University Hospitals Sussex
NHS Foundation Trust

Venous Thromboembolism Prevention Policy

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Venous Thromboembolism Prevention Policy

1. INTRODUCTION

1.1 Hospital-acquired Thrombosis (HAT) accounts for thousands of deaths annually and fatal pulmonary embolism remains a common cause of in-patient mortality. HAT accounts for 50 to 60% of all cases of Venous Thromboembolism (VTE) seen in the UK. Treatment of non-fatal symptomatic VTE and related long term morbidities is associated with considerable cost to the health service.

1.2 VTE is a condition in which a blood clot (a thrombus) forms in a vein. It most commonly occurs in the deep veins of the legs; this is called a deep vein thrombosis. The thrombus may dislodge from its site of origin to travel in the blood – a phenomenon called embolism.

1.3 Non-fatal complications of pulmonary thrombosis include pulmonary hypertension. Deep venous thrombosis carries a considerable burden of morbidity, sometime long term, because of chronic venous insufficiency. This in turn can cause post-thrombotic syndrome (chronic limb pain, swelling and skin changes and ultimately venous ulceration). Non-fatal complications of DVT and PE have significant impact on quality of life.

1.4 The risk of developing VTE depends on the condition and/or procedure for which the patient is admitted and on any predisposing risk factors (such as age, obesity and concomitant conditions).

1.5 NICE introduced seven quality standards (QS3) for VTE prevention which was published in guideline 92 January 2010 and updated in march 2018. These standards are incorporated within this policy. (See Appendix 1 for more details)

2. Purpose

To enable health care practitioners to identify patients who are risk of developing VTE and select the appropriate therapy to reduce the risk of VTE occurring and thereby reduce the mortality and morbidity associated with this disease.

2.1. Patient/Client Group

All patients (age 16 and above) admitted for treatment, including day cases or patients discharged from A&E with lower limb devices such as plaster casts and braces.

2.2. Exceptions / Contraindications

2.2.1. Children (under the age of 16)

2.2.2. Pharmacological VTE prophylaxis in people 16 to 18 years of age: follow the recommendations on low molecular weight heparin (LMWH), Fondaparinux, Asprin, Apixaban, Rivaroxaban, Dabigatran and Edoxaban but note that currently (February 2021) these drugs do not have UK marketing authorization for use in people under 18 for this indication. The prescriber should obtain and document informed consent, and follow relevant professional guidance according to local policies and procedures.

2.2.3. Pregnant and post-partum woman admitted to hospital have been identified as a group requiring special consideration. Treatment of this group is covered by the BSUH maternity VTE prophylaxis protocol (also see 3.1.13)

2.2.4. For local guidance on the management of thromboprophylaxis in Covid 19, see BSUH guidelines Management of Thromboprophylaxis, Thrombosis and Coagulopathy in Covid 19

2.2.5. Some day patients are excluded from the VTE risk assessment process (see Appendix 2)

3. Definitions

3.1 Hospital Acquired Thrombosis (HAT) is defined as any VTE event diagnosed within hospital, not present on admission, and developing after 48 hours as an inpatient or within 90 days of hospital discharge following an inpatient stay of at least 24 hours, or following a surgical procedure under general or regional anaesthetic.

3.2 Root Cause Analysis (RCA) provides a structured approach to identifying factors leading to the development of venous thromboembolism, analysis of the underlying cause(s) of the thromboembolic event and outlining an approach for responding to them.

3.3 Heparin induced Thrombocytopenia (HIT) is an uncommon adverse reaction to heparin products. It is 10 times more likely with unfractionated heparin than with low molecular weight heparin; the risk is higher in surgical than in medical patients and is very low in pregnancy. Guidelines for the diagnosis and management of HIT from the British Haematological Society outline monitoring requirements and options for alternative anticoagulation in patients with a positive diagnosis. (See Appendix 3)

3.4 Intermittent Pneumatic Compression (IPC) is a non-pharmacological method of VTE prophylaxis. IPC uses an air pump and inflatable leggings to provide pulsing pressure that encourages venous blood flow, reducing stasis, and by extension DVT formation.

3.5 Anti-embolic Stockings are designed to promote venous return reducing stasis and by extension DVT formation. Stockings should meet the British Standards BS6612:1985 and BS7672:1993 to provide graduated compression and produce a calf measure of 14-15mmHg and 14-18mmHg at the ankle.

4. Responsibilities, Accountabilities and Duties

4.1 Chief Executive. The Chief Executive will be aware of their legal duties as the responsible person for meeting the requirements of national VTE prophylaxis guidelines. They will be aware of the performance of the Trust in meeting all regulations and recommendations and will ensure that adequate resource is provided for appropriate action to be taken.

4.2 The Patient Safety Group. The Thrombosis Committee chair or representative will present data as requested regarding VTE Risk Assessments, HATS and Root Cause Analysis to the Clinical Outcomes and Effectiveness Committee.

4.3 The Thrombosis Committee. This multidisciplinary committee is responsible for the development and maintenance of satisfactory venous thrombosis prophylaxis practices within the Trust, with the aim of achieving a reduction in the incidence of hospital acquired venous thromboembolism and improving public and professional understanding of VTE.

4.4 Doctors. It is the responsibility of the admitting doctor to ensure that this policy is adhered to in respect of VTE risk assessments, investigation and treatment of VTE.

4.5 Nurses. Nursing staff are responsible and accountable for the fitting and care of patients wearing anti-embolic stockings as outlined in this policy. If this task is delegated to a student or health care assistant the qualified nurse must be satisfied that the delegate had sufficient training and possess the required knowledge and skill to carry out the task and they remain accountable for this task. Nursing staff are responsible for providing written and verbal information about the risk of hospital acquired VTE and documenting that they have done so.

4.6 Pharmacists. Pharmacists are responsible for clinically screening drug charts and discharge summaries to ensure that appropriate risk assessment has been undertaken and thromboprophylaxis has been considered and prescribed if appropriate.

5. Clinical Management

5.1 General principles of VTE risk assessment

- All adult Medical, Surgical, Trauma & Othopaedics, Obstetrics & Gynaecology and Paediatric (16 years and older) patients admitted to UHS will be screened for risk of VTE and bleeding as part of the admission process. Patients will be considered for VTE prophylaxis if appropriate.
- The balance of the person's individual risk of VTE against their risk of bleeding must be considered when deciding whether to offer pharmacological thromboprophylaxis to patients. Patients should be involved in the decision making process.
- VTE prophylaxis should be offered if the likely benefit from reducing the risk of symptomatic VTE is greater than the risk of harm from major bleeding caused by anticoagulation.
- Divisions and departments should decide who is responsible for performing risk assessments in their area. In most circumstances, the admitting practitioner (junior doctor, advance nurse practitioner) is responsible for risk assessment and prescription of VTE prophylaxis, and this is reviewed at consultant review/ward round.
- For elective surgical admissions, the risk assessment will be performed at the pre-op assessment clinic (where decisions about other drugs such as antiplatelet agents can also be made). Reassessment should take place on the day of surgery to ensure that any changes to clinical status have been considered.
- The patient's VTE risk will be recorded on the VTE risk assessment chart (Appendix 4). If appropriate, VTE prophylaxis (pharmacological, mechanical or a combination of both) will be prescribed.
- All admitted patients, who have one or more risk factors for VTE and who have been risk assessed as appropriate for pharmacological prophylaxis, low molecular weight heparin (LWMH) or unfractionated heparin (UFH), will be prescribed this as soon as possible (see Appendix 3). Where possible, this should occur within 14 hours of admission. VTE prophylaxis should be administered at 18:00 hours (unless special

circumstances or contraindications exist).

- The risk of VTE must be reassessed on the consultant-led post take round within 24 hours of admission, at 72 hours after admission, and whenever there is a change in clinical condition.
- VTE prophylaxis must take into account any contraindications. Deviations or reasons to withhold VTE prophylaxis must be recorded clearly in the patient's healthcare record.
- If patients refuse or decline VTE prophylaxis, they should be counseled regarding the risks of VTE whilst in hospital, and the conversation clearly documented in the medical records. All patients should receive verbal and written information about the risk of VTE and measures taken to avoid VTE as well as possible side effects of prophylaxis. Failure to provide this information can result in significant medico-legal cost to the Trust. They should be encouraged to reduce their risk of VTE by adhering to simple measures such as hydration, early mobilization and exercise.
- Heparins are of animal origin and this may be of concern to some people. Enoxaparin sodium is a biological substance obtained by alkaline depolymerization of heparin benzyl ester derived from porcine intestinal mucosa. Fondaparinux is a synthetic heparin and can be offered as an alternative in these circumstances. For further information, see Muslim Faith, Guidance on Animal Products in Medicines .
- Fondaparinux is not suitable for those patients with a latex allergy or those who are pregnant or breast feeding (see Fondaparinux prescribing information). It is contra-indicated in creatinine clearance less than 20ml/min. See appendix 3 for further information.

5.2 Thromboprophylaxis Recommendations for Specific Patient Groups

- The recommendations for thromboprophylaxis for Medical patients are summarized in Appendix 5.
- NICE recommends considering a minimum of 7 days of thromboprophylaxis in all surgical patients where the risk of VTE outweighs the risk of bleeding and taking into account individual patient factors and clinical judgment. After some types of surgery NICE recommends thromboprophylaxis for longer time periods (see Appendices 6-9 for further details on different types of surgery)
- Obstetric VTE risk assessment tool should be used for all women on admission to hospital or a midwife led unit if they are pregnant, have given birth, have had a miscarriage or a termination of pregnancy in the last 6 weeks. Reassess risk of VTE and bleeding and assess the need for VTE prophylaxis within 6 hours of giving birth, having a miscarriage or termination of pregnancy, or of their clinical condition changes. Obstetric patients are assessed according to the Royal College of Obstetricians and Gynaecologists (RCOG) Greentop Guide 37a VTE prophylaxis in pregnancy. An obstetric-specific risk assessment is laid out in the BSUH maternity VTE prophylaxis protocol. An obstetric-specific drug chart which includes this risk assessment is available for this purpose.
- All surgical patients who are at risk of VTE, and some medical patients at risk of VTE but with a contra-indication to pharmacological VTE prophylaxis, should be offered ant-embolism stockings (AES) or intermittent pneumatic compressions stockings (IPC) eg: Flowtrin boots, unless these are contra-indicated. AES and IPC should be prescribed separately from LWMH (see Appendix 10)

- Advise people to consider stopping oestrogen containing contraceptives or hormone replacement therapy 4 weeks before elective surgery. If stopped, provide advice on alternative methods of contraception. Individuals can be directed to seek further advice from their GP or from Brighton and Hove Sexual Health and Contraception (SHAC) service. Further information on contraception can be obtained from Contraception Choices
- Consider VTE thromboprophylaxis for people at increased risk of VTE who are interrupting anticoagulant therapy. See BSUH Bridging Guidelines for further information.

5.3 Potential Complications of Pharmacological Thromboprophylaxis

- Allergy, including heparin induced thrombocytopenia (HITT) and skin reactions: If a patient is suspected of having HITT, all low molecular weight (LWMH) and unfractionated heparin (UFH) must be stopped immediately and the patient discussed with the haematologist on-call (Registrar or Consultant).
- Bleeding from pre-existing lesions or surgical procedures: The risk will be exacerbated by thrombocytopenia or the concurrent use of other anti-thrombotic/antiplatelet agents. The patient should be carefully reassessed and heparin stopped if risks of bleeding outweigh the benefits. If the risk of VTE outweighs the risk of bleeding, LWMH should be prescribed in addition to the usual anti-platelets.
- Anticoagulation: LWMH (weight based dosing) should be prescribed for patients at increased risk of VTE who are interrupting anticoagulant therapy (also known as "Bridging").
- LWMH accumulation in renal impairment will result in an increased risk of bleeding. Frequent reassessment will be required especially if the renal function is changing rapidly. The dose of LWMH should be reviewed in patients with renal impairment and a dosage reduction or switch to unfractionated heparin (UFH) should be considered (See dosing Appendix 3).
- There is a small risk of causing or exacerbating hyperkalaemia in patients at risk eg: CKD, diabetes, potassium- sparing agents and acidosis. Consideration of risks versus benefits should be discussed with a senior clinician when making a decision to withhold LWMH in this context.
- Weight appropriate dosing: LWMH and UFH must be prescribed according to weight appropriate dosing (Appendix 3).
- Wound infection is a potential risk of wound ooze. This can have significant potential complications (further surgery and possible amputation) for patients with metal endoprostheses commonly used in trauma and elective orthopaedic surgery. Any decision not give thromboprophylaxis should be discussed with the patient and clearly documented in the medical notes.

5.4 Potential Complications of Mechanical thromboprophylaxis (see also Appendix 10)

- Allergy to materials
- Incorrect application may result in damage to skin or circulation. Careful assessment of the patients' suitability for the use of AES should be carried out prior to fitting. See appendix for

full details. Both limbs should be measured and the correct size selected according to the manufacture recommendation. If the correct size is unavailable that the stockings should not be applied.

- AES can cause skin pressure damage especially where there is poor skin, circulatory or neurological problems. The stockings should be removed daily, and feet and legs should be inspected for signs of skin damage. Particular attention should be given to the heel, and bony prominences as these are the most common areas to sustain pressure damage. In patients with a significant reduction in mobility, poor skin integrity or any sensory loss, inspect the skin two or three times per day, particularly over the heels and bony prominences.
- Discontinue the use of anti-embolism stockings if there is marking, blistering or discoloration of the skin, particularly over the heels and bony prominences, or if the patient experiences pain or discomfort. If suitable, offer a foot impulse or intermittent pneumatic compression device as an alternative.

5.5 Aftercare

- All methods of VTE prophylaxis only reduce the risk of VTE; they do not negate it completely. Patients and their carers should be educated about the symptoms, signs and prevention of VTE, so that they can continue to reduce their risk after discharge and report concerning symptoms to their GP (see 5.6).
- Certain patient groups may need to be discharged on VTE prophylaxis. The duration will depend on factors such as length of admission, mobility, procedure (if surgical) and personal risk factors (see appendices 5-10). In areas of uncertainty, individual cases may be discussed with Haematology (Consultant or Registrar).
- At discharge, adequate supply of VTE prophylaxis should be supplied and the amount dispensed should be documented on the discharge summary. The duration of intended VTE prophylaxis must be stated clearly.
- Clear documentation to the GP and the patient must be included in the discharge summary regarding the duration of the VTE prophylaxis and whether the GP needs to supply additional VTE prophylaxis for the intended duration.
- The discharge team may need to involve the district nurses for LMWH administration post discharge.
- If a patient is discharged from hospital wearing anti-embolism stockings (AES), they should be worn until mobility returns to baseline. Great care must be taken to ensure that patients and carers are educated in the correct use and fitting of AES to avoid complications of tissue damage and disruption of blood supply. This should be clearly documented in the patient's record.

5.6 Patient Information

- **On admission**. The nurses will be responsible for ensuring that all patients have access to verbal and written information about VTE. The information sheet How to prevent blood clots whilst you are in hospital and after your return home will be available to each patient, and their relatives or carers. Patients should be verbally reminded of the importance of preventing thrombosis, especially if declining prophylactic measures. The health care

professional issuing the leaflet should sign in the appropriate section of the drug chart that they have done so.

- **On discharge**. The same leaflet (see On Admisson above) forms part of the patient's discharge information. There is also mandatory written information printed on all electronic discharge summaries regarding VTE symptoms and prevention. If sent home on VTE prophylaxis, the patient needs information about its administration, duration and possible associated risks (this includes AES).

5.7 Evidence Base: NICE Guideline NG89

The evidence has been summarized in NICE guidelines NG89: Venous thromboembolism in over 16's: reducing the risk of hospital acquired deep vein thrombosis or pulmonary embolism 2018 (National Institute for Health and Clinical Excellence). The following section provides a summary of the key guidance by subject/specialism as follows:

- Medical patients: Appendix 5

a. All acutely ill patients
b. Renal impairment
c. Cancer (out patients)
d. Acute strokes
e. Acute coronary syndromes
f. Palliative care
g. Psychiatric illness
h. Critical care

- Orthopaedic surgery: Appendix 6
- Spinal injury and Neurological surgery: Appendix 7
    a. Spinal injury
    b. Cranial surgery
    c. Elective spinal surgery
- Other surgery: Appendix 8
    a. Major trauma
    b. Abdominal surgery
    c. Head and neck surgery
    d. Cardiac & thoracic surgery
- Vascular surgery: Appendix 9

6. Training

Teaching and training on hospital associated VTE (HAT) prevention is included in medical student training and F1 and pharmacist induction. It is no longer part of mandatory training for clinical staff at RSCH and PRH (since 2018). The Thrombosis and Anticoagulation Nurse Specialists are responsible for nurse education in the Trust using a blend of face to face and electronic teaching methods.

7. Monitoring

Measurable Policy Objective	Monitoring / Audit Method	Frequency	Responsibility for monitoring	Where is monitoring reported and which groups / committees will be responsible for progressing and reviewing action plans
Are the 7 NICE quality standards for VTE prevention being met (see Appendix 12)	Root Cause Analysis Medicine Safety Audits Ward spot checks EPMA audits*	Continuous Quarterly Monthly	Lead VTE Nurse, Thrombosis Committee Chair VTE and Anticoagulation nurses/Pharmacy	Thrombosis Committee Thrombosis Committee

*The Electronic Prescribing and Medicines Administration system is due to be launched in 2021 at RSCH and PRH

Auditing the VTE prevention pathway is an important aspect of improving the quality of patient care. The elements listed should be subject to audit.

NHS Trusts are expected to audit the following:

- Rates of mandatory risk assessment on admission
- Appropriate thromboprophylaxis rates
- Appropriate measurement and monitoring of anti-embolism stockings
- Patient counseling rates on admission and discharge
- RCA on all HATS
- Number of HATS
- Number of avoidable HATS

8. Due Regard Assessment

As an organisation, UHS is under a statutory duty to set out arrangements to assess and consult on whether their policy and function impact on equality with regard to race, ethnic origin, nationality, gender, gender identity, culture, religion or belief, sexual orientation, age, marriage and civil partnership status, pregnancy and maternity status and disability. A review of the assessed impact of this policy against these criteria can be seen below:

Due Regard Assessment Tool

		Yes/No	Comments
1.	Does the document/guidance affect one group less or more favourably than another on the basis of:		
	• Age	yes	Due regard has been given to age – including alternative processes in sections 2.2.1
	• Disability	no	
	• Gender	no	
	• Gender identity	no	
	• Marriage and civil partnership	no	
	• Pregnancy and maternity	yes	Due regard has been given to pregnancy and maternity – including alternative processes in sections 2.2.3 and 5.
	• Race	no	
	• Religion or belief	yes	Due regard has been given to religion or belief in section 5.1
	• Sexual orientation, including lesbian, gay and bisexual people	yes	Due regard has been given to trans gender people taking hormones including increased risks of VTE relating to hormone therapy outlined in section 5.2
2.	Is there any evidence that some groups are affected differently and what is/are the evidence source(s)?	no	
3.	If you have identified potential discrimination, are there any exceptions valid, legal and/or justifiable?	no	
4.	Is the impact of the document/guidance likely to be negative?	no	
5.	If so, can the impact be avoided?	n/a	
6.	What alternative is there to achieving		
7.	Can we reduce the impact by taking different action and, if not, what, if any, are the reasons why the policy should continue in its current form?		

8.	Has the policy/guidance been assessed in terms of Human Rights to ensure service users, carers and staff are treated in line with the FREDA principles (fairness, respect, equality, dignity and autonomy)	yes	

9. Links to other Trust Policies and Guidelines

Maternity VTE protocol MP012 RSCH PRH

Maternity VTE Protocol (SRH WGH)

National guidance on thromboprophylaxis, Thrombosis and Coagulopathy in Covid

VTE Management Guidelines Trust-wideConfirmed VTE Treatment Pathway Trust-wide

Peri-operative Bridging Guidelines Trust-wide

Epidural Policy Trust-wide

References:

1. National Institute for Health and Care Excellence March 2018. Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism (NG89). https://www.nice.org.uk/guidance/ng89

2. Wang, T.F., et al., Efficacy and safety of high-dose thromboprophylaxis in morbidly obese inpatients. Thrombosis and haemostasis, 2014. 111(1): p.88-93

3. Vandiver, J.W., Ritz, L.l & Lalama, J.T.J., Chemical prophylaxis to prevent venous thromboembolism in morbid obesity: literature review and dosing recommendations. Journal of Thrombosis and Thrombolysis, 2016. 41(3): 475-81

4. British Committee for Standards in Haematology, Guidelines on the diagnosis and management of Heparin induced thrombocytopenia: second edition 2012 https://onlinelibrary.wiley.com/doi/full/10.1111/bjh.12059

5. Enoxaparin Inhixa smpc https://www.medicines.org.uk/emc/product/784/smpc

6. Heparin Sodium smpc https://www.medicines.org.uk/emc/product/7419/smpc

7. Fondaparinux smpc https://www.medicines.org.uk/emc/product/3359/smpc

8. Reducing the Risk of Venous Thromboembolism during Pregnancy and the Puerperium

Royal College of Obstetricians and Gynacologists Green Top Guideline 37a April 2015

https://www.rcog.org.uk/globalassets/documents/guidelines/gtg-37a.pdf

Appendix 1

Venous thromboembolism in adults: reducing the risk in hospital

NICE Guidance Quality standard [QS3] Published date: 29 June 2010 last updated: 21 March 2018

Statement 1

Medical, surgical or trauma patients have their risk of VTE and bleeding assessed using a national tool as soon as possible after admission to hospital.

Statement 2

Patients who are at increased risk of VTE, are given information about VTE prevention on admission to hospital.

Statement 3

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

Statement 4

Medical, surgical or trauma patients have their risk of VTE reassessed at consultant review or if their clinical condition changes.

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.

Appendix 2

Groups of Patients Excluded from VTE Prophylaxis Requirements

1. Haemodialysis day case patients
2. Endoscopy day case patients
3. Chemotherapy day case patients
4. Opthalmology procedures with local anaesthetic/regional/sedation and procedure time lasting <90mins
5. Non-cancer ENT surgery lasting less than 90 minutes with local anaesthetic/regional/sedation and not full general anaesthetic
6. Non –cancer plastic surgery lasting less than 90 minutes with local anaesthetic/regional/sedation and not full general anaesthetic
7. Non-cancer dental and maxilla-facial sugery lasting less than 90 minutes with local anaesthetic/regional/sedation and not full general anaesthetic – see HRG list
8. Medical day case procedures includingtransfusions
9. Pacemaker insertion
10. Epidural procedures in the pain clinic
11. Sleep Studies
12. Hand surgery taking less than 90mins with local anaesthetic/regional/sedation taking less than 90mins

BSUH Thrombosis Committee 2020

Appendix 3: BSUH Weight based Dosing for VTE thromboprophylaxis

Creatinine clearance	Body Weight			
	<50kg	50-100kg	>100kg	>150kg
>30ml/min	Enoxaparin 20mg OD	Enoxaparin 40mg OD	Enoxaparin 40mg BD	Consider Enoxaparin 60mg BD
15-30ml/min*	Enoxaparin 20mg OD	Enoxaparin 20mg OD	Unfractionated heparin 5,000 units TDS	Consider Unfractionated heparin 7,500 units TDS[2,3]
<15ml/min	Unfractionated heparin 5,000 units BD	Unfractionated heparin 5,000 units BD**	Unfractionated heparin 5,000 units TDS	Consider Unfractionated heparin 7,500 units TDS[2,3]

*Note: **renal impairment can increase the bleeding risk with low molecular weight heparin.** Anti-xa monitoring should be considered for prolonged use (more than 5 days), levels should be checked on day 3 and then levels should be monitored twice weekly. Anti-Xa levels to be checked 4-6 hours post dose (target range 0.2-0.4 units/ml). Contact pathology lab to discuss if necessary.

**patients at very high risk of VTE such as underlying malignancy, consider UFH 5,000 three times daily

Fondaparinux

Fondaparinux is a synthetic heparin and can be offered as an alternative to heparins which are of animal origin (see section 5.1). It is contra-indicated in creatinine clearance less than 20ml/min. Recommended prophylactic dose of fondaparinux is 2.5mg once daily . This should be reduced to 1.5mg once daily if weight less than 50kg or in renal impairment with creatinine clearance between 20 and 50ml/min. See fondaparinux prescribing information for further information on timing of doses post operatively.

Monitoring[4]

- **Platelets – Heparin-Induced Thrombocytopenia/Thrombosis (HITT)** can occur in <1% of patients. All patients who are to receive enoxaparin should have a baseline platelet count before starting
    - Post-operative patients and cardiopulmonary bypass patients who have been exposed to heparin in the previous 100 days and are receiving enoxaparin should have a platelet count determined 24 hours after starting.
    - Post-cardiopulmonary bypass patients receiving enoxaparin should have platelet count monitoring performed every 2–3 days from days 4 to 14 or until enoxaparin is stopped
    - Post-operative patients (other than cardiopulmonary bypass patients), medical patients and obstetric patients receiving enoxaparin do not need routine platelet monitoring
    - If the platelet count falls by 30% or more and/or the patient develops new thrombosis or skin allergy or any of the other rarer manifestations of heparin-induced thrombocytopenia (HIT) between days 4 and 14 of heparin administration, HIT should be considered and a clinical assessment made
- **Haemorrhage –** monitor for extensive bruising and bleeding
- **Hyperkalaemia –** occurs in <0.1% patients due to suppression of adrenal secretion of aldosterone. Potassium levels should be monitored weekly in diabetes, CKD, pre-existing metabolic acidosis or if on drugs that increase potassium levels (i.e. potassium sparing diuretics).
- **Renal function –** dose may need to be altered if renal function deteriorates

Appendix 4: BSUH VTE Risk Assessment Tool

All patients, 18 years and over, must be risk-assessed on admission to hospital and then re-assessed whenever the clinical situation changes. All patients must be issued with a VTE leaflet regardless of their risk.

Step 1: Assess all patients for level of mobility (tick one box)

Step 2: For groups A & B below, assess thrombosis risk. Tick each box that applies in column 1) for first assessment and use second column 2) to re-assess

Step 3: Review bleeding risk (tick each box that applies

Mobility (tick one box only)									
Group A			**Group B**			**Group C**			
Any surgical patient	Tick		Medical patient expected to have ongoing reduced mobility relative to normal state	Tick		Medical ambulant patient (mobile for 50% of waking hours). This would not be expected to be the case in most in-patient groups	Tick		
Assess these patients for thrombosis risk and bleeding risk below						Risk assessment now complete, tick action box and sign bottom of page			

Thrombosis Risk – tick column 1) for first assessment which should be done within 24 hours of admission and use column 2) for re-assessment					
Patient related	1)	2)	Admission related	1)	2)
Active cancer or cancer treatment			Significant reduced mobility for 3 days or more		
Age greater than 60 years			Hip or knee replacement		
Dehydration			Hip fracture		
Known thrombophilia			Total anaesthetic plus surgical time > 90 minutes		
Obesity (BMI > 30 kg/m^2)			Surgery involving pelvis or lower limb with a total anaesthetic plus surgical time > 60 minutes		
One or more significant medical co-morbidities (eg heart disease, metabolic or endocrine disorders, respiratory disease, acute infection, inflammatory condition)			Acute surgical admission with inflammatory or intra-abdominal condition		
Personal history or first degree relative with a history of VTE			Critical care admission		
Use of hormone replacement therapy			Surgery with significant reduction in mobility		
Use of oestrogen containing contraceptive therapy			Pregnancy or within 6 weeks post-partum		
Varicose veins with thrombophlebitis			**NO THROMBOSIS RISK IDENTIFIED**		

Bleeding risk- – tick column 1) for first assessment which should be done within 24 hours of admission and use column 2) for re-assessment					
Patient related	1)	2)	Admission related	1)	2)
Active bleeding			Neurosurgery, spinal surgery or eye surgery		
Acquired bleeding disorder (eg acute liver failure)			Other procedure with high bleeding risk		
Concurrent use of anticoagulants known to increase risk of bleeding (eg warfarin with INR > 2)			Lumbar puncture /epidural/spinal anaesthesia expected in next 12 hours (see epidural policy for advice on DOACs)		
Acute stroke (ischaemic within 2 weeks, haemorrhagic within 1 month)			Lumbar puncture/epidural/spinal anaesthesia within the previous 4 hours (see epidural policy for advice on DOACs)		
Platelets less than 75x10^9/L			**Record here other reasons for withholding thromboprophylaxis**		
Uncontrolled systolic hypertension (BP > 230/120 mmHg)					
Untreated inherited bleeding disorders					
Endocarditis, temporary pacing wires or pericardial effusions			**NO BLEEDING RISK IDENTIFIED**		

Action											
Thrombosis risk present with **NO** bleeding risk LMWH/UFH- **all patients** **Also prescribe stockings *** if surgical or orthopaedic pt	1)	2)	Thrombosis risk present **AND** bleeding risk **Prescribe anti-embolism stockings*** unless contra-indicated see next page	1)	2)	Thrombosis risk present **AND** patient **already prescribed** treatment dose warfarin/LMWH/heparin/ other oral or injectable anticoagulant **No prophylaxis required**	1)	2)	No documented thrombosis risk present **No prophylaxis required**	1)	2)

Appendix 5: Medical patients

If using pharmacological VTE prophylaxis for patients - aim to start it as soon as possible. Ideally within 14 hours of admission where possible, unless contraindicated or otherwise stated in population-specific recommendations

<table>
<tr>
<td>ALL Acutely ill patients:
If the likely benefit from reducing the risk of symptomatic VTE is greater than the risk of harm from major bleeding caused by anticoagulation:
• Add LMWH (prophylactic weight based dosing) for a minimum of 7 days if mobility not fully restored to baseline on discharge; or according to senior clinician discretion.</td>
<td>Patients with renal impairment: If the likely benefit from reducing the risk of symptomatic VTE is greater than the risk of harm from major bleeding caused by anticoagulation:
• If using pharmacological VTE prophylaxis for people with renal impairment, use LWMH or UFH
• If needed, reduce the dose of LMWH (see Appendix 3 for local protocol)</td>
<td rowspan="2">Ambulatory patients with cancer (Out-patients):
Unless patient at increased risk of VTE due to risk factors other than cancer, do not offer VTE prophylaxis to patients with cancer /receiving cancer-modifying treatments (radio-/ chemo-/ immunotherapy) who are mobile, consider in:
• Pancreatic cancer receiving chemotherapy: consider LMWH for duration of chemotherapy
• Myeloma currently treated with thalidomide, pomalidomide or lenalidomide in combination with steroids: LMWH (weight-based dosing), or aspirin (75mg or 150mg) or DOAC using locally agreed protocols</td>
</tr>
<tr>
<td>Acute stroke patients:
• Do not offer anti-embolism stockings (AES)
• Consider intermittent pneumatic compression (IPC) if immobile (start within first 3 days of stroke)
• Continue IPC for 30 days or until mobile or discharged
• Do not offer pharmacological thromboprophylaxis in acute stroke (ischaemic stroke within 2 weeks, reassess risk of VTE at 2 weeks; haemorrhagic stroke, consider after 1 month following discussion with senior clinician)</td>
<td>Acute coronary syndromes (ACS):
If receiving anticoagulation for ACS management, patients do not usually require VTE prophylaxis acutely, but should be risk assessed and prescribed LMWH once ACS resolved, if still an in-patient.</td>
</tr>
<tr>
<td>Patients receiving palliative care:
If the risk assessment of VTE outweighs the risk of bleeding:
• Use LMWH (weight-based dosing)
• If life expectancy short, consider views of patient and family/ carers (document clearly).
• Review thromboprophylaxis daily
• Do not offer VTE prophylaxis to patients in the last few days of life.</td>
<td>Patients admitted for psychiatric illness:
If the risk of VTE outweighs the risk of bleeding:
• LMWH (weight-based dosing)
• Continue VTE prophylaxis until patient no longer at risk for VTE.</td>
<td>Patients admitted to critical care:
If the risk assessment of VTE outweighs the risk of bleeding:
• LMWH (weight based dosing)
• Risk assess at least daily
• If pharmacological prophylaxis is contraindicated offer AES/ IPC until mobility returned to normal baseline
• Refer to BSUH Covid VTE guideline for specific guidance on this group of patients</td>
</tr>
</table>

Fondaparinux can be considered as an alternative to LMWH in certain circumstances – see Appendix 3

Appendix 6: Orthopaedic patients

If using pharmacological VTE prophylaxis for patients - aim to start it as soon as possible. Ideally within 14 hours of admission where possible, unless contraindicated or otherwise stated in population-specific recommendations

Lower limb immobilisation (LLI):

(Non-removable lower limb immobilisation which eliminates active calf contraction and less than full weight-bearing)

If the risk of VTE outweighs the risk of bleeding:

- LMWH (weight-based dosing) until weight bearing or 42 days, whichever is sooner

Elective hip replacement (THR):

In standard risk patients LMWH for 10 days then aspirin 75mg for a further 28 days. Higher risk patients - use LMWH (weight based dosing) for 28 days.

Alternatively consider a DOAC

Foot & ankle surgery: Consider LMWH (weight-based dosing)

- If anaesthesia time ≥ 90 min OR,
- If VTE risk outweighs bleeding risk OR,
- If the patient is immobilised (eg: arthrodesis/ arthroplasty), continue LMWH until fully mobile or 42 days, whichever is sooner.

Fragility fracture of pelvis/ hip/ proximal femur:

If the risk of VTE outweighs the risk of bleeding:

Pre-operatively:

- If surgery is delayed beyond the day of admission, start LMWH (weight-based dosing)
- Give last dose of LMWH no less than 12 hours before surgery (24 hours for fondaparinux)

Post-operatively:

- Start LMWH 6-12 hours post surgery, if bleeding risk low.
- LMWH (weight-based dosing) for **1 month**.

If pharmacological VTE prophylaxis contraindicated consider intermittent pneumatic compression (IPC).

Continue until mobility restored to baseline.

Elective knee replacement (TKR): *See below for TKR risk assessment proforma*

In low risk patients with no additional VTE risk factors apart from TKR surgery: aspirin 75mg for 14 days combined with anti- embolic stockings (AES) until patient discharge.

Higher risk patients use LMWH for 14 days.

Consider IPC if pharmacological prophylaxis contraindicated

Alternatively consider using a DOAC

All non-arthroplasty knee surgery:

- If anaesthesia time ≥ 90 min OR;
- If VTE risk outweighs bleeding risk
- AND if bleeding risk low

Start **LMWH 6-12 hours post-surgery**. Prescribe LMWH (weight- based dosing) for **14 days**.

If patient low risk for VTE **AND** anaesthetic time < 90 minutes - use of LMWH up to surgeons discretion / may not be required.

Upper limb surgery:

- LMWH only if anaesthesia time ≥90 minutes OR,
- If the surgery makes it difficult for the patient to mobilise fully in the post-operative period.

Fondaparinux can be considered as an alternative to LMWH in certain circumstances – see Appendix 3

VTE risk assessment & prophylaxis in Total Knee Replacement (Adults) Appendix 6 continued

Following joint replacement surgery there is an increased risk of developing venous thromboembolism (VTE) for all patients. This risk is further increased in certain patients. VTE prophylaxis must therefore be prescribed for all patients undergoing joint replacement.

The choice of regimen is based on the risk of developing a VTE or contraindications to therapy with aspirin.

For patients receiving pre-existing anticoagulation therapy please select "Option 3".

CHECKLIST 1: Permanent risk factors for VTE . If ANY risk factors present please select prophylaxis "Option 2". Tick all risk factors present:	
Previous VTE (deep vein thrombosis or pulmonary embolism)	
VTE in 1st degree relative (parent, sibling, children)	
Obesity (BMI >30) Weight_____Height_____	
Active cancer (on treatment or the under care of Oncology/Haematology)	
Significant comorbidities: 1.Cardiac failure 2.Respiratory conditions (COPD/ asthma/ bronchiectasis/ pulmonary hypertension) 3.Inflammatory bowel disease 4.Diabetes on treatment 5.Rheumatoid inflammatory/ connective tissue disorders 6.Pro-thrombotic haematological disorders (polycythaemia /essential thrombocytosis / myeloproliferative disorders)	
Oestrogen treatment including combined contraceptive pill; HRT; or tamoxifen	
Significant varicose veins	
Pregnant or within 6 weeks of childbirth or miscarriage	
Any recent hospital admission or major surgery within 6 weeks	
Known thrombophilia (Antiphospholipid syndrome, Factor V Leiden, Protein C/S/Antithrombin deficiency)	

CHECKLIST 2: Contraindications (Tick all contraindications present) **Contraindications to aspirin prophylaxis:** If contraindications present please select prophylaxis "Option 2"	
Allergy to aspirin	
Previous significant bleed (Gastrointestinal / urogenital / soft tissue) on aspirin/ NSAIDs	
Contraindications to LMWH prophylaxis: If contraindications present please select prophylaxis "Option 1". If VTE risks are present (see checklist one), please discuss with a Haematologist	
Hypersensitivity to heparin or previous HITS	
Creatinine clearance <15ml/min (consider unfractionated heparin, see appendix 1)	
Contraindications to both LMWH and aspirin prophylaxis: If contraindications consider omitting prophylaxis (discuss with a Haematologist)	
Haemophilia/bleeding disorder	
Thrombocytopenia (plts <75 x 10^9/l) - dose adjusted LMWH may be appropriate	
Recent CVA (4 weeks) or severe uncontrolled hypertension	
Recent eye or nervous system surgery/ traumatic injury	
Active peptic ulcer or recent GI bleed	

VTE prophylaxis prescribing options following knee replacement			
Option 1	**TED stockings or Intermittent pneumatic compression (IPC) whilst an inpatient**	Aspirin 75mg OD for 14 days	
Option 2		Weight <50kg: Enoxaparin 20mg OD for 14 days	
		Weight 50-100kg: Enoxaparin 40mg OD for 14 days	
		Weight 101-150kg: Enoxaparin 40mg BD for 14 days	
		Weight >150kg: Enoxaparin 60mg BD for 14 days	
		Any deviation from this weight-based dosing must be documented in the pathway post-op notes.	
Option 3		Follow bridging advice for patients on established anticoagulation (see BSUH intranet for guidelines/ discuss with Anticoagulation and VTE service). These patients should receive LWMH at either prophylactic or treatment doses, depending on individual case. **No patient on established anticoagulation should receive aspirin prophylaxis**	

Notes to prescriber: 1. Check FBC and U&E, unless normal in the last 2 months
2. Give patient information leaflet: "How to prevent blood clots whilst you are in hospital and after your return home"
3. Discuss complex cases with Haematologist/Anticoagulation and VTE Team

Appendix 7: Spinal injury patients & neurological (spinal or cranial) surgery

If using pharmacological VTE prophylaxis for patients - aim to start it as soon as possible unless contraindicated or otherwise stated in population-specific recommendations.

<table>
<tr><th>Spinal injury:</th><th>Cranial surgery:</th><th>Elective spinal surgery:</th></tr>
<tr><td colspan="3">• Start either anti-embolism stockings (AES) or intermittent pneumatic compression (IPC) from admission.
• Continue for 30 days or until the patient is fully mobile or discharged, whichever is sooner.</td></tr>
<tr><td>Reassess risk of bleeding at 24 hours AFTER admission.

If the risk of VTE outweighs the risk of bleeding:

• Add LMWH for patients not having surgery in the next 24–48 hours.

• Continue VTE prophylaxis for 30 days or until the person is fully mobile or discharged, whichever is sooner.</td><td>If the risk of VTE outweighs the risk of bleeding:

• add LMWH starting 24– 48 hours after surgery
• Continue LMWH (prophylactic weight based dosing) for a minimum of 7 days

• If high risk of VTE consider LMWH < 24 hours post-op according to senior/ MDT opinion.
Contraindications to pharmacological VTE prophylaxis:
• Ruptured cranial vascular malformations (eg: brain aneurysms)
• Intracranial haemorrhage (spontaneous or traumatic) until lesion secured/condition stable.</td><td>Consider individual patient & surgical factors (major or complex surgery), and senior clinical judgement.

If the risk of VTE outweighs the risk of bleeding:

• Add LMWH starting 24–48 hours after surgery.

• Continue LMWH for 30 days or until the patient is fully mobile or discharged, whichever is sooner.

• If patient high risk for VTE consider LMWH < 24 hours post-op according to senior/ MDT opinion.</td></tr>
<tr><td colspan="3">• If pharmacological VTE prophylaxis is contraindicated, consider intermittent pneumatic compression (IPC).
• Continue until mobility restored to baseline or discharged, whichever is sooner.</td></tr>
</table>

Fondaparinux can be considered as an alternative to LMWH in certain circumstances – see Appendix 3

Appendix 8: Other Surgery

If using pharmacological VTE prophylaxis for patients - aim to start it as soon as possible. Ideally within 14 hours of admission where possible, unless contraindicated or otherwise stated in population-specific recommendations

<table>
<tr><th>Major Trauma:</th><th>Abdominal surgery: Gastrointestinal, gynaecological, urological and bariatric surgery.</th><th>Head and Neck surgery:
Oral and maxillofacial surgery and ENT surgery.</th></tr>
<tr><td colspan="2">• Start intermittent pneumatic compression (IPC) or graduated compression stockings from admission according to local policies.
• Continue until mobility returned to normal baseline or anticipated mobility.
• Reassess risk of VTE and bleeding at least daily, and whenever the clinical condition changes.</td><td rowspan="2">If the risk of VTE outweighs the risk of bleeding:
• LMWH (prophylactic weight based dosing) for a minimum of 7 days

If there is an increased risk of VTE and a high risk of bleeding:
Choose either -
• anti-embolism stockings, OR
• intermittent pneumatic compression.
Continue until mobility returned to normal baseline or anticipated mobility.</td></tr>
<tr><td>If the risk of VTE outweighs the risk of bleeding:
• Add LMWH (prophylactic weight based dosing) for a minimum of 7 days</td><td>If risk of VTE outweighs the risk of bleeding:
• Add LMWH (prophylactic weight based dosing) for a minimum of 7 days

In major abdominal cancer surgery:
• Extend LMWH to 28 days Post-operatively.

In nephrectomy (if cancer-related)
• Extend LMWH to 28 days postoperatively</td></tr>
<tr><td colspan="3">Cardiac & Thoracic surgery:
If at increased risk of VTE. Choose either:
• Anti-embolism stockings or
• intermittent pneumatic compression.
• Continue until mobility returned to normal baseline or anticipated mobility.

If the risk of VTE outweighs the risk of bleeding:
• Add LMWH for a minimum of 7 days if <u>not having other anticoagulation therapy</u></td></tr>
</table>

Fondaparinux can be considered as an alternative to LMWH in certain circumstances – see Appendix 3

Appendix 9: Vascular Surgery

If using pharmacological VTE prophylaxis for patients - aim to start it as soon as possible. Ideally within 14 hours of admission where possible, unless contraindicated or otherwise stated in population-specific recommendations

Open vascular surgery or endovascular procedures / aneurysm repair:	**Lower limb amputation:**	**Varicose vein surgery:**
If the risk of VTE outweighs the risk of bleeding: • Consider LMWH (prophylactic weight based dosing) for a minimum of **7 days** **If pharmacological prophylaxis contraindicated:** • Start anti-embolism stockings (AES) or intermittent pneumatic compression (IPC). • Continue until the person no longer has significantly reduced mobility relative to their normal or anticipated mobility.	**If the risk of VTE outweighs the risk of bleeding:** • Consider LMWH (prophylactic weight based dosing) for a minimum of **7 days** **If pharmacological prophylaxis contraindicated:** • Start intermittent pneumatic compression (IPC) on the **contralateral leg**, on admission. • Continue until the person no longer has significantly reduced mobility relative to their normal or anticipated mobility.	**Start LMWH 6-12 hours post surgery only if:** • Anaesthesia time >90min OR; • If VTE risk outweighs bleeding risk Prescribe LMWH (weight based dosing) for a minimum of **7 days** **If VTE risk increased and pharmacological prophylaxis is contraindicated:** • Anti-embolism stockings **If patient low risk for VTE AND anaesthetic time < 90 minutes:** • LMWH may not be required (up to surgeons discretion).

Fondaparinux can be considered as an alternative to LMWH in certain circumstances – see Appendix 3

Appendix 10: Mechanical VTE prophylaxis (AES and IPC)

Anti-embolism stockings (AES)

Fitting of Anti-embolic Stockings for Thromboembolic Prophylaxis

Pedal pulses should be checked prior to fitting stockings to ensure adequate arterial circulation. If absent, do not apply stockings and seek medical advice.

Explain to the patient that they need to wear stockings to help prevent Depp Vein thrombosis developing. This information is also in the patient advice booklet 'How to prevent blood clots whilst you are in hospital and after you return home', which the patient should be given on admission.

Poorly fitting stockings will result in complications. A stocking that is too big will often not be effective in preventing VTE. A stocking that is too small or the wrong length will result in tissue damage or even produce a tourniquet effect that can cause venous or arterial thrombosis.

Both limbs should be measured prior to fitting of the stockings and if necessary a different size fitted to each leg as indicated by the manufacturer's recommendations. Measurements should be taken using a tape measure and in centimetres. The circumference of the leg should be measured two fingers width above the external malleolus for below knee stockings. For thigh length still take the ankle measurements then confirm the widest part of the thigh is also required. These measurements should be recorded in the nursing notes. If the correct size is not immediately available, it should be ordered from supplies and the patient should be left without anti-embolic stockings until the correct size can be obtained.

Applying Anti-embolic Stockings

Insert your hand as far as the heel pocket, grab the centre of the pocket, and turn the stockings inside out. Position the stocking over the patient's foot, centring the heel in the pocket and the inspection opening under the toes. Place two or three fingers of each hand in the gathered section and ease the lower part of the stocking around the calf and up the leg. Knee length stockings should be placed to below 2 fingers breadth (2.5-5cm) of the knee joint to allow for unencumbered knee movement. Thigh length stockings should be placed to the top of the thigh and should sit 2.5-7.5cm below the base of the buttock (gluteal furrow). The gusset should be facing inside the leg. The fabric of the stockings should be smooth against the skin with no bunching.

Stockings should never be cut, folded or rolled down, as this will adversely affect the pressure gradient and could create a tourniquet effect leading to DVT or pressure damage.

Record the date and time you apply the stockings, their length and size in the nursing notes. And sign and date in drug chart.

For further information or training contact the Thrombosis & Anticoagulation Service ext 64217

Contraindications - Do not offer AES in:

- **Suspected/ proven peripheral arterial disease**
- **Peripheral arterial bypass grafting**
- **Peripheral neuropathy or other causes of sensory impairment**
- **Local conditions where stockings may cause damage eg: fragile skin, dermatitis, gangrene or recent skingraft**
- **Known allergy to material of manufacture**
- **Severe leg oedema**
- **Major limb deformity or unusual leg size or shape preventing correct fit**
- **Caution with venous ulcers or wounds**

Guidance for the use of AES:

- Use AES that provide graduated compression and produce calf pressure of 14–15 mmHg (Equals 14–18 mmHg at the ankle).
- Patients legs must be measured and ensure the correct size AES is provided.
- Stockings should be fitted and patients shown how to use them by staff trained in their use.
- Offer assistance if they are not worn correctly.
- Re-measure legs and re-fit AES in patients who develop oedema/ postoperative swelling.
- Encourage people to wear their stockings day and night until mobility returns to normal.
- Remove AES daily to inspect skin condition, and for hygiene. In people at risk of skin injury (significantly reduced mobility / poor skin integrity/ any sensory loss) inspect the skin more than once a day (note heels and bony prominences).
- Stop use of AES if skin marking, blistering or discolouration of the skin, or if they cause pain ordiscomfort.
- Offer intermittent pneumatic compression as an alternative, if appropriate.
- If patient is discharged from hospital wearing anti-embolism stockings (AES), they should be worn until mobility returns to baseline
- Patients/ carers must be educated in the correct use and fitting of AES to avoidcomplications.
- If patient or carer is unable to remove and replace AES then patient should not be discharged with AES

Intermittent pneumatic compression devices (IPC)

- Do not offer intermittent pneumatic compression to people with a known allergy to the material ofmanufacture.
- Advise the person to wear their device for as much time as possible

Appendix 11: **Peri Operative Measures**

Pre- operative period:

- Advise people to consider stopping oestrogen-containing oral contraceptives or hormone replacement therapy 4 weeks before elective surgery. If stopped, provide advice on alternative contraceptive methods. Individuals can be directed to seek further advice from their GP or from Brighton and Hove Sexual Health and Contraception (SHAC) service. Further information on contraception can be obtained from Contraception Choices

Intra- operative period: (see BSUH epidural policy)

- Consider regional anaesthesia where possible. Consider regional anaesthesia
- For individual patients, as it carries a lower risk of VTE than general anaesthesia.
- Prophylactic dose LMWH (weight-based dosing) should be withheld minimum of **12 hours** prior to epidural and can be given 4 hours after catheter removed
- Treatment dose LMWH must be withheld for minimum **24 hours**
- Procedures under local anaesthesia do not need VTE prophylaxis
- General anaesthetic time ≥ 90 minutes is considered a risk factor for thrombosis

Post-operative period:

- Encourage patients to mobilise as soon as possible
- Do not allow patients to become dehydrated unless clinically indicated