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<th>THROMBOPROPHYLAXIS IN ORTHOPAEDIC SURGERY</th>
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<tr>
<td>Contact Name and Job Title (Author)</td>
<td>Gary Masterman  Deputy Chief Pharmacist (Governance)</td>
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<td>Division &amp; Specialty</td>
<td>Specialist Services</td>
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<td>Orthopaedic patients</td>
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**This guideline has been registered with the trust. However, clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt contact a senior colleague or expert. Caution is advised when using guidelines after the review date.**
1 INTRODUCTION
An estimated 25,000 people die in the UK each year from preventable hospital-acquired Venous Thromboembolism (VTE) most commonly when a deep vein thrombosis (DVT) propagates to become an acute pulmonary embolism (PE).

In addition, treatment of non-fatal, symptomatic VTE and related long-term morbidities is associated with considerable costs to the health service.

The risk of developing VTE depends on a range of pre-existing risk factors as well as the reason for admission to hospital. Orthopaedic surgery carries a very high risk of VTE and without thromboprophylaxis, it is estimated that 40-60% of patients that undergoing hip or knee replacement will develop VTE.

The Chief Medical Officer’s report on the Independent Expert Working Group on the prevention of VTE in hospitalised patients 2008 (DH 2008) later formalised as NICE Guideline No92: Venous Thromboembolism: reducing the risk (NICE 2010) laid out minimum standards of care that hospital inpatients could expect with respect to reducing the risk of VTE.

There are a number of mechanical and pharmacological methods of thromboprophylaxis that can greatly reduce the risk of VTE and its associated outcomes with little or no increase in the risk of bleeding as detailed within the policy and where appropriate to do so they must be administered to our patients.

2 Key Principles
The guidance is a local adaptation of NICE Clinical Guideline No 92: Venous Thromboembolism: reducing the risk. (NICE 2010) and ensures that the Trust meets the statutory responsibilities laid out therein.

The guidance acts to ensure that all patients undergoing orthopaedic surgery at Wrightington, Wigan and Leigh NHS Foundation Trust will receive a risk assessment to determine their VTE risk within 24 hours of admission. Elective patients who have not had a risk assessment under this policy will not be admitted to theatre until one is completed. Trauma patients will have the risk assessment completed as soon as the clinical situation allows.

Where it is determined that the risk from VTE outweighs any risk or contraindication of administering thromboprophylaxis, patients shall receive mechanical thromboprophylaxis and one of the available modes of pharmacological thromboprophylaxis as detailed in this guideline.

3 Responsibilities
3.1 Registered Nurses (RN)

3.1.1 RNs will ensure that the VTE risk assessment on the medicine chart is completed by the clerking doctor or if this is not done by another doctor prior to the patient going to theatre and within 24 hours if surgery is delayed

3.1.2 RNs will complete the AQ (Advancing Quality) data collection sheet in the patient’s pathway is completed as appropriate for the stage of their treatment.
3.1.3 RNs will document that the patient’s VTE risk assessment has been completed as needed for CQUIN or other data collection to ensure that Divisional compliance with current and future standards can be demonstrated.

3.1.4 RNs will measure and apply compression hosiery or other mechanical methods of VTE if the patient requires it, as detailed within this guideline. This activity may be delegated to an appropriately trained Health Care Assistant (HCA) or Assistant Practitioner (AP).

3.1.5 RNs will administer any prescribed pharmacological thromboprophylaxis in accordance with this policy.

3.1.6 RNs will document any episodes of VTE within the care pathway and complete a DATIX form to support this entry.

3.2 Medical Staff

3.2.1 The doctor who clerks the patient must complete the VTE risk assessment on the medicine chart at the time of admission or as soon as possible afterwards. This must be carried out for elective patients prior to them being sent to theatre and for trauma patients unless the clinical situation makes this impossible. In all cases a doctor must complete the VTE risk assessment within 24 hours of admission.

3.2.2 The doctor must prescribe any pharmacological thromboprophylaxis required after carrying out this risk assessment, following the details for the agents specified in this guideline. The doctor must pay particular attention to contraindications, cautions and interactions (including epidurals) described in Appendix 1.

3.3 Pharmacy Staff

3.3.1 The ward pharmacist will be responsible for ensuring that any pharmacological thromboprophylaxis that is prescribed is compliant with this guideline so that the treatment is safe and effective.

3.3.2 The ward pharmacist will contact a doctor and get any discrepancies or problems resolved within 24 hours of their identification (at once if the patient is at immediate risk).

3.3.3 The ward pharmacist will record all interventions made and report them to the Chief Pharmacist each month for NHSLA monitoring purposes.

3.4 Arthroplasty Staff

Arthroplasty administration staff will collect the AQ sheet from the notes and input the data into the AQ pathway on the Electronic Prescribing Record (EPR) so that it can be reported against the AQ criteria. The Arthroplasty Practitioner AQ Lead will analyse the data and report each month to Trust Board, Divisional Leads and Orthopaedic Consultants.

3.5 Clinical Governance Staff

The Divisional Clinical Governance department will ensure that weekly VTE returns are completed correctly by ward staff and collected from each ward. The forms detail the number of patients on each ward that have had a VTE assessment carried out on admission is collected. The Clinical Governance Department.
4 CARE PATHWAY

To be commenced on admission:

The Clerking Doctor completes the “Patients Undergoing Surgery” thromboprophylaxis risk assessment in the Medicine chart on admission and signs & dates it.

4.1 For all patients

4.1.1 Do not allow patients to become dehydrated unless clinically indicated

4.1.2 Encourage patients to mobilise as soon as possible

4.1.3 Remember that aspirin or other antiplatelet agents do not give adequate protection against VTE alone

4.1.4 Consider offering temporary inferior vena caval filters to patients who are at very high risk of VTE (such as patients with previous VTE event or active malignancy) if mechanical and pharmacological thromboprophylaxis is contraindicated

4.1.5 Patients who are already on warfarin must be managed with reference to the Haematology guidelines on Management of patients on oral anticoagulants who are undergoing surgery

4.2 For elective patients

4.2.1 Advise women to consider stopping oestrogen –containing contraceptives or HRT 4 weeks prior to surgery. If they wish to continue this is fine as long as they receive thromboprophylaxis as well

4.2.2 Advise the patients to stop antiplatelet or anticoagulants before surgery at the time determined in the current peri-operative medication guidelines

4.2.3 Consider that regional anaesthesia carries a lower VTE risk then general anaesthesia. Take into account patient preferences, suitability for regional anaesthesia and any other planned method of thromboprophylaxis

4.2.4 If regional anaesthesia is used, plan the timing of pharmacological prophylaxis to minimise the risks of epidural haematoma

4.2.5 Do not routinely offer any thromboprophylaxis to patients having surgery under local anaesthesia by local infiltration with no limitation of mobility

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## 5 OVERVIEW OF CARE

<table>
<thead>
<tr>
<th>Who</th>
<th>When</th>
<th>What</th>
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| **Patients having elective surgery** | Before admission (at POAC) | - Advise women to consider stopping oestrogen-containing oral contraception or HRT 4 weeks prior to surgery. If they wish to continue this is fine as long as they receive adequate thromboprophylaxis  
- Advise patients to stop antiplatelets or anticoagulants at the time determined in the current peri-operative medication guidelines  
- Plan anaesthesia (see Section 4.2)  
- Give patient any relevant information on VTE and prevention |
| **All Patients** | On admission | - Clerking doctor completes the “Patients Undergoing Surgery” thromboprophylaxis risk assessment on the medicine chart and signs and dates this  
- Give/reinforce any relevant information on VTE and prevention  
- Offer thromboprophylaxis if appropriate |
| **All Patients** | During ward-based care | - Reassess risks of VTE and bleeding  
- Review thromboprophylaxis if the patient’s condition changes  
- Keep patients hydrated and encourage them to mobilise as soon as possible |
| **Patients to be discharged with thromboprophylaxis** | During ward-based care | - Offer information on correct use and duration of thromboprophylaxis at home and who to contact for help.  
- Ensure patients are able to use the thromboprophylaxis at home, have someone to help them or have been referred to District Nursing services  
- Offer information on signs and symptoms of adverse events related to thromboprophylaxis and who to contact if seen  
- Inform the GP that the patient has been discharged with thromboprophylaxis |
| **All Patients** | Before discharge | - Offer information on signs and symptoms of PE and DVT  
- Offer information on the importance of seeking help and who to contact if any signs of DVT, PE or other problems appear |

5.1 Any thromboprophylaxis needed will be determined by working through the “Patients Undergoing Surgery” thromboprophylaxis risk assessment on the medicine chart.

5.2 If there are risk factors but the doctor doesn’t want any thromboprophylaxis they must tick the “No to all” box, sign and date it. If no thromboprophylaxis is prescribed then the reason should be documented in the patient’s case notes and then reviewed after surgery. The decision should be included in ward round notes during the stay.

5.3 If thromboprophylaxis is needed this may be mechanical and/or pharmacological as detailed Sections 6 to 9.

### 6 MECHANICAL THROMBOPROPHYLAXIS

**NICE** recommends that patients are offered mechanical thromboprophylaxis for the indications of hip arthroplasty, knee arthroplasty and hip fracture

For all other orthopaedic surgery, **NICE** recommends that surgeons should consider offering mechanical thromboprophylaxis after assessing the risks and discussing with the patient. If any surgeon does not want to use mechanical thromboprophylaxis they must record this in the patient’s notes or care pathway

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Choice of mechanical thromboprophylaxis

These may be:

(a) Anti-embolism stockings (thigh or knee-length) – first-line where appropriate
and/or

(b) Foot Impulse Devices or

(c) Intermittent Pneumatic Compression Devices

6.1 Anti-embolism Stockings

6.1.1 Do not offer anti-embolism stockings to patients with any of the following

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<tr>
<td>1.</td>
<td>Peripheral arterial disease (suspected or proven)</td>
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<tr>
<td>2.</td>
<td>Peripheral arterial bypass grafting</td>
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<tr>
<td>3.</td>
<td>Peripheral neuropathy or other causes of sensory impairment</td>
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<td>4.</td>
<td>Skin conditions that may cause damage such as ‘tissue paper’ skin, dermatitis, gangrene or recent skin graft</td>
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<td>5.</td>
<td>Allergy to the material(s) of manufacture</td>
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<td>6.</td>
<td>Cardiac failure</td>
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<td>7.</td>
<td>Leg oedema due to congestive heart failure</td>
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<td>8.</td>
<td>Unusual leg size or shape or major limb deformity (fitting issues)</td>
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<tr>
<td>9.</td>
<td>Existing pressure ulcers to heels and/or venous ulcers/wounds to legs</td>
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6.1.2 Measure legs and use correct stocking size. Staff who fit stockings must be trained in their use and must show patients how to use them.

6.1.3 If oedema or postoperative swelling develops, ensure legs are re-measured and stockings refitted

6.1.4 Use stockings that provide graduated compression and produce a calf pressure of 14-15 mmHg

6.1.5 Encourage patients to wear the stockings day and night from admission until they no longer have significantly reduced mobility. In the absence of any other guidance this will be until they return for the next outpatient appointment as a minimum.

6.1.6 Remove stockings for 30 minutes each day for hygiene purposes and to inspect skin condition. If patient has significant reduction in mobility, poor skin integrity or sensory loss, inspect skin two or three times per day, particularly over heels and bony prominences

6.1.7 Discontinue use of stockings if there is marking, blistering or discolouration of skin, particularly over heels and bony prominences, or if the patient has pain or discomfort. If suitable, offer intermittent pneumatic compression or foot impulse devices as alternative

6.1.8 Show patients how to apply anti-embolism stockings correctly to ensure that this will reduce their risk of developing VTE

6.1.9 Monitor the use of anti-embolism stockings and offer assistance if they are not being worn correctly

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6.1.10 Prior to discharge ensure that patients are given an Anti Embolism Stockings – Patient Information leaflet and ask them if they understand the information they have been given

6.2 Foot Impulse Devices and Intermittent Pneumatic Compression Devices

6.2.1 Intermittent Pneumatic Compression Devices (currently WWL NHSFT use Flowtron® pumps) are the mechanical thromboprophylaxis method of choice for hip fracture patients after surgery. They should be continued until the patient is mobile again.

6.2.2 In all other orthopaedic surgeries, these are an alternative mechanical method of thromboprophylaxis that may be used if anti-embolism stockings are unsuitable

6.2.2 Do not offer these devices to patients that have an allergy to the material(s) of Manufacture

6.2.3 Encourage patients on the ward who have these devices to use them for as much of the time as is possible and practical, both when in bed and when sitting in a chair

7 THROMBOPROPHYLAXIS FOR ELECTIVE HIP OR KNEE REPLACEMENT

7.1 At admission

Offer mechanical VTE prophylaxis with any one of:

(7.1) Anti-embolism stockings (thigh or knee length) used with caution – see section 6.1
(7.2) Foot Impulse Devices
(7.3) Intermittent Pneumatic Compression Devices

Continue until the patient's mobility is no longer significantly reduced.

7.2 Post-Operatively

Offer pharmacological thromboprophylaxis, which may be one of the following MSK approved drugs as preferred by the team:

7.3 Low-Molecular Weight Heparin (LMWH)

The LMWH used is currently: Dalteparin (Fragmin®) at a dose of 5000 units daily

7.3.1 Hip Arthroplasty: In the absence of contra indications (Appendix 1) patients should receive low molecular weight heparin daily, started 6-12 hours after surgery and continued for at least* 35 days (5 weeks) from the date of surgery.

[*The duration of treatment may need to be extended further if the patient’s risk does not diminish due to immobility or other factors.]

If the patient has a history of DVT or PE this duration should be extended to at least* 42 days (6 weeks)
7.3.2 Knee Arthroplasty: In the absence of contra indications (Appendix 1) patients should receive low molecular weight heparin daily, started 6-12 hours after surgery and continued for at least*14 days from the date of surgery (knees).

[*The duration of treatment may need to be extended further if the patient’s risk does not diminish due to immobility or other factors]

If the patient has a history of DVT or PE this duration should be extended to at least* 42 days (6 weeks).

7.3.3 Renal Impairment or low body-weight: Dalteparin (Fragmin®) dose should be reduced to 2500 units daily if Creatinine Clearance is less than 30ml/min or body weight is <45Kg.

7.4 Dabigatran (Pradaxa®)

7.4.1 In the absence of any contra-indications (Appendix 1) patients should receive dabigatran 110mg between 1-4 hours after surgery and then 220mg daily for 28 days (4 weeks) from the date of surgery (hips)

7.4.2 In the absence of any contra-indications (Appendix 1) patients should receive dabigatran 110mg between 1-4 hours after surgery and then 220mg daily for 10 days from the date of surgery (knees)

7.4.3 If the patient has a history of DVT or PE these durations should be extended to 42 days (6 weeks) for hips or knees

7.4.4 Reduced doses of 75mg between 1-4 hours after surgery and then 150mg daily for the same duration are required for any of the following:

(a) Moderate renal impairment (CrCl of 30-50ml/min) – note if renal function worse than this then dabigatran is contraindicated
(b) Elderly patients (>75 years)
(c). Concomitant administration of amiodarone, quinidine or verapamil (if moderate renal failure and verapamil may need to reduce further to 75mg daily)
(d) Platelet count of 50-100 x 10^9/L

7.5 Apixaban (Eliquis®)

7.5.1 In the absence of any contra-indications (Appendix 1) patients should receive apixaban 2.5mg between 12 and 24 hours after surgery and then 2.5mg twice daily for 35 days from the date of surgery (hips)

7.5.2 In the absence of any contra-indications (Appendix 1) patients should receive apixaban 2.5mg between 12 and 24 hours after surgery and then 2.5mg twice daily for 14 days from the date of surgery (knees)

7.5.3 If the patient has a history of DVT or PE these durations should be extended to 42 days (6 weeks) for hips or knee
Note concerning Rivaroxaban (Xarelto®)

A conscious decision has been made to not include rivaroxaban as an option for thromboprophylaxis in orthopaedic surgery at WWL NHSFT – this is based on higher bleeding rates reported in clinical trial and post-marketing data

Important Note

Before prescribing any of the approved agents for pharmacological thromboprophylaxis listed above you must check that there are no contra-indications to their use

Appendix 1 on page 16 details this information.

Further information can be found in the Summary of Product Characteristics SPC for each drug at http://www.medicines.org.uk

If there are any contraindications present use a different agent or mechanical methods of thromboprophylaxis alone

If further advice is needed, please contact your Pharmacy Department

7.6 Special Note: Epidurals/Spinals with pharmacological thromboprophylaxis

7.6.1 The use of pharmacological thromboprophylaxis in patients receiving epidural/spinal anaesthesia is cautioned due to a small risk of spinal haematoma formation. Coadministration should be avoided wherever possible.

7.6.2 Insertion or removal of an epidural catheter must be delayed for 12 hours after a dose of Low-Molecular Weight Heparin (LMWH)

7.6.3 Dabigatran or apixaban must not be used at all while the epidural is in place:

| Dabigatran – use mechanical methods and LMWH instead until the epidural is removed. The first dose of dabigatran must be 24 hours after the previous dose of LMWH and no sooner than 2 hours after epidural removal |
| Apixaban – the first dose can be given 12 to 24 hours after surgery. If the epidural catheter will remain in situ longer than this then mechanical methods and LMWH should be used. If LMWH is given then the first dose of abixaban must be 24 hours after the previous dose of LMWH. The first dose of abixaban must be no sooner than 5 hours after epidural removal Insertion or removal of the catheter must be delayed for 12 hours after a dose of LMWH. |

7.6.4 After a catheter is removed, subsequent doses of LMWH must not be given within 4 Hours

7.6.5 If the epidural needs to be removed urgently, weigh risk of delay vs. risk of haematoma and leave as long as possible.

7.6.6 In all situations extreme vigilance and frequent neurological monitoring must be employed if epidural or spinal anaesthesia is used in patients receiving LMWH.

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8 THROMBOPROPHYLAXIS FOR HIP FRACTURE SURGERY

8.1 Mechanical Thromboprophylaxis

8.1.1. TED stockings are not routinely used pre-operatively unless the Consultant requests them in addition to pharmacological thromboprophylaxis with LMWH

8.1.2. After surgery the patient must be fitted with Flowtron® pumps if their mobility is restricted and continued until the patient is no longer immobile.

8.2 Low-Molecular Weight Heparin (LMWH)

8.2.1 LMWH is the pharmacological thromboprophylaxis to be used as dabigatran (Pradaxa®) and apixaban (Eliquis®) are not licensed for this indication

8.2.2 The LMWH used is currently Dalteparin (Fragmin®) at a dose of 5000 units daily

8.2.3 In the absence of contra indications (Appendix 1) patients must receive low molecular weight heparin daily started on admission. This should be stopped 24 hours before surgery, restarted 8-12 hours after surgery and continued for at least* 35 days (5 weeks) from the date of surgery

8.2.4 If the patient has a history of DVT or PE this duration should be extended to at least* 42 days (6 weeks)

* The duration of treatment may need to be extended further if the patient’s risk does not diminish due to immobility or other factors.

8.2.5 Renal Impairment or low body-weight : Dalteparin (Fragmin®) dose should be reduced to 2500 units daily if Creatinine Clearance is less than 30ml/min or body weight is <45Kg.

Important Note

Before prescribing any of the approved agents for pharmacological thromboprophylaxis listed above you must check that there are no contra-indications to their use (Appendix 1, Page 16) Further information can be found in the Summary of Product Characteristics SPC for each drug at http://www.medicines.org.uk. If there are any contraindications present use a different agent or mechanical methods of thromboprophylaxis alone. If further advice is needed, please contact your Pharmacy Department

8.3 Special Note: Epidurals/Spinals with Low Molecular Weight Heparins (LMWH)

8.3.1 The use of LMWH in patients receiving epidural/spinal anaesthesia is cautioned due to a small risk of spinal haematoma formation.

8.3.2 Insertion or removal of an epidural catheter must be delayed for 12 hours after a dose of LMWH

8.3.3 After a catheter is removed, subsequent doses of LMWH must not be given within 4 Hours

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8.3.4 If the epidural needs to be removed urgently, weigh risk of delay vs. risk of haematoma and leave as long as possible.

8.3.5 In all situations extreme vigilance and frequent neurological monitoring must be employed if epidural or spinal anaesthesia is used in patients receiving LMWH

9 PHARMACOLOGICAL THROMBOPROPHYLAXIS FOR ALL OTHER PROCEDURES

9.1 Risk Assessment

9.1.2 Any thromboprophylaxis needed will be determined by working through the “Patients Undergoing Surgery” thromboprophylaxis risk assessment on the medicine chart. If there are risk factors but the doctor doesn’t want any thromboprophylaxis they must tick the “No to all” box, sign and date it.

If no thromboprophylaxis is prescribed then the reason should be documented in the patient’s case notes and then reviewed after surgery. The decision should be included in ward round notes during the stay.

9.1.3 This must be carried out for upper limb patients as well as some of the risk factors defined by NICE are not related to the site of surgery: e.g. surgical time, age, BMI etc – see medicine chart for further details. The requirement is that the assessment is carried out and recorded – whether treatment is given depends on the outcome of that risk assessment – this may not always be needed.

9.1.4 If there is a VTE risk and a significant bleeding risk then a risk-benefit decision must be made by the team on admission and this decision to provide thromboprophylaxis or not entered in the patient’s notes or pathway as appropriate

9.2 Mechanical Thromboprophylaxis

9.2.1 If there is a VTE risk without any significant bleeding risk determined then the team should (after discussing with the patient) consider offering mechanical VTE prophylaxis with either anti-embolism stockings (thigh or knee length) used with caution (Section 6.1) or foot Impulse Devices or Intermittent Pneumatic Compression Devices (Section 6.2)

9.2.2 Continue until the patient is no longer at increased risk of VTE

9.3 Pharmacological Thromboprophylaxis

9.3.1 HIGH RISK: Prescribe Dalteparin (Fragmin®) 5,000 units daily, starting 6-12 hours post-operatively and continued until the patient is no longer at increased risk of VTE.

9.3.2 LOW-MODERATE RISK: Consider prescribing Dalteparin (Fragmin®) 2,500 units daily, starting 6-12 hours post-operatively and continued until the patient is no longer at increased risk of VTE.

9.3.3 Dabigatran (Pradaxa®) and Apixaban (Eliquis®) are only licensed for elective hip and knee replacement and cannot be used following any other procedure
9.3.4 For pelvic surgery, Low Molecular Weight Heparin is to be given until the patient’s mobility is no longer impaired. Unless directed otherwise the duration of treatment is to be 12 weeks.

9.3.5 Patients that have a lower limb immobilised in a cast/boot/otherwise and score “2 or more” on the thromboprophylaxis risk assessment need LMWH at an appropriate dose daily until the cast/boot is removed and mobility is resumed.

Patients that have a lower limb immobilised in a cast/boot/otherwise but are partial/fully weight bearing and score “1 or 0” on the thromboprophylaxis risk assessment do not require LMWH routinely

**Important** – this is guidance in the absence of any specific direction by the surgeon.

The operation note MUST be consulted when writing discharge letters to check for any specific requirements for thromboprophylaxis in such cases.

**Important Note**

**Before** prescribing dalteparin (Fragmin®) you must check that there are no contraindications to their use (Appendix 1 on Page 16 details this information)

Further information can be found in the Summary of Product Characteristics SPC for each drug at [http://www.medicines.org.uk](http://www.medicines.org.uk)

If there are any contraindications present use a different agent or mechanical methods of thromboprophylaxis alone

If further advice is needed, please contact your Pharmacy Department

**9.4 Special Note: Epidurals/Spinals with Low Molecular Weight Heparins (LMWH)**

9.4.1 The use of LMWH in patients receiving epidural/spinal anaesthesia is cautioned due to a small risk of spinal haematoma formation.

9.4.2 Insertion or removal of an epidural catheter must be delayed for 12 hours after a dose of LMWH

9.4.3 After a catheter is removed, subsequent doses of LMWH must not be given within 4 hours

9.4.4 If the epidural needs to be removed urgently, weigh risk of delay vs. risk of haematoma and leave as long as possible.

9.4.5 In all situations extreme vigilance and frequent neurological monitoring must be employed if epidural or spinal anaesthesia is used in patients receiving LMWH
10 PATIENTS ALREADY ON WARFARIN

Patients who are already on warfarin must be managed with reference to the Haematology guidelines on Management of patients on oral anticoagulants who are undergoing surgery (see Intranet for current version)

Information on dosing of warfarin can be found on the Trust’s Warfarin Prescription sheets or by contacting the Pharmacy or Haematology departments in cases of uncertainty.
### Contraindications to Low Molecular Weight Heparin (LMWH) (Enoxaparin or Dalteparin)

- Known hypersensitivity to heparins
- History of heparin induced thrombocytopenia (HITT)
- Acute gastroduodenal ulcer
- Major acute bleeding
- Haemorrhagic diathesis or serious coagulation disorders unless directed otherwise by a haematologist
- Septic endocarditis
- Recent injury/surgery to central nervous system, eyes or ears
- Recent (3 months) stroke or severe headache

### Precautions

- Do not administer via the IM route. If treatment doses of either agent are given, avoid other IM injections also
- Caution should be exercised in patients with an increased risk of bleeding complications (see data sheet for list)
- History of thrombocytopenia
- Spinal/epidural anaesthesia (see data sheet for list)

### Interactions

- Anticoagulant/antiplatelet agents
- Low dose aspirin for primary prevention (isolated hypertension) should be omitted whilst on dalteparin but if for secondary prevention (e.g. history of cardiac or cerebrovascular events) it should continue
- Antihistamines (reduced effect)
- Cardiac glycosides (reduced effect)
- Tetracycline (reduced effect)
- Ascorbic acid (reduced effect)
- Systemic glucocorticoids
- NSAIDs or high dose aspirin should be avoided with if the patient has renal failure

### Contraindications to Dabigatran

- Hypersensitivity to dabigatran
- Severe renal impairment (CrCl <30ml/min)
- Active clinically significant bleeding
- Organised lesion at risk of bleeding
- Bleeding tendency (e.g. INR>1.4, platelet count <50 x 10^9/L)
- Hepatic impairment with LFTs > twice upper limit of normal (Need LFTs)
- Indwelling epidural catheter or within 2 hours of removal – LMWH should be used as bridging therapy until catheter is removed. Give the 1st dose of dabigatran 24 hours after the last LMWH dose
- Children and adolescents <18
- Pregnancy and breastfeeding
- A number of drugs – if on any of the agents listed below please contact pharmacy for advice

### Precautions

- Patients weighing <50kg or >110kg
- Elderly patients (>75yrs) reduce dose to 150mg daily
- Moderate renal impairment (CrCl 30-50ml/min) reduce dose to 150mg daily
- Conditions with an increased risk of bleeding (see data sheet for list)

### Interactions Contraindicated Together

- Systemic azole antifungal agents
- HIV protease inhibitors
- St.John's Wort
- Rifampicin
- Carbamazepine
- Phenytoin
- Heparins and LMWH
- Fondaparinux
- Desirudin
- Thrombolytics
- GpIIb/IIIa receptor antagonists
- High dose aspirin (>160mg daily)
- Ticlopidine
- Sulfinpyrazone
- Warfarin & other vitamin K antagonists
- Prasugrel
- Cyclosporin
- Tacrolimus

### Cautioned Together

- Aspirin <160mg/day can be used
- NSAIDs can be used but increase bleeding risk
- Amiodarone, quinidine, verapamil – reduce dose to 150mg daily (if also moderate renal impairment may need 75mg daily with verapamil)

### Contraindications to Apixaban

- Hypersensitivity to apixaban
- Severe renal impairment (CrCl <15ml/min)
- Active clinically significant bleeding
- Organised lesion at risk of bleeding
- Severe hepatic impairment with altered coagulopathy
- Indwelling epidural catheter or within 5 hours of removal – LMWH should be used as bridging therapy if needed but note that 1st dose can be given up to 24 hours post-op so may be unnecessary
- Children and adolescents <18
- Pregnancy and breastfeeding
- A number of drugs – if on any of the agents listed below then please contact pharmacy for advice

### Precautions

- Mild to moderate hepatic impairment (Need LFTs)
- Conditions with an increased risk of bleeding (see data sheet for list)
- Severe, uncontrolled hypertension
- Recent neurological or ophthalmological surgery
- Moderate renal impairment (CrCl 15-29ml/min)

### Interactions Contraindicated Together

- Systemic azole antifungal agents
- HIV protease inhibitors
- Heparins and LMWH
- Fondaparinux
- Desirudin
- Thrombolytics
- GpIIb/IIIa receptor antagonists
- Clopidogrel
- Dipyriramole
- Dextran
- Sulfinpyrazone
- Warfarin & other vitamin K antagonists

### Cautioned Together

- Rifampicin
- Phenytoin
- Carbamazepine
- Phenobarbitone
- St.John's Wort
- NSAIDs including aspirin

**No dose alteration is advised but caution and close monitoring if it is necessary to co-prescribe apixaban with these agents**

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### Table 1: Contraindications, Precautions and Drug Interactions with Pharmacological Thromboprophylaxis

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<thead>
<tr>
<th>Condition</th>
<th>Agents to Avoid or Caution</th>
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Appendix 2

REFERENCES


5. NICE Clinical Guideline No 92: Venous Thromboembolism: reducing the risk. January 2010 (reviewed unchanged 2014)

6. NICE Technology Appraisal TA157: Dabigatran etexilate for the prevention of venous thromboembolism after hip or knee replacement in adults (Sep 2008)

7. NICE Technology Appraisal TA245: Apixaban or the prevention of venous thromboembolism after hip or knee replacement in adults (Jan 2012)

8. SIGN Clinical Guideline 122: Prevention and Management of Venous Thromboembolism (December 2010)