Oxford University Hospitals NHS Trust

Oxford Haemophilia & Thrombosis Centre

Preventing blood clots while in hospital
What is a Deep Vein Thrombosis (DVT)?

A DVT is the name given to a blood clot which forms inside a vein that is deep beneath the skin of your leg, or sometimes in your pelvis.

The clot obstructs the flow of blood through the affected vein and can cause swelling or pain.

Sometimes, part of the clot breaks off and passes through your circulation and reaches your lung. This is called a Pulmonary Embolism (PE), which can cause shortness of breath and chest pain.
Venous Thromboembolism (VTE) is the collective name for DVT and PE.

Is VTE serious?
VTE can be a very serious and potentially life threatening condition.

What causes blood to clot?
Blood clotting is vital to ensure that when we cut ourselves a clot forms to stop bleeding. There are times when the clotting process goes wrong, and blood clots inside our veins causing a DVT.
This is more likely to happen when the blood flow around the body is slower or when the blood becomes sticky – for example, when we stay in bed for a few days or when veins are injured during an operation.

What are the symptoms of VTE?
Typical symptoms are leg swelling, pain calf tenderness and redness.
Other symptoms include chest pain, feeling short of breath and coughing up blood. However, a VTE can occur without any symptoms.

Who is at risk of VTE?
There are factors which place you at greater risk of a VTE.
These include:
• Reduced mobility – especially if you are having an operation or unwell enough to be confined to bed
• There is a family or personal history of VTE
• You have a medical condition, e.g. heart failure or diabetes
• You have cancer
• You take certain medications, such as the contraceptive pill or hormone replacement therapy
• You are aged over 60.

What you can do to reduce the risk of
developing a VTE

Before you come into hospital:
• Talk to your GP about medication, especially if you are taking the contraceptive pill or hormone replacement therapy. Your GP may advise you to stop taking them in the weeks before your operation.
• Keep to a healthy diet
• Stop smoking.

During your stay in hospital:
• Ask your doctor or nurse “What is being done to reduce my risk of a VTE?”
• Keep moving around, especially after surgery. In many cases this will be the only measure you need to take to reduce your risk of VTE.
• Exercise your legs while you are in bed.
• Drink plenty of water.

If you are considered to be at risk, your doctor might consider giving you a drug called heparin, which is a small injection. Possible side effects can be bruising at the injection site and prolonged bleeding from any cut to the skin.

You may be advised to wear anti-embolic stockings. You will be measured for these stockings and shown how to wear them.

Please report any new symptoms in your feet and legs to your nurse or doctor.

You may be asked to wear a special inflatable sleeve or cuff around your lower leg while in bed. This inflates automatically and provides pressure at regular intervals.

At Home:
Once you get home, it is important to:
• Keep moving around
• Drink plenty of water
• Continue with leg exercises
If you are asked to continue taking heparin when you go home you will be given more information. Be aware that your risk of developing blood clots can continue for up to 3 months after you have gone home.

**Exercises**

The following exercises are intended to help your circulation and breathing.

**Ankles:** Paddle your feet up and down and circle them around and around.

**Knees:** Brace your knees so that you can feel the muscle tighten on the front of the thigh. Hold for a count of 3 and gently relax. **Bottom:** Clench your buttock muscles together and hold for a count of 3 before relaxing.

**Breathing:** Place your hands on the side of your rib cage. Take a deep breath and feel your ribs being pushed out to the side as you expand your lungs.

**How to contact us**

If you have any questions or concerns about VTE, please contact Thromboprophylaxis Nurse or Thrombosis Team:

Direct line: Tel: **01865 857519** or **01865 225629**

**Further Information**

The National Institute of Clinical Excellence (NICE) have produced guidelines on reducing the risk of thromboembolism for patients in hospital. Information for patients and carers on this topic can be found at: http://www.nice.org.uk/nicemedia/live/12695/47199/47199.doc

If you need an interpreter or need a document in another language, large print, Braille or audio version, please call **01865 221473** or email **PALSJR@ouh.nhs.uk**

Thromboprophylaxis Nurse

Version 1, September 2010

Review,  September 2013
# Venous Thromboembolism Prevention and Management of DVT in Adults Policy

<table>
<thead>
<tr>
<th>Category:</th>
<th>Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary:</td>
<td>This document outlines the Trust policy for inpatient thromboprophylaxis including risk assessment, and the diagnosis and treatment of deep vein thrombosis in adults (excluding pregnancy and the puerperium).</td>
</tr>
<tr>
<td>Equality Analysis undertaken:</td>
<td>May 2016</td>
</tr>
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<td>Valid From:</td>
<td>July 2016</td>
</tr>
<tr>
<td>Date of Next Review:</td>
<td>This will usually be 3 years from the approval date unless otherwise specified</td>
</tr>
<tr>
<td>Approval Date/ Via:</td>
<td>Clinical Policy Group</td>
</tr>
<tr>
<td>Distribution:</td>
<td>Distributed to Divisional Directors, Divisional Nurses, Clinical Directors, Matrons &amp; Ward Sisters, Divisional CGRPs, Practice Educators, Clinical Governance Leads and Medical Staff via Anticoagulation and Thrombosis site</td>
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| Related Documents: | Reducing the risk of venous thromboembolism in patients admitted to hospital-NICE CG 92  
Venous thromboembolism prevention quality standard 3 – NICE QS3  
Venous Thromboembolic diseases: the management of venous thromboembolic diseases and the role of thrombophilia testing-NICE CG-144  
OUHFT Medicine Information Leaflet (MIL) Volume 7 No 4 Prevention of hospital acquired venous thromboembolism (VTE) in adult inpatients  
OUHFT Venous Thromboembolism in Pregnancy and the Puerperium  
OUHFT Prevention of venous thromboembolism in patients with acute stroke  
OUHFT Anti-embolism stocking assessment and management document  
OUHFT Application for VTE risk assessment cohorting arrangements  
OUHFT Incident Reporting and Investigation Policy  
| Author(s): | Consultant haematologists  
Senior VTE prevention nurse  
Lead anticoagulation pharmacist |
| Further Information: | Anticoagulation and Thrombosis Intranet Site |
| This Document replaces: | Venous Thromboembolism prevention and management in adults Version 4.0 – July 2015 |

**Lead Director:** Medical Director  
**Issue Date:** July 2016
## Document History

<table>
<thead>
<tr>
<th>Date of revision</th>
<th>Version number</th>
<th>Reason for review or update</th>
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<tbody>
<tr>
<td>June 2012</td>
<td>Version 2.0</td>
<td>To reflect the merged Oxford University Hospitals Trust</td>
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<tr>
<td>April 2013</td>
<td>Version 3.0</td>
<td>Introduction of rivaroxaban. Guidance of investigation for underlying malignancy</td>
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<tr>
<td>July 2015</td>
<td>Version 4.0</td>
<td>Introduction of apixaban. Alteration of policy on cancer screening</td>
</tr>
<tr>
<td>July 2016</td>
<td>Version 5.0</td>
<td>Full review/update due.</td>
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## Consultation Schedule

<table>
<thead>
<tr>
<th>Who? Individuals or Committees</th>
<th>Rationale and/or Method of Involvement</th>
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<tbody>
<tr>
<td>Divisional Directors</td>
<td>Trust-wide consultation process and Anticoagulation and Thrombosis site</td>
</tr>
<tr>
<td>Clinical Directors</td>
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<td>Divisional CGRs</td>
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<td>Practice Educators</td>
<td>Trust-wide consultation process and Anticoagulation and Thrombosis site</td>
</tr>
<tr>
<td>Medical Staff</td>
<td>Trust-wide consultation process and Anticoagulation and Thrombosis site</td>
</tr>
</tbody>
</table>
Contents
Document History .................................................................................................................. 2
Consultation Schedule .......................................................................................................... 2
Contents ................................................................................................................................. 3
Who should read this document? ....................................................................................... 4
Key Standards ....................................................................................................................... 4
Background............................................................................................................................ 4
Aim ........................................................................................................................................ 5
Venous Thromboembolism (VTE) risk assessment process .................................................. 5
Thromboprophylaxis ............................................................................................................. 6
Mechanical thromboprophylaxis .......................................................................................... 6
Pharmacological thromboprophylaxis .................................................................................. 6
Medical patients .................................................................................................................. 6
High risk surgical patients ................................................................................................. 6
Moderate risk surgical inpatients ...................................................................................... 7
Alternatives to dalteparin: ................................................................................................. 8
Extended (post discharge) thromboprophylaxis .................................................................. 9
Stroke patients .................................................................................................................... 9
Palliative care patients ....................................................................................................... 9
Compliance ........................................................................................................................... 10
Procedure to be followed if DVT is suspected ................................................................... 10
Diagnosis of DVT ................................................................................................................ 10
Initiation of treatment in cases of diagnostic delay ............................................................ 12
Management of the patient once a DVT has been diagnosed ............................................ 12
A) Treatment with apixaban ............................................................................................... 12
B) Treatment with rivaroxaban ......................................................................................... 13
C) Treatment with low molecular weight heparin and warfarin ...................................... 14
Selecting an anticoagulant ................................................................................................. 15
Investigation for cancer in patients with unprovoked DVT ................................................ 15
Duration of treatment and follow-up .................................................................................. 16
VTE Medicine Information Leaflets .................................................................................... 16
Training ................................................................................................................................. 16
Review .................................................................................................................................. 17
References ............................................................................................................................ 17
Responsibilities ...................................................................................................................... 18
Definitions ............................................................................................................................. 19
Monitoring Compliance ....................................................................................................... 20
Equality Analysis ................................................................................................................... 21
Who should read this document?
This document should be read by all clinical staff across the Trust, particularly those who are involved in invasive procedures, including: all permanent, locum, agency and bank surgeons or their deputies who work in Oxford University Hospitals NHS Foundation Trust.

Key Standards
With regard to VTE prevention, the Trust follows NICE CG140 and related NICE QS3. The following key standards must be followed:

List of statements NICE QS3:

Statement 1: All patients, on admission, receive an assessment of VTE and bleeding risk using the clinical risk assessment criteria described in the national tool.

Statement 2: Patients/carers are offered verbal and written information on VTE prevention as part of the admission process.

Statement 3: Patients provided with anti-embolism stockings have them fitted and monitored in accordance with NICE guidance.

Statement 4: Patients are re-assessed within 24 hours of admission for risk of VTE and bleeding.

Statement 5: Patients assessed to be at risk of VTE are offered VTE prophylaxis in accordance with NICE guidance.

Statement 6: Patients/carers are offered verbal and written information on VTE prevention as part of the discharge process.

Statement 7: Patients are offered extended (post hospital) VTE prophylaxis in accordance with NICE guidance.

OUHFT Standards:

1. Initial VTE risk assessment should be performed within 24 hours and ideally within 6 hours of admission.

2. OUHFT recommends re-assessment when clinical condition changes rather than specifically at 24h after admission (in variance to statement 4 above).

3. An individual VTE risk assessment must be carried out on every adult inpatient, with the exception of patients who fit the cohort criteria.

Background

1. **Venous Thromboembolism (VTE)** is a significant cause of mortality, long term disability and chronic ill health. The prioritisation of VTE prevention in the NHS was accepted by government in 2005, when VTE was estimated by the Health Select Committee (2005) to cause in excess of 25,000 deaths each year, a substantial proportion of which would be preventable with appropriate thromboprophylaxis.

   The House of Commons Health Committee produced the report ‘Prevention of Venous Thromboembolism in Hospitalised Patients’ (2005). In response, a ministerial statement concluded that VTE risk assessment of every patient on admission to hospital must become a reality.
VTE risk assessment followed by appropriate prophylaxis reduces VTE related morbidity and mortality. It is proposed that by following guidelines for adult thromboprophylaxis risk assessment and management, this will assist in reducing the incidence of VTE.

2. This document summarises the Trust’s approach to the risk assessment and prevention of VTE in adult in-patients and the investigation and treatment of DVT (excluding pregnancy and the puerperium). For patients who are pregnant or up to 6 weeks post-partum, please refer to OUHFT guidance Venous Thromboembolism in Pregnancy and the Puerperium.

Aim

The purpose of this Policy is to ensure that:

- All adult in-patients have an accurate Venous Thromboembolism Risk Assessment and are offered appropriate thromboprophylaxis.
- Suspected DVTs are diagnosed and treated as required.

Venous Thromboembolism (VTE) risk assessment process

3. The VTE Risk Assessment Tool is available in an electronic format housed within the electronic clinical patient record. This sits within the Cerner Millennium EPR system. The Risk Assessment Tool is based on the national tool and complies with NICE guidance. All completed VTE risk assessments will be viewable within the EPR clinical systems for all users; information is subsequently sent to the Trust’s ORBIT data warehouse.

4. All adult patients admitted to the Trust must be risk assessed within 24 hours of admission, and preferably within 6 hours. An individual VTE risk assessment will be carried out on every adult in-patient, with the exception of patients who fit the cohort criteria (as agreed by Divisional Director and OUHFT Medical Director). Of note, a cohort application form is available on the Intranet (Cohorting Application) and a list of all approved cohorts is available on ORBIT.

5. On admission the admitting medical practitioner will complete an e-VTE risk assessment. The risk factors for thrombosis and bleeding are listed on the electronic Trust VTE risk assessment form and as part of the flow diagrams in the related Medicine Information Leaflet: Prevention of hospital acquired venous thromboembolism in adult in-patient (see Appendix 1 and 2). Both the thrombosis risk and bleeding risk sections require completion. The completed electronic risk assessment will provide a recommendation for appropriate thromboprophylaxis for the patient. It is imperative that this guidance is considered unless there is a clinical reason not to. In this case, the reason must be documented in the medical notes.

6. It is the responsibility of the admitting doctor to prescribe appropriate thromboprophylaxis (both mechanical and pharmacological) on the prescription chart as soon as possible after risk assessment has been completed. We would expect all eligible patients to have appropriate VTE prevention measures administered within 36 hours of admission. The patient’s risk of VTE and bleeding should be re-assessed whenever the clinical parameters change, to ensure that the methods of VTE prophylaxis being used are suitable, that VTE prophylaxis is being used correctly and to identify adverse events resulting from VTE prophylaxis. Clinicians
must ensure that other pertinent information relating to risk assessment and treatment decisions is recorded within the patient's clinical record.

7. Pharmacological VTE prophylaxis will not be routinely offered to patients with risk factors for bleeding. The risk and benefits of offering thromboprophylaxis will be discussed with a senior member of the admitting team and the decision documented in the patient's health record.

8. Patients being admitted for surgery may be VTE risk assessed as part of the pre-assessment process by specialist nurses working within pre-operative assessment clinics. Where VTE risk assessments are completed during the preoperative assessment the doctor responsible for prescribing thromboprophylaxis must check the assessment prior to any treatment being prescribed.

**Thromboprophylaxis**

9. All patients (and/or carers) should be offered verbal and written information on VTE prevention as part of the admission and discharge processes.

10. Once a risk assessment has been made thromboprophylaxis should be given in accordance with “NICE clinical guideline No. 92 - Venous Thromboembolism: reducing the risk of venous thromboembolism (deep vein thrombosis and pulmonary embolism) in patients admitted to hospital (2010).”

**Mechanical thromboprophylaxis**

11. Separate guidance exists for the use of mechanical methods of thromboprophylaxis (see guidelines on mechanical methods of thromboprophylaxis under OUHFT ‘anticoagulation and thrombosis’ intranet).

12. Mechanical thromboprophylaxis must be prescribed on the drug chart. There is greater evidence to support the use of intermittent pneumatic compression (IPC) devices in medical patients, when compared to anti-embolic stockings (AES). Patients who require IPC and AES should have them fitted and monitored in accordance with Trust policy and NICE guidance, including regular ‘skin safety checks’.

**Pharmacological thromboprophylaxis**

13. Dalteparin is the OUHFT low molecular weight heparin (LMWH) of choice for pharmacological prophylaxis. The dose is dependent on the patient’s weight, and whether they are medical, moderate risk surgical or a high risk surgical patient.

**Medical patients**

14. The licensed dose for medical patients is 5,000 units once daily. However, there is some evidence to suggest dose banding based on weight (see Table 1) may provide more effective prophylaxis and should be considered in patients at the extremes of body weight.

**High risk surgical patients**

15. “High risk” surgical patients can be defined as “hip or knee arthroplasty, hip fracture surgery, major trauma and spinal cord injury, and surgery in patients with other significant / multiple risk factors (e.g. cancer, previous VTE)”.

16. The licensed dose for high risk surgical patients is 5,000 units once daily. However, there is some evidence to suggest dose banding based on weight (see Table 1) may
provide more effective prophylaxis and should be considered in patients at the extremes of body weight.

**Table 1**: Weight based doses for medical and high risk surgical inpatients

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Dose (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 40</td>
<td>2,500 once daily</td>
</tr>
<tr>
<td>40-120</td>
<td>5,000 once daily</td>
</tr>
<tr>
<td>121-150</td>
<td>7,500 once daily</td>
</tr>
<tr>
<td>More than 150</td>
<td>5,000 twice daily</td>
</tr>
</tbody>
</table>

**Moderate risk surgical inpatients**

17. “Moderate risk” surgical patients are those requiring thromboprophylaxis but not in the high risk group (see above).

18. The licensed dose for this group of patients is 2,500 units once daily, but there is evidence to suggest that the dose should be increased in obese patients.

**Table 2**: Weight based doses for moderate risk surgical inpatients

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Dose (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 121</td>
<td>2,500 once daily</td>
</tr>
<tr>
<td>121-150</td>
<td>5,000 once daily</td>
</tr>
<tr>
<td>More than 150</td>
<td>7,500 once daily</td>
</tr>
</tbody>
</table>

**Peri-operative dalteparin**

19. For moderate risk surgical patients the SPC and BNF suggests 2,500 units 1-2 hours before surgery then 2,500 units every 24 hours. For high risk surgical patients the SPC and BNF give two options either giving 2,500 units 1-2 hours before surgery, then 2,500 units 8-12 hours later, followed by a regular daily dose of 5,000 units once daily or 5,000 units on the evening before surgery, followed by 5,000 units every 24 hours. NICE guidelines suggest the start of LMWH prophylaxis can be delayed until 6-12 hours after elective hip and knee replacement surgery. (NB. See **Tables 1 and 2** above for guidance on dosing patients at extremes of body weight.)

**Monitoring**

20. Routine monitoring of the anticoagulant effect of dalteparin is not normally required; however it may be necessary in certain circumstances (consideration should be given to monitoring dose adjustments in extremes of body weight and in patients with significant renal impairment).

21. Routine monitoring for heparin induced thrombocytopenia (HIT) is not required for patients receiving dalteparin, except for patients who have undergone cardiac surgery. In these patients platelet counts should be monitored at baseline and every 2-4 days between days 4 to 14 of treatment.

22. Inhibition of aldosterone secretion by unfractionated or low molecular weight heparin can cause result in hyperkalaemia in susceptible patients (e.g. patients with diabetes,
chronic renal failure, or acidosis, or those taking potassium sparing drugs). If such patients are given dalteparin for longer than 7 days potassium should be monitored weekly whilst an inpatient.

**Use in renal impairment**

23. Dalteparin is renally cleared, so care is required when administering dalteparin to patients with severe renal impairment (GFR less than 20mL/min). Limited data suggest that dose adjustment may not be required with short-term use (less than 10 days). For longer term use, accumulation can be measured by a heparin anti-Xa assay (citrate tube to coagulation laboratory). Peak (4 hours post dose) and trough (immediately pre-dose) should be measured. For thromboprophylaxis, peak levels should be in the region of 0.3 heparin anti-Xa units/mL, with undetectable troughs.

24. Arbitrary dose reduction may result in sub-optimal provision of prophylaxis and may put the patient at increased risk of hospital acquired VTE. However a dose reduction should be considered in those patients in whom accumulation is detected by heparin anti-Xa assay.

Note: eGFR is a reasonable guide to GFR in most patients. In patients at extremes of body weight a GFR should be should be calculated using the Cockcroft-Gault formula (and ideal body weight).

**Use in dialysis patients**

25. There is very little data with regard to use of prophylactic dalteparin, and dosing regimens in dialysis patients. Dialysis patients are overall at increased risk of both thrombosis and bleeding. Following discussion with renal consultants at OUHFT, it has been agreed that in-patients at risk of thrombosis should be prescribed standard dose of dalteparin unless contraindicated (in addition to routine anticoagulant for prevention of clotting in extracorporeal circuit). If there is particular concern with regard to bleeding risk then this should be discussed with renal consultant, and reduced dosage considered on an individual basis, with documentation of this decision.

**Alternatives to dalteparin:**

**Fondaparinux**

26. For patients unable to receive dalteparin, but who are eligible for pharmacological thromboprophylaxis (e.g. patients with a history of heparin induced thrombocytopenia (HIT)), fondaparinux is available. The dose for thromboprophylaxis is 2.5mg subcutaneously once daily for most patients.

Note: In patients with renal insufficiency (GFR 20-50mL/min), the dose should be reduced to 1.5mg subcutaneously once daily.

27. In patients with significant renal impairment (GFR less than 20mL/min), fondaparinux should be avoided. If such a patient presents, contact the on call haematology registrar for advice (either the Coag SpR on bleep 5529 during normal working hours and or the Haem SpR via switch out of hours).

**Danaparoid**

28. Danaparoid is also available for patients with a history of HIT, at a dose of 750units subcutaneously twice daily. Monitoring of anticoagulant effect is not normally required. In patients at extremes of body weight and those with renal insufficiency
then danaparoid anti-Xa levels can be measured and dose adjustments made if necessary. Steady state levels should be in the region of 0.15-0.35 danaparoid anti-Xa units/ml.

**Unfractionated heparin**

29. Unfractionated heparin is only indicated for use in certain specialist clinical areas (transplant) and should not be used outside of those areas unless on the advice of a specialist.

**Direct/novel oral anticoagulants (DOACs/NOACs)**

30. Apixaban, dabigatran and rivaroxaban are oral agents licensed for extended thromboprophylaxis after elective hip or knee surgery. They are available for use as detailed in the applicable NICE TA.

**Aspirin**

31. As stated in NICE CG92: Do not regard aspirin or other antiplatelet agents as adequate prophylaxis for VTE.

**Extended (post discharge) thromboprophylaxis**

32. Certain high risk procedures (e.g. hip and knee arthroplasty, major abdominal cancer surgery) carry a significant risk of VTE that continues post discharge, and as such extended thromboprophylaxis is indicated after these procedures. Duration depends on indication and the agent used. If a patient is discharged from hospital with extended thromboprophylaxis, the responsible doctor must ensure that the patient’s GP is informed.

Note: for dalteparin, the total duration of extended thromboprophylaxis as per SPC is:

- Hip replacement/fracture – 35 days
- Knee replacement – 14 days
- Major abdominal cancer surgery – 28 days

33. Certain very high risk patients, such as previous history of provoked VTE, may warrant extended thromboprophylaxis e.g. for 5-7 days after lower risk procedures. Please contact haematology for advice (coagulation SpR bleep 5529).

**Stroke patients**

34. Separate guidance is available for assessment and provision of thromboprophylaxis after acute stroke (within the last 30 days), see Acute Stroke Service guidelines: *Prevention of venous thromboembolism in patients with acute stroke*.

**Palliative care patients**

35. Consider offering pharmacological VTE prophylaxis to patients in palliative care who have potentially reversible acute pathology. Take into account potential risks and benefits and the views of patients and their families and/or carers. Do not routinely offer pharmacological or mechanical VTE prophylaxis to patients admitted for terminal care or those commenced on an end of life care pathway. Review decisions about VTE prophylaxis for patients in palliative care daily, taking into account the views of patients, their families and/or carers and the multidisciplinary team.
Compliance
36. Compliance with NICE quality statements, and National Contract requirements, will be monitored (see compliance section 62). The OUHFT process for Hospital acquired thrombosis (HAT) reporting was agreed at Clinical Effectiveness Committee September 2015. The initial HAT screen form (Appendix 3) and a flow diagram of the agreed HAT process (Appendix 4) are included in the appendices of this document.

Procedure to be followed if DVT is suspected

Diagnosis of DVT
37. Patients presenting at the Emergency Department with a suspected DVT, who are suitable for outpatient treatment can be referred directly to the DVT Clinic at the Churchill Hospital.

38. The outpatient protocol at the Trust is that patients initially have a pre-test probability assessment (see table below) and are classified as “unlikely” or “likely” to have a DVT based on the score. Algorithm - DVT diagnosis (overleaf) is then followed.

39. In-patients can also follow this algorithm. However, as most in-patients developing symptoms or signs suggestive of DVT are likely to have a raised D-dimer they could reasonably proceed to ultrasound without the need to measure D-dimer.

40. If ultrasound is restricted to the proximal veins a negative scan should be repeated in 6-8 days in “likely” patients (unless they have a normal D-dimer).

Pre-test Probability Assessment (Wells DVT Score)

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<thead>
<tr>
<th>Points</th>
<th>Score</th>
<th>Probability</th>
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</thead>
<tbody>
<tr>
<td>≤1</td>
<td>“Unlikely”</td>
<td></td>
</tr>
<tr>
<td>≥2</td>
<td>“Likely”</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Points</th>
<th>Active cancer (patient receiving treatment for cancer within the previous six months or currently receiving palliative treatment)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Paralysis, paresis, or recent plaster immobilisation of the lower extremities</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Recently bedridden for 3 days or more, or major surgery within previous twelve weeks</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Localised tenderness along the distribution of the deep venous system</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Entire leg swollen</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Calf swelling at least 3 cm larger than the asymptomatic leg (measured ten cm below tibial tuberosity)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Pitting oedema confined to the symptomatic leg</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Collateral superficial veins (nonvaricose)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Previously documented venous thromboembolism</td>
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</tr>
<tr>
<td></td>
<td>Alternative diagnosis at least as likely as deep vein thrombosis</td>
<td>-2</td>
</tr>
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</table>
41. “Likely” patients who do not have a negative D-dimer need a repeat scan of the proximal veins one week later. They remain off anticoagulation whilst awaiting this. An alternative strategy for these patients would be to extend the initial scan to the whole leg (i.e. to also scan the calf veins).

42. A negative D-Dimer with our reagent is < 500 μg/l FEU.

43. In patients who have already had an anticoagulant, D-dimers will not be used as part of the diagnostic algorithm.
Initiation of treatment in cases of diagnostic delay

44. Patients with suspected DVT should be offered an interim therapeutic dose of anticoagulation therapy if diagnostic investigations are expected to take longer than 4 hours unless the risk of so doing is felt to outweigh the benefit and should have diagnostic investigations completed within 24 hours.

Management of the patient once a DVT has been diagnosed

This can be either with A) Apixaban, B) Rivaroxaban or C) LMWH and warfarin

A) Treatment with apixaban

45. Apixaban, a direct inhibitor of factor Xa, is given orally for the treatment of DVT and PE and for the secondary prevention of recurrent DVT and PE. Apixaban does not require therapeutic monitoring (nor concurrent initial treatment with heparin).

It should not be used in those less than 18 years of age.

It should ideally be prescribed using the apixaban power plan.

Dose
10 mg twice daily for 7 days, then 5 mg twice daily.
On the first day the second dose can be taken later that evening even if the first dose is given in the afternoon.
The licenced dose for prevention of recurrent DVT and/or PE following completion of 6 months of treatment for DVT or PE is 2.5 mg twice a day (but see page 15 which considers this possibility after 3 months).

Renal impairment
No dose adjustment is necessary in patients with mild or moderate renal impairment. In patients with severe renal impairment (GFR 15-29 mL/min) apixaban is to be used with caution. We will not routinely use apixaban if GFR < 30 mL/minute but in selected patients it can be considered for use if the GFR is 15-30 ml/min.
Estimated GFR (eGFR) is a reasonable guide to GFR in most patients, but in patients at extremes of body weight a GFR should be calculated using the Cockcroft-Gault formula (and ideal body weight). A GFR calculator is available at [http://www.nuh.nhs.uk/healthcare-professionals/antibiotics/antibiotics-calculators/creatinine-clearance-calculator/](http://www.nuh.nhs.uk/healthcare-professionals/antibiotics/antibiotics-calculators/creatinine-clearance-calculator/)

Hepatic impairment – avoid in liver disease with coagulopathy.

Pregnancy or breast feeding – avoid.

Missed doses - If a dose is missed the patient should take the missed dose immediately and take the next dose on time (if the next dose is due a double dose can be taken).

Interaction with other medicinal products
The use of factor Xa inhibitors is not recommended in patients receiving concomitant systemic treatment with azole-antimycotics (such as ketoconazole, itraconazole, voriconazole and posaconazole) or HIV protease inhibitors (such as ritonavir). These active substances are strong inhibitors of both CYP3A4 and P-gp and therefore may
increase rivaroxaban and apixaban plasma concentrations to a clinically relevant degree. Co-administration of factor Xa inhibitors with strong CYP3A4 inducers e.g. rifampicin, phenytoin, carbamazepine, phenobarbital or St. John’s Wort, may lead to reduced rivaroxaban and apixaban plasma concentrations. We therefore recommend that strong CYP3A4 inducers should not be co-administered with factor Xa inhibitors when treating acute venous thromboembolism. Macrolide antibiotics, such as clarithromycin and erythromycin, may inhibit metabolism of factor Xa inhibitors and therefore caution should be applied if co-prescribed.

**Prescription**
Initially three weeks treatment should be prescribed and supplied and the GP should then continue.

**B) Treatment with rivaroxaban**

46. Rivaroxaban, a direct inhibitor of factor Xa, is given orally for the treatment of DVT and PE and for the secondary prevention of recurrent DVT and PE. Rivaroxaban does not require therapeutic monitoring (nor concurrent initial treatment with heparin).

It should not be used in those less than 18 years of age.

**Dose**
15 mg twice daily with food for 21 days, then 20 mg once daily with food.

**Renal impairment**
If GFR 15–49 mL/minute initially 15 mg twice daily for 21 days, thereafter, the recommended dose is the standard 20 mg once daily but a reduction of the dose from 20 mg once daily to 15 mg once daily should be considered if the patient's assessed risk for bleeding outweighs the risk for recurrent DVT and PE. The SPC says use with caution if GFR 15-29 mL/minute and avoid if GFR less than 15 mL/minute.

We will not routinely use rivaroxaban if GFR < 30 mL/minute. Estimated GFR (eGFR) is a reasonable guide to GFR in most patients, but in patients at extremes of body weight a GFR should be calculated using the Cockcroft-Gault formula (and ideal body weight). A GFR calculator is available at [http://www.nuh.nhs.uk/healthcare-professionals/antibiotics/antibiotics-calculators/creatinine-clearance-calculator/](http://www.nuh.nhs.uk/healthcare-professionals/antibiotics/antibiotics-calculators/creatinine-clearance-calculator/)

**Hepatic impairment** – avoid in liver disease with coagulopathy.

**Pregnancy or breast feeding** – avoid.

**Missed doses** - If a dose is missed during the 15 mg twice daily treatment phase (day 1 - 21), the patient should take the missed dose immediately and take the next dose on time (if the next dose is due two 15 mg tablets can be taken together). The patient should then continue with 15 mg twice daily.

47. If a dose is missed during the once daily treatment phase (day 22 and onwards), the patient should take the missed dose immediately, and continue on the following day with the once daily intake as recommended. The dose should not be doubled within the same day to make up for a missed dose.
Interaction with other medicinal products

48. The use of factor Xa inhibitors is not recommended in patients receiving concomitant systemic treatment with azole-antimycotics (such as ketoconazole, itraconazole, voriconazole and posaconazole) or HIV protease inhibitors (such as ritonavir). These active substances are strong inhibitors of both CYP3A4 and P-gp and therefore may increase rivaroxaban and apixaban plasma concentrations to a clinically relevant degree. Co-administration of factor Xa inhibitors with strong CYP3A4 inducers e.g. rifampicin, phenytoin, carbamazepine, phenobarbital or St. John’s Wort, may lead to reduced rivaroxaban and apixaban plasma concentrations. We therefore recommend that strong CYP3A4 inducers should not be co-administered with factor Xa inhibitors when treating acute venous thromboembolism. Macrolide antibiotics, such as clarithromycin and erythromycin, may inhibit metabolism of factor Xa inhibitors and therefore caution should be applied if co-prescribed. Co-administration of rivaroxaban with dronedarone should be avoided given limited clinical data.

Prescription

49. Initially three weeks treatment should be prescribed and the GP should then continue.

C) Treatment with low molecular weight heparin and warfarin

50. It is imperative that the patient is weighed and that the weight is documented on the drug chart. In exceptional circumstances, when weighing the patient is not possible, the estimated weight must be documented on the drug chart. Baseline bloods (FBC, U&Es and coagulation screen) should be taken prior to the initial dose of dalteparin, but it’s administration should not be delayed. The baseline blood results should be checked prior to administering the second dose of dalteparin.

USE FIXED DOSE SYRINGES and give dalteparin subcutaneously once a day*

<table>
<thead>
<tr>
<th>Weight</th>
<th>Dose</th>
<th>Colour Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 46 kg</td>
<td>7,500 units</td>
<td>GREEN</td>
</tr>
<tr>
<td>46-56 kg</td>
<td>10,000 units</td>
<td>RED</td>
</tr>
<tr>
<td>57-68 kg</td>
<td>12,500 units</td>
<td>BROWN</td>
</tr>
<tr>
<td>69-82 kg</td>
<td>15,000 units</td>
<td>PURPLE</td>
</tr>
<tr>
<td>83-120 kg</td>
<td>18,000 units</td>
<td>GREY</td>
</tr>
<tr>
<td>&gt;120 kg</td>
<td>bd dosing*</td>
<td></td>
</tr>
</tbody>
</table>

*for patients >120 kg consider 100 units/kg bd (but give 18,000 units first dose if giving a single injection whilst awaiting a scan the next day).

Low molecular weight heparin is likely to accumulate when the GFR falls below 20 ml/min. For patients with GFR less than 20ml/min, either use intravenous unfractionated heparin and monitor the APTT appropriately or use subcutaneous dalteparin with 2/3 of the normal weight adjusted dosage and monitor anti-Xa plasma concentration.

Dalteparin should be continued until the INR has been ≥ 2 for at least two consecutive days or for five days – whichever is the longer.

51. Monitoring the platelet count for heparin induced thrombocytopenia is not necessary.

52. See Medicines Information Leaflet Treatment of venous thromboembolism (VTE) in adults with dalteparin (Fragmin®) for more details.
Warfarin

53. The recommended target INR is 2.5 (target range 2.0 – 3.0). Our warfarin induction schedule is shown in the table. If the initial INR ≤ 1.3 the patient will receive 5mg of warfarin once daily on days 1 and 2. The INR is checked on days 3 and 4 and the warfarin dose is adjusted according to the schedule.

<table>
<thead>
<tr>
<th>days 1 &amp; 2</th>
<th>day 3</th>
<th>day 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>INR</td>
<td>dose</td>
<td>INR</td>
</tr>
<tr>
<td>&lt; 1.5</td>
<td>10 mg</td>
<td>&lt; 1.6</td>
</tr>
<tr>
<td>1.5-2.0</td>
<td>5 mg</td>
<td>1.6-1.7</td>
</tr>
<tr>
<td>2.1-2.5</td>
<td>3 mg</td>
<td>1.8-1.9</td>
</tr>
<tr>
<td>2.6-3.0</td>
<td>1 mg</td>
<td>2.0-2.3</td>
</tr>
<tr>
<td>&gt;3.0</td>
<td>0 mg*</td>
<td>2.4-2.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.8-3.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.1-3.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.6-4.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;4.0</td>
</tr>
</tbody>
</table>

* a senior thrombosis nurse or doctor should decide on further management.

After day 4, until the INR is > 2.0 for two consecutive days, a senior thrombosis nurse or doctor will continue to amend the warfarin dose based on the INR result.

Selecting an anticoagulant

54. Warfarin is usually preferred if GFR < 30 ml/min or if there is liver dysfunction.

55. Choice of anticoagulant should be discussed with the patient, some may prefer to opt for a drug with a longer history of use or have warfarin again if they’ve been on it before.

56. The efficacy of rivaroxaban and apixaban are similar to that of warfarin. If there is no medical reason to favour warfarin and if there is no patient preference for warfarin we will use a Xa inhibitor. Compared to warfarin, both are significantly less likely to cause major bleeding. Additionally, apixaban is significantly less likely to cause clinically relevant non-major bleeding. Rivaroxaban (but not apixaban) had an increased risk of GI bleeding compared with warfarin. When compared with placebo for long-term secondary prevention rivaroxaban had a significantly increased risk of bleeding but apixaban did not. This, coupled with the dose reduction for long-term use makes apixaban our current Xa inhibitor of choice.

Investigation for cancer in patients with unprovoked DVT

57. All patients should have a full history and examination. Patients with any concerning symptoms or signs should have targeted further investigations to investigate for an underlying cancer.

58. In patients over 40 years with a first unprovoked VTE, but who do not have any concerning clinical symptoms or signs, NICE (clinical guideline 144), based on a randomised trial, said consider the possibility of further investigation with an abdomino-pelvic CT scan (and a mammogram for women), though a non-randomised concurrent-controlled cohort study did not support this. A recent large
randomised controlled trial (Carrier et al N Eng J Med 2015;373:697-704) has however shown that routine screening with CT of the abdomen and pelvis did not provide a clinically significant benefit. This trial did offer targeted additional tests as part of a limited screen so following this trial we would suggest a:

- CXR
- and if not performed in the past year
- Breast examination in women over 50 years of age
- PSA in men over 40 years of age.

59. Although women in this trial women were offered a cervical smear if they had not had one in the past year our cervical screening service advise that this is unlikely to have clinical utility.

**Duration of treatment and follow-up**

60. Patients with proximal DVT should be treated for at least 3 months. For a first proximal DVT or a PE associated with transient risk factors treatment will usually stop at three months. Long-term treatment will be considered for recurrent thrombosis, patients with an on-going risk factor, or whose event was unprovoked.

61. It may be possible to decide on finite (3 months) or indefinite anticoagulation when treatment is started but many patients (e.g. those with a first unprovoked proximal DVT) will need to be reviewed at three months to decide whether to stop anticoagulation or whether to continue indefinitely. Patients can be referred to the thrombosis consultants for a three month review if required.

**VTE Medicine Information Leaflets**

62. The Oxford Medicines Information leaflets are produced by clinical areas to encourage prescribing which is safe, efficacious and cost-effective to the NHS. They are approved by the Trust Medicines Management and Therapeutics Committee and available via the intranet. Those related to this aspect of care are as follows:

- Prevention of hospital acquired venous thromboembolism (VTE) in adult inpatients
- Initiating oral anticoagulation with vitamin K antagonists (VKAs) in adult patients
- Reversal of oral anticoagulation (vitamin K antagonists) in adult inpatients
- Guidelines on when to use and how to monitor intravenous unfractionated heparin in adults
- Treatment of VTE in adults with dalteparin (Fragmin)
- Treatment of DVT and PE with rivaroxaban or apixaban in adults
- Treatment of VTE with dalteparin (Fragmin) in patients with cancer

**Training**

63. Training required to fulfil this policy will be provided in accordance with the Trust’s Training Needs Analysis. Management and monitoring of training will be in accordance with the Trust’s *Statutory and Mandatory Training Policy* available via the
Intranet. This information can be accessed via the Learning and Development pages on the Trust intranet.

**Review**

64. This policy will be reviewed every 3 years, as set out in the *Policy for the Development and Implementation of Procedural Documents.*

**References**


Responsibilities

The **Chief Executive** has overall responsibility for ensuring the Trust has processes in place to risk assess for VTE; the **Medical Director** has overall responsibility for the clinical content of the policy and the **Director of Clinical services** has responsibility for delivery of this policy as executive lead.

The **Thromboprophylaxis team** are responsible for:
- Updating Trust policy in accordance with new evidence and updated guidelines
- Facilitating reporting of VTE risk assessment nationally and locally
- Facilitating audits of key performance measures of VTE prevention, such as appropriateness of thromboprophylaxis and information given to patients
- Facilitating Root Cause Analysis (RCA) of Hospital Acquired Venous Thromboembolism (HAT)

**Medical practitioners** working within adult services are responsible for: (a) following the procedure if VTE is suspected (b) understanding the importance of VTE risk assessment and for using the standard risk assessment tool as outlined in this document. It is the responsibility of the assessing doctor to prescribe appropriate thromboprophylaxis on the prescription chart.

**Nursing staff** are responsible for: checking that an appropriate assessment has been completed, and if this is not the case it is their responsibility to bring this to the attention of the doctor in charge of the patient’s care. Nursing staff are also responsible for the correct administration of AES when prescribed, including awareness of contraindications and documentation of ‘skin safety checks’.

**Pharmacists** working within adult services are responsible for: review of thromboprophylaxis as part of ‘drug round’, and highlighting to team any concerns that patient may not be on appropriate thromboprophylaxis.

**The Thrombosis Working Group** is the group responsible for: reviewing and monitoring compliance with this policy and for identifying remedial actions to improve compliance.

**Patient Safety and Clinical Risk Committee** is responsible for: ensuring the development and implementation of clinical risk policies and procedures throughout the Trust. The Thrombosis Working Group is a sub-committee of the Patient Safety and Clinical Risk Committee.

**Clinical Effectiveness Committee** is responsible for reviewing the results of the Trust wide VTE audits, and for ensuring oversight of appropriate action plans and support.

**SIRI forum** is responsible for reviewing all reports of ‘potentially preventable’ thrombosis in an open and consistent manner, to ensure appropriate level of further investigation and shared learning.

**The Performance and Information Team** are responsible for: providing clinical, operational and strategic information with regard to activity recording, performance and outcome measures.

**Medicines Management and Therapeutics Committee** is responsible for: ensuring drugs used within the Trust are being delivered and monitored, utilising consistent evidenced based and appropriate clinical protocols and guidance.
Definitions
The terms in use in this document are defined as follows:

Venous thromboembolism (VTE) - is a condition in which a blood clot (thrombus) forms in a vein. Blood flow through the affected vein can be limited by the clot, and may cause swelling and pain. Venous thrombosis occurs most commonly in the deep veins of the leg or pelvis; this is known as a deep vein thrombosis (DVT). An embolism occurs if all or a part of the clot breaks off from the site where it forms and travels through the venous system. If the clot lodges in the lung a potentially serious and sometimes fatal condition, pulmonary embolism (PE) occurs. Venous thrombosis can occur in any part of the venous system. However, DVT and PE are the most common manifestations of venous thrombosis. The term VTE embraces both the acute conditions of DVT and PE, and also the chronic conditions which may arise after acute VTE-such as post thrombotic syndrome and pulmonary hypertension—both problems being associated with significant ill-health and disability.

Thromboprophylaxis: a measure (which can be pharmacological or mechanical) taken to prevent the development of a venous thromboembolism.

Cohort group: a group of patients admitted for the same procedure who are considered to have a similar risk profile and are assessed as a group as being at low risk of VTE.

High risk surgical patient: can be defined as “hip or knee arthroplasty, hip fracture surgery, major trauma and spinal cord injury, and surgery in patients with other significant/multiple risk factors e.g. cancer, previous VTE”.

D-dimer: a breakdown product of fibrin, which is usually raised in the blood of patients with VTE.

GFR: Glomerular filtration rate. Estimated GFR (eGFR) is a reasonable guide to GFR in most patients. In patients at extremes of body weight a GFR should be calculated using the Cockcroft-Gault formula (and ideal body weight).

HAT: Hospital Acquired Venous Thromboembolism, a Deep Vein Thrombosis or Pulmonary Embolus following an inpatient stay within the preceding 90 days, or one that is diagnosed during a patient stay, but that was not present on admission.

ORBIT: Oxford University Hospitals Reporting Business Intelligence tool database.

BNF: British National Formulary is a medical and pharmaceutical reference book that contains a wide spectrum of information and advice on prescribing and pharmacology.

SmPC: Summary of product characteristics—Document required before medical product can be authorized for marketing. It contains a definitive description of the product both in terms of its properties and the clinical use it can be put

CTPA: Computed Tomography Pulmonary Angiogram—is a medical diagnostic test that employs computed tomography to obtain an image of the pulmonary arteries

tPA: Tissue Plasminogen Activator—is a protein involved in the breakdown of blood clots.
Monitoring Compliance

Data collection will be critical in evaluating the impact of VTE risk assessment and appropriate management on improving health outcomes for patients. A detailed report on risk assessment compliance is available within the ORBIT Data Base, highlighting Division’s and Consultant’s Percentage Compliance.

<table>
<thead>
<tr>
<th>Aspect of compliance or effectiveness being monitored</th>
<th>Monitoring method</th>
<th>Responsibility for monitoring (job title)</th>
<th>Frequency of monitoring</th>
<th>Group or Committee that will review the findings and monitor completion of any resulting action plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of patients assessed for their risk of developing VTE</td>
<td>Monthly VTE Risk Assessment Performance Reports *</td>
<td>Divisional Directors</td>
<td>Monthly</td>
<td>Thrombosis Working Group will review overall compliance quarterly, Monthly data will be reviewed at divisional level</td>
</tr>
<tr>
<td>Audits of key aspects of VTE prevention such as appropriateness of thromboprophylaxis and information given to patients</td>
<td>Trust-wide and local VTE audits</td>
<td>Divisional Directors</td>
<td>3 to 6 monthly</td>
<td>Data will be reviewed at a divisional level, by Thrombosis working Group and at Clinical Effectiveness Committee</td>
</tr>
<tr>
<td>Root cause analysis of all hospital acquired thromboses (see OUHFT Trust policy on process of reporting HATs, and appendices 3 and 4)</td>
<td>VTE prevention team</td>
<td>Divisional Directors</td>
<td>Continuous. All potentially preventable HATs are escalated to SIRI forum.</td>
<td>SIRI forum, Thrombosis Working Group</td>
</tr>
<tr>
<td>How the organisation trains staff, in line with the training needs analysis</td>
<td>This will be monitored in accordance with the Trust’s Statutory and Mandatory and Training Policy available via the Intranet.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* VTE prevention team is responsible for ensuring that risk assessments are completed for patients in a timely manner and that patients are adequately monitored for VTE prophylaxis.
## Equality Analysis

<table>
<thead>
<tr>
<th>Have you considered how the Policy will affect people:</th>
<th>Yes</th>
<th>No</th>
<th>How have these groups been included in the development of the Policy?</th>
<th>How will the Policy affect them?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who have a physical or sensory impairment? Have you consulted with them?</td>
<td>☒</td>
<td>☐</td>
<td></td>
<td>There are no potential to discriminate on these grounds</td>
</tr>
<tr>
<td>With a disability?</td>
<td>☒</td>
<td>☐</td>
<td></td>
<td>There are no potential to discriminate on these grounds</td>
</tr>
<tr>
<td>Of different gender?</td>
<td>☒</td>
<td>☐</td>
<td></td>
<td>There are no potential to discriminate on these grounds</td>
</tr>
<tr>
<td>Of different ages?</td>
<td>☒</td>
<td>☐</td>
<td></td>
<td>There are no potential to discriminate on these grounds</td>
</tr>
<tr>
<td>With different racial heritages?</td>
<td>☒</td>
<td>☐</td>
<td></td>
<td>There are no potential to discriminate on these grounds</td>
</tr>
<tr>
<td>With different sexual orientations?</td>
<td>☒</td>
<td>☐</td>
<td></td>
<td>There are no potential to discriminate on these grounds</td>
</tr>
<tr>
<td>Who are pregnant or recently had a baby?</td>
<td>☒</td>
<td>☐</td>
<td></td>
<td>There are no potential to discriminate on these grounds</td>
</tr>
<tr>
<td>With different religions or beliefs?</td>
<td>☒</td>
<td>☐</td>
<td></td>
<td>There are no potential to discriminate on these grounds</td>
</tr>
<tr>
<td>Who are going through gender re-assignment or have transitioned?</td>
<td>☒</td>
<td>☐</td>
<td></td>
<td>There are no potential to discriminate on these grounds</td>
</tr>
<tr>
<td>Of different marital/partnership status?</td>
<td>☒</td>
<td>☐</td>
<td></td>
<td>There are no potential to discriminate on these grounds</td>
</tr>
<tr>
<td>Who are carers?</td>
<td>☒</td>
<td>☐</td>
<td></td>
<td>There are no potential to discriminate on these grounds</td>
</tr>
<tr>
<td>Any other group who may be affected by this policy</td>
<td>☒</td>
<td>☐</td>
<td></td>
<td>There are no potential to discriminate on these grounds</td>
</tr>
</tbody>
</table>

### Summary of Analysis

<table>
<thead>
<tr>
<th>Does the analysis show evidence of:</th>
<th>Yes</th>
<th>No</th>
<th>Please explain your answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>The potential to discriminate?</td>
<td>☐</td>
<td>☒</td>
<td></td>
</tr>
<tr>
<td>The advancement of equality of opportunity?</td>
<td>☒</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>The promotion of good relations between groups?</td>
<td>☒</td>
<td>☐</td>
<td></td>
</tr>
</tbody>
</table>
Is pharmacological VTE prophylaxis contraindicated? Does the risk of bleeding outweigh the risk of VTE?

Yes

Start mechanical thromboprophylaxis. Choose any of AES, IPC or foot impulse devices (unless contraindicated). Continue until the patient no longer has significantly reduced mobility.

No

Is pharmacological VTE prophylaxis contraindicated? Does the risk of bleeding outweigh the risk of VTE?

No

Offer pharmacological treatment and continue until no significant reduction in mobility or discharged. Reassess VTE and bleeding risk daily.

Yes

Continue mechanical thromboprophylaxis alone. Reassess bleeding and VTE risk daily.

### High risk surgical patient

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Dalteparin dose (units) subcut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 121</td>
<td>2,500 once daily</td>
</tr>
<tr>
<td>121-150</td>
<td>5,000 once daily</td>
</tr>
<tr>
<td>More than 150</td>
<td>7,500 once daily</td>
</tr>
</tbody>
</table>

If GFR less than 20ml/min, monitor peak and trough heparin anti-Xa after 10 days. See Mil alternatives to dalteparin if history of heparin induced thrombocytopenia (HIT) or allergy.

### Moderate risk surgical patient

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Dalteparin dose (units) subcut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 121</td>
<td>2,500 once daily</td>
</tr>
<tr>
<td>121-150</td>
<td>5,000 once daily</td>
</tr>
<tr>
<td>More than 150</td>
<td>7,500 once daily</td>
</tr>
</tbody>
</table>

### Extended (post discharge) thromboprophylaxis

This is indicated for certain high risk procedures. For dalteparin, the total duration of extended thromboprophylaxis as per SPC is: Hip replacement/fracture – 35 days. Knee replacement – 14 days. Major abdominal cancer surgery – 28 days.

It may be indicated for certain high risk patients (eg previous history of VTE) after a lower risk procedure. Advise contact haematology.

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**Key:**

AES – anti-embolic stockings; IPC – intermittent pneumatic compression; GFR – glomerular filtration rate (eGFR is a reasonable guide to GFR in most patients, but in patients at extremes of body weight GFR should be calculated using Cockcroft-Gault and ideal body weight); VTE – venous thromboembolism
d– significantly reduced mobility = defined in NICE guidelines as ‘patients who are bed bound, unable to walk unaided or likely to spend a substantial proportion of their day in bed or in a chair’
e - High VTE risk surgical patient: hip or knee arthroplasty, hip fracture surgery, major trauma and spinal cord injury, and surgery in patients with other significant (eg cancer, previous VTE) or multiple VTE risk factors
f - Moderate VTE risk surgical patient: those requiring thromboprophylaxis but not in the high risk group (see above).

### a Additional risk factors for VTE

- Age over 60 years
- Active cancer or cancer treatment
- Critical care admission
- Dehydration
- Known thrombophilia
- Obesity (BMI over 30kg/m²)
- One or more significant medical comorbidities (for example): heart disease, metabolic endocrine or respiratory pathologies, acute infectious diseases, inflammatory conditions
- Personal history of VTE or first-degree relative with a history of VTE
- Use of hormone replacement therapy
- Use of oestrogen-containing contraceptive therapy
- Varicose veins with phlebitis
- Pregnancy or less than 6 weeks postpartum

### b Risk factors for bleeding

- Active bleeding
- Acquired bleeding disorder (such as acute liver failure)
- Concurrent use of anticoagulants known to increase the risk of bleeding (such as warfarin with an INR 2 or more; direct/monovalent oral anticoagulants such as apixaban, rivaroxaban, edoxaban, dabigatran; or fondaparinux)
- Acute stroke
- Thrombocytopenia (platelets less than 75x10⁹/l)
- Uncontrolled systolic hypertension (230/120mmHg or higher)
- Untreated inherited bleeding disorder (such as haemophilia and von Willebrand’s disease)
- Lumbar puncture/epidural/spinal anaesthesia within the next 12 hours
- Lumbar puncture/epidural/spinal anaesthesia within the previous 4 hours
- Other high risk bleeding procedure such as neurosurgery, spinal surgery or eye surgery

### c Contraindications to AES

Do not offer AES to patients who have:

- Suspected or proven arterial disease
- Peripheral arterial bypass grafting
- Peripheral neuropathy or other causes of sensory impairment
- Any local conditions in which AES may cause damage, for example fragile ‘tissue paper skin’ dermatitis, gangrene or recent skin graft
- Known allergy to material of manufacture
- Cardiac failure
- Severe leg oedema or pulmonary oedema from congestive heart failure
- Unusual leg size or shape
- Major limb deformity preventing correct fit
- Acute stroke

Use caution and clinical judgement when applying AES over venous ulcers or wounds.
VTE Prevention in Adult Medical Inpatients

(See separate maternity guidance for pregnancy and the puerperium, and main NHSLA document for palliative care patients e)

Is the patient at increased risk of VTE?

Reduced mobility AND 1 or more additional risk factor(s) for VTE a

OR

Have had or are expected to have significantly reduced mobility d for greater than 3 days

Yes

Is pharmacological VTE prophylaxis contraindicated b? Does the risk of bleeding outweigh the risk of VTE?

No

Offer pharmacological treatment

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Dalteparin dose (units) subcut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 40</td>
<td>2,500 once daily</td>
</tr>
<tr>
<td>40-120</td>
<td>5,000 once daily</td>
</tr>
<tr>
<td>121-150</td>
<td>7,500 once daily</td>
</tr>
<tr>
<td>More than 150</td>
<td>5,000 twice daily</td>
</tr>
</tbody>
</table>

If GFR less than 20ml/min, monitor peak and trough heparin anti-Xa after 10 days. Use standard dose dalteparin for patients on dialysis unless particular concern with regard to bleeding risk. See MIL for alternatives to dalteparin for patients on dialysis unless particular concern with regard to bleeding risk.

See stroke guidelines

Yes

Has the patient had an acute stroke (within last 30 days)?

No

Mechanical thromboprophylaxis indicated eg AES or IPC (unless contraindicated) c

Continue until no significant reduction in mobility or discharged

Reassess risk of bleeding and VTE within 24 hours of admission and whenever clinical situation changes

Key:

AES - anti-embolic stockings; IPC - intermittent pneumatic compression; GFR – glomerular filtration rate (eGFR is a reasonable guide to GFR in most patients, but in patients at extremes of body weight GFR should be calculated using Cockcroft-Gault and ideal body weight); VTE - venous thromboembolism

d - significantly reduced mobility is defined in NICE CG92 as ‘patients who are bed bound, unable to walk unaided or likely to spend a substantial proportion of their day in bed or chair’

e - Consider offering pharmacological VTE prophylaxis to patients in palliative care who have potentially reversible acute pathology. Do not routinely offer pharmacological or mechanical VTE prophylaxis to patients admitted for terminal care or those commenced on an end of life care pathway.

a Additional risk factors for VTE

- Age over 60 years
- Active cancer or cancer treatment
- Critical care admission
- Dehydration
- Known thrombophilia
- Obesity (BMI over 30kg/m²)
- One or more significant medical comorbidities (for example): heart disease, metabolic endocrine or respiratory pathologies, acute infectious diseases, inflammatory conditions
- Personal history of VTE or first-degree relative with a history of VTE
- Use of hormone replacement therapy
- Use of oestrogen-containing contraceptive therapy
- Varicose veins with phlebitis
- Pregnancy or less than 6 weeks postpartum

b Risk factors for bleeding

- Active bleeding
- Acquired bleeding disorder (such as acute liver failure)
- Concurrent use of anticoagulants known to increase the risk of bleeding (such as warfarin with an INR 2 or more; direct/novel oral anticoagulants such as apixaban, rivaroxaban, edoxaban, dabigatran; or fondaparinux)
- Acute stroke
- Thrombocytopenia (platelets less than 75x10⁹/l)
- Uncontrolled systolic hypertension (230/120mmHg or higher)
- Untreated inherited bleeding disorder (such as haemophilia and von Willebrand’s disease)
- Lumbar puncture/epidural/spinal anaesthesia within the next 12 hours
- Lumbar puncture/epidural/spinal anaesthesia within the previous 4 hours
- Other high risk bleeding procedure such as neurosurgery, spinal surgery or ophthalmic

Special considerations for patients in the puerperium

- Postpartum haemorrhage
- Puerperal sepsis
- Surgical or gynaecological procedures

Special considerations for patients during pregnancy

- Varicose veins
- Deep vein thrombosis
- Cryoglobulinaemia
- Thrombocytopenia

c Contraindications to AES

Do not offer AES to patients who have:

- Suspected or proven arterial disease
- Peripheral arterial bypass grafting
- Peripheral neuropathy or other causes of sensory impairment
- Any local conditions in which AES may cause damage, for example fragile ‘tissue paper skin’ dermatitis, gangrene or recent skin graft
- Known allergy to material of manufacture
- Cardiac failure
- Severe leg oedema or pulmonary oedema from congestive heart failure
- Unusual leg size or shape
- Major limb deformity preventing correct fit
- Acute stroke

Use caution and clinical judgement when applying AES to venous ulcers or wounds