrombin and is present in around 2% of the UK population.

Deficiency of the naturally occurring anticoagulants Protein C, Protein S and AT III are rare but have high recurrence risks for thrombosis. Studies suggest the
approximate lifetime recurrence risk for thrombosis in these conditions may be as follows:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Risk Range</th>
<th>Recurrence Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein S</td>
<td>12 - 17%</td>
<td>1 in 6 - 8</td>
</tr>
<tr>
<td>Protein C</td>
<td>22 – 26%</td>
<td>1 in 4 - 5</td>
</tr>
<tr>
<td>AT III</td>
<td>32 – 51%</td>
<td>1 in 2 - 3</td>
</tr>
</tbody>
</table>

Pregnancies with thrombophilia are at high risk:

For the mother:
- increased risk of VTE (and arterial thrombosis)
- increased risk of pre-eclampsia

For the foetus:
- early and late fetal loss
- growth restriction
- pre-term delivery

Several studies have tried to establish the risk of VTE in pregnancy associated with individual thrombophilias. The research data is not easily comparable as the diagnostic methodologies and terminology used varies, and different patient groups were observed or recruited in the different studies.

One such study gives an example of the relative risk for VTE of some known thrombophilias (90,000 pregnancies, St Mary’s Hosp, UK):

<table>
<thead>
<tr>
<th>Thrombophilia</th>
<th>Relative Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>FV Leiden</td>
<td>1 / 437</td>
</tr>
<tr>
<td>Protein C deficiency</td>
<td>1 / 113</td>
</tr>
<tr>
<td>AT deficiency *</td>
<td></td>
</tr>
<tr>
<td>Type 1</td>
<td>1 / 2.8</td>
</tr>
<tr>
<td>Type 2</td>
<td>1 / 42</td>
</tr>
</tbody>
</table>

* Many authors do not distinguish between the several described types of AT III deficiency. An overall deficiency of AT III is the key finding of note.

There is good evidence to support diagnostic testing for women with VTE in pregnancy: 50% will have an underlying thrombophilia

**When to test for thrombophilia:**

NB: first check the patient record for any previous known results

In pregnancy:
- Maternal VTE – new episode or past history
- Recurrent miscarriage (3 or more consecutive early fetal losses)
- Severe IUGR (live or stillborn)
- Late foetal loss (<34 weeks)
- Severe early pre-eclampsia (<34 weeks)
- Some connective tissue disorders (SLE, systemic sclerosis)
In the non-pregnant:
- Unprovoked VTE (ie: not associated with oestrogen containing contraceptive pill, pregnancy, trauma or surgery)
- Recurrent VTE
- Atypical site thrombosis (eg: axillary vein, or arterial)

It is not necessary to repeat testing for congenital thrombophilia; the patient’s genotype does not change. Many patients will have been tested and diagnosed as a result of family tracing following an earlier VTE event in a relative.

Acquired thrombophilia tests are worth repeating in subsequent pregnancies. These results will require expert interpretation; sensitivity of testing and normal ranges vary from lab to lab. Acquired Protein C deficiency can be a feature of normal pregnancy, repeat the testing after pregnancy.

Protein S levels fall in normal pregnancy; there is no value in diagnostic testing during a pregnancy. Pre-existing Protein S deficiency diagnosed outside of pregnancy is significant.

Despite its prevalence in the population, there is no evidence that routine screening for FV Leiden mutation is cost effective, even in pregnancy. Appropriate evidenced based management for patients with FVL in pregnancy remains unclear and varies from centre to centre, usually dependent on other existing co-factors in the individual patient’s history.

**Advice on samples and collection:**

<table>
<thead>
<tr>
<th>1</th>
<th>Test Requested</th>
<th>Which Form?</th>
<th>Which bottles?</th>
<th>Getting results</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td>Purple (EDTA)</td>
<td>Red (Plain)</td>
<td>Blue (Citrate)</td>
</tr>
<tr>
<td>2</td>
<td>FBC</td>
<td>Haematology</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Clotting screen</td>
<td>Haematology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>APCR</td>
<td>Haematology</td>
<td>4 Blue Top</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>FV Leiden and Prothrombin variant</td>
<td>Haematology (then sent to Oxford)</td>
<td>2 Purple Top</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Protein C</td>
<td>Haematology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Protein S</td>
<td>Haematology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>AT III</td>
<td>Haematology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Lupus anticoagulant</td>
<td>Haematology</td>
<td>2</td>
<td>H</td>
</tr>
<tr>
<td>2</td>
<td>AntiCardiolipin Antibodies</td>
<td>Microbiology</td>
<td>1</td>
<td>M</td>
</tr>
</tbody>
</table>
Pregnancy Management Advice for Anticoagulation

Notes:

Warfarin crosses the placenta and is contraindicated in pregnancy:
- Embryopathy: especially between 6 – 9w gestation
- Anticoagulation risk to the foetus: especially 3rd trimester
- Some patients at very high risk do need to remain on warfarin (eg: artificial heart valves) and require specialist advice before and during pregnancy

Heparins do not cross the placenta:
- Long term LMWH has not been associated with osteoporosis in pregnancy although there are rare reports of osteoporosis with LMWH usage in other clinical situations
- Long term LMWH rarely causes Heparin Induced Thrombocytopenia (HIT), which is a risk factor for thrombosis, but again this has not been described in pregnancy. Nevertheless monthly FBC monitoring is advised
- Unfractionated heparin does cause osteoporosis: >30% will lose more than 10% of their bone mass and 2% will have an osteoporotic fracture.

General Points:

There remains relatively little evidence in this field. Best practice revolves around multidisciplinary care, consistency in management incorporating advice from relevant expert groups, and audit of results. Patients receiving antenatal anticoagulation should therefore be referred to the pregnancy thrombophilia clinic (AAU x5435, Monday afternoons) and will be under the joint care of Mrs Anthony and Dr Swart.

Management recommendations will differ according to the patient’s circumstances

Women offered anticoagulation will be counselled as to the main antenatal risks of LMWH:
- There is an increased risk of bleeding on anticoagulation (related to peak levels). Stop treatment and seek urgent advice if any bleeding occurs
- Prophylactic dose regimes however rarely precipitate new unprovoked bleeding, but the will make any bleeds more significant and prolonged
- Risks of invasive procedures (eg: amniocentesis and ECV) are increased in mothers on anticoagulants
- Anaesthetic considerations. Regional blocks are contraindicated within 12 hours of low prophylactic doses of LMWH, and absolutely contraindicated on higher dose LMWH or intravenous anticoagulation. These patients are therefore at higher risk for general anaesthesia for interventions and should be referred to a consultant anaesthetist for discussion and airway assessment

LMWH prophylaxis usually begins once viability is confirmed in very high risk cases, or may be delayed in lower risk situations until after genetic screening/invasive diagnostic testing is likely to be offered, or into the 3rd trimester

Enoxaparin is the drug of choice; patients are taught self-administration by specialist midwives / haematology nurses. Once daily doses are best given in the morning; this facilitates dose monitoring by anti-Xa assays. Thrombocytopenia may occur after commencing LMWH: a platelet count is checked one week after beginning treatment. Injection sites are checked at each visit: rarely, local allergy dictates a change of drug

Low dose aspirin (75 – 150mg daily) is advisable for patients with positive Lupus Anticoagulant or Antiphospholipid antibodies
Basic care rules:

1) For Delivery

Spontaneous labour is preferred. Elective delivery may be appropriate by induction of labour (consultant decision), and more rarely will need to be by elective cesarean section. Planned admissions will be made in the afternoon before delivery to facilitate their proper assessment and must be fully clerked by medical staff and notified to the core team specialist midwives.

- Each patient will have a clear management plan in their records
- GECS should be worn in labour and postnatally
- Maintain adequate hydration and, if possible, mobility
- Anticoagulation medication must always be properly and clearly documented, and include the time of administration of any doses
- All patients for delivery must have blood taken for FBC and group and save serum. Patients with bleeding must be cross matched
- Patients on anticoagulation should have drains left in at surgery
- Senior staff (obstetric, anaesthetic and midwifery) must be involved in the intrapartum care of these patients

Patients at relatively low risk can usually omit their daily LMWH on the day of delivery. Prophylaxis must not be omitted for more than 24 – 36hrs in total.

For patients at high risk, anticoagulation must continue through the delivery period:

- Begin iv heparin in established labour (this may usually be stopped briefly approximately 2-3hrs before delivery is anticipated)
- Following delivery, restart / continue iv heparin if clinically unstable or recommence LMWH if stable. Begin warfarin if needed on day 2 and overlap with LMWH until INR is steady for 6 days in the non-pregnant therapeutic range

2) Post partum:

Risk of VTE remains high in the puerperium:

- Early mobilisation, adequate hydration, and GECS to take home
- Refer patients to the anticoagulant service before discharge using the anticoagulation chart clinical details form as per the guidance. Continuing management is via the haematology dept/GP
- Choice of continuing anticoagulation depends on other risk factors

1% of pts on long term warfarin will have bleeding with an INR of > 2-3, and 25% of these are fatal. Therefore 6m of LMWH is probably safer than warfarin in the absence of other co-factors

- Recommend continuing to use GECS for up to 2 years to reduce risk of subsequent venous insufficiency
3) Breast feeding:

Breast feeding is considered safe on both warfarin and LMWH. Tiny amounts are detectable in breast milk, but do not cause anticoagulation in the term newborn. Caution should be exercised in preterms and very low birth weight babies

The following anticoagulation regimes are used according to circumstance:

a) Recent isolated VTE <6m before pregnancy:
   - Seek specialist advice. If still on treatment, change from warfarin to LMWH pre-conceptually, or at the latest before 6w gestation to avoid embryopathy

b) Previous VTE on long term anticoagulants
   - Change to enoxaparin 0.5 –1mg/kg every 12 hrs before 6w gestation + GECS

c) Multiple previous VTE, no identified thrombophilia:
   - Prophylactic antenatal LMWH + GECS
   - 6w post partum prophylaxis

d) Previous VTE on oral contraceptive
   - Prophylactic antenatal LMWH + GECS
   - 6 weeks post partum prophylaxis

e) Single previous VTE that was not pregnancy related, and was associated with a particular risk factor which is no longer present:
   - Check for thrombophilia – see below if confirmed

   If none found:
   - GECS
   - no antenatal LMWH
   - antenatal low dose aspirin is advised in special cases
   - 6w post-partum prophylaxis with LMWH (enoxaparin 40mg/day)

f) Single VTE and underlying thrombophilia
   or Where VTE was idiopathic, pregnancy or o/c related or with other risk factors which are still present (eg: obesity):
   - Prophylactic antenatal LMWH +/- GECS.
   - Post partum 6w LMWH (enoxaparin 40mg/day)

   Notes: Antithrombin III deficiency – more intensive anticoagulation is required
   Lupus Anticoagulant +ve: Add aspirin 75 –150mg/day

   Notes: Heritable thrombophilia diagnosed by family history/testing but no prior VTE:
   - Surveillance or prophylactic antenatal LMWH +/- GECS. Management will depend on individual risk profile following full counselling except:
     AT III deficiency (highly thrombogenic) or strongly symptomatic kindred: these women merit prophylaxis, not surveillance
   - Post partum LMWH prophylaxis for 6w

   Note: Thrombophilia patients without VTE history but who have a history of pregnancy loss do better on LMWH than on aspirin (Gris et al, Blood 2004: OR = 15.5 for a better pregnancy outcome on LMWH than Aspirin)
Monitoring prophylactic doses of enoxaparin

There is no clear evidence base for making recommendations on this subject. It is our practice to use a standard dose of enoxaparin 40mg daily and where possible to demonstrate anti-Xa activity at 0.2-0.8 u/ml on this regime. In some situations a minimum anti-Xa level of 0.5 u/ml will be the target. Levels are organised via the Haematology clinic under the supervision of Dr Swart

VTE in pregnancy: diagnosis

Making a diagnosis is very important and should not be deferred because of the pregnancy

Diagnostic tests: duplex ultrasound, venography and VQ scan, spiral CT and MRI

DVT is a real risk throughout pregnancy: in a review of 650,000 pregnancies (Scotland) more DVT occurred in the antenatal period than in the puerperium

Venous stasis is a big factor even in early pregnancy
Doppler flow in the lower leg is reduced by >3% by 15w, and reduced by >60% by 36w gestation

Lower limb DVT is most often left sided, especially in pregnancy: 85% are left sided in pregnancy, only 55% in the non-pregnant

Lower limb DVT is frequently and usually (>90%) asymptomatic in pregnancy: In pregnancy <10% are symptomatic with typical leg swelling and pain Only 5% with classical symptoms in pregnancy have a proven DVT (vs 20% having symptoms in the non-pregnant)

72% of DVTs are ilio-femoral in pregnancy vs 9% in the non-pregnant

Ileo-femoral DVT is more dangerous, more likely to embolise, and is more common than below knee DVT in pregnancy

With symptomatic proximal DVT, even without chest symptoms - 40% of patients have a high probability of PE on a VQ scan

Anticoagulation for an acute VTE event

NB: This advice is specifically on anticoagulation management for VTE in pregnancy
Refer to departmental guidance for resuscitation, investigation and for other complications if they are present
Ante-natally:

All patients admitted elsewhere in the hospital (eg: A&E, EAU) should be transferred to Labour Ward HDU for their care, unless they require critical care support

- The consultant obstetrician must be informed
- Seek support from obstetric anaesthetic colleagues in assessing the patient
- Begin treatment if VTE is clinically suspected, while waiting for confirmatory tests
- Involve consultants immediately if the patient is also bleeding, or has recently done so, or if they are already on thromboprophylaxis

- Choice of initial anticoagulation depends on assessing the patient fully:
  - the patient is stable and clinical picture of VTE is weak:
    - give LMWH until the diagnosis is proven or excluded: 1mg/kg enoxaparin bd
    - manage on Labour Ward in HDU area
  - the patient is unstable and/or clinical suspicion is high:
    - begin iv heparin: dose as per protocol
    - consider transfer to ITU
    - very rarely, consider delivery

If VTE diagnosis is confirmed, refer to consultant haematologist for dose advice and continuing pregnancy management in the joint clinic (Dr Swart): ring extension 5839 for patient to be seen in next available clinic

Anti-Xa monitoring: therapeutic level is 0.8–1.2 u/mL for VTE but it is usually unnecessary to monitor immediately or continuously as 1mg/kg gives this level almost always

Glossary:

- APCR: activated Protein C resistance
- AT III: antithrombin III deficiency
- AAU: antenatal assessment unit
- CT: computerised tomography scan
- DVT: deep vein thrombosis
- ECV: external cephalic version
- FBC: full blood count
- FV L: factor V Leiden mutation
- GECS: graduated elastic compression stockings
- HDU: high dependency unit
- INR: international normalised ratio (a standardised expression of clotting time)
- IUGR: intra-uterine growth restriction
- LMWH: low molecular weight heparin
- MRI: magnetic resonance imaging scan
- OR: odds ratio (likelihood ratio)
- PE: pulmonary embolism
- SLE: systemic lupus erythematosis
- VTE: venous thrombo-embolism
- VQ scan: ventilation – perfusion lung scan
**FORM 2:**
Nominated Lead to complete all parts of the form except where grey background – the information is required to enable uploading of all Procedural Documents to the Intranet
NB: Grey shading denotes areas to be completed by Governance Team

<table>
<thead>
<tr>
<th>UPLOAD DATA - DOCUMENTS FOR UPLOAD TO THE INTRANET</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Document Title</strong></td>
</tr>
<tr>
<td><strong>Is this document New?</strong></td>
</tr>
<tr>
<td><strong>If No, quote old document number to be withdrawn (&amp; name if different)</strong></td>
</tr>
</tbody>
</table>

**Details of Nominated Lead:**

<table>
<thead>
<tr>
<th>Full Name</th>
<th>Rachel Westwood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Title</td>
<td>Lead Clinical Pharmacist, Surgery</td>
</tr>
<tr>
<td>Directorate</td>
<td>Medicine</td>
</tr>
<tr>
<td>Email address</td>
<td><a href="mailto:rachel.westwood@ngh.nhs.uk">rachel.westwood@ngh.nhs.uk</a></td>
</tr>
</tbody>
</table>

**Level Group (Who does this document affect?)**

<table>
<thead>
<tr>
<th>Choose Directorate (system has these groups only):</th>
</tr>
</thead>
<tbody>
<tr>
<td>(NB: HR, Occ Health &amp; T&amp;D documents to be uploaded to HR Group, not Trustwide)</td>
</tr>
<tr>
<td>Anaesthetics &amp; Critical Care ✓</td>
</tr>
<tr>
<td>Child Health</td>
</tr>
<tr>
<td>Corporate Affairs</td>
</tr>
<tr>
<td>Diagnostics</td>
</tr>
<tr>
<td>Facilities</td>
</tr>
<tr>
<td>Finance</td>
</tr>
<tr>
<td>General Surgery ✓</td>
</tr>
</tbody>
</table>

**Document Identification**

<table>
<thead>
<tr>
<th>Document Number</th>
<th>MMC 10/13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version Number</td>
<td>2</td>
</tr>
</tbody>
</table>

Contd…
**FORM 2 contd:**

<table>
<thead>
<tr>
<th>Document Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Keywords</strong> (please give up to ten - to assist search on intranet)</td>
</tr>
<tr>
<td><strong>Title</strong></td>
</tr>
<tr>
<td><strong>Level</strong></td>
</tr>
<tr>
<td><strong>Type (GU, PO etc.)</strong></td>
</tr>
<tr>
<td><strong>Author</strong></td>
</tr>
<tr>
<td><strong>Ratified</strong></td>
</tr>
<tr>
<td><strong>Ratified date (meeting date):</strong></td>
</tr>
<tr>
<td><strong>EqIA completed?</strong></td>
</tr>
<tr>
<td><strong>EqIA date:</strong></td>
</tr>
</tbody>
</table>

**Time Lines (as per front of document)**

| **Date of Current Version** | February 2010 |
| **Date of First Issue** | September 2004 |
| **Review Date (next)** | February 2012 |
| **Review Reminder Date** | (automatic - 6 months from Review Date) |