Prevention of Hospital Acquired Thrombosis Policy

Salford Royal NHS Foundation Trust
University Teaching Trust
safe • clean • personal

Classification: Policy
Lead Author: The Thrombosis Committee
Contact author(s): Daniel Horner, Janet Hegarty
Authors Division: SH&SC

Unique ID: TC36(07)
Issue number: 6.2
Expiry Date: July 2019 (Indefinite extension given)

Contents

Who should read this document?

- All practitioners involved in the admission and routine inpatient care of patients at Salford Royal Foundation Trust
- All practitioners involved in the admission and routine care of patients undergoing any daycase surgical procedure under general or regional anaesthesia at Salford Royal Foundation Trust
- All practitioners involved in the outpatient management of patients at high risk for venous thromboembolism

Key Messages

- Venous thromboembolism (VTE) is a leading cause of cardiovascular death.
- Up to 60% of all VTE cases occur during or after hospitalisation
- Hospital Associated Thromboembolism (HAT) is a form of healthcare associated harm and can be minimised by vigiliant practice.
- All patients likely to have a length of stay >12 hours in the hospital require a HAT risk assessment on admission, to determine their level of risk and trigger consideration of prophylaxis.
- All patients having a surgical procedure under general or regional anaesthesia require a preoperative HAT risk assessment to determine their level of risk, and trigger consideration of appropriate thromboprophylaxis.
- During hospital admission, initial HAT risk assessments should be verified within 24hours by a senior member of the responsible team and repeated whenever the clinical situation changes significantly. Assessments should be reviewed weekly as a minimum to ensure harm free care.
- All patients should be prescribed appropriate mechanical and chemical thromboprophylaxis as dictated by regular HAT risk assessments
- All patients utilising daycase surgery and the surgical admission lounge should undergo structured assessment and tailored HAT prevention measures dependent on anaesthetic technique and operation.
- All patients deemed to be at high risk of HAT on discharge should be considered for extended spectrum thromboprophylaxis
- All cases of confirmed HAT must have a root cause analysis completed to identify shortfalls in this process and opportunities for improving care

Background & Scope

Deep Vein Thrombosis (DVT) is a condition in which blood clots form in the deep veins of the leg, pelvis and arms. These clots can travel in the circulation and lodge in the lungs, known as pulmonary embolism (PE). Along with other superficial and rarer types of clot, DVT and PE are described together by the umbrella term of Venous Thromboembolism (VTE). All patients admitted to hospital or undergoing interventional procedures have an increased risk of VTE, as a result of decreased mobility (leading to venous stasis), inflammatory state and dehydration.

60% of all VTE occurs in hospital inpatients or patients who have recently been admitted to hospital. These cases are known as Hospital acquired Thrombosis (HAT). VTE associated with hospitalisation is the leading cause of disability adjusted life years lost in low and middle income countries, and the second most common in high income countries[1]. 1:4 people worldwide die of condtions caused by thrombosis. More information on the global burden of VTE can be found here.

VTE can be fatal and often leads to serious morbidity. However, many if not most cases are preventable through education, awareness and thromboprophylaxis. There is a national drive from NHS England to reduce potentially avoidable harm from VTE. There is also accompanying guidance from the National Institute for Health and Care excellence, which forms the benchmark for performance and patient safety[2].

We are all directly accountable for ensuring VTE prevention is embedded in our care.

This policy is aimed at ensuring all patients admitted for acute hospital care to Salford Royal are assessed for their risk of HAT and prescribed appropriate thromboprophylaxis. It also covers additional considerations in special patient groups, extended spectrum prophylaxis on discharge and the process of shared learning and continual improvement through root cause analysis of HAT cases.

This policy is not intended for use in community units or nursing home settings.

What is new in this version?

This is an update and extensive revision of the 2012 Trust Policy.
Key messages and background/scope have been extended to highlight the work by NHS England and incorporation of the national VTE prevention program into the standard NHS Contract.
The guidance for prevention of HAT in all relevant specialty groups has been amended or added after directorate consultation.
A new section on HAT prevention in daycase surgical patients has been added
Links have been added to additional HAT prevention protocols used within the trust for special groups, to cohort resource and simplify guidance.
Links to the new HAT risk assessment document have been included

HOW TO PREVENT HOSPITAL ACQUIRED THROMBOSIS (HAT)

HAT Risk Assessment

All patients admitted to Salford Royal should have a HAT assessment completed on admission. This assessment forms the basis of decision making for prescription of mechanical and chemical thrombolprophylaxis.

The HAT risk assessment should be verified within 24 hours of admission by a senior member of the responsible clinical team to validate or reassess initial decision making. Assesssments should further be repeated whenever the clinical situation changes, and revisited on a weekly basis to confirm accuracy. Following a recent serious incident, it is also recommended as a good practice point that HAT assessments should be repeated whenever a patient is transferred from a high care area to a ward environment.

The assessment document can be found by typing HAT into the order entry menu and has three sections:

1) Risk factors for developing thrombosis
2) Risk factors for significant bleeding
3) Balanced decision of whether pharmacological thromboprophylaxis is appropriate.

Patients should be re-assessed for their risk of developing HAT at any point in their admission where the clinical situation changes. Examples of this include:

- Ambulatory patient admitted for minor illness who deteriorates and becomes bedbound >3 days
- Patient who is not prescribed pharmacological prophylaxis due to a pending high risk procedure, who has now had the procedure (or the procedure is cancelled) and no longer has the contraindication
- Patient suffering a significant bleed during hospital admission
- Patient who has returned to baseline mobility and their risk factors for HAT have resolved

In addition to changing clinical or social circumstance, it is considered best practice to regularly ensure ‘harm free care’; HAT risk assessments should be repeated weekly at a minimum to ensure subtle changes in circumstance are not overlooked.

The HAT risk assessment should guide decision making as to whether thromboprophylaxis is required, contra-indicated or deemed unnecessary/innapropriate. When required, appropriate mechanical and/or pharmacological thromboprophylaxis will then need to be prescribed by the treating team. Guidance on these treatments can be found in the relevant sections below.

Mechanical Thromboprophylaxis

If mechanical thromboprophylaxis is considered appropriate following HAT risk assessment, antiembolism stockings (AES) or intermittent pneumatic compression (IPC) devices are the preferred options. Both these interventions should be followed with reminder checks prescribed on EPR. It is not recommended to use both modalities in any patient group routinely, other than during the perioperative period in theatre/surgical admissions lounge.

Anti Embolism Stockings (AES):

Graduated compression stockings are recommended for all emergency surgical admissions, all elective cases with a combined anaesthetic and surgical time of more than 90 minutes, and any surgical patient with 1 or more recognised VTE risk factor.

They are not recommended routinely for medical patients, but may be used where there are contraindications to chemical thromboprophylaxis at the discretion of the treating clinician.

The stocking compression profile should be approximately 18mmHg at the ankle, and 14mmHg at the mid-calf

There are a number of contraindications to AES placement. These are listed in appendix 2, along with practical information on application. Appendix 3 provides a flow chart for consideration of use.

Where risk assessment indicates that graduated compression stockings should be used, but they are contraindicated by other factors, then this should be documented.

Intermittent Pneumatic Compression (IPC) devices

Intermittent Pneumatic Compression devices can be used as an alternative to AES. In addition, there is an emerging evidence base for use in stroke patients and those with critical illness[3,4]. As such, IPC devices should be prescribed electronically for these patients and those at increased risk of VTE undergoing surgery, in accordance with the later subsections.

Where risk assessment indicates that IPC devices should be used, but they are contraindicated by other factors or refused by the patient, this should be documented.

A decision to apply IPC devices to a patient undergoing surgery is always a clinical one. It should be taken by the responsible clinical team after evaluating the risks and benefits. Relative contraindications for IPC devices are listed in appendix 4.

Where IPCs are used for surgical patients receiving ward level care post operatively, they should be removed once the patient leaves the post anaesthetic care unit to return to the ward, unless otherwise prescribed.

Prophylactic vena caval filter placement

There is limited evidence to support the use of inferior vena caval (IVC) filter placement to prevent acute VTE. The filter itself acts as prothrombotic and both the placement and the removal are intravascular procedures that carry a degree of risk.

NICE guidance suggests to consider offering temporary inferior vena caval filters to patients who are at very high risk of VTE and for whom other methods of mechanical and pharmacological VTE prophylaxis are contraindicated [2].

The following conditions could be considered to place a patient at very high risk of VTE:

- Previous venous thromboembolism (proximal DVT or confirmed segmental PE)
- Active malignancy
- Major pelvic or lower limb trauma

IVC filters require placement under X Ray guidance in a theatre environment by an interventional radiologist. SRFT has access to this facility on Monday afternoons only at present. In addition, an SLA agreement is in place to facilitate *urgent* interventional radiology procedures in major trauma patients as required.

These cases are rare and the decision to proceed to filter placement should be made in conjunction with the interventional radiology team at Central Manchester Foundation Trust (CMFT). Discuss with the duty interventional radiologist of the day through CMFT switchboard. Placement of a prophylactic IVC filter out of hours is never indicated.

When inserted, arrangements should be made to remove the filter as soon as the contraindications to pharmacological prophylaxis have passed.

There is limited low level evidence to support the use of clinician inserted, retrievable temporary, vena caval filters, such as the Angel catheter© [5-7]. However, there is no current facility for venographic screening prior to removal at SRFT. As such, these devices should only be sited following consensus discussion with interventional radiology, vascular and orthopaedic services.

The vast majority of cases under consideration for filter insertion should be referred to the vascular interventional radiology service at CMFT.

Pharmacological Thromboprophylaxis

If pharmacological thromboprophylaxis is considered appropriate following HAT risk assessment, the ***low molecular weight heparin (LMWH) tinzaparin is the recommended trust formulary option for prophylaxis of venous thromboembolism in medical and surgical patients at Salford.***

For clinicians working in satellite areas where other LMWH agents are used, the relevant product literature and Summary of Product Characteristics (SPC) guidance for those agents should be consulted and followed.

For patients between 50 and 120kg in weight, Tinzaparin 4500 units should be prescribed. This is a once daily prescription, usually administered at 18:00. Prescribe a once only dose to be given immediately if the next 18:00 dose would delay starting prophylaxis by more than 18 hours (i.e if the standard prescription is ordered >18:00 and before 00:00).

Several patient population groups require an alternative agent or dosing strategy; these groups are listed below:

Patients with a high (or low) Body Mass Index (BMI)

For patients outside the weight bracket of 50-120kg the following dose adjustments of tinzaparin are recommended:

Please note that these doses are based on local expert recommendations, and are outwith current licensing of tinzaparin.

Actual Body Weight (Kg)	**Tinzaparin Dose**
<50	2500units daily
50-120	4500units daily
121-140	6000units daily
140-160	7000units daily
161-180	8000units daily
181-200	9000units daily
>201	10000units daily

Patients with kidney disease/ renal impairment

For patients with significant renal impairment (eGFR <30mls/min) enoxaparin is the recommended trust formulary option for prophylaxis of venous thromboembolism, where clinically indicated.

If the eGFR is <30mls/min give prophylactic enoxaparin 20mg once daily for patients up to 100Kg. Refer to ward pharmacist or Haematologist for advice regarding patients < 50kg or >100kg.

Enoxaparin is unlicensed for eGFR less than 15 mls/min (SPC update 2017); however more than 10 years of use locally at SRFT has demonstrated the safety of

prophylactic dosing with this agent in this population. If the balance of clotting/bleeding risk in an individual patient is weighed against the use of enoxaparin, unfractionated heparin (5000units BD subcutaneously) may be considered as an alternative; this agent carries the potential advantages of a shorter half life and potential reversibility. However, it is unfamiliar and not without risk – use should be supported by a documented discussion at consultant level. It may also be decided during this discussion that the risks of pharmacological thromboprophylaxis outweigh the benefits; a shared decision to omit prophylaxis should then be taken with the patients and/or the next of kin.

For patients with prolonged hospital admission and enoxaparin use, monitoring of factor Xa levels is recommended within the summary of product characteristics. See the trust guide available on the intranet for the logistics of performing and interpreting this investigation. Although there is limited literature available on the topic, local consensus suggests to monitor factor Xa levels every 7 days.

Bleeding considerations with pharmacological thromboprophylaxis:

Bleeding rates overall with prophylactic dose anticoagulation are very low. Current evidence in general medically ill or surgical patients suggests a major bleeding rate of approximately 0.19% (1:500) and a clinically relevant non major bleeding rate of 1.9% (1:50)[8-10]. However, certain patients will have individualised risks that warrant caution with prescription, or temporary omission. In addition, certain patient groups will require treatment of an underlying disease or consideration of an alternative agent for thromboprophylaxis. These factors and patient groups are summarised below:

Absolute Contraindications to LMWH prescription:

- Significant active bleeding from any site
- Thrombocytopaenia (platelets <50)
- Hypersensitivity to heparin compounds or previous confirmed evidence of heparin induced thrombocytopaenia - *will need to consider alternative agent such as Fondaparinux or Danaparoid*

Conditions known to increase bleeding risk with LMWH / cautions:

- Acquired bleeding disorder (such as liver failure with INR >1.5)
- Acute stroke (within last 4 weeks) or bacterial endocarditis
- Uncontrolled hypertension BP >230/120

Conditions requiring individualised treatment

- Concurrent use of therapeutic dose anticoagulation (warfarin/DOAC agents) – *will need to omit pharmacological prophylaxis pending senior decision.*
- Hyperkalaemia – *LMWH can supress aldosterone and exacerbate this issue, particularly in high risk groups (diabetes/CRF/concomitant meds)*

- Traumatic brain or spinal cord injury during the first 2 weeks of care – *needs individual tailored risk assessment dependent on lesion and neurosurgical management*
- Untreated inherited bleeding disorder (e.g. haemophilia or von Willebrands disease) – *for hip arthroplasty will need factor replacement and prophylaxis*
- Frail elderly or end of life care pathway – *may be appropriate to omit all non-essential medications – for discussion at consultant level.*

Time sensitive contraindications

- LMWH should not be given within the 12 hours before epidural or spinal anaesthesia
- LMWH must not be given for 6 hours after insertion or removal of epidural catheters, or 6 hours after spinal (lumbar) puncture

Monitoring of pharmacological thromboprophylaxis

A baseline platelet count, potassium level and creatinine measurement is recommended prior to commencing LMWH at any dose.

The British Committee for Standards in Haematology no longer recommend routine monitoring of platelet counts for patients on heparin therapy, but any evidence of bleeding or thrombosis should naturally prompt clinical review and relevant blood tests, including platelet count and eGFR measurement[11].

A small risk of heparin induced thrombocytopaenia exists with all low molecular weight heparins. In addition, if any heparin product has been used within the preceding 100 days sensitisation is more likely. Platelet count assessment 24hours after commencing thromboprophylaxis is recommended in this latter group of patients to ensure no acute drop in the early stages[11,12]. If an acute drop (>50%) is seen, LMWH should be suspended and haematology advice sought regarding HIT assays and further testing.

Patient Information and pharmacological thromboprophylaxis

Low molecular weight heparins are porcine derivative medications. This information should be conveyed to patients where relevant, and in particular to patients of muslim or Jewish faith or those who follow a vegan diet. Fondaparinux may be considered as an alternative, although experience of use in certain patient groups is limited, for example patients with severe renal impairment (eGFR < 30ml/min). See the relevant trust guidelines and specific summary of product characteristics for dosing information.

Patient Information and Education

All patients should be informed of the risk of HAT by provision of the dedicated trust leaflet (Prevention of Hospital Acquired Thrombosis) and their attention drawn to the relevant trust video information resources. This leaflet is available here.

Trust video resources for patient induction can be found here, and include a short film on the risk of and how to avoid HAT. All patients should be offered an opportunity to review this video as part of the standard nursing admission process.

All patients should be verbally encouraged to mobilise as soon as possible and avoid dehydration where clinically possible by all staff.

Aspirin and/or other antiplatelet agents should not be regarded as adequate prophyalxis against VTE.

Patients should be educated on reducing their personalised VTE risk whilst in a hospital environment. This may include cessation of oestrogen containing contraceptives or hormone replacement therapy prior to surgery, smoking cessation advice and stating the importance of medication compliance.

Low molecular weight heparins are porcine derivative medications. This information should be conveyed to patients where relevant, and in particular to patients of muslim or Jewish faith or those who follow a vegan diet. Fondaparinux may be considered as an alternative, although experience of use in certain patient groups is limited, for example patients with severe renal impairment (eGFR < 30ml/min). See the relevant trust guidelines and specific summary of product characteristics for dosing information.

SPECIAL PATIENT GROUPS AND ADDITIONAL CONSIDERATIONS

Thromboprophylaxis in Elective Surgical Admissions

Day Case Surgery and the Surgical Admissions Lounge (SAL)

Unless the procedure is planned awake under local anaesthetic, a documented HAT risk assessment should be carried out for all surgical patients either in pre-operative assessment clinic or on the day of surgery.

PERIOPERATIVE CARE

All patients admitted through SAL should be informed of the trust approach to prevention of hospital acquired thrombosis and provided with a copy of the designated patient information leaflet. All staff should conduct intentional rounds within SAL/DSU to ensure patients are not dehydrated and that they remain mobile while awaiting a procedure. Staff should proactively coordinate with the theatre team to minimise fasting duration and thus prevent dehydration preoperatively. Intravenous fluid therapy should be considered when clinical suspicion of dehydration is present.

SPECIAL CIRCUMSTANCES

In patients who are usually on treatment with therapeutic dose anticoagulation, review the specific trust guidance on perioperative bridging.

SURGERY WITH LOCAL ANAESTHESIA

Patients listed for procedures under local anaesthesia with or without sedation do not require a HAT assessment or thromboprophylaxis of any type, provided they remain at baseline mobility status following the operation.

SURGERY WITH GENERAL / REGIONAL ANAESTHESIA

All patients who undergo a surgical procedure with a combined anaesthetic and surgical of more than 90 minutes, or 60 minutes if the surgery involves the pelvis or the lower limb, should be considered at risk of VTE.

All day case surgical patients should be provided with fitted AES and/or IPC devices on admission by nursing staff. The only exceptions to this include elective daycase patients with no recognised VTE risk factors and a predicted surgical/anaesthetic time of <90 minutes, or when specific contra-indications to AES/IPC devices exist. Please see Appendices 2 to 4 for guidance on assessment, contraindications and practical considerations. Mechanical prophylaxis should be prescribed post operatively on the EPR if the intention is to continue post theatre.

Specific daycase indications to consider IPC devices over AES are as follows:

- Patients in whom mechanical thromboprophylaxis is indicated but contraindications to AES have been noted.
- Patients with a high risk of bleeding in the postoperative period where pharmacological VTE prophylaxis could be delayed (neurosurgery, spinal surgery, head and neck surgery, etc..)
- Patients with planned admission to level 2 or level 3 critical care area
- Upon surgical or anaesthetic request
- Patients having a procedure under general/regional anaesthesia and listed time greater than 90 minutes.

All patients remaining, or likely to remain in hospital for >12 hours and who have been assessed as being at risk of HAT with a low bleeding risk should have an appropriate weight adjusted dose of LMWH prescribed daily. See the previous section on pharmacological prophylaxis for prescribing guidance. LMWH should be commenced 6-12hours post op unless a clear alternative plan is documented by the responsible surgeon.

All patients at risk of HAT should have thromboprophylaxis continued daily until discharge, or until they no longer have significantly reduced mobility.

INTRAOPERATIVE CARE

For the surgical procedure, consider regional anaesthesia in addition to other methods of VTE prophylaxis where feasible and appropriate. The WHO checklist should incorporate confirmation of VTE prophylaxis at each stage:

Team brief – Identify patient's requirement for mechanical prophylaxis (IPC/AES)

Anaesthetic Room Sign in – Confirm the need for mechanical VTE prophylaxis

Theatre Time out - Confirm the application of mechanical VTE prophylaxis

Theatre Sign out – Confirm HAT assessment completed and appropriate prophylaxis prescribed

POSTOPERATIVE CARE

In the recovery area, replace AES if they have been removed or damaged in theatre Continue to use the IPC device if already commenced, until ambulation or parent team decision to stop

Patients should not leave recovery without a confirmed and documented HAT assessment, and prescription for mechanical & pharmacological prophylaxis as indicated. Clinical urgency as dictated by a consultant anaesthetist is the only exception to this; these cases should be handed over to the ward team for ongoing care.

Encourage early mobilisation as soon as patient can tolerate unless there are specific instructions for immobility in the postoperative note. Encourage patients who have AES to continue to use them for 3 – 5 days in the postoperative period (removal for 30minutes each day for hygiene needs and skin inspection)

Advice on prevention, symptoms and signs of VTE should be given to all patients. Confirm receipt of the dedicated Hospital Acquired Thrombosis leaflet and ensure all patients have a suggested point of contact in the event of concerns. This task should be part of the formal discharge checklist.

On the ward, AES should be checked daily to ensure proper application. If there are concerns about active bleeding, defer pharmacological prophylaxis and start IPCC along with AES stocking until senior clinical review and decision.

EXTENDED SPECTRUM PHARMACOLOGICAL THROMBOPROPHYLAXIS

Increasingly complex cases are performed as daycase procedures. Some of these cases may not return to baseline mobility immediately, or may have a particularly high individualised risk of VTE. Current evidence suggests the risk of VTE after daycase surgery in these patients can be up to 10 times the risk of routine daycase patients who return to baseline mobility immediately[13,14]. As such, these complex cases are potentially ameniable to prevention with extended spectrum mechanical and pharmacological prophylaxis.

There are no widely validated decision tools to guide extended spectrum thromboprophylaxis in this cohort; as such a decision to prescribe pharmacological prophylaxis to continue after hospital discharge should be taken in consultation with the relevant surgical/anaesthetic teams.

The following are considered as high level risk factors and should prompt a discussion about use of extended spectrum prophylaxis[15].

- BMI>40
- Surgical duration > 120 minutes
- Therapeutic arthroscopic procedures
- Active cancer / cancer treatment
- Pregnancy
- Previous DVT and/PE
- Familial Thrombophilia
- ASA 3
- Age >60
- Expected to have significantly reduced mobility after discharge

Any patient with a high level risk factor above and a low bleeding risk should be strongly considered for extended spectrum thromboprophylaxis. NICE guidance suggests at least 5-7 days of LMWH use.

Trauma and Orthopaedics (Elective Hip and Knee surgery)

For patients undergoing elective hip or knee surgery, there is a good evidence base and supportive NICE technology appraisals for oral thromboprophylaxis using the direct oral anticoagulant (DOAC) drugs. Rivaroxiban is the agent of choice at Salford Royal. The prophylactic dose is 10mg once daily. Contra-indications and cautions are listed in Appendix 5.

How to phase and dose prophylactic rivaroxaban for elective hip and knee surgery:

- Pharmalogical prophylaxis should commence on the day of surgery
- Due to concerns about increased rates of bleeding in the immediate post operative period, patients should initially commence thromboprophylaxis with 3 days of LMWH at appropriate weight adjusted dose.
- LMWH should then be converted on day 4 to Rivaroxaban 10mg orally OD.
- Rivaroxiban should be continued for 32 days (35 days total prophylaxis) after Total Hip Replacement (THR)
- Rivaroxiban should be continued for 11 days (14 days total) following Total Knee replacement.

It should be noted that while both agents are licensed for pharmacological prophylaxis in elective joint replacement, this phased dosing strategy is technically off licence. This strategy has arisen following initial surgical concerns regarding increased bleeding rates with DOAC agents.

The phased method of initial LMWH followed by DOAC agent therapy has been used for over 5 years at SRFT with few complications; as such it continues to be the preferred method of pharmacological thromboprophylaxis for these patients.

Trauma and Orthopaedics (Elective Soft Tissue Knee Surgery)

Patients undergoing elective or trauma daycase soft tissue knee surgery with a tourniquet time of 60 minutes or longer are deemed to be at increased risk of VTE as stipulated in recent NICE guidance. In the absence of acute bleeding risk (as determined by the responsible surgeon) pharmacological thromboprophylaxis should be prescribed for perioperative administration as per the licensed indications. An AES should also be fitted on the non operative leg if appropriate.

Patients considered to be at high risk of subsequent postoperative VTE (as determined by the previous listed risk factors or a consultant opinion) should be considered for extended spectrum pharmacological thromboprophylaxis. In the absence of any major bleeding risks, patients should be offered 5-7 days of LMWH as per NICE guidance.

Thromboprophylaxis in Emergency Surgical Admissions

Major Trauma

All major trauma patients should have a HAT risk assessment completed and verified by a senior clincian within 24hours of admission. NICE guidance suggests that particular attention is paid to the following issues:

- Mechanical thromboprophylaxis should be started as soon as possible and continued until the patient no longer has significantly reduced mobility. See the previous section for options in mechanical thromboprophylaxis.
- Pharmacological thromboprophylaxis should be started if the bleeding risk has been established as low and continued until the patient no longer has significantly reduced mobility.

If pharmacological thromboprophylaxis is contraindicated due to patient or disease related factors (and the contraindication is likely to persist >5 days), but the ongoing VTE risk is considered to be high, this patient group stand to benefit from early consideration of prophylactic vena caval filter insertion. See the previous section about how to organise this and the caveats around insertion. Such patients are likely to be in a critical care environment and as such should undergo daily multidisciplinary review and consensus decision regarding thrombosis risk.

Trauma and Orthopaedics

All orthopaedic inpatients (except elective hip and knee replacement):

All orthopaedic patients should be provided with fitted AES from admission unless specific contra-indications exist. Please see Appendices 2 and 3 for guidance on assessment and practical considerations. Stocking checks must be prescribed on the EPR.

All patients assessed as being at risk of HAT should have an appropriate weight adjusted dose of LMWH prescribed daily. See the previous section on pharmacological prophylaxis for prescribing guidance.

Once prescribed, LMWH should be stopped 12 hours prior to acute surgery. LMWH should be restarted 6-12 hours post surgery. All patients at high risk of HAT should have thromboprophylaxis continued until they no longer have significantly reduced mobility from baseline.

Orthopaedic outpatients with temporary lower limb immobilisation:

Specific trust policy documents have been created for this group of patients. Guidance documents on risk assessment and prophylaxis in the emergency department and orthopaedic clinic can be found here and here respectively.

Neurosurgery

All neurosurgical patients should be provided with fitted AES OR IPC devices unless specific contra-indications exist. Please see Appendices 2 to 4 for guidance on assessment and practical considerations. Mechanical prophylaxis reminder checks should be prescribed on the EPR.

The need for pharmacological prophylaxis in neurosurgical patients should be weighed against the risk of serious intracranial bleeding and the type of operative intervention – if in doubt the decision should always be checked with the responsible neurosurgeon.

A structured tool to aid decision making on chemical thromboprophylaxis in the critically ill neurosurgical patient is available on the trust intranet.

Guidance tailored to specific neurosurgical procedures is provided below:

Minor neurosurgical procedures such as carpal tunnel decompression, osetoma removal & sural nerve biopsies:

- A HAT risk assessment should be documented and tailored thromboprophylaxis should be assessed and prescribed in the same way as all other surgical patients.

Elective craniotomy:

- In the absence of any unpredicted bleeding complications, pharmacological prophylaxis can start at 24 hours post op

Subarachnoid haemorrhage:

- Following definitive protection (clipping or coiling) pharmacological prophylaxis can start at 24 hours post op

Spontaneous subural or extradural haematoma:

- If evacuated with good haemostasis then pharmacological prophylaxis can be started 3 days post op
- If managed conservatively, pharmacological prophylaxis is contraindicated – the patient should be reassessed in 2 weeks

Traumatic Brain Injury:

- Diffuse axonal injury with no significant bleed - pharmacological prophylaxis can be started 3 days post op
- Evacuated haematoma with good haemostasis: pharmacological prophylaxis can be started 3 days post op
- Contusionectomy, lobectomy or decompression with no significant bleeding: pharmacological prophylaxis can be started 3 days post op
- Significant haematoma with conservative management: pharmacological prophylaxis is contraindicated – the patient should be reassessed in 2 weeks

Spinal Orthopaedics

All spinal surgical patients should be provided with fitted AES OR IPC devices unless specific contra-indications exist. Please see Appendices 2 to 4 for guidance on assessment and practical considerations. Mechanical prophylaxis reminder checks should be prescribed on the EPR.

The need for pharmacological prophylaxis in spinal surgical patients should be weighed against the risk of serious bleeding and the type of operative intervention – if in doubt the decision should always be checked with the responsible spinal surgeon.

For traumatic spinal injuries, please review the previous sections regarding guidance on patients with major trauma and neurosurgical injury.

For spinal patients pending operative intervention please review the previous section on timings and dose omission for those patients recieiving pharmacological thromboprophylaxis.

Particular scenarios where guidance is amended include the following:

Quadroplegia in the ITU setting following acute spinal cord injury

- Acute phase – pharmacological prophylaxis can start 24 hours after insult/ injury
- Chronic or treated stage – commence treatment dose LMWH or warfarin

Established Quadroplegia in the ward setting

- Pharmacological prophylaxis should be given
- Although the patient may be at their usual mobility it is likely that the reason for hospitalisation will increase their risk of clot.

General Surgery (to include urology, ENT and all other surgical specialties without specific subsection)

All patients who undergo an urgent surgical procedure with a combined anaesthetic and surgical of more than 90 minutes, or 60 minutes if the surgery involves the pelvis or the lower limb, should be considered at risk of VTE.

Once in a ward environment, all general surgical patients should be provided with fitted AES OR IPC devices unless specific contra-indications exist. Please see Appendices 2 to 4 for guidance on assessment and practical considerations. Mechanical prophylaxis reminder checks should be prescribed on the EPR.

All patients assessed as being at risk of HAT who have a low bleeding risk should have an appropriate weight adjusted dose of LMWH prescribed daily. See the previous section on pharmacological prophylaxis for prescribing guidance.

All patients at risk of HAT should have thromboprophylaxis continued until they no longer have significantly reduced mobility (at least 5-7 days)

All patients who have had major cancer surgery in the abdomen or pelvis should have pharmacological prophylaxis extended to 28 days postoperatively.

Procedure specific guidance:

Thyroid or parathyroid surgery
These patients should not routinely receive pharmacological prophylaxis for HAT since perioperative bleeding can be catastrophic & immediately life threatening.

However any patient identified as having a high risk (e.g. past history of DVT, PE, or pro-thrombotic state) should be discussed with the consultant surgeon. All patients must have mechanical thromboprophylaxis with intraoperative IPC use and post-operative AES use.

Day case bariatrics or gastrointestinal surgery:
All patients at risk of HAT should have thromboprophylaxis continued until they no longer have significantly reduced mobility (at least 5-7 days usually). See the earlier specific guidance on Day Case Surgery and the Surgical Admissions Lounge.

Pregnancy

To be read in conjunction with the trust Guideline for the care of women who are pregnant or have recently given birth presenting to the emergency department which includes specific information about the care of women beyond 16 weeks gestation.

Women who are pregnant or have given birth within the previous 6 weeks should have a HAT risk assessment carried out on admission to hospital. Pregnancy itself is a risk factor for VTE which continues for 6 weeks post-partum (the puerperium). In addition to the usual risk factors, the following pregnancy specific risk factors which increase thrombosis risk should be considered:

Risk Factors in Entire Pregnancy and Puerperium:

- Age >35 years
- Parity 3 or more
- Multiple pregnancy

Temporary Risk Factors:

- Assisted reproductive therapy and ovarian hyperstimulation (1st trimester)
- Prolonged labour (6 weeks post-partum)
- Forceps delivery (6 weeks post-partum)
- Delivery by caesarean section (6 weeks post-partum)
- Hyperemesis gravidarum (while an active health issue)
- Excess blood loss or blood transfusion during recent birth (6 weeks post-partum)
- Pre-eclampsia (from onset until 6 weeks post-partum)

All pregnant women admitted to hospital who are not undergoing surgery should be offered pharmacological thromboprophylaxis providing the bleeding risk is considered to be low. This includes women with ovarian hyperstimulation. If there is any doubt as to bleeding risk the opinion of the gynaecology consultant on call should be sought.

Women with hyperemesis gravidarum who are admitted only require pharmacological prophylaxis if they are admitted for longer than the duration of the rapid rehydration protocol. Women undergoing termination of pregnancy do not require prophylaxis with LMWH unless they have additional risk factors.

Women who are to undergo surgery should also be offered prophylaxis with LMWH. If a regional anaesthetic is planned, LMWH heparin should not be given 12 hours before the procedure or until 6 hours after the procedure. These women should also be offered mechanical thromboprophylaxis. Carefully plan when to start and stop pharmacological thromboprophylaxis for these women, in order to minimise the risk of bleeding.

Royal College of Obstetrics and Gynaecology (RCOG) green top guideline 37a advises all pregnant women should be assessed for their risk of VTE in early pregnancy. Those women presenting to SRFT who have not yet been assessed during antenatal care and are found to be at very high risk (4 or more risk factors) should be considered for pharmacological thromboprophylaxis during the remainder of their pregnancy and up to 6 weeks afterwards, providing the bleeding risk is considered to be low. This may also apply in some women with a known thrombophilia and or a personal history of VTE. The decision to continue prophylaxis on discharge should be made by the consultant gynaecologist on call and it is strongly recommended that the RCOG guideline is consulted when considering. This decision should only be made following discussion with the woman and should be communicated to the relevant obstetric team at the planned booking hospital.

For most pregnant women assessed as being at risk of VTE, an appropriate dose of LMWH should be prescribed. Please see prescribing info in the relevant section. Non-standard dosing is used in some high risk pregnant women; the RCOG guideline should be consulted in these cases.

Critical Care

All critically ill patients should be considered to be at high risk of HAT. As such they should be provided with mechanical prophylaxis on admission with IPC devices unless specific contra-indications exist. Please see Appendix 4 for guidance on assessment and practical considerations. Mechanical prophylaxis reminder checks should be prescribed on the EPR.

The need for pharmacological prophylaxis in critical care patients should be weighed against the risk of serious bleeding and the type of operative intervention if relevant – if in doubt the decision should always be checked with the responsible surgeon or intensivist.

A structured tool to aid decision making on pharmacological thromboprophylaxis in the critically ill patient is available on the trust intranet.

For neurosurgical and spinal patients in a critical care environment, please refer to the relevant specialty sections.

Given the rapid changes in clinical condition that can occur in a critical care environment, the decision regarding pharmacological prophylaxis should be revisited daily by the responsible intensive care team.

Thromboprophylaxis in Emergency Medical Admissions

General medical admissions

All medical patients should have a HAT risk assessment documented and verified by a senior clinician within 24 hours of hospital admission.

Medical patients should be regarded as being at increased risk of VTE if they:

- Have had or are expected to have significantly reduced mobility for 3 days or more OR
- Are expected to have ongoing reduced mobility relative to their normal state and have one or more specific recognised risk factors for VTE

Medical patients who are assessed as being at risk of VTE who have a low bleeding risk should be offered pharmacological thromboprophylaxis as soon as possible after risk assessment has been completed. Prophylaxis should continue until the patient is no longer at risk of VTE.

Mechanical thromboprophylaxis is not routinely recommended for medical inpatients, but can be used at the discretion of the treating clinician where there are contraindications to pharmacological thromboprophylaxis or particularly high VTE risk.

Ageing and Complex Medicine

Elderly patients should be managed as per the general medical and relevant specialty specific sections of the policy, with the following caveats as described by the British Geriatric Society best practice guideline:

- Many older patients are confused, either from delirium or dementia, and will be unable to give consent to treatment. Thus the consultant must assume responsibility of making a best interests judgement on the value of treatment on behalf of the patient.
- The skin in older people is frequently more fragile, and easily bruised. Older people are probably more likely to suffer from local bruising and minor haemorrhages at the injection site or the use of antiembolic stockings. This may cause pain and discomfort, in a patient who is perhaps unable to understand the reason for the treatment, and this may undermine rehabilitation.
- Some patients are near end-of-life where their admission and treatment have goals of relieving symptoms and not necessarily prolonging life. For these people, injections may be an additional unwelcome burden.
- Patients who are usually immobile do not require thromboprophylaxis unless they have an additional illness.

- Patients who are at risk of multiple falls will have an enhanced risk of bruising from pharmacological thromboprophylaxis.

- Mortality risk from PE and from major haemorrhage are both increased in older people.

After consideration of these issues, the risks and burdens of mechanical and pharmacological thromboprophylaxis may be deemed to outweigh the benefits. However, the geriatrician has a duty to ensure non ageist practice and all patients still require a VTE risk assessment on admission to hospital.

ACM patients undergo regular structured reviews of their thrombosis risk as part of routine ward round safety net and "Harm Free Care" reviews. The decision to omit thromboprophylaxis should be taken at consultant level. This should be recorded during these reviews or at other times, and if the burden of treatment felt to outweigh the benefit, then the management decision documented accordingly.

Stroke Medicine and Spontaneous Intracranial Haemorrhage

There is significant risk of VTE in immobile stroke patients whilst in hospital and the following interventions should be considered to reduce this risk.

Intermittent Pneumatic Compression

Intermittent Pneumatic Compression (IPC) has been clearly shown to reduce the incidence of DVT at 30 days (8.5% vs. 12.1%) and improve survival at 6 months (but not functional outcome)[16]. IPC should be provided for patients with acute *ischaemic* or *haemorrhagic* stroke as soon as feasibly possible and ideally within three days of admission to hospital where the following criteria apply:

1. Patient is for active treatment (i.e. not for palliation)
2. Patient is immobile (unable to walk independently to the toilet)
3. Patient is willing to wear the IPC devices
4. There are no contraindications to wearing IPC devices, such as:
   - severe congestive heart failure
   - severe lower limb oedema
   - severe skin problems or ulcers on legs
   - severe peripheral vascular disease
   - suspected or pre-existing acute DVT

Treatment should be continued for 30 days or until patient becomes independently mobile (requires no manual assistance to transfer from bed and mobilise to toilet) or is discharged, whichever is sooner. Where patients are reluctant to wear IPC or lack capacity to agree to IPC the patient's capacity in relation to this decision should be recorded and a risk benefit discussion had with them or their representative as appropriate. NICE recommends that healthcare professionals explain to the patient or their family members/carers the evidence that IPC reduces the risk of DVT and

may provide an increase in survival, but will not help them recover from their stroke, and there may be an associated increased risk of surviving with severe disability [2]. Mechanical prophylaxis reminder checks should be prescribed on the EPR.

Pharmacological prophylaxis (unfractionated or low molecular weight heparin)

Meta-analysis of trials in *ischaemic* stroke suggests that for every 1000 patients treated with any low dose anticoagulant, there will be 4 additional intracranial haemorrhages and 1 additional extracranial haemorrhage against prevention of 3 pulmonary emboli and 328 DVTs (though almost all DVTs were asymptomatic). This evidence is deemed of low quality by an ESO expert panel (Dennis et al 2016). Evidence for use of LMWH in *haemorrhagic* stroke is limited and inconclusive [17].

Based on this evidence, it is recommended that prophylactic anticoagulation with low molecular weight heparin (LMWH) should be considered in immobile patients with stroke in whom the benefits of reducing the risk of venous thromboembolism is high enough to offset the increased risks of intracranial and extracranial bleeding associated with their use (Dennis et al 2016).

However, no validated tools exist to assess these risks. Generic risk factors for thrombosis are listed in appendix 1. To aid clinicians in making decisions in practice, the following NICE recommendations may be considered:

Consider offering prophylactic dose LMWH (or UFH for patients with severe renal impairment or established renal failure) if:

1. *a diagnosis of haemorrhagic stroke has been excluded, and:*
2. *the risk of bleeding (haemorrhagic transformation of stroke or bleeding into another site) is assessed to be low, and*
3. *the patient has one or more of:*

    - *major restriction of mobility*
    - *previous history of VTE*
    - *dehydration*
    - *comorbidities (such as malignant disease).*

Continue until the acute event is over and the patient's condition is stable.

However, note that haemorrhagic stroke should not be considered an absolute contraindication to the use of LMWH. This is supported by the AHA/ASA 2015 intracerebral haemorrhage guidance, which suggests that LMWH may be considered after day 1 to 4 post-onset for prevention of VTE in patients with reduced mobility.

In considering the risk of haemorrhagic transformation of stroke (2, above), risk is increased in larger strokes and reduced by longer time since onset [18].

Graduated compression stockings have been clearly shown to be of no benefit in stroke patients and should not be used [16].

Renal Medicine

Despite a recognised alteration in bleeding risks that is multi factorial (especially in end stage renal failure) local practice has been to assess all renal patients for risk of HAT as per standard medical inpatients. Formalised risk assessment on admission is advised and subsequent provision of pharmacological prophylaxis dependent on eGFR if indicated, as per the previous guidance. Please note at extremes of body weight the Cockcroft-Gault CrCl formula should be used to estimate GFR. A free online calculator for this formula can be found here.

All renal patients should therefore be managed as standard medical inpatients, with formalised risk assessment on admission and subsequent provision of pharmacological prophylaxis where indicated. For patients with an eGFR of <30mls/min, enoxaparin is regarded as the agent of choice. Please see the previous section on pharmacological prophylaxis for specific prescribing guidance.

It should be noted that NICE guidance does not recommend mechanical or pharmacological prophylaxis for patients with central venous catheters *who are ambulant*. Patients with indwelling central catheters to facilitate haemodialysis who are unwell, limited in mobility or who have increased baseline VTE risk should be strongly considered for both mechanical and pharmacological prophylaxis.

Critical Care

All critically ill patients should be considered to be at high risk of HAT. As such they should be provided with mechanical prophylaxis on admission with IPC devices unless specific contra-indications exist. Please see Appendix 4 for guidance on assessment and practical considerations. Mechanical prophylaxis reminder checks should be prescribed on the EPR.

The need for pharmacological prophylaxis in critical care patients should be weighed against the risk of serious bleeding and the type of operative intervention if relevant – if in doubt the decision should always be checked with the responsible surgeon.

A structured tool to aid decision making on pharmacological thromboprophylaxis in the critically ill patient is available on the trust intranet.

For neurosurgical and spinal patients in a critical care environment, please refer to the relevant specialty sections.

Given the rapid changes in clinical condition that can occur in a critical care environment, the decision regarding pharmacological prophylaxis should be revisited daily by the responsible intensive care team.

Root Cause Analysis and incident reporting

As per the standard NHS contract, all diagnoses of VTE at the trust should be routinely screened to categorise and investigate cases of HAT. This facilitates shared learning, quality improvement and promotion of best practice. Diagnostic data is captured routinely through post-mortem notification and trust imaging audit via CRIS reporting template (all cases coded as VTE positive).

HAT is defined by NHS England as a deep vein thrombosis or pulmonary embolism which occurs during inpatient stay (>24hours in hospital) or in a patient who has had a hospital admission in the preceding 90 days.

Root cause analysis (RCA) should be completed on all cases of HAT to investigate whether HAT risk assessments were appropriately completed and whether thromboprophylaxis was prescribed/delivered reliably. RCA of these cases should fall to independent, multisiciplinary divisional teams. In the event that trust policy was not followed, cases of HAT should be deemed preventable and subsequently reported via the DATIX system as an adverse incident with preventable harm.

All RCA episodes will be cascaded to divisional governance to facilitate shared learning and thematic anlaysis. It is expected that an action plan will be completed where preventable HAT is identified.

The RCA template is outlined in appendix 6.

Standards

1. Every patient admitted to the Trust will have a prevention of hospital acquired thrombosis risk assessment completed on admission and verified within 24hours.
2. HAT risk assessments will be repeated whenever the clinical scenario changes significantly, and at a weekly minimum in the absence of clinical change.
3. All patients will be prescribed and administered the prophylaxis appropriate to their risk assessment.
4. All patients who suffer a hospital associated thrombus will have a root cause analysis completed.
5. Any HAT episodes deemed potentially preventable after RCA will undergo formal DATIX reporting to be classed as preventable harm. Formal divisional investigation will follow with shared learning disseminated through governance structures and the thrombosis committee.

Explanation of terms & Definitions

VTE: Venous Thromboembolism – a clot arising in the deep veins of the leg or in the pulmonary arteries

HAT: Hospital Associated thrombus – a clot arising as a consequence of hospital admission or treatment – usually one which has occurred after 48 hours of hospitalisation, or in a patient with a hospital admission within the preceding 90 days.

LMWH: Low molecular weight heparin

RCA: Root Cause Analysis

SPC: Summary of Product Characteristics

SIARC: Serious Investigation and Review of Case

Roles and responsibilities

The Trust Board has overall responsibility for developing, implementing and monitoring the effectiveness of this policy.

The Chief Executive is accountable to the Trust Board for ensuring that:
· The policy is developed and implemented across the Trust
· Implementation is monitored and that any deficiencies are brought to the attention of the Trust Board

General Managers, Divisional Directors of nursing and Assistant Directors of Nursing (ADNS) will be responsible for:
· Ensuring systems are in place on admission to identify and prophylactically treat those patients who are at significant risk of developing thrombosis
· Keep under review current risk assessment, control measures, procedures and training within their areas to ensure where deficiencies are identified, recommendations and action plans are developed.
· Ensure adequate provision of training and support to staff in relation to the requirements of the policy and the use of anti-embolism devices and preparation and administration of anti-embolism drugs.
· Ensure all deviations from policy are identified via the adverse incident system.

The Medical Director, Divisional Chairs, Clinical Leads and Consultants will be responsible for:
· Ensure systems are in place on admission to identify those patients who are at significant risk of developing thrombosis
· Ensure all staff develop and maintain basic professional competence in prevention of hospital acquired thrombosis risk assessment and are aware of their responsibilities in preventing its occurrence, ensuring anti embolism devices are used in accordance with the policy

· Ensuring all prescriptions for anti-embolism drugs are in accordance with this policy.
· Ensure that patients who refuse appropriate prophylactic treatment are made fully aware of and understand the risk involved and that this is documented.
· Ensure all confirmed episodes of DVT & PE are documented as complications on EPR within Health Issues

Lead Nurses, Matrons and Ward Managers, will within their areas of control:
· Ensure systems are in place on admission to identify those patients who are at significant risk of developing venous thrombosis.
· Ensure that a risk assessment is carried out correctly on every admitted patient in accordance with the standards (section 2)
· Ensure all staff develop and maintain basic professional competence in prevention of hospital acquired thrombosis and are aware of their responsibilities in preventing its occurrence.
· Ensure that staff develop and maintain basic professional competence in the care of patients who are receiving prophylactic anti embolism therapy, such as checking skin condition when anti embolism stockings are used.
· Ensure all staff develop and maintain an appropriate level of knowledge in the use and application of anti-embolism devices and the preparation and administration of anti-embolism drugs.
· Ensure there are adequate stocks of anti-embolism devices on the ward.
· Ensure reporting systems are in place to inform medical staff of any suspected DVT or PE and that all confirmed episodes are documented as complications on EPR within Health Issues.
· Ensure that any deviations from policy are reported via the adverse incident system

All staff will:
· Ensure a risk assessment has been carried out and follow the identified pathway aimed at preventing hospital acquired thrombosis
· Ensure anti embolism devices are used in accordance with the prevention of hospital acquired thrombosis policy
· Ensure anti embolism drugs are administered in accordance with the prescription, which is in line with the policy.
· Inform medical staff of any suspected occurrences of thrombosis
· Ensure all episodes of thrombosis are documented as complications on EPR within Health Issues.
· Ensure all deviations from policy are reported via the adverse incident system.
· Ensure that inadequacies in stock level of anti-embolism devices are reported immediately to the ward/unit manager.
· Ensure that where patients refuse the use of anti-embolic devices or recommended drug therapy, this is documented and medical staff informed.
· Where a patient continues to refuse treatment the Consultant in charge of patients care should be informed before any elective procedure or intervention takes place.

Pharmacy is responsible for:
· Ensuring that all prescriptions clinically checked for Low Molecular Weight Heparins (LMWHs) and rivaroxaban are in accordance with the policy.
· Ensure ward stock levels of prophylactic drugs are maintained.

The Department of Postgraduate Medical education is responsible for:

· Ensuring that all doctors in training grades complete the medicines management workbook and the national VTE e-learning tool as part of their induction process.

References

1. Day ISCfWT. Thrombosis: a major contributor to the global disease burden. *J Thromb Haemost* 2014; **12**(10): 1580-90.
2. NICE. Venous Thromboembolism - Reducing the Risk. In: CG92, editor. London: National Institute for Clinical Excellence; 2010.
3. Arabi YM, Khedr M, Dara SI, et al. Use of intermittent pneumatic compression and not graduated compression stockings is associated with lower incident VTE in critically ill patients: a multiple propensity scores adjusted analysis. *Chest* 2013; **144**(1): 152-9.
4. Dennis M, Sandercock P, Graham C, Forbes J, Collaboration CT, Smith J. The Clots in Legs Or sTockings after Stroke (CLOTS) 3 trial: a randomised controlled trial to determine whether or not intermittent pneumatic compression reduces the risk of post-stroke deep vein thrombosis and to estimate its cost-effectiveness. *Health Technol Assess* 2015; **19**(76): 1-90.
5. Cadavid CA, Gil B, Restrepo A, et al. Pilot study evaluating the safety of a combined central venous catheter and inferior vena cava filter in critically ill patients at high risk of pulmonary embolism. *J Vasc Interv Radiol* 2013; **24**(4): 581-5.
6. Serednicki W, Dobrowolska E, Kaluza K, Kopacz M, Wordliczek J. Angel((R)) Catheter use for pulmonary embolism prophylaxis in a polytrauma patient. *Injury* 2015; **46**(6): 1167-70.
7. Taccone FS, Bunker N, Waldmann C, et al. A new device for the prevention of pulmonary embolism in critically ill patients: Results of the European Angel Catheter Registry. *J Trauma Acute Care Surg* 2015; **79**(3): 456-62.
8. Lassen MR, Gallus A, Raskob GE, et al. Apixaban versus enoxaparin for thromboprophylaxis after hip replacement. *N Engl J Med* 2010; **363**(26): 2487-98.
9. Goldhaber SZ, Leizorovicz A, Kakkar AK, et al. Apixaban versus enoxaparin for thromboprophylaxis in medically ill patients. *N Engl J Med* 2011; **365**(23): 2167-77.
10. Raskob GE, Gallus AS, Pineo GF, et al. Apixaban versus enoxaparin for thromboprophylaxis after hip or knee replacement: pooled analysis of major venous thromboembolism and bleeding in 8464 patients from the ADVANCE-2 and ADVANCE-3 trials. *J Bone Joint Surg Br* 2012; **94**(2): 257-64.
11. Watson H, Davidson S, Keeling D, Haemostasis, Thrombosis Task Force of the British Committee for Standards in H. Guidelines on the diagnosis and management of heparin-induced thrombocytopenia: second edition. *Br J Haematol* 2012; **159**(5): 528-40.
12. Baglin T, Barrowcliffe TW, Cohen A, Greaves M, British Committee for Standards in H. Guidelines on the use and monitoring of heparin. *Br J Haematol* 2006; **133**(1): 19-34.
13. Cardiovascular Disease E, Research T, European Venous F, North American Thrombosis F, International Union of A, Union Internationale du P. Prevention and treatment of venous thromboembolism: international consensus statement (guidelines according to scientific evidence). *Clin Appl Thromb Hemost* 2013; **19**(2): 116-8.
14. Nicolaides AN, Fareed J, Kakkar AK, et al. Prevention and treatment of venous thromboembolism--International Consensus Statement. *Int Angiol* 2013; **32**(2): 111-260.
15. Pannucci CJ, Shanks A, Moote MJ, et al. Identifying patients at high risk for venous thromboembolism requiring treatment after outpatient surgery. *Ann Surg* 2012; **255**(6): 1093-9.
16. Collaboration CT, Dennis M, Sandercock P, et al. The effect of graduated compression stockings on long-term outcomes after stroke: the CLOTS trials 1 and 2. *Stroke* 2013; **44**(4): 1075-9.
17. Steiner T, Al-Shahi Salman R, Beer R, et al. European Stroke Organisation (ESO) guidelines for the management of spontaneous intracerebral hemorrhage. *Int J Stroke* 2014; **9**(7): 840-55.
18. Zhang J, Yang Y, Sun H, Xing Y. Hemorrhagic transformation after cerebral infarction: current concepts and challenges. *Ann Transl Med* 2014; **2**(8): 81.

Appendices

Appendix 1

NICE recognised VTE risk factors:

- Surgical procedure with a combined anaesthetic and surgical of more than 90 minutes, or 60 minutes if the surgery involves the pelvis or the lower limb.
- Active Cancer or cancer treatment
- Age>60
- Dehydration
- Known Thrombophilias
- BMI >30kg/m^2
- One or more significant medical co-morbidities
- Personal history or first degree relative with a history of VTE
- Use of hormone replacement therapy
- Use of oestrogen containing contraceptive therapy
- Varicose veins with phlebitis
- Critical care admission

NICE recognised bleeding risk factors:

- Active bleeding
- Aquired bleeding disorders
- Concurrent use of anticoagulants known to increase the risk of bleeding
- Lumbar puncture/episdural/spinal anaesthesia expected within the next 12 hours
- Lumbar puncture/episdural/spinal anaesthesia within the last 4 hours
- Acute stroke
- Thrombocytopaenia (platelets <75*10^9/L)
- Uncontrolled systolic hypertension (230/120mmHg or higher)
- Untreated inherited bleeding disorders (such as haemophilia or von Willebrands disease)

Appendix 2

Contraindications to Anti Embolism stockings

- suspected or proven peripheral arterial disease
- peripheral arterial bypass grafting
- peripheral neuropathy or other causes of sensory impairment
- any local conditions in which stockings 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.

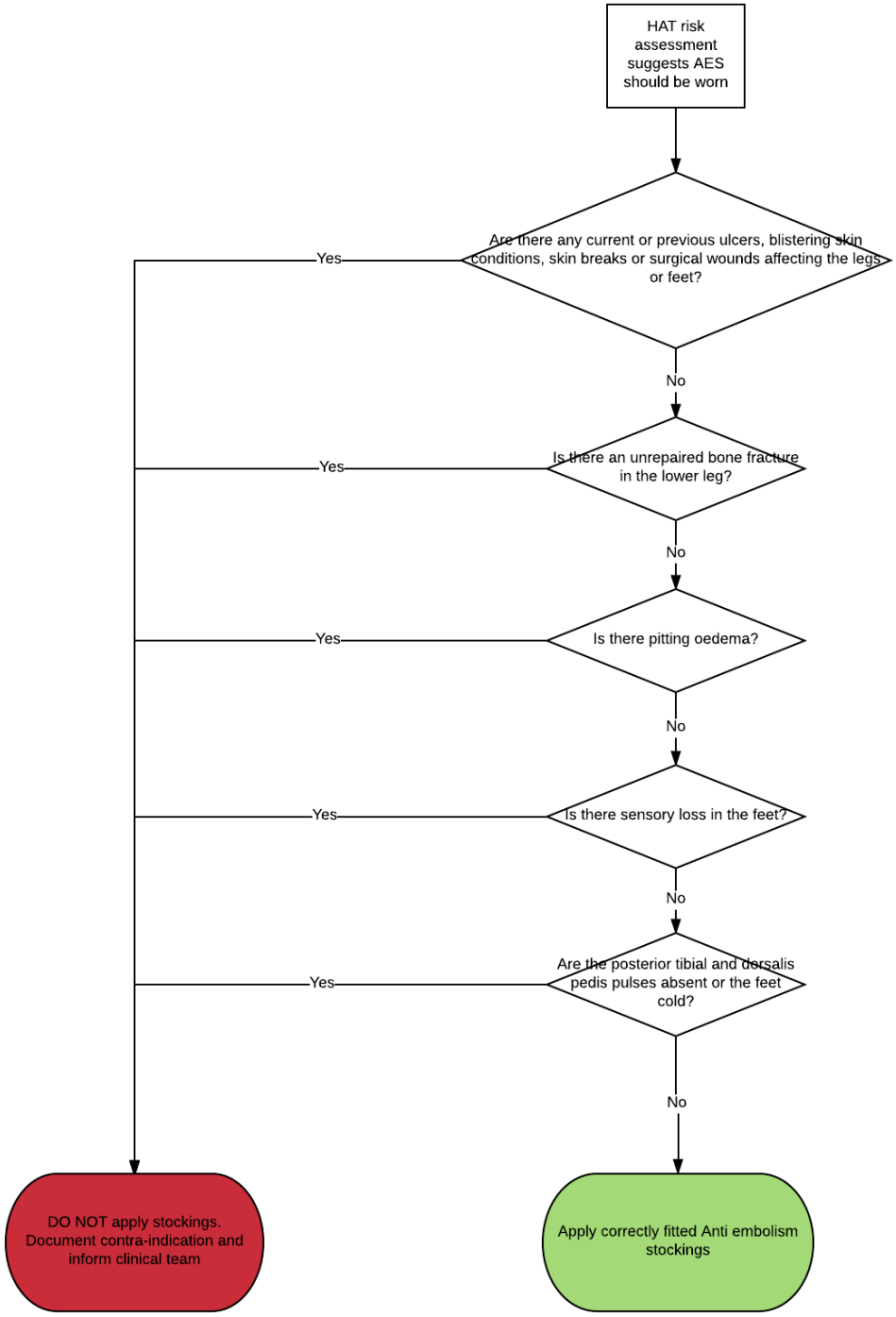
Protocol for fitting and follow up of Anti Embolism Stockings (AES)

- Patients will be informed of the recommendation to wear graduated support stockings and given an information leaflet
- The patient's leg will be measured in accordance with the manufacturer's instruction and an appropriate size stocking fitted.
- The ankle circumference and the size of stocking supplied will be documented in the care record.
- 30 minutes after initial AES application the legs will be checked. If there is any redness or pressure damage use of the stockings will be stopped.
- At the beginning of each shift nurses will check to ensure AES are in place and fitted appropriately i.e. no wrinkles (which can act as a tourniquet and increase the risk of DVT).
- AES will be worn for 23.5 hours per day; during the half hour when they are removed the skin should be re-examined particularly over the pressure points.
- Legs will be re measured if there is new oedema or swelling. Any increase in size must be documented and new stockings supplied.

- Clean stockings will be supplied every 3 days
- Patients whose mobility is likely to be restricted after discharge may be at increased risk of DVT/PE for up to six weeks post discharge. These patients will be given two pairs of GSS and an information leaflet to take home. The GP should be informed.
- If the patient is unable to remove or apply stockings independently and no family or carer help is available, then the task should be referred to the district nursing team.
- AES should be worn until normal mobility has resumed.

Appendix 3

FLOW CHART FOR THE APPLICATION OF ANTI EMBOLISM STOCKINGS



To complement Trust Guideline: HAT POLICY
Date of Review:

Appendix 4

Contraindications for IPC devices
• Severe peripheral vascular disease. • Severe congestive cardiac failure • Confirmed acute deep vein thrombosis • Immobilized for > 72 hours without pharmacological prophylaxis; this should be taken in context regarding DVT risk and is not an absolute contraindication. Late application can still be considered by risk assessment on a per patient basis, provided the treating clinical team are reasonably confident regarding the absence of acute DVT. • Any local condition that the garment could disturb, including: gangrene, a recent skin graft, dermatitis or untreated, infected leg wounds

Appendix 5

Contraindications to rivaroxaban
Active bleeding Pregnancy Breast feeding Epidural catheter placement or other planned/recent spinal or neurosurgical interventional procedure
Cautions in use of rivaroxaban
Bleeding disorders Concomitant use of drugs that increase risk of bleeding Severe hypertension Active or recent gastrointestinal ulceration Vascular retinopathy Recent surgery Hepatic impairment Renal impairment – avoid if eGFR<15mls/min Multiple drug interactions – see additional trust guidance and refer to the BNF or Summary of Product Characteristics

Appendix 6

Double click on the template box below to view a word document

Hospital Associated Venous Thromboembolism

Division & investigator

Patient number:

Date of VTE: DVT or PE?

Did event occur as an inpatient (> 48 hours)

Date of previous relevant stay

Was patient appropriately risk assessed (within 24 hours)? If not, why not?

Was patient prescribed appropriate thromboprophylaxis? If not, why not?

Was thromboprophylaxis given reliably? If not why not?

Were there any complications from thromboprophylaxis?

If the patient's situation changed was their VTE risk re-assessed?

When was thromboprophylaxis stopped? Was this appropriate?

Was the patient a candidate for extended prophylaxis on discharge? If yes did this occur? /

Could this VTE have been avoided? /

What steps would you recommend to address any shortcomings? /

Appendix 7

How to complete a HAT assessment:

Completing a HAT assessment.pptx

Document Control Information

Prevention of Hospital Acquired Thrombosis Policy	Salford Royal NHS Foundation Trust University Teaching Trust safe • clean • personal
Lead Author: The Thrombosis Committee **Additional authors:** Daniel Horner, Janet Hegarty **Document owner:** Daniel Horner **Contact details:** Daniel.horner@srft.nhs.uk / 68793	
Classification: Clinical policy **Scope:** Trust-wide **Applies to:** All staff **Document for public display:** Yes	
Keywords: Hospital Acquired Thrombosis, Deep Vein Thrombosis, Pulmonary Embolism, Venous Thromboembolism, Risk, Thrombosis, prophylaxis, mechanical thromboprophylaxis, pharmacological thromboprophylaxis, tinzaparin, enoxaparin,	
Associated Documents: Investigation and Management of Venous Thromboembolic Disease (including deep vein thrombosis and pulmonary embolism) P130213(01) Prevention of Hospital Acquired Thrombosis (HAT) Leaflet MED31(16) Oral Anticoagulation Guidelines P130211(02) Anticoagulation guidelines – Unfractionated Heparin P130211 (01)	
Unique Identifier: TC36(07) **Issue number:** 6.2 **Replaces:** 6.1 **Authorised by:** MMG / CEC **Authorisation date:** 11/7/2017 **Next review:** July 2019	

Policy Implementation Plan

This policy will be implemented and sustained through the Trust Thrombosis Committee.

A number of policy education and implementation measures already exist through this committee, including mandatory online learning for new starters, medicines management workbooks, national e-learning modules and trust guidelines. In addition, the Thrombosis Committee now has multidisciplinary representation to cascade this work through the divisional hierarchy in addition to nominated

'thrombosis champions' who can disseminate this policy document. All these measures will be utilised to champion and embed this revised policy document.

This policy is also being implemented alongside a new EPR structured note designed to provide decision support, prescribing guidance, links to prescribing and validation options. This project is badged under the Global Digital Excellence agenda and as such is receiving EPR operational and education/training support. This support is already agreed and arranged to co-incide with policy revision launch.

Monitoring and Review

The processes described in this policy will be subject to regular review by the Trust Thrombosis Committee, who meet quarterly. A comprehensive dashboard incorporating measures of quality and safety for both thrombosis and anticoagulation is reviewed at all meetings.

The performance of risk assessment will be electronically captured using the transparent HAT assessment prodecapo measure. The appropriateness of thromboprophylaxis prescription will be assessed with a point prevalence audit to be carried out regularly on a pharmacy audit cycle.

Completed Root Cause Analysis of cases of Hospital Associated Thromboembolism will be reviewed by the VTE committee once every quarter. The Venous Thromboembolism Committee will report to the Clinical Effectiveness committee on an annual basis with a summary of progress and a report on thematic analysis and shared learning from these events.

Endorsement

Endorsed by:		
Name of Lead Clinician/Manager or Committee Chair	**Position of Endorser or Name of Endorsing Committee**	**Date**
Neurosurgical Governance committee	Charlotte Hammerbeck-Ward	January 2017
Trauma and Orthopaedic Governance committee	Zaf Naqui	January 2017
Thrombosis committee	Daniel Horner / Janet Hegarty	April 2017
General Surgical Governance	Helen Doran	May 2017
Major Trauma Governance Group	Stuart Wildman / Martin Smith / Anthony Clayson	June 2017
Renal Pharmacist/Consultant working group	Elizabeth Willis / Janet Hegarty	June 2017
Medicines Management Group	Paul Chadwick	June 2017
Clinical Effectiveness Committee	Pete Turkington	July 2017

Screening Equality Analysis Outcomes

The Trust is required to ensure that all our policies/procedures meet the requirements of its service users, that it is accessible to all relevant groups and **furthers the aims of the Equality Duty for all protected groups by age, religion/ belief, race, disability, sex, sexual orientation, marital status/ civil partnership, pregnancy/ maternity, gender re-assignment. Due consideration may also be given to carers & socioeconomic factors.**

Have you been trained to carryout this assessment? If 'no' contact Equality Team 62598 for details.	
Name of policy or document : Policy for the Prevention of Hospital Acquired Thrombosis **Key aims/objectives of policy/document: Provide clear standards for the assessment and management of patients at risk of Hospital Acquired Thrombosis.** (impact on both staff & service users)	
1) a) Who is this document or policy aimed at?	All trust staff
2) a) Is there any evidence to suggest that your 'end users' have different <u>needs</u> in relation to this policy or document; (e.g. health/ employment inequality outcomes) (**NB If you do not have any evidence you should put in section 8 how you will start to review this data)**	No
3) a) Does the document require any decision to be made which could result in some individuals receiving different treatment, care, outcomes to other groups/individuals?	No
b) If yes, on what basis would this decision be made? **(It must be justified objectively)**	n/a
4) a) Have you included where you may need to make reasonable adjustments for disabled users or staff to ensure they receive the same outcomes to other groups ?	No

5) a) Have you undertaken any consultation/ involvement with service users or other groups in relation to this document?	Multiple specialty reviews.
b) If yes, what format did this take? Face/face or questionnaire? (please provide details of this)	
c) Have any amendments been made as a result?	
6) a) Are you aware of any complaints from service users in relation to this policy?	No
b) If yes, how was the issue resolved? Has this policy been amended as a result?	

7) a) To summarise; is there any evidence to indicate that any groups listed below receive different outcomes in relation to this document?

	Yes		No	unsure
	Positive	**Negative***		
Age			No	
Disability			No	
Sex			No	
Race			No	
Religion & Belief			No	
Sexual orientation			No	
Pregnancy & Maternity			No	
Marital status/civil partnership			No	
Gender Reassignment			No	
Carers *1			No	
Socio/economic2**			No	

1: That these two categories are not classed as protected groups under the Equality Act.

2: Care must be taken when giving due consideration to socio/economic group that we do not inadvertently discriminate against groups with protected characteristics

Negative Impacts

*If any negative impacts have been identified you must either a) state below how you have eliminated these within the policy or b) conduct a full impact assessment:

8) How will the future outcomes of this policy be monitored? **Subject to review every 2 years and consideration by trust thrombosis committee of impact on a quarterly basis.**

9) **If any negative impact has been highlighted by this assessment, you will need to undertake a full equality impact assessment:**

Will this policy require a full impact assessment? No
(if yes please contact Equality Team, 62598/67204, for further guidance)

High/Medium/Low Type/sign Daniel Horner
date: July 2017