

CP58

Prevention and Treatment of Venous Thromboembolism

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Attachments:

Attachment 1a	Risk assessment form (paper version)
Attachment 1b	ED lower limb risk assessment tool
Attachment 2a	NICE clinical guideline NG89 Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism
Attachment 2b	NICE clinical guideline NG158 Venous and thromboembolic diseases: diagnosis, management and thrombophilia testing
Attachment 3a	Trust protocol on Prevention of Thromboembolism
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1.0 Policy Statement

The purpose of this policy is to provide clear guidance for all health professionals in the prevention, detection, and treatment of venous thromboembolism (VTE) – a major cause of avoidable deaths in hospital. The major goals are to reduce the incidence of VTE in the Trust and to reduce the morbidity and mortality from confirmed cases.

Specific aims are:

- To ensure patients are risk assessed for VTE using a National Institute for Health and Care Excellence (NICE) / Department of Health (DoH) approved tool.
- To ensure NICE compliant chemical and mechanical prophylaxis are offered to patients based on the risk assessments in all departments.
- To focus training and education of medical and nursing staff in VTE prevention and prophylaxis.
- To provide information to patients on admission and discharge on VTE recognition.
- To measure VTE outcomes and to investigate all hospital associated cases occurring within the Trust.
- To ensure that management of confirmed cases of VTE within the Trust is consistent with best practice and current national guidelines.

2.0 Definitions

Electronic data system - an electronic patient observation system that has a module for completing VTE risk assessments (e.g. VitalPac, BadgerNet, ePMA).

Hospital Associated VTE - a VTE episode that occurs whilst a patient is in hospital, or if the patient is admitted and diagnosed with VTE having had a hospital admission in the prior 90 days.

VTE - a deep venous thrombosis (DVT) and pulmonary embolism (PE) represent different manifestations of the same clinical entity referred to as a venous thromboembolism. Venous thrombosis occurs when red blood cells, fibrin and, to a lesser extent, platelets and leukocytes, form a mass within a vein. A pulmonary embolism results when a piece of thrombus detaches from a vein wall, travels to the lungs, and lodges within the pulmonary arteries.

3.0 Accountabilities

The Medical Director as the sponsor of this policy, is accountable for policy development and regular review (no longer than three-yearly intervals, or sooner if dictated by changes in national guidance), and for ensuring final approval is obtained from the Trust management team.

The Trust VTE group is accountable for initial ratification of the policy, and for monitoring compliance through commissioned clinical audits. It is responsible for

the ongoing monitoring and development of practice in VTE prevention and treatment in the Trust. It is also responsible for sharing the Trust VTE risk assessment compliance with all Divisional Medical Directors, Clinical Directors, Matrons and Directorate Managers on a monthly basis.

The group is authorised by the Quality and Safety Oversight Group (QSOG) to review all documents relating to its terms of reference and that its reports inform the Trust managerial decision-making processes. The group provides QSOG a report every six months, in which any significant, recurring or unresolved concerns will be highlighted.

The VTE group will appoint subgroups as required to review/ implement any required changes in practice and policy within the Trust in VTE.

Divisions are accountable for engagement with the VTE Group, oversight of divisional performance, and reporting progress against agreed improvement actions.

Directorates are accountable for addressing identified areas of non-compliance, implementing actions arising from audits, reviews and monitoring activity, and demonstrating improvements have been embedded and sustained.

Anticoagulation Care Team (ACT) responsible for undertaking agreed monitoring, audit and review activities, reporting findings, themes and risks to the VTE Group.

Healthcare Professions leaders and managers (medical, nursing, midwives and other allied healthcare professionals) are accountable for distributing this policy to all relevant staff within their spheres of responsibility.

All relevant healthcare staff are accountable for their own compliance with the policy, and for reporting any incidents of non-compliance (whether this has had an adverse effect or not).

Admitting Team: the admitting team (which may comprise medical staff, physicians associates, registered midwives, advanced nurse practitioners and non-medical prescribers) must complete risk assessments on admission and ensure that appropriate thromboprophylaxis is prescribed and administered.

4.0 Policy Detail

The prevention, detection and treatment of VTE is a complex process. The policy therefore affects all clinical areas of the Trust. There are 3 aspects of the policy: risk assessment; management of prevention of VTE; management of confirmed cases of VTE.

As an overriding principle, all patients aged 16 years and over falling in one of the categories below will require a VTE risk assessment:

- admitted to The Royal Wolverhampton NHS Trust (RWT) or undergoing treatment at an RWT collaborative site (VTE risk assessment to be completed within 4 hours of admission)
- waiting for an admission within the emergency department (VTE risk assessment to be completed within 12 hours of arrival to the department)
- discharged from hospital (including from the Emergency Department (ED)) with lower limb devices such as plaster casts and braces.

Where applicable, appropriate prescription and administration of thromboprophylaxis within 14 hours of admission or decision to admit (DTA) is essential, this may require a stat dose being prescribed.

Electronic/Paper VTE risk assessments and prevention.

An electronic VTE risk assessment tool is available, and this must be used for all patients admitted to clinical areas within the Royal Wolverhampton NHS Trust where an electronic data system is installed. Clinical areas without an electronic data system must use paper risk assessments. A paper risk assessment is included as Attachment 1a with an equivalent available on the electronic data systems. The ED lower limb risk assessment tool is included in Attachment 1b and is aimed for assessment of patients within ED with lower limb devices, such as plaster casts and braces. Further information can be found in attachments 3a, 3b and 7.

The management of suspected and confirmed cases of VTE

The management of suspected and confirmed cases of VTE is outlined as follows:

- Trust protocol on Management of Pulmonary Embolism (Attachment 5a)
- Thrombolysis for Massive Pulmonary Embolism (Attachment 5b)
- Trust protocol for Deep Vein Thrombosis (Attachment 6)
- Trust protocol on Thromboembolic disease during pregnancy and puerperium acute management (Attachment 8)

The above documents relate to DVT and PE and do not include management of thrombosis that occurs at other sites such as CVST (cerebral venous sinus thrombosis) and splanchnic vein thrombosis.

Enoxaparin adult dosing guidelines

- Enoxaparin dosing guide (Attachment 4)

Awareness is required around the risk of dual prescribing of a DOAC and LMWH. If the patient normally receives a DOAC and will continue to receive it, do not prescribe LMWH.

Heparin Induced Thrombocytopenia

Heparin Induced thrombocytopenia (HIT) is a known complication of heparin therapy. Patients with suspected HIT must be managed as outlined in the protocol (Attachment 9a).

Patient information leaflets.

Patients must be provided with written information on VTE prevention, on admission or pre-admission. Additional leaflets are available for patients receiving chemical prophylaxis and for those using graduated compression stockings. There is a specific leaflet for people who are anticoagulated with non-vitamin K antagonist

anticoagulants. The corresponding patient information leaflets can be found on the VTE intranet page and are listed within the reference list.

Structured Audit and Learning Review

The following Trust policies are used as detailed below:

- OP 10 (Risk Management and Patient Safety Reporting Policy)
For identifying and highlighting incidents related to VTE and anticoagulation.
- GOP02 (Patient Safety Incident Response Policy)
Used to highlight learning and improvement within the Trust.

For every hospital associated VTE the anticoagulation team will complete an incident form, following which the department where the incident occurred will need to complete a HAT structured audit within 4 weeks of notification. The audit will be reviewed by the VTE Clinical Lead, and if problems in care are identified a VTE learning review will be requested.

All learning reviews will be carried out by the clinical lead for the area of primary clinical responsibility or a consultant (nominated by the clinical lead) who is not the consultant responsible for care episode resulting in the investigation.

The above process is illustrated in the flow chart in attachment 10.

The findings of the structured audits and learning reviews will be reviewed regularly by the VTE group and any themes emerging are reported to the relevant clinical area or relevant governance committee. Attachment 11 shows the structured audit and learning review tool.

5.0 Financial Risk Assessment

1	Does the implementation of this policy require any additional Capital resources	No
2	Does the implementation of this policy require additional revenue resources	No
3	Does the implementation of this policy require additional manpower	No
4	Does the implementation of this policy release any manpower costs through a change in practice	No
5	Are there additional staff training costs associated with implementing this policy which cannot be delivered through current training program or allocated training times for staff.	No
	Contractual agreements with the Integrated Care Board (ICB) are in place related to performance in the area of VTE risk assessment completion and root cause analysis. This is for information only with no financial rewards or penalties.	

	Financial penalties would apply if timescales for investigating cases of harm/death and implementing the being open policy were not adhered to	
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6.0 Equality Impact Assessment

The initial Equality Impact Assessment has identified a low impact affecting on PPC (Disability -visual impairment). To address this issue, a standard statement is included within the document control sheet of the policy offering the policy in large print where necessary.

7.0 Maintenance

The policy will be reviewed at least every three years or sooner if dictated by changes in national guidance. The Medical Director and the Trust VTE group will be responsible for coordinating the review and ratifying any amendments prior to final approval by the Trust management team.

8.0 Communication and Training

The policy will be available on the Trust intranet site on the policies page.

Staff will be alerted to any policy updates by use of the various communication channels within the Trust.

Training is provided to those staff identified in the Training Needs Analysis (TNA) in OP41, through induction programs and an e-learning package.

9.0 Audit Process

This policy will be audited as part of the cohort of mandatory Trust-wide audits. Reports will be submitted to the VTE group for discussion and identification of any areas of concern which may require action plans to improve. Additional monitoring will also take place in conjunction with contractual requirements of the integrated care board.

Criterion	Monitoring Method	Frequency	Service Actions Identified	Group/Lead
If patients are assessed for their risk of developing venous thromboembolism (VTE) including timescales for first and second assessments	Audit tool – Electronic data system / Patient case notes & paper risk assessments	Monthly reporting of risk assessment figures Monthly monitoring of timescales	Monthly report shared with directorates and divisions, whenever persistently below target it is the responsibility of the department to develop strategies for improvement in collaboration with the VTE group	VTE group ACT VTE service
Monitoring of full VTE prevention quality standards	Audit tool – InPhase	Audit frequency per ward based on compliance: ≥75% - Annually 51%-74.9% - 6 months ≤ 50.9% - 3 months	Feedback given to ward managers Plan of action by ward if compliance ≤ 51.9% twice within 12 months.	VTE group ACT VTE service Directorate governance
Hospital associated cases of VTE will be monitored	Structured audit tool	Monthly report	Hospital acquired thrombosis learning reviews	VTE group Directorates
Organisation's expectations in relation to staff training, as identified in the training needs analysis	Reviewed as per OP41 audit section	Reviewed as per OP41 audit section	Reviewed as per OP41 audit section	Reviewed as per OP41 audit section

10.0 References

British Thoracic Society guidelines for the management of suspected acute pulmonary embolism, British Thoracic Society Standards of Care Committee Pulmonary Embolism Guideline Development Group, Vol 73 supplement 2 (2018)

DH Policy Implementation on VTE Risk Assessment; day case procedure cohorts: Letter to Medical Directors from Head of West Midlands SHA, July 2010

GP02 Patient Safety Incident Response Policy

Leaflet for patients: Are you at risk of a Deep Vein Thrombosis in hospital (SPS011)

Leaflet for patients: Enoxaparin for prevention or treatment of a blood clot (WCA 2005)

Leaflet for patients: How do I use my graduated compression stockings? (SPSO18)

Leaflet for patients: Non-Vitamin K Oral Anticoagulant (NOAC) / Direct Oral Anticoagulant (DOAC) Therapy (MI_1005514)

Learn from patient safety event NHS England January 2024

National Health Service framework contractual requirements SC22

National Thrombosis Survey report by Thrombosis UK in association with getting it right first-time program September 2021

NCEPOD Know the score: A review of the quality of care provided to patients aged over 16 years with a new diagnosis of pulmonary embolism. October 2019

NICE NG89 Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism (March 2018 updated August 2019)

NICE clinical guideline 158 'Venous Thromboembolic diseases: Diagnosis, management and thrombophilia testing (March 2020 updated August 2023).

NICE NG191 COVID-19 rapid guideline: managing COVID-19 Published March 2021 updated May 2024

NICE Quality Standard 201 for diagnosis and management of thromboembolic diseases. (August 2021)

OP10 Risk Management and Patient Safety Reporting Policy

OP41 Induction and Mandatory Training Policy

OP60 Being Open Policy

“Prevention of VTE in hospitalised patients”, Department of Health publication, March 2010

The All-Party Parliamentary Thrombosis Group/ Department of Health: Venous thromboembolism prevention: a patient safety priority (June 2009)

The All-Party Parliamentary Thrombosis Group: Thrombosis: awareness, assessment, management and prevention. Third annual audit of acute NHS Hospital Trusts (2009)

The Health Select Committee publication: Report on the Prevention of Venous Thromboembolism in Hospitalised Patients (2005)

The Report of the Independent Working Group on the Prevention of Venous Thromboembolism in Hospitalised Patients (Department of Health, 2007)

Venous Thromboembolism (VTE) Risk Assessment Data Collection guidance NHS digital June 2024

Document Control

Reference Number and Policy name: CP58 Prevention and treatment of venous thromboembolism	Version: 4.0 July 2026		Status: Final	Author: VTE group Director Sponsor: Group Chief Medical Officer
Version / Amendment History	Version	Date	Author	Reason
	1.0	Dec 10	VTE lead	Introduction
	1.1	Nov 2011	VTE clinical lead	New National Guidance
	1.2	Aug 2012	VTE clinical nurse specialist	Policy Review
	1.3	Nov 2012	VTE clinical nurse specialist	Policy Review
	1.4	Sept 2013	VTE clinical lead	Minor amendments to PE & DVT Protocols
	2	Jan 15	VTE clinical nurse specialist	Policy review and update of attachments.
	2.1	July 17	VTE clinical nurse specialist	Policy review and update of attachments
	2.2	March 18	VTE clinical nurse specialist	Minor word changes updated in Attachments 3 & 4
	2.3	Sept 19	VTE clinical nurse specialist	Updated NICE guidance
	2.4	June 2020	VTE clinical nurse specialist	Extension whilst review takes place
	2.5	Oct. 2020	VTE clinical nurse specialist	Extension whilst review takes place.
	3.0	March 2021	VTE clinical nurse specialist	Policy Review

3.1	June 2022	VTE clinical nurse specialist	Minor updates to Attachment 16
3.2	July 2022	VTE clinical nurse specialist	Updates to Attachment 9
3.3	June 2024	VTE clinical nurse specialist	Extension
3.4	April 2025	ACT Matron	Extension
3.5	May 2025	VTE Clinical Nurse Specialist	Updated hyperlinks to Attachments 7 & 8
3.6	October 2025	VTE Clinical Nurse Specialist	Updated Attachment 1
3.7	Dec. 2025	VTE Clinical Nurse Specialist	Extension
3.8	July 2026	VTE Clinical Nurse Specialist	Extension
4.0	July 2026	VTE clinical lead	Policy Review
Intended Recipients: All clinical staff caring for patients over the age of 16.			
Consultation Group / Role Titles and Date: VTE group Obstetrics and gynaecology clinical lead Trauma and orthopaedics clinical lead Cardiology directorate. Medical Director October 2024 Health records group September 2020 Patient information reader group September 2024 Designated representatives from Obstetrics, Haematology and Pharmacy Medicines Management Group – July 2026			
Name and date of Trust level committee where reviewed		Group Policy Meeting: July 2026	
Name and date of final approval committee		Executive Sponsor: September 2026	

Date of Policy issue	September 2026
Review Date and Frequency (standard review frequency is 3 yearly unless otherwise indicated)	September 2029 - Every 3 years unless changes in national guidance.
Training and Dissemination: Principles incorporated in trust mandatory VTE training. Dissemination via trust intranet and staff bulletin.	
To be read in conjunction with: OP 10 Risk management and patient safety reporting policy . OP 60 being open (duty of candour) policy . GOP02 Patient safety incident response policy	
Initial Equality Impact Assessment (all policies): Completed Yes Full Equality Impact assessment (as required): Completed Yes <u>If you require this document in an alternative format e.g., larger print please contact Policy administrator 88904</u>	
Contact for Review	VTE group rwh-tr.ACT-VTE@nhs.net
Implementation plan / arrangements (Name implementation lead)	Dr A De Serio VTE clinical lead
Monitoring arrangements and Committee	VTE group
Document summary / key issues covered: This policy directs clinical staff in the processes to be followed for the prevention, management and treatment of venous thromboembolism in patients over the age of 16.	
Key Words for intranet searching purposes	Venous Thromboembolism VTE DVT Deep Vein thrombosis PE Pulmonary Embolism Anticoagulation Enoxaparin Warfarin DOACs NOACs Non-Vitamin K (NOAC) therapy Compression stockings TEDS

	Inhixa HIT Heparin Induced thrombocytopenia COVID-19
High Risk Policy? Definition: • Contains information in the public domain that may present additional risk to the public e.g. contains detailed images of means of strangulation. • References to individually identifiable cases. • References to commercially sensitive or confidential systems. If a policy is considered to be high risk it will be the responsibility of the author and director sponsor to ensure it is redacted to the requestee.	No

Risk Assessment for Venous Thromboembolism (VTE)

All patients should be risk assessed on admission to hospital. Patients should be reassessed within 24 hours of admission and whenever the clinical situation changes.

Surname	NHS No
Forename	
Address	DOB
Postcode	(or affix patient label)

Step One

Assess all patients admitted to hospital for level of mobility (tick one box). All surgical patients, and all medical patients with significantly reduced mobility, should be considered for further risk assessment.

Step Two

Review the patient-related factors shown on the assessment sheet against thrombosis risk, ticking each box that applies (more than one box can be ticked).

Any tick for thrombosis risk should prompt thromboprophylaxis according to NICE guidance.

The risk factors identified are not exhaustive. Clinicians may consider additional risks in individual patients and offer thromboprophylaxis as appropriate.

Step Three

Review the patient-related factors shown against bleeding risk and tick each box that applies (more than one box can be ticked).

Any tick should prompt clinical staff to consider if bleeding risk is sufficient to preclude pharmacological intervention.

Guidance on thromboprophylaxis is available at:

Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism.

NICE guideline (NG89) published 21 March 2018, last reviewed 18 September 2024

www.nice.org.uk/guidance/ng89

Risk Assessment For Venous Thromboembolism (VTE)

Mobility - all patients (tick one box)			
Surgical patient		Medical patient expected to have ongoing reduced mobility relative to normal state	
		Medical patient NOT expected to have significantly reduced mobility relative to normal state	
Assess for thrombosis and bleeding risk below			Risk assessment now complete

Thrombosis Risk

Patient Related	Tick	Admission Related	Tick
Active cancer or cancer treatment		Significantly reduced mobility for 3 days or more	
Age > 60		Hip or knee replacement	
Dehydration		Hip fracture	
Known thrombophilias		Total anaesthetic + surgical time > 90 minutes	
Obesity (BMI >30 kg/m ²)		Surgery involving pelvis or lower limb with a total anaesthetic + surgical time > 60 minutes	
One or more significant medical comorbidities (eg heart disease;metabolic,endocrine or respiratory pathologies;acute infectious diseases; inflammatory conditions)		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			
Varicose veins with phlebitis			
Pregnancy or < 6 weeks post partum (see NICE guidance for specific risk factors)			

Bleeding Risk

Patient Related	Tick	Admission Related	Tick
Active bleeding		Neurosurgery, spinal surgery or eye surgery	
Acquired bleeding disorders (such as acute liver failure)		Other procedure with high bleeding risk	
Concurrent use of anticoagulants known to increase the risk of bleeding (such as warfarin with INR >2)		Lumbar puncture / epidural / spinal anaesthesia expected within the next 12 hours	
Acute stroke (intracranial haemorrhage not yet ruled out)		Lumbar puncture / epidural / spinal anaesthesia within the previous 4 hours	
Thrombocytopenia (platelets< 75x10 ⁹ /l)			
Uncontrolled systolic hypertension (230/120 mmHg or higher)			
Untreated inherited bleeding disorders (such as haemophilia and von Willebrand's disease)			

Balance risks of VTE and bleeding. Do not offer pharmacological VTE Prophylaxis if patient has any risk factor for bleeding and risk of bleeding outweighs risk of VTE.

Refer to the NICE VTE Prophylaxis algorithm relevant to your speciality (available on Trust Intranet)

Reassess risks of VTE and bleeding within 24 hours of admission and whenever clinical situation changes, use an additional form.

Pharmacological prophylaxis given? ☐ None ☐ Reason:

Mechanical prophylaxis given? ☐

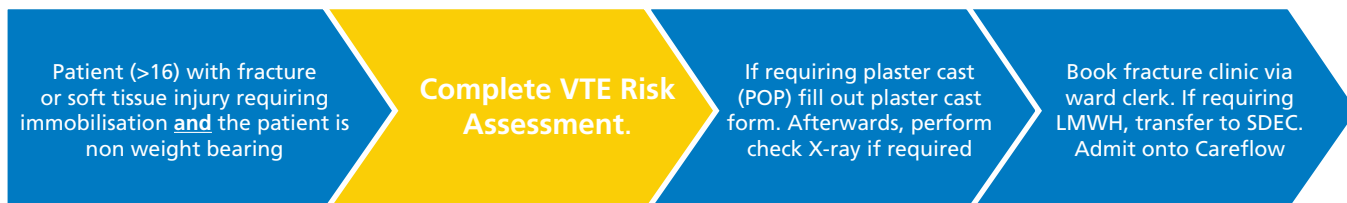
Name:..... Signature: Designation:

Date:.....Time: Stamp

Lower Limb Immobilisation Pathway (Over 16)

Surname	Unit No
Forename	NHS No
Address	DOB
Postcode	(or affix patient label)

Date:.....



VTE assessment: if yes to any on the following indications then proceed to contraindications. If there are no contraindications then prescribe prophylactic LMWH (Low Molecular Weight Heparin).

Indications for LMWH:

☐ Current smoker	☐ Known thrombophilia
☐ BMI > 30 kg/m ²	☐ Varicose veins with phlebitis
☐ Age > 60 years	☐ Heart disease
☐ Oestrogen containing contraceptive pill or HRT	☐ Metabolic / endocrine pathology
☐ Pregnancy or < 6 weeks post-partum	☐ Lung disease
☐ First degree relative with PE / DVT	☐ Inflammatory disease
☐ Acute infectious diseases	☐ Active Cancer / Current cancer treatment
☐ High Risk Injury, for example, Achilles rupture, fibula and/or tibia shaft fracture, tibial plateau fracture	☐ Previous DVT / PE

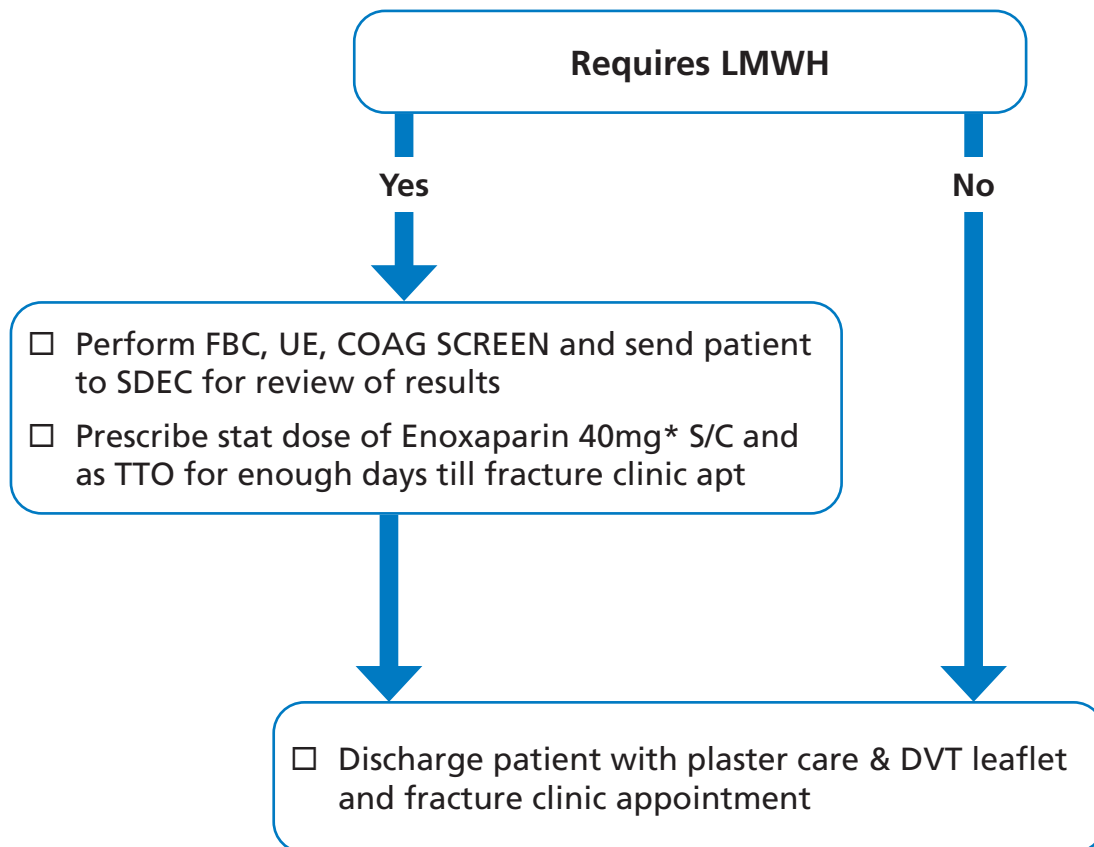
Contraindications for LMWH:

☐ Active bleeding / risk of significant bleeding	☐ Acute Stroke / haemorrhagic stroke
☐ Bleeding disorder, for example, acute liver failure	☐ Inability to supervise / monitor treatment
☐ Thrombocytopenia (platelets <50 x10 ⁹ /l)	☐ Acute infective endocarditis
☐ Untreated inherited bleeding disorders, for example, haemophilia / von Willebrand's disease	☐ Uncontrolled hypertension (>230mmHg Systolic or >120mmHg diastolic)
☐ Already on anticoagulant / INR in therapeutic range	☐ Previous heparin induced thrombocytopenia
☐ Recent / impending procedure to eye or Spine	☐ Patient refusal
☐ Coagulopathy	☐ Allergy

*Reduce dose of Enoxaparin in patients who weigh less than 50kg or with severe renal impairment (e-GFR<30ml/min) to 20mg daily. If Crcl <15 refer to Trust guidelines. Increase dose to 40mg BD for patients weighing 100 to 150kg and 60mg BD for pts >150kg.

Name:..... Signature: Designation:

Date:..... Time: Stamp



Name:..... Signature: Designation:.....
Date:..... Time: Stamp

PROPHYLAXIS AGAINST VENOUS THROMBOEMBOLISM

For the Trauma and Orthopaedic Departmental Protocol for Venous Thromboprophylaxis, refer to Attachment 3b.

VENOUS THROMBOEMBOLISM RISK ASSESSMENT

- Complete **venous thromboembolism (VTE) risk assessment** via electronic data system or, if not available, a paper copy (Attachment 1a).
- Complete **ED lower limb immobilisation pathway** (Attachment 1b) whenever appropriate
- For pregnant and postpartum patients, use obstetric risk assessment on Badgernet, as per Attachment 7.
- Using the below risk factors list, assess for presence or absence of any risk factors.
- Check for contraindications to chemical and mechanical thromboprophylaxis and bleeding risk, see “Contraindications to treatment” (page 4), then choose appropriate thromboprophylaxis.
- Prescribe prophylaxis on the prescription chart (or EPMA) considering the time of prescription and, if necessary, prescribe a stat dose. Thromboprophylaxis should commence as soon as possible and always within 14 hours of admission or decision to admit (DTA).
- Give information leaflet on VTE prevention to patient on admission and discharge – document that this has been given to the patient.

RISK FACTORS

- Age >60 yr
- Obesity (BMI >30 kg/m²)
- Personal/family history of Deep Vein Thrombosis (DVT) / Pulmonary Embolism (PE)
- Pregnant or postpartum
- Current use of combined contraceptive pill or Hormone Replacement Therapy (HRT)
- Varicose veins with phlebitis
- Active cancer or ongoing cancer treatment
- Medical patients with reduced mobility ≥3 days
- Medical comorbidities (e.g. dehydration and cardiac, metabolic, endocrine, respiratory, acute infectious or inflammatory conditions)
- Acute surgical patient with inflammatory or intra-abdominal condition
- Surgical procedure lasting >90 min
- Surgery involving pelvis or lower limb lasting >60 min
- Surgical patient if significant immobility is expected
- Critical care admission
- Inherited thrombophilia (hyperhomocysteinaemia, protein C, S or antithrombin deficiency, Factor V Leiden or prothrombin 20210A gene mutation)
- Any of the following:
 - antiphospholipid syndrome
 - Behçet’s disease
 - myeloproliferative disease
 - nephrotic syndrome
 - paraproteinaemia

- paroxysmal nocturnal haemoglobinuria.

PROPHYLAXIS REGIMENS

Type of surgery/medical admission	Prophylaxis regimen ¹	
	At least one risk factor present	No other risk factor present
Medical (including non-haemorrhagic stroke)	1	GM
Active cancer (non-ambulant patient)	1	1
Stroke (haemorrhagic)	GM/ ICD	GM/ ICD
Surgery		
Hip replacement/fracture #	5	5
Total knee replacement	4	4
Multiple trauma or active bleeding	6	6
Other orthopaedic surgery #	3	2
Lower limb plaster cast #	3	GM
Cancer surgery (abdomen/pelvis)	5	5
GI/bariatric surgery (procedure lasting >60 min)	3	2
Laparoscopic surgery/Day surgery	3	2
Spinal surgery (unless patient has ruptured vascular malformation, not secured)	6	2
Cardiac surgery (unless patient already anticoagulated)	3	2
Thoracic surgery	3	2
Gynaecological surgery (excl. caesarean section)	3	2
Major urological surgery	3	2
Vascular surgery (for patients being transferred to RHH) and other local procedures	3*	2
Assess risks and benefits of thromboprophylaxis for each patient and exercise clinical judgement		

GM = General measures

MP = Mechanical prophylaxis with graduated compression stockings (***unless contraindicated e.g. PVD, neuropathy**) or Intermittent Compression Device [ICD] if preferred by the clinician).

LMWH = Low molecular weight heparin

Regimen	Suggested prophylaxis
1	GM + LMWH - consider minimum of 7 days LMWH for acutely ill medical patients if risk of VTE outweighs risk of bleeding
2	GM + MP
3	GM + MP + LMWH (until mobile ~ 5–7 days)
4	GM + MP + LMWH* for 14 days
5	GM + MP + LMWH* for 28 days
6	GM + MP + LMWH (start 48 hr post-op and only when CVS stable and clotting normal)
<i>*Instead of LMWH, Dabigatran, Rivaroxaban, Apixaban or Edoxaban can be used for thromboprophylaxis after hip/knee replacement surgery</i> # see attachment 3b Trauma and Orthopaedic Departmental Protocol for Venous Thromboprophylaxis	

General measures (GM)

- Do not allow patient to become dehydrated.
- Encouragement to mobilise early if clinically safe.

Surgical patients

- If due for afternoon surgery, consider IV fluids but ideally ensure they take oral clear fluids liberally until 2 hours before surgery.
- If appropriate, consider using regional anaesthesia (risk of VTE higher with general anaesthesia).
- Encourage patient to mobilise.
- if immobilised, arrange leg exercise as soon as possible after surgery.

Graduated compression stockings

- Unless contraindicated (see below) offer **all surgical patients** class 2 anti-embolism stockings on admission.
- Patients should be measured and fitted in accordance with manufacturer's guidelines.
- Show patient how to wear stockings correctly and monitor their use by using a care plan for patients prescribed graduated compression stockings.
- Encourage patient to wear anti-embolism stockings from admission until returning to their usual level of mobility.

Intermittent compression devices

- Unless contraindicated (see below) intermittent compression devices maybe used as an alternative to stockings and in high-risk cases alongside stockings.
- Patients should be measured and fitted in accordance with manufacturer's guidelines.
- Monitor their use by using a care plan.
- Encourage patient to use them for as much of the time as is possible and practicable, both when in bed and when sitting in the chair (or as per attachment 16 Trauma and Orthopaedic departmental protocol for venous thromboprophylaxis).

CONTRAINDICATIONS TO TREATMENT

Graduated compression stockings

- Massive oedema of the leg or pulmonary oedema from congestive heart failure
- Severe arteriosclerosis or other ischemic vascular disease
- Peripheral vascular disease (proven or suspected)

- Neuropathy
- New CVA
- Extreme leg deformity
- Local leg condition – dermatitis, gangrene or recent skin graft
- Allergy to material.

Intermittent compression devices

- Severe arteriosclerosis or other ischemic vascular diseases
- Known or suspected deep vein thrombosis
- Severe cardiac congestion
- Local leg conditions – gangrene, untreated, infected leg wound, recent skin graft or dermatitis
- Allergy to material
- Do not use with patients who are confused and at risk of falls.

Low molecular weight heparin (LMWH)

- Active bleeding
- Risk of significant bleeding
- Platelet count $<50 \times 10^9/L$
- Coagulopathy
- Known bleeding disorder
- Allergy to heparin/LMWH
- Haemorrhagic stroke
- Renal impairment (reduced dose LMWH or UFH – see **IV unfractionated heparin** guideline)
- Previous heparin induced thrombocytopenia
- Anticoagulated with INR in therapeutic range
- Uncontrolled hypertension (>230 mmHg systolic or >120 mmHg diastolic)
- Acute infective endocarditis
- Planned lumbar puncture within 12 hours.

If LMWH is contraindicated, prescribe anti-embolism stockings, or if stockings also contraindicated, intermittent compression device. Where both chemical and mechanical prophylaxis is contraindicated then adequate hydration and fluid balance monitoring is mandatory.

Precautions – LMWH

- If patient normally receives a vitamin K antagonist anticoagulant and INR sub-therapeutic commence treatment dose LMWH until INR in range for 2 consecutive days.
- If patient normally receives a DOAC and will continue to receive it do not prescribe LMWH
- Monitor for any bleeding.
- If renal function deteriorates, review dose of LMWH accordingly or use UFH.
- **Do not** administer LMWH within 12 hr of inserting or withdrawing a spinal/epidural catheter, lumbar puncture or following deep peripheral nerve block.

For more guidance on dosing enoxaparin see Attachment 4.

Patients suspected/confirmed COVID-19

For guidance on enhanced thromboprophylaxis for patients suspected or confirmed COVID-19 see policies and guidance within the VTE intranet page.

Trauma and Orthopaedic Departmental Protocol for Venous Thromboprophylaxis

1.0 Policy Statement

A VTE risk assessment should be completed on the electronic data system within the trust agreed time frames on all T&O patients. The outcome of this assessment should be considered on an individual basis and appropriate treatments should be put in place to minimize the risk of VTE where appropriate.

For patients with a significant past history of unprovoked thrombosis, prior post-surgical VTE episodes or other risk factors for VTE, prophylaxis should be in the form of formal anticoagulation (choice and duration at Orthopaedic Consultant discretion with guidance from Haematology where appropriate).

Reference should be made to the appropriate trust guidelines on the peri-operative management of patients who are taking other forms of anticoagulant medication at the time of admission/ treatment.

It is recognized that the under 16 years paediatric population not routinely be considered for VTE prophylaxis but in situations where body morphology and reasons for admission reflect a more adult pattern, prophylaxis may be considered at the discretion of the admitting consultant.

2.0 Accountabilities

The Orthopaedic Directorate is accountable for protocol development and regular review (no longer than three-yearly intervals, or sooner if dictated by changes in national guidance), and for ensuring final approval is obtained from the Divisional Management Team.

3.0 Protocol Detail

VTE prophylaxis for patients who have undergone a Total Hip Replacement:

28 days Low Molecular weight heparin (LMWH).

Intermittent compression devices to be worn at all times for the first post-operative night, and thereafter whilst in/on bed until discharged.

With the advent of various NOACs (oral anticoagulants), and recent changes to NICE guidance relating to the use of aspirin, it is recognized that these are alternative means of prophylaxis that are available. Having considered the licensing and dosing arrangements for these agents, as well as the wish to provide a uniform policy across the trauma and

elective pathways, these will not routinely be considered as the first line agents. In situations where the standard protocols are not deemed reasonable these agents are available and are acceptable for use within the department.

In situations where porcine based medications (ie enoxaparin) are not acceptable to patients Fondaparinux will be the available alternative for the same duration.

Wherever alternative agents are being considered prescribers and consultants are reminded to check dosing, licensing and indications carefully as these often differ significantly for orthopaedic practice and conditions such as AF/stroke.

VTE prophylaxis for patients who have undergone a Total Knee Replacement:

14 days low molecular weight heparin.

Intermittent compression devices to be worn over night on the first post-operative night and thereafter whilst in/on the bed until discharged. A graduated compression stocking may also be used on the operative leg in conjunction with intermittent compression devices to reduce limb swelling.

With the advent of various NOACs (oral anticoagulants) and recent changes to NICE guidance relating to the use of aspirin it is recognized that these are alternative means of prophylaxis that are available. Having considered the licensing and dosing arrangements for these agents, as well as the wish to provide a uniform policy across the trauma and elective pathways, these will not routinely be first line agents. In situations where the standard protocols are not deemed reasonable these agents are available and are acceptable for use within the department.

In situations where porcine based medications (ie enoxaparin) are not acceptable to patients Fondaparinux will be the available alternative for the same duration.

Wherever alternative agents are being considered prescribers and consultants are reminded to check dosing, licensing and indications carefully as these often differ significantly for orthopaedic practice and conditions such as AF/stroke.

Other Elective Surgical Procedures:

For elective surgical procedures lasting greater than 1 hour, consideration should be given to chemical and mechanical prophylaxis.

For upper limb surgery where the patient is in a beach chair position for prolonged periods, consideration should be given to chemical and mechanical prophylaxis.

For patients immobilized in POP for long periods the risk of haematoma formation and wound related complications should be balanced against those of VTE prophylaxis. This

decision will be at the Consultant's discretion. Prolonged non weight bearing and above knee immobilisation are considered to factors that increase the risk of VTE episodes associated with cast immobilisation.

Spine Surgery:

Where there are concerns relating to potential epidural haematoma formation, chemical prophylaxis should be considered with caution and mechanical options are more appropriate.

Trauma Patients:

Neck of Femur Fractures:

Low molecular weight heparin for 28 days.

Intermittent compression devices to be worn at all times for the first post-operative night, and thereafter whilst in/on bed until discharged.

If there are any issues regarding confusion or unsteadiness, intermittent compression devices should be discontinued given the risk of falling.

Oral agents are not licensed in these circumstances.

Other Lower Limb Fractures:

Consideration should be given to pharmacological VTE prophylaxis with LMWH for people with lower limb immobilisation where the risk of VTE outweighs their risk of bleeding. Consider stopping prophylaxis if lower limb immobilisation continues beyond 42 days.

The management decision rests with the individual consultant. In patients with family history, previous DVT, malignancy, non-weight bearing status, long leg and equinus casts and raised BMI consideration should be given to prophylaxis.

For outpatients in POP consideration of VTE prevention should be documented on fracture clinic plaster form.

For non-POP patients the risk of VTE should be balanced against the risk of treatment in all cases and clinical decision made documented in patients' medical notes.

Spine Injuries:

Anticoagulant treatment should be delayed until neurological deterioration is excluded. Mechanical prophylaxis should be considered from the time of admission, intermittent compression devices would routinely be considered most appropriate.

Paediatric Patients:

For patients under 16 years of age, VTE prophylaxis is not routinely required unless there are significant risk factors (previous DVT/PE) (coagulopathy/malignancy). Discussion between a paediatric haematologist and the admitting consultant should take place where there is any concern.

In all cases both elective and trauma, the benefits of VTE prophylaxis should be considered carefully and weighed against the risk. Flexibility and clinical judgment will need to be exercised where necessary on an individual basis.

Day Case Surgery:

Consideration should be given to weight bearing status and the level of immobility post operatively. Upper limb procedures that do not restrict the level of mobility at all require no prophylaxis. For lower limb procedures where mobility maybe impaired any VTE assessment and treatment decisions should be documented clearly. Ultimately the need for treatment will be at the Consultant's discretion.

Contraindications:

In situations where intermittent compression devices are contraindicated it is likely that TED stockings will also be inappropriate. The use of intermittent electrical stimulation can be considered as an alternative if there are no contraindications to its use.

4.0 Equipment Required

No additional equipment is required

5.0 Training

Local induction training will be used to ensure all new staff are aware of the detail of this local protocol. Updates and changes to the guideline will be communicated through directorate governance meetings to staff within the departments

6.0 References

NICE guideline NG89 Venous thromboembolism in over 16s:reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism March 2018

Enoxaparin (Inhixa®) - Adult dosing guidelines

ALWAYS weigh patient – DO NOT estimate body weight or rely on patient's own approximation.

1. Venous Thromboembolism (VTE) Thromboprophylaxis.

In pregnancy refer to CP58 Attachment 7 Antenatal and Postnatal Thromboprophylaxis.

For patients with suspected or confirmed COVID-19 refer to guidance on the VTE intranet page under policies and guidance.

VTE thromboprophylaxis should commence as soon as possible and within 14 hours of admission (timings for surgical procedures may need to be considered)

Weight	Renal function Method	Renal function with eGFR>30 (chronic kidney disease (CKD) 1, 2, 3)	Renal function abnormal CKD 4 or 5 [#] or eGFR<30)
50-100 Kg	Calculated estimated Glomerular Filtration Rate (eGFR) (CKD-EPI method) automatically provided by RWT lab	Enoxaparin 40mg (4,000 IU) Once Daily (OD)	Enoxaparin 20mg (2,000 IU) OD if eGFR 15- 30 [#]
101-150 Kg*		Enoxaparin 40mg (4,000 IU) Twice Daily (BD)*	Enoxaparin 20mg (2,000 IU) BD/40 mg (4,000 IU) OD if eGFR 15- 30*, [#]
>150 Kg *		Enoxaparin 60mg (6,000 IU) BD*	Enoxaparin 30mg (3,000 IU) BD if eGFR 15- 30 *, [#]
<50 Kg *	Calculated Creatinine clearance †	Enoxaparin 20mg (2,000 to 4,000 IU) OD *	Enoxaparin 20mg (2,000 IU) OD*

* - consider factor Xa levels (4 hours post dose) to guide dosing if clinical concerns or extremes of age or body weight

† - Creatinine Clearance (Cr Cl) can be calculated using the Cockcroft-Gault formula using this link [Creatinine Clearance \(Cockcroft-Gault Equation\)](#)

- Enoxaparin is not licensed below Cr Cl < 15 (except for prevention of thrombus formation in haemodialysis patients) and is to be used on a case-by-case basis weighing up pros and cons due to lack of available data.

NB- the BNF recommends that pre-surgical dosing should occur at a gap of 12 hours or more from planned surgery in high-risk patients and at least 2 hours prior in moderate risk patients. However, given the practicalities surrounding pre-operative care, this aspect has been left to the discretion of individual professionals. It may not be feasible to use anything other than the second option in the majority of patients being admitted on the morning of surgery. Preoperative enoxaparin is contraindicated within 12 hours of spinal or epidural anaesthesia.

History of Heparin-Induced Thrombocytopenia (HIT) (>100 days)

Use of enoxaparin sodium in patients with a history of immune mediated HIT within the past 100 days or in the presence of circulating antibodies is contraindicated. Circulating antibodies may persist several years.

Enoxaparin sodium is to be used with extreme caution in patients with a history (>100 days) of (HIT) without circulating antibodies. The decision to use enoxaparin sodium in such a case must be made only after a careful benefit risk assessment and after non-heparin alternative treatments are considered (e.g. danaparoid sodium).

2. For Pulmonary Embolism (PE) and/or Deep Vein Thrombosis (DVT) treatment

In pregnancy refer to CP58 Attachment 8 Thromboembolic disease during pregnancy and puerperium acute management.

Once decision to treat has been made give enoxaparin 1 mg/kg BD subcutaneous (s/c).

Only consider the alternative, lower dose of enoxaparin of 0.75 mg/kg BD s/c for the treatment of PE if the patient is asymptomatic with an incidental finding that is non cancer related or for distal DVT with low risk of recurrence, or the patient is at higher risk of bleeding. However, this should be balanced against the likely higher risk of PE recurrence versus the 1mg/kg bd dose, especially in patients who are obese (weight >150 kg) or have cancer or recurrent VTE.

For patients with a weight >150kg, Haematology advice should be sought.

Dose adjustments for patients with severe renal failure^{\$}

Severe renal failure is defined as Cr Cl <30ml/min/m². Calculated Cr Cl should be used instead of eGFR for all instances where treatment doses are being prescribed, and renal function is not normal. Enoxaparin is not licensed below Cr Cl < 15 (except for prevention of thrombus formation in haemodialysis patients) and is to be used on a case-by-case basis weighing up pros and cons due to lack of available data. Cr Cl can be calculated using the Cockcroft-Gault formula: [Creatinine Clearance \(Cockcroft-Gault Equation\)](#).

Renal impairment dose adjustment ^{\$}. The suggested dose is 1mg (100 IU) /kg/day in those with Cr Cl 0ml/min/m² (CKD stage 4 or 5 ^{#,*} see table on page 1 for additional information).
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Inhixa care in use:

The following Inhixa syringes have a concentration of **2.5mg per 0.025ml graduation:**

- Inhixa syringes **100mg** (10,000iu) in 1.0ml
- Inhixa syringes **80mg** (8000iu) in 0.8ml
- Inhixa syringes **60mg** (6000iu) in 0.6ml

The following Inhixa syringes have a concentration of **3.75mg per 0.025ml graduation:**

- Inhixa syringes **120mg** (12,000iu/0.8ml)
- Inhixa syringes **150mg** (15,000iu/1.0ml)

Multiple syringes may be required to achieve the necessary dose

Dose rounding may also be necessary.

Points to note before administration

- Never expel the air bubble before use
- If you have difficulty reading the graduations:
Hold the grey needle shield and rotate the syringe gently to make the graduations more visible or rotate the plunger clockwise.
If you still find it difficult to read the graduation, it is possible to peel back the edge of the syringe label, but DO NOT remove the label completely.

References:

- Anticoagulation approach in morbid obesity: a comprehensive review on venous thromboembolism management [Frontiers | Anticoagulation approach in morbid obesity: a comprehensive review on venous thromboembolism management](#) Accessed 12/12/2025
- Comparing low-molecular-weight-heparin dosing for treatment of venous thromboembolism in patients with obesity [Comparing low-molecular-weight heparin dosing for treatment of venous thromboembolism in patients with obesity \(RIETE registry\) | Blood Advances | American Society of Hematology](#) Accessed 12/12/2025
- Creatinine Clearance (Cockcroft-Gault Equation) [Creatinine Clearance \(Cockcroft-Gault Equation\)](#) Accessed 05/08/2025
- Enoxaparin sodium - indications and dosing; BNF. [Enoxaparin sodium | Drugs | BNF | NICE](#) Accessed 05/08/2025
- Inhixa, Summary of Product characteristics. [Inhixa 10,000 IU \(100 mg\)/1.0 mL solution for injection - Summary of Product Characteristics \(SmPC\) - \(emc\) | 782](#) Accessed 05/08/2025
- What doses of thromboprophylaxis are appropriate for adult patients at extremes of body weight? Prepared for NHS healthcare professionals by the HAT Committee of the UK Clinical Pharmacy Association. Published June 2015

Attachment 5a (CP58)

Trust Protocol and Management of Pulmonary Embolism

Recognition and assessment

Signs and symptoms

- Dyspnoea (or worsening chronic dyspnoea)
- Pleuritic chest pain
- Cough
- Haemoptysis
- Signs of associated Deep Vein Thrombosis (DVT) (leg swelling or leg pain)
- Unexplained syncope
- Other chest pain which does not sound cardiac
- Pleural Rub
- Tachycardia
- Low grade fever
- Tachypnoea (respiratory rate > 20/min)

Risk factors

- History of immobilisation (complete bed rest for 3-4 days in previous 4 weeks)
- Recent surgery (within past 12 weeks, note type of surgery)
- Cancer (current or within past 6 months)
- Lower limb problems (immobility problems e.g. paralysis) or fracture of lower limb with immobilisation
- Pregnancy/puerperium
- Cardio-respiratory disorders (acute myocardial Infarction (MI), chronic symptomatic illness, irreversible airways disease)
- Thrombophilia (e.g. Protein S deficiency, Factor V Leiden, Lupus anticoagulant)
- Strong family history of DVT or Pulmonary Embolism (PE)
- Previous proven or current PE or DVT
- Third generation oral contraceptive pill, drugs, travel

Differential diagnosis

- Pneumonia, including atypical organisms
- Cardiac failure and acute Myocardial Infarction
- Dissection of the aorta
- Worsening of underlying lung disease including exacerbations asthma/Chronic Obstructive Pulmonary Disease (COPD)
- Malignancy involving the lungs
- Hyperventilation syndrome
- Sepsis

Investigations and diagnosis

In accordance with NICE guideline (NG) 158, people who present with symptoms and signs of PE should have a general medical history assessment, physical examination and a chest X-ray (CXR) to exclude other causes. An electrocardiogram (ECG) should be considered too.

If clinical suspicion of PE is low based on the overall clinical impression (history, examination and initial investigations) and other diagnosis are feasible, NG158 suggests considering using the pulmonary embolism rule-out criteria (**PERC**) to help determine whether any further investigations for PE are needed. The PERC rule has not been validated in people with COVID-19.

If PE is still suspected a schematic algorithm can be found on intranet under medical guideline, same day emergency care, ***Suspected Pulmonary Embolus Ambulatory Pathway and further management***.

If PE is still suspected the following actions should be completed, if not done already:

- Perform ECG and CXR
- Send blood test for Full Blood Count (FBC), Urea & Electrolytes (U&Es), Liver Function Test (LFT), International Normalised Ratio (INR) and D-dimer
- Interpret **D-dimer** according to the **age-adjusted** criteria for people aged 50 and above (D-dimer positive if the value is equal or higher than the person's age multiplied by 10, i.e. for a 65-year-old, the D-dimer cut off will be 650)
- Calculate the **two-level PE Wells score**
- Perform a pregnancy test in women below the age of 50

If PE is unlikely based on Well's score and d-dimer negative, alternative diagnosis should be sought.

If PE is likely based on Well's score and/or d-dimer, the following actions should be completed:

- Assess haemodynamic stability of the patient and escalate to senior and intensive care if appropriate.
- Calculate Pulmonary Embolism Severity Index (**PESI**) score and National Early Warning Score (NEWS) 2 to assess the suitability of outpatient management for low-risk PE, unless the patient is already admitted.
- Request computed tomography pulmonary angiogram (CTPA) or if contraindicated (allergy to contrast, high risk from irradiation, severe renal impairment) and CXR normal discuss with radiology suitability for V/Q scan as alternative imaging.
- If imaging not immediately available, patient not already admitted and low risk PE based on PESI score and NEWS2 ≤ 3 , refer to SDEC for ambulatory pathway.
- Administer interim anticoagulation with low molecular weight heparin (LMWH) or direct oral anticoagulant (DOAC), taking in consideration of renal function and any other contraindications.

Management of confirmed PE

1. General

- Administer treatment dose LMWH or DOAC if not contraindicated
- Oxygen (O₂) to maintain oxygen saturations (SaO₂) ≥ 94%
- Adequate analgesia for pleuritic pain: ibuprofen 200-400mg 6hrly (not if pregnant), codeine phosphate 30-60mg 8hrly, paracetamol 1gm 6hrly, diamorphine 2.5-5mg s/c 4hrly with suitable antiemetic (metoclopramide 10mg or cyclizine 50mg 8hrly).
- Allow right atrial pressure (i.e. JVP) to remain high if elevated
- Avoid diuretics unless senior decision maker or ICU team instructions
- Patients with clinical signs of PE severity, PESI score III-IV or RV (right ventricle) dysfunction on Echo or CTPA, should have troponin checked and being considered for 48-72h inpatient monitoring; for these patients is also preferable considering using LMWH for the first 48-72h prior to switching to DOAC.

If haemodynamic instability or life-threatening PE refer to attachment 5b

2. Anticoagulation treatment for confirmed PE

Assess for general contraindication to anticoagulation (e.g. Active bleeding, severe bleeding diathesis, recent, planned or emergency high bleeding risk surgery/procedure, major trauma, history of intracranial haemorrhage, particularly if recent ICH) and if present discuss with senior and/or haematology specialist.

Prior to initiating anticoagulation, blood test (FBC, UEs, LFTs, INR) and weight should be recorded.

Anticoagulation choice will depend on various patient specific factors.

Every patient commenced on anticoagulation needs to receive appropriate counselling, including indication to treatment, possible risk of bleeding and when/how to seek medical advice. Every patient should be provided with the anticoagulation alert card and drug specific leaflet (available on Same Day Emergency Care (SDEC) or via the Anticoagulation Care Team (ACT) in-reach service, contactable on 07775011911) and a discharge/clinic letter with the following information: the likely cause of the pulmonary embolism, whether it was provoked or unprovoked, details of follow-up appointments, any further investigations required, details of anticoagulant prescribed and its duration.

- Recurrent VTE in a patient already on anticoagulation and with good compliance require discussion with haematology for advice.
- Venous thromboembolism (VTE) in pregnant and post-partum patients (refer to attachment 8).
- Patient with severe renal impairment, Creatinine clearance (Cr Cl) <15 ml/min (chronic kidney disease (CKD) stage 4/5), using The Cockcroft and Gault formula the anticoagulant of choice is warfarin, and the renal team should be contacted. For warfarin initiation see paragraph below.

- Hepatic disease (including Child-Pugh classes B and C) associated with coagulopathy and clinically relevant bleeding risk, the anticoagulant of choice is LMWH, and the gastroenterology team should be contacted. See attachment 4 for Enoxaparin dosing.
- Patients discharged only on Enoxaparin (or LMWH) should be encouraged to either self-administer injections or identify a family member or carer to give them the injections. They should be taught injection technique and site selection. They should be provided with sharps boxes and information leaflets. The ACT in-reach team are on site at New Cross Hospital and can be contacted by phone (07775011911), email (rw-h-tr.act.vte@nhs.net) or Care Flow Connect for support. Housebound patients who are not able to self-administer can be referred to Planned Care via Care Coordination on 01902 443322 and will require a Patient Specific Directive (PSD) authorisation to be completed and emailed to rw-h-tr.carecoordinationtriage@nhs.net.
- If the patient has known anti-phospholipid syndrome, the anticoagulant of choice is warfarin and a referral to haematology and rheumatology is required. For warfarin initiation see paragraph below
- For the extreme body weight, body mass index (BMI) > 40 kg/m² or weight <50kg (apixaban)/<60kg (rivaroxaban) or >150kg, the anticoagulant of choice is warfarin or LMWH (refer to warfarin initiation paragraph or attachment 4, respectively). If a decision is made to use a DOAC instead, monitoring of anti-factor Xa activity is required. Anti-factor Xa activity on Day 3 at 2-4 hours post dose (peak level) & before the next dose at 24 hours (trough level) should be performed and if below the expected range, patient should be switched to warfarin.
- Patient with active cancer should be anticoagulated for at least 3-6 months and LMWH or DOAC can be used. DOAC is contraindicated in luminal cancer and a discussion with Haematologist is required if in doubt.

The table below summarises some of the cautions relevant to each single class of anticoagulant and dosing.

Drug	Cautions	Dosing
Warfarin	Regular blood test monitoring /Frequent dose changes. Contraindicated in pregnancy. It can be used during breastfeeding. Warn women in childbearing age about the need of contraception (avoid oestrogen-based product) whilst on the medication due to unknown effects on the foetus.	As per INR – see dedicated paragraph
Apixaban	Caution if Cr Cl 15-29mL/min. Avoid if Cr Cl <15mL/min. Not indicated if body weight <50kg or >150kg. Contraindicated in pregnancy and breastfeeding.	10mg BD for 7 days then 5mg BD for the duration of treatment. Reduced dose may be considered at 3 months follow-up

	Warn women in childbearing age about the need of contraception (avoid oestrogen-based product) whilst on the medication due to unknown effects on the foetus. Consider drug interactions.	
Rivaroxaban	Avoid if Cr Cl <15mL/min. Caution if body weight <60kg or >150kg. Contraindicated in pregnancy and breastfeeding. Warn women in childbearing age about the need of contraception (avoid oestrogen-based product) whilst on the medication due to unknown effects on the foetus. Consider drug interactions.	15mg BD for 21 days (to be taken with food) then 20mg OD for the duration of treatment. Reduced dose may be considered at 3 months follow-up
Enoxaparin	Advised in cancer/pregnant patients. Reduce dose if Cr Cl 15-29mL/min. Avoid if Cr Cl <15mL/min. Dose of Enoxaparin may need to be adjusted if patient is significantly underweight or overweight, at high VTE risk, or has renal impairment (estimated Glomerular Filtration Rate (eGFR) <30 ml/min). Haematology advice should be sought.	1mg/kg BD or in selected case 0.75mg/kg BD. If Cr Cl 15-29 ml/min the dose is 1mg/kg OD. For more information refer to attachment 4.

Initiating warfarin

- Load with warfarin as per anticoagulation guidelines on **warfarin** prescribing – these can be found on the warfarin prescription charts and is pictured below.

Warfarin Prescribing Guideline

Table 1

Schedule for inpatient dosage and monitoring of full-dose. Warfarin therapy in patients with active thrombosis baseline INR <1.4		
Day	INR (best taken 9-10am)	Warfarin dose (mg)
1st	<1.4	10
2nd	<1.8	10
	1.8	1
	>1.8	0.5
3rd	<2.0	10
	2.0-2.2	5
	2.3-2.6	4
	2.7-3.0	3
	3.1-3.3	2
	3.4-3.6	1
	3.6-4.0	0.5
	>4.0	Omit dose
4th	predicted maintenance dose	
	<1.4	>8
	1.4	8
	1.5	7.5
	1.6-1.7	7
	1.8	6.5
	1.9	6
	2.0-2.1	5.5
	2.2-2.3	5
	2.4-2.6	4.5
	2.7-3.0	4
	3.1-3.5	3.5
	3.6-4.0	3
	4.1-4.5	miss out next day's dose then give 2 mg from day 5
	>4.5	miss out next 2 day's doses, then give 1mg

Table 2

5mg initiation schedule for inpatient dosage and monitoring of full-dose Warfarin therapy in patients with active thrombosis baseline INR <1.4		
Day	INR (best taken 9-10am)	Warfarin dose (mg)
1 st	Monitor & record INR	5
2 nd	Monitor & record INR	5
3 rd	<1.5	10
	1.5-1.9	5
	2.0-3.0	2.5
	>3.0	Omit dose
4 th	<1.5	10
	1.5-1.9	7.5
	2.0-3.0	5
5 th	>3.0	Omit dose
	<2.0	10
6 th	2.0-3.0	5
	>3.0	Omit dose
	<1.5	12.5
	1.5-1.9	10
	2.0-3.0	5
	>3.0	Omit dose

Table 1 has no predictive value beyond day 4 - use clinical judgement only.

Refer to Trust guidelines for slow initiation/ other patient groups

- Continue enoxaparin at a treatment dosage alongside warfarin for at least 5 days and until INR established with therapeutic range > 2 for at least 24 hours, whichever is the longer.
- Give the patient a yellow anticoagulant treatment record book ensuring it is fully completed as mentioned in the patient held record section below. For detailed advice on commencement of warfarin treatment please see warfarin guideline (this can be found on the reverse of the warfarin dosing charts).
- Do not use warfarin in patients with underlying malignancy – refer to the above table and liaise with oncology as necessary.
- Discharge / refer patient if medically fit for on-going anticoagulation management in the community (see section 4 discharge and follow-up) unless other reasons to keep the patient in

3. Further investigations

All patients with a diagnosis of PE should have a thorough history and examination (this might include breast, testicular and rectal examination) to look for evidence of malignancy and establish if provoked or unprovoked.

Patients should be advised to engage with national cancer screening.

Further investigations should be arranged **ONLY** if indicated by history and examination (these may be Calcium, PSA, CXR, CT, endoscopy).

For patient diagnosed with unprovoked PE, send lab test for antiCardiolipin Ab (IgG AcL), these ideally should be sent before starting anticoagulation.

Review blood test and arrange further investigations if abnormalities detected.

4. Discharge planning, duration of treatment and follow-up.

Discharge planning for patients on Warfarin

Complete PSD for oral anticoagulation medication and send the fully complete PSD to rwh-tr.anticoagulation@nhs.net.

Prescribe Warfarin 1mg, 3mg and 5mg tablets for 14 days.

If the patient requires Enoxaparin, prescribe Enoxaparin at the required dose for 7 days.

Patients discharged on Enoxaparin (or LMWH) should be encouraged to either self-administer injections or identify a family member or carer to give them the injections. They should be taught injection technique and site selection. They should be provided with sharps boxes and information leaflets. The ACT in-reach team are on site at New Cross Hospital and can be contacted by phone (07775011911), email (rwh-tr.act.vte@nhs.net) or Care Flow Connect for support. Housebound patients who are not able to self-administer can be referred to Planned Care via Care Coordination on 01902 443322 and will require a Patient Specific Directive (PSD) authorisation to be completed and emailed to rwh-tr.carecoordinationtriage@nhs.net.

For patients discharged home from ED / SDEC, complete the Authorisation for DVT / Low Risk PE Hospital at Home (Adult) pathway. For more information on this pathway, please contact the ACT in-reach team on 07775011911. The authorisation form can be located on the VTE intranet page under “useful documents”.

- **Patient held record:** Give the patient a yellow anticoagulant treatment record book containing details of all INR results and warfarin doses administered to date. Demographic details in this book should match those on the PSD. Ensure the following information is discussed with the patient and documented in the yellow book and clinical notes: Indication for warfarin, target INR, start date and duration of therapy. The previous four INR results OR however many are available, and date of next INR should also be documented in the yellow book and clinical notes. Pre-dosing of Warfarin should only occur at the point of discharge to ensure adequate doses are advised until the patient is seen by the Anticoagulation Care Team.

- For support, contact ACT on 07775011911, or through Care Flow Connect.

General Discharge planning (Warfarin or DOAC)

Patients who reside in Wolverhampton and are registered with a Wolverhampton GP should be referred to ACT via care coordination (01902 443322) or by using the internal referral tab on clinical portal. Complete a PSD for oral anticoagulation ensuring the end date of treatment is stated. Send the completed PSD to rwh-tr.anticoagulation@nhs.net. Some GPs offer anticoagulation services for their patients directly via the GP surgery, details of these are available on the VTE intranet page. ACT and Care Coordination can also advise regarding this. An appointment can then be booked directly with the GP practice.

Patients who do not live within a Wolverhampton post code area or do not have a Wolverhampton GP will not be able to be referred to this service. Please contact ACT on 07775011911 or email rwh-tr.act-vte@nhs.net, or refer to VTE intranet page. For further advice and guidance.

GP and patient should be provided with discharge or clinic letter to contain the following information: the likely cause of the pulmonary embolism, whether it was provoked or unprovoked, details of follow-up appointments, any further investigations required, details of anticoagulant prescribed and its duration

The majority of patients will require at least 3 months of treatment, patients with cancer may require 3-6 months.

At 3 months all patients require a follow-up where a decision needs to be made regarding extended anticoagulation taking into consideration risk of recurrence, bleeding risks and patient's choice.

There are no widely used and validated tool to calculate the risk of recurrence. In patients with unprovoked PE the HAS-BLED score can be used to calculate the risk of bleeding.

Patients discharged from the emergency services (Emergency Department (ED) / SDEC / Acute Medical Unit (AMU)) can be referred for follow up at 3 months to the Acute Medicine Clinic to assess indication for an Echocardiogram (i.e. persistency of dyspnoea on exertion) and prolonged or lifelong treatment.

For patients discharged from a department different from the above then it is advisable for the discharging team to organise a follow-up.

Indication for Haematology referral are:

- Complex cases
- Unprovoked proximal DVT or PE
- Unprovoked VTE in young patients

Inferior Vena Cava filters

Inferior Vena Cava (IVC) filters are radiologically placed devices which prevent the dissemination of clots from lower limbs to the pulmonary circulation.

Due to lack of clear evidence regarding the use of IVC filter, NG158 recommends to only consider an IVC filter when therapeutic anticoagulation is contraindicated (i.e. concomitant intracranial bleed). It also recommended to remove the IVC filter when anticoagulation is no longer contraindicated and anticoagulation treatment should be established before the IVC filter is removed.

In the event that there might be an indication for an IVC filter please liaise with the on-call haematologist and one of the interventional radiologists for further discussion and advice.

References

- Angel LF, Tapson V, Galgon RE, Restrepo MI, Kaufman J. Systematic review of the use of retrievable inferior vena cava filters. *Journal of Vascular and Interventional Radiology* 2011; 22(11): 1522-1530.e3
- Anticoagulation approach in morbid obesity: a comprehensive review on venous thromboembolism management [Frontiers | Anticoagulation approach in morbid obesity: a comprehensive review on venous thromboembolism management](#) Accessed 12/12/2025
- Comparing low-molecular-weight-heparin dosing for treatment of venous thromboembolism in patients with obesity [Comparing low-molecular-weight heparin dosing for treatment of venous thromboembolism in patients with obesity \(RIETE registry\) | Blood Advances | American Society of Hematology](#) Accessed 12/12/2025
- NICE clinical guideline 158 'Venous Thromboembolic diseases: Diagnosis, management and thrombophilia testing (March 2020 updated August 2023).
- Radiologic Management of Inferior Vena Cava Filters; Expert Panel on Interventional Radiology: ACR appropriateness criteria - 2012 available at <https://acsearch.acr.org/docs/69342/Narrative/>
- What doses of thromboprophylaxis are appropriate for adult patients at extremes of body weight? Prepared for NHS healthcare professionals by the HAT Committee of the UK Clinical Pharmacy Association. Published Jun 2015
- **2019 ESC Guidelines for the diagnosis and management of acute pulmonary embolism developed in collaboration with the European Respiratory Society (ERS): The Task Force for the diagnosis and management of acute pulmonary embolism of the European Society of Cardiology (ESC)** [Stavros V Konstantinides, Guy Meyer, Cecilia Becattini, Héctor Bueno, Geert-Jan Geersing, Veli-Pekka Harjola, Menno V Huisman, Marc Humbert, Catriona Sian Jennings, David Jiménez, Nils Kucher, Irene Marthe Lang, Mareike Lankeit, Roberto Lorusso, Lucia Mazzolai, Nicolas Meneveau, Fionnuala Ní Áinle, Paolo Prandoni, Piotr Pruszczyk, Marc Righini, Adam Torbicki, Eric Van Belle, José Luis Zamorano, ESC Scientific Document Group](#)

Attachment 5b (CP58)

Thrombolysis for Massive Pulmonary Embolism

Introduction

This guideline should be used in conjunction with Trust policy CP58 and attachment 5a within the policy

Indications for thrombolysis

Life-threatening features, one of the following to be present:

- Cardiac arrest
- Obstructive shock: Systolic blood pressure (SBP) <90 mmHg or vasopressor required to achieve SBP ≥90mmHg despite adequate filling status AND end-organ hypoperfusion (altered mental status; cold, clammy skin; oliguria/anuria; increased serum lactate)
- Persistent hypotension: SBP <90mmHg or systolic BP drop present ≥40mmHg, lasting longer than 15 minutes and not caused by new onset of arrhythmia, hypovolaemia or sepsis

CTPA should be done whenever possible to confirm the diagnosis of PE.

Bedside targeted echo (FEEL/FICE) can be performed when the clinical suspicion for acute pulmonary embolism (PE) is high and a CT is contraindicated or cannot be completed. In a haemodynamically compromised patient with suspected PE, echo signs of right ventricular (RV) pressure overload and dysfunction may justify thrombolysis in the absence of another cause for these findings.

Before OR after thrombolysis, patients should be discussed and/or reviewed by CCOT (critical care outreach) and ICCU consultant/registrar.

Patients deemed suitable for Level 2/Level 3 care should be transferred to HDU/ICCU.

Patients deemed not an appropriate candidate for level 2/level 3 care could be considered for monitoring on a base ward.

1st line:

- Cardiac arrest: Alteplase 50 mg IV as bolus injection (see page 2 for further guidance regarding contraindication, administration and monitoring). A further bolus dose of 50mg IV can be considered during prolonged CPR attempt (e.g. 30min after the first dose). In these circumstances, consider performing CPR for at least 60-90 min before termination of resuscitation attempts. Lucas device to support compression during this time can be found in Resus room (cubicle 1) in the emergency department.
- Obstructive shock or Persistent hypotension, as per the above definitions: 10 mg intravenous bolus over 1-2 minutes, followed by 90mg intravenous infusion over 2 hours (maximum 1.5 mg/kg in patients <65Kg body weight)

2nd line:

- Streptokinase 1.5 million units IV as an infusion over 2 hours (see page 3 for further guidance). **Only to be used if and when 1st line agent is not available anywhere in the Trust (i.e. national shortage)**

If **thrombolysis is contra-indicated**, then discuss with ICCU consultant and on call cardiothoracic team.

Failure to respond to thrombolysis, defined as persistent clinical instability and unchanged RV dysfunction on echo after 36h, may be an indication for Pulmonary Embolectomy: contact on call cardiothoracic team.

PREGNANCY

If a pregnant woman has a collapse or shock associated with a massive Pulmonary Embolism, consider thrombolytic therapy. In this situation thrombolysis is associated with 1-6% risk of maternal bleeding, 1.7% foetal mortality but no maternal mortality and the decision to proceed or refrain must be discussed with on-call obstetric consultant.

DO NOT USE STREPTOKINASE IN PREGNANT PATIENTS UNLESS NO OTHER SAFER ALTERNATIVE AVAILABLE

Alteplase

Contraindications

Thrombolysis is contraindicated in cases where there is high risk of haemorrhage however in an immediately life-threatening PE these may become relative.

Absolute Contraindications	Relative Contraindications
• Intracranial bleed, haemorrhagic stroke, or stroke of unknown origin at anytime • Ischemic stroke in the past 6 months • Central nervous system (CNS) neoplasm • Recent major trauma/surgery/ head injury (within preceding 3 weeks) • Gastrointestinal (GI) bleeding within the past 2 months • Known bleeding disorder • Recent Major Haemorrhage • Oral anticoagulant therapy if INR > 1.3	• Pregnancy or within 4 weeks post-partum • Non compressible arterial puncture within the past 7 days • Traumatic resuscitation • Advance liver disease • Active peptic ulcer disease • Severe uncontrolled hypertension (systolic BP > 200 diastolic BP > 100) • Endocarditis • Haemorrhagic pancreatitis

For further information see manufacturers summary of product characteristics ([SPC](#))

Administration/cautions

Follow the link to access the Master Stock list that will show where alteplase is located beyond ED and ICCU. [Critical Medicines and Master Stock List](#)

The decision for thrombolysis should be made by a registrar or consultant. They have the responsibility to prescribe.

The initial bolus injection should be given by the senior doctor.

Preparation:

Alteplase is reconstituted using the water for injection provided – do not shake, mix thoroughly by gently swirling the vial.

Patient Monitoring

Electrocardiogram (ECG) and continuous haemodynamic monitoring are required – Record vital signs every 15 minutes for the first hour and every 30 minutes for the next 2 hours.

Observe the infusion site for haematoma and bleeding: if present request review by doctor.

Alteplase can cause anaphylactoid reactions. If mild reactions such as itching or rash occur, the doctor must be informed, and a decision needs to be made whether to stop the drug or manage symptoms with chlorphenamine/corticosteroid if needed.

Starting anticoagulation post thrombolysis with Alteplase

Check APTT ratio immediately post-completion of administration and at 4 hours.

Start treatment dose enoxaparin once APTT ratio is less than 2.

Streptokinase

Contra-indications

Thrombolysis is contraindicated in cases where there is high risk of haemorrhage however in an immediately life-threatening PE these may become relative.

Repeat treatment with streptokinase administered more than 5 days and less than 12 months after initial treatment may not be effective. This is because of the increased likelihood of resistance due to antistreptokinase antibodies.

Absolute Contraindications	Relative Contraindications
• Active bleeding • Intracranial bleed or haemorrhagic stroke at anytime • Ischemic stroke in the past 3 months • CNS neoplasm • Recent major trauma/surgery/ head injury (within preceding 8 weeks) • GI bleeding within the past 2 months • Known bleeding disorder • Recent Major Haemorrhage	• Oral anticoagulant therapy if INR > 1.3 • Pregnancy or within 4 weeks post-partum • Recent abortion • Non compressible arterial puncture within the past 7 days • Traumatic cardiopulmonary resuscitation. • Advance liver disease • Active peptic ulcer disease • Severe uncontrolled hypertension (systolic BP > 200 diastolic BP > 100) • Endocarditis • Haemorrhagic pancreatitis • Mitral valve defects or AF • Diabetic retinopathy • Previous administration of Streptokinase within last 12 months

For further information see BNF

Administration/cautions

The decision for thrombolysis should be made by a registrar or consultant. They have the responsibility to prescribe.

If patient is on unfractionated heparin prior to thrombolysis, this must be reversed with protamine sulfate before the start of thrombolytic therapy. The thrombin time should not be more than twice the normal control value before thrombolytic therapy is started

Preparation:

The contents should be dissolved in 5 ml of 0.9% sodium chloride or water for injection. The solution should be swirled gently to facilitate quick reconstitution, but care should be taken to avoid foaming.

Streptokinase may be given by intravenous infusion via syringe pump in 50ml of 0.9% sodium chloride, 5% glucose, or Ringer-lactate (Hartmanns') solution.

Patient monitoring

ECG and continuous haemodynamic monitoring are required – Record vital signs every 15 minutes for the first hour and every 30 minutes for the next 2 hours.

Stop or reduce infusion rate if systolic blood pressure is less than 100 mmHg: request review by doctor.

Observe the infusion site for haematoma and bleeding: if present request review by doctor.

Streptokinase can cause anaphylactoid reactions. If mild reactions such as itching, rash, flushing, the doctor must be informed and a decision needs to be made whether to stop the drug or manage symptoms with chlorphenamine/corticosteroid if needed.

Starting anticoagulation post thrombolysis with Streptokinase

Check APTT ratio 6 hours after start of infusion

Unfractionated Heparin (UFH) should be started once APTT ratio is <2 . If APTT ratio still >2 , discuss with consultant oncall haematologist.

The initiation of longer acting anticoagulants e.g. Low molecular weight Heparin (LMWH), warfarin, direct oral anticoagulants (DOACs), should be delayed for at least 24hrs post thrombolysis to ensure there is no delayed bleeding that would warrant the immediate cessation of anticoagulation.

References

- Summary of product characteristics for Alteplase.
- Streptokinase; BNF [Streptokinase | Drugs | BNF | NICE](#)
- **2019 ESC Guidelines for the diagnosis and management of acute pulmonary embolism developed in collaboration with the European Respiratory Society (ERS): The Task Force for the diagnosis and management of acute pulmonary embolism of the European Society of Cardiology (ESC)** Stavros V Konstantinides, Guy Meyer, Cecilia Becattini, Héctor Bueno, Geert-Jan Geersing, Veli-Pekka Harjola, Menno V Huisman, Marc Humbert, Catriona Sian Jennings, David Jiménez, Nils Kucher, Irene Marthe Lang, Mareike Lankeit, Roberto Lorusso, Lucia Mazzolai, Nicolas Meneveau, Fionnuala Ní Áinle, Paolo Prandoni, Piotr Pruszczyk, Marc Righini, Adam Torbicki, Eric Van Belle, José Luis Zamorano, ESC Scientific Document Group
- [Pulmonary embolism - Treatment algorithm | BMJ Best Practice](#)

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Attachment 6 (CP58)

Deep Venous Thrombosis (DVT)

Recognition and Assessment

Symptoms and signs

- Swelling of limb (arm, calf or leg)
- Pain and stiffness of affected limb
- Pitting oedema
- Increased skin temperature
- Erythema
- Tenderness (especially over the deep venous system).
- Mild fever
- In rare cases when swelling from DVT is extensive the venous circulation may be **severely** compromised – characterised by severe pain, swelling, cyanosis, rapid development of tense oedema and venous gangrene (phlegmasia caerulea dolens) elevate bed foot to 40° and ensure fluid replacement adequate to compensate for extravasation. These cases require urgent senior review and referral to on-call vascular team.

Risk factors

- History of immobilisation (complete bed rest for 3-4 days in previous 4 weeks)
- Recent surgery (within past 12 weeks, note type of surgery)
- Cancer (current or within past 6 months)
- Lower limb problems (immobility problems e.g. paralysis) or fracture of lower limb with immobilisation
- Pregnancy/puerperium
- Cardio-respiratory disorders (acute myocardial Infarction (MI), chronic symptomatic illness, irreversible airways disease)
- Thrombophilia (e.g. Protein S deficiency, Factor V Leiden, Lupus anticoagulant)
- Strong family history of DVT or Pulmonary Embolism (PE)
- Previous proven or current PE or DVT
- Third generation oral contraceptive pill, drugs, travel

Differential diagnosis

- Ruptured Baker's cyst (history of knee arthritis or trauma, swelling behind knee).
- Torn calf muscles/damage to Achilles tendon (sudden pain in calf following twisting of leg with or without evidence of haematoma. Disruption of tendon indicates severe rupture and should be discussed with orthopaedic team Specialist Registrar (SPR) on-call).
- Cellulitis

Investigations and Diagnosis

In accordance with NICE guideline (NG) 158, people who present with symptoms or signs of DVT should have a general medical history assessment and physical examination to exclude other causes.

If DVT is suspected a schematic algorithm can be found on intranet under medical guideline, same day emergency care, ***Suspected Deep Vein Thrombosis Ambulatory Pathway and further management.***

If DVT is suspected use the **two-level DVT Wells score** to estimate the clinical probability.

DVT unlikely (Wells score 1 point or less)

The following actions should be completed, if not done already:

- Send blood test for Full Blood Count (FBC), Urea & Electrolytes (U&Es), Liver Function Test (LFT), International Normalised Ratio (INR) and D-dimer
- Interpret **D-dimer** according to the **age-adjusted** criteria for people aged 50 and above (D-dimer positive if the value is equal or higher than the person's age multiplied by 10, i.e. for a 65-year-old, the D-dimer cut off will be 650)
- If D-dimer positive, request affected leg USS doppler
- Interim anticoagulation (refer to attachment 4 if using treatment dose enoxaparin or below section on treatment if using DOAC – direct oral anticoagulant; taking in consideration renal function or any other contraindications) if USS doppler delayed for more than 4 hours
- If D-dimer negative, consider alternative diagnosis

DVT likely (Wells score 2 points or more)

The following actions should be completed, if not done already:

- Send blood test for Full Blood Count (FBC), Urea & Electrolytes (U&Es), Liver Function Test (LFT), International Normalised Ratio (INR) and D-dimer
- Request affected leg USS doppler
- Interim anticoagulation (refer to attachment 4 if using treatment dose enoxaparin or below section on treatment if using DOAC – direct oral anticoagulant) if USS doppler delayed for more than 4 hours

Actions following USS Doppler

- If USS doppler has confirmed DVT see below section regarding treatment and management
- If USS Doppler negative, follow the action in the table below. Interpret D-dimer according to the age-adjusted criteria for people aged 50 and above (D-dimer positive if the value is equal or higher than the person's age multiplied by 10, i.e. for a 65-year-old, the D-dimer cut off will be 650)

Well's score	D-dimer	Doppler US result	Plan
<2	positive	Negative for DVT	Discharge (consider alternative diagnosis)
≥2	negative	Negative for DVT	Discharge (consider alternative diagnosis)
≥2	positive	Negative for DVT	Repeat scan in 6-8 days -No anti-coagulation between the scans-If 2 nd scan negative then discharge (consider alternative diagnosis)

Management of confirmed DVT

1. General

- If **ileo-femoral DVT** or concerns of Phlegmasia caerulea dolens, the case needs to be discussed with the senior medical team and may require interventional radiology or vascular team involvement. NG158 advises to consider catheter directed thrombolytic therapy for people with symptomatic iliofemoral DVT if **all** the following factors are present: symptoms lasting less than 14 days, good functional status, life expectancy of 1 year or more, low risk of bleeding
- Start anticoagulation treatment if not contraindicated
- Adequate analgesia if required
- Unless the symptoms severe or the patient requires admission to hospital for reasons other than suspected DVT, treat as out-patient
- Encourage ambulation
- Elevation of leg when seated
- Do not offer elastic graduated compression stockings to prevent post-thrombotic syndrome or VTE recurrence after a proximal DVT. This recommendation does not cover the use of elastic stockings for the management of leg symptoms after DVT.

2. Anticoagulation treatment for confirmed DVT

Assess for general contraindication to anticoagulation (e.g. Active bleeding, severe bleeding diathesis, recent, planned or emergency high bleeding risk surgery/procedure, major trauma, history of intracranial haemorrhage, particularly if recent ICH) and if present discuss with senior and/or haematology specialist.

Prior to initiating anticoagulation, blood test (FBC, UEs, LFTs, INR) and weight should be recorded. Perform a pregnancy test in all women below the age of 50 years.

Anticoagulation choice will depend on various patient specific factors.

Every patient commenced on anticoagulation needs to receive appropriate counselling, including indication to treatment, possible risk of bleeding and when/how to seek medical advice. Every patient should be provided with the anticoagulation alert card and drug

specific leaflet (available on Same Day Emergency Care (SDEC) or via the Anticoagulation Care Team (ACT) in-reach service, contactable on 07775011911, and a discharge/clinic letter with the following information: the likely cause of the pulmonary embolism, whether it was provoked or unprovoked, details of follow-up appointments, any further investigations required, details of anticoagulant prescribed and its duration.

- Recurrent VTE in a patient already on anticoagulation and with good compliance require discussion with haematology for advice.
- Venous thromboembolism (VTE) in pregnant and post-partum patients (refer to attachment 8).
- Patient with severe renal impairment, Creatinine clearance (Cr Cl) <15 ml/min (chronic kidney disease (CKD) stage 4/5), using The Cockcroft and Gault formula, the anticoagulant of choice is warfarin and the renal team should be contacted. For warfarin initiation see paragraph below.
- Hepatic disease (including Child-Pugh classes B and C) associated with coagulopathy and clinically relevant bleeding risk, the anticoagulant of choice is LMWH and the gastroenterology team should be contacted. See attachment 4 for Enoxaparin dosing.
- Patients discharged only on Enoxaparin (or LMWH) should be encouraged to either self-administer injections or identify a family member or carer to give them the injections. They should be taught injection technique and site selection. They should be provided with sharps boxes and information leaflets. The ACT in-reach team are on site at New Cross Hospital and can be contacted by phone (07775011911), email (rwh-tr.act.vte@nhs.net) or Care Flow Connect for support. Housebound patients who are not able to self-administer can be referred to Planned Care via Care Coordination on 01902 443322 and will require a Patient Specific Directive (PSD) authorisation to be completed and emailed to rwh-tr.carecoordinationtriage@nhs.net.
- If the patient has known anti-phospholipid syndrome, the anticoagulant of choice is warfarin and a referral to haematology and rheumatology is required. For warfarin initiation see paragraph below
- For the extreme body weight, body mass index (BMI) > 40 kg/m² or weight <50kg (apixaban)/<60kg (rivaroxaban) or >150kg, the anticoagulant of choice is warfarin or LMWH (refer to warfarin initiation paragraph or attachment 4, respectively). If a decision is made to use a DOAC instead, monitoring of anti-factor Xa activity is required. Anti-factor Xa activity, peak level and trough level, timing to be guided by haematology specialist, should be performed and If below the expected range, patient should be switched to warfarin.
- Patient with active cancer should be anticoagulated for at least 3-6 months and LMWH or DOAC can be used. DOAC is contraindicated in luminal cancer and a discussion with Haematologist is required if in doubt.

The table below summarises some of the cautions relevant to each single class of anticoagulant and dosing.

Drug	Cautions	Dosing
Warfarin	Regular blood test monitoring /Frequent dose changes. Contraindicated in pregnancy. It can be used during breastfeeding. Warn women in childbearing age about the need of contraception (avoid oestrogen-based product) whilst on the medication due to unknown effects on the foetus.	As per INR – see dedicated paragraph
Apixaban	Caution if Cr Cl 15-29mL/min. Avoid if Cr Cl <15mL/min. Not indicated if body weight <50kg or >150kg. Contraindicated in pregnancy and breastfeeding. Warn women in childbearing age about the need of contraception (avoid oestrogen-based product) whilst on the medication due to unknown effects on the foetus. Consider drug interactions.	10mg BD for 7 days then 5mg BD for the duration of treatment. Reduced dose may be considered at 3 months follow-up
Rivaroxaban	Avoid if Cr Cl <15mL/min. Caution if body weight <60kg or >150kg. Contraindicated in pregnancy and breastfeeding. Warn women in childbearing age about the need of contraception (avoid oestrogen-based product) whilst on the medication due to unknown effects on the foetus. Consider drug interactions.	15mg BD for 21 days (to be taken with food) then 20mg OD for the duration of treatment. Reduced dose may be considered at 3 months follow-up
Enoxaparin	Advised in cancer/pregnant patients. Reduce dose if Cr Cl 15-29mL/min. Avoid if Cr Cl <15mL/min. Dose of Enoxaparin may need to be adjusted if patient is significantly underweight or overweight, at high VTE risk, or has renal impairment (estimated Glomerular Filtration Rate (eGFR) <30 ml/min). Haematology advice should be sought.	1mg/kg BD or in selected case 0.75mg/kg BD. If Cr Cl 15-29 ml/min the dose is 1mg/kg OD. For more information refer to attachment 4.

Initiating warfarin

- Load with warfarin as per anticoagulation guidelines on **warfarin** prescribing – these can be found on the warfarin prescription charts and is pictured below.

Warfarin Prescribing Guideline

Table 1

Schedule for inpatient dosage and monitoring of full-dose. Warfarin therapy in patients with active thrombosis baseline INR <1.4		
Day	INR (best taken 9-10am)	Warfarin dose (mg)
1st	<1.4	10
2nd	<1.8	10
	1.8	1
	>1.8	0.5
3rd	<2.0	10
	2.0-2.2	5
	2.3-2.6	4
	2.7-3.0	3
	3.1-3.3	2
	3.4-3.6	1
	3.6-4.0	0.5
	>4.0	Omit dose
4th	predicted maintenance dose	
	<1.4	>8
	1.4	8
	1.5	7.5
	1.6-1.7	7
	1.8	6.5
	1.9	6
	2.0-2.1	5.5
	2.2-2.3	5
	2.4-2.6	4.5
	2.7-3.0	4
	3.1-3.5	3.5
	3.6-4.0	3
	4.1-4.5	miss out next day's dose then give 2 mg from day 5
	>4.5	miss out next 2 day's doses, then give 1mg

Table 2

5mg initiation schedule for inpatient dosage and monitoring of full-dose Warfarin therapy in patients with active thrombosis baseline INR <1.4		
Day	INR (best taken 9-10am)	Warfarin dose (mg)
1 st	Monitor & record INR	5
2 nd	Monitor & record INR	5
3 rd	<1.5	10
	1.5-1.9	5
	2.0-3.0	2.5
	>3.0	Omit dose
4 th	<1.5	10
	1.5-1.9	7.5
	2.0-3.0	5
5 th	>3.0	Omit dose
	<2.0	10
	2.0-3.0	5
6 th	>3.0	Omit dose
	<1.5	12.5
	1.5-1.9	10
	2.0-3.0	5
	>3.0	Omit dose

Table 1 has no predictive value beyond day 4 - use clinical judgement only.

Refer to Trust guidelines for slow initiation/ other patient groups

- Continue enoxaparin at a treatment dosage alongside warfarin for at least 5 days and until INR established with therapeutic range > 2 for at least 24 hours, whichever is the longer.
- Give the patient a yellow anticoagulant treatment record book ensuring it is fully completed as mentioned in the patient held record section below. For detailed advice on commencement of warfarin treatment please see warfarin guideline (this can be found on the reverse of the warfarin dosing charts).
- Do not use warfarin in patients with underlying malignancy – refer to the above table and liaise with oncology as necessary.
- Discharge / refer patient if medically fit for on-going anticoagulation management in the community (see section 4 discharge and follow-up) unless other reasons to keep the patient in.

3. Further investigations

All patients with a diagnosis of PE should have a thorough history and examination (this might include breast, testicular and rectal examination) to look for evidence of malignancy and establish if provoked or unprovoked.

Patients should be advised to engage with national cancer screening.
Further investigations should be arranged **ONLY** if indicated by history and examination (these may be Calcium, PSA, CXR, CT, endoscopy).
For patient diagnosed with unprovoked PE, send lab test for antiCardiolipin Ab (IgG AcL), these ideally should be sent before starting anticoagulation.
Review blood test and arrange further investigations if abnormalities detected.

4. Discharge, duration of treatment and follow-up

Discharge planning for patients on Warfarin

Complete PSD for oral anticoagulation medication and send the fully complete PSD to rwh-tr.anticoagulation@nhs.net.

Prescribe Warfarin 1mg, 3mg and 5mg tablets for 14 days.

If the patient requires Enoxaparin, prescribe Enoxaparin at the required dose for 7 days.

Patients discharged on Enoxaparin (or LMWH) should be encouraged to either self-administer injections or identify a family member or carer to give them the injections. They should be taught injection technique and site selection. They should be provided with sharps boxes and information leaflets. The ACT in-reach team are on site at New Cross Hospital and can be contacted by phone (07775011911), email (rwh-tr.act.vte@nhs.net) or Care Flow Connect for support. Housebound patients who are not able to self-administer can be referred to Planned Care via Care Coordination on 01902 443322 and will require a Patient Specific Directive (PSD) authorisation to be completed and emailed to rwh-tr.carecoordinationtriage@nhs.net.

For patients discharged home from ED / SDEC, complete the Authorisation for DVT / Low Risk PE Hospital at Home (Adult) pathway. For more information on this pathway, please contact the ACT in-reach team on 07775011911. The authorisation form can be located on the VTE intranet page under "useful documents".

- Patient held record: Give the patient a yellow anticoagulant treatment record book containing details of all INR results and warfarin doses administered to date. Demographic details in this book should match those on the PSD. Ensure the following information is discussed with the patient and documented in the yellow book and clinical notes: Indication for warfarin, target INR, start date and duration of therapy. The previous four INR results OR however as many as are available, and date of next INR should also be documented in the yellow book and clinical notes. Pre-dosing of Warfarin should only occur at the point of discharge to ensure adequate doses are advised until the patient is seen by the Anticoagulation Care Team.
- For support, contact ACT on 07775011911 or through Care Flow Connect.

General Discharge planning (Warfarin or DOAC)

Patients who reside in Wolverhampton and are registered with a Wolverhampton GP should be referred to ACT via care coordination (01902

443322) or by using the internal referral tab on clinical portal. Complete a PSD for oral anticoagulation ensuring the end date of treatment is stated. Send the completed PSD to rw-h-tr.anticoagulation@nhs.net. Some GPs offer anticoagulation services for their patients directly via the GP surgery, details of these are available on the VTE intranet page. ACT and Care Coordination can also advise regarding this. An appointment can then be booked directly with the GP practice.

Patients who do not live within a Wolverhampton post code area or do not have a Wolverhampton GP will not be able to be referred to this service. Please contact ACT on 07775011911 or email rw-h-tr.act-vte@nhs.net, or refer to VTE intranet page. For further advice and guidance.

GP and patient should be provided with discharge or clinic letter to contain the following information: the likely cause of the pulmonary embolism, whether it was provoked or unprovoked, details of follow-up appointments, any further investigations required, details of anticoagulant prescribed and its duration

The majority of patients will require at least 3 months of treatment, patients with cancer may require 3-6 months.

At 3 months all patients require a follow-up where a decision needs to be made regarding extended anticoagulation taking into consideration risk of recurrence, bleeding risks and patient's choice.

There are no widely used and validated tool to calculate the risk of recurrence. In patients with unprovoked PE the HAS-BLED score can be used to calculate the risk of bleeding.

Patients discharged from the emergency services (Emergency Department (ED) / SDEC / Acute Medical Unit (AMU)) can be referred for follow up at 3 months to the Acute Medicine Clinic to assess indication prolonged or lifelong treatment. For patients discharged from a department different from the above then it is advisable for the discharging team to organise a follow-up.

Indication for Haematology referral are:

- Complex cases
- Unprovoked proximal DVT or PE
- Unprovoked VTE in young patients

Inferior Vena Cava filters

Inferior Vena Cava (IVC) filters are radiologically placed devices which prevent the dissemination of clots from lower limbs to the pulmonary circulation.

Due to lack of clear evidence regarding the use of IVC filter, NG158 recommends to only consider an IVC filter when therapeutic anticoagulation is contraindicated (i.e. concomitant intracranial bleed). It also recommended to remove the IVC filter when anticoagulation is no longer contraindicated and anticoagulation treatment should be established before the IVC filter is removed.

In the event that there might be an indication for an IVC filter please liaise with the on-call haematologist and one of the interventional radiologists for further discussion and advice.

References

- Angel LF, Tapson V, Galgon RE, Restrepo MI, Kaufman J. Systematic review of the use of retrievable inferior vena cava filters. *Journal of Vascular and Interventional Radiology* 2011; 22(11): 1522-1530.e3
- Anticoagulation approach in morbid obesity: a comprehensive review on venous thromboembolism management [Frontiers | Anticoagulation approach in morbid obesity: a comprehensive review on venous thromboembolism management](#) Accessed 12/12/2025
- Comparing low-molecular-weight-heparin dosing for treatment of venous thromboembolism in patients with obesity [Comparing low-molecular-weight heparin dosing for treatment of venous thromboembolism in patients with obesity \(RIETE registry\) | Blood Advances | American Society of Hematology](#) Accessed 12/12/2025
- NICE clinical guideline 158 'Venous Thromboembolic diseases: Diagnosis, management and thrombophilia testing (March 2020 updated August 2023).
- Radiologic Management of Inferior Vena Cava Filters; Expert Panel on Interventional Radiology: ACR appropriateness criteria - 2012 available at <https://acsearch.acr.org/docs/69342/Narrative/>
- What doses of thromboprophylaxis are appropriate for adult patients at extremes of body weight? Prepared for NHS healthcare professionals by the HAT Committee of the UK Clinical Pharmacy Association. Published Jun 2015
- **2019 ESC Guidelines for the diagnosis and management of acute pulmonary embolism developed in collaboration with the European Respiratory Society (ERS): The Task Force for the diagnosis and management of acute pulmonary embolism of the European Society of Cardiology (ESC)** Stavros V Konstantinides, Guy Meyer, Cecilia Becattini, Héctor Bueno, Geert-Jan Geersing, Veli-Pekka Harjola, Menno V Huisman, Marc Humbert, Catriona Sian Jennings, David Jiménez, Nils Kucher, Irene Marthe Lang, Mareike Lankeit, Roberto Lorusso, Lucia Mazzolai, Nicolas Meneveau, Fionnuala Ní Áinle, Paolo Prandoni, Piotr Pruszczyk, Marc Righini, Adam Torbicki, Eric Van Belle, José Luis Zamorano, ESC Scientific Document Group

Heparin-Induced Thrombocytopenia

Background information:

Types of Heparin-Induced Thrombocytopenia (HIT)

- Isolated HIT – thrombocytopenia but without obvious thrombosis; at high risk of clot formation
- HITT- HIT with thrombosis

When to suspect HIT

- Development of new arterial/venous thrombosis whilst on heparin
- Extension of an existing thrombosis whilst on heparin
- Unexplained thrombocytopenia whilst receiving heparin
- Platelet count typically begins to fall 5-10 days after starting heparin. Rarely the onset of HIT can be day 10-15. The platelet count usually falls by at least 50% with a median nadir of $55 \times 10^9/L$.
- If heparin exposure in the previous 100 days, then thrombocytopenia may occur from day 2.
- Thrombosis in an unusual site (cerebral, renal, skin necrosis)
- Anaphylactoid reaction after UFH intravenous bolus – cardio-respiratory, neurological or unusual symptoms within 30 minutes
- Skin lesions at heparin injection sites

Note: Thrombocytopenia is rarely severe in HIT. Despite a low platelet count, bleeding is uncommon.

Differential diagnoses

- Sepsis
- Disseminated intravascular coagulation
- Thrombocytopenia associated with medication
- Thrombocytopenia due to any other reason

Actions when HIT is suspected

- Perform pre-test probability scoring for HIT using the quick reference guide (see page 3)

Laboratory tests

- Obtain blood sample for HIT antibody testing, 5 mL clotted blood (white top Z9), Full Blood Count (FBC), Urea and Electrolytes (U&E), Liver Function Tests (LFT), Prothrombin Time (PT) Activated Partial Thromboplastin Time (APTT), Fibrinogen
- Send sample with pre-test probability form to blood bank. If form is to be faxed, notify blood bank (ext 8242) in advance
- Do not base clinical decisions on HIT antibodies result alone, as it may be falsely positive. Immunological tests used have a high sensitivity but low specificity. Positive HIT screen does not necessarily confirm HIT, especially in patients with low pre-test probability.
- In making a diagnosis of HIT, the clinician's estimate of the pre-test probability of HIT, together with the enzyme-linked immunosorbent assay (ELISA) and information on reversal using higher doses of heparin should be used to determine the post-test probability of HIT.
- HIT can be excluded in patients with an intermediate pre-test score who have a negative particle gel immunoassay

HIT suspected
Patient receiving heparin, new onset thrombocytopenia +/-
new thrombotic event

Discuss with haematologist and perform 4T score^{1,2,3}

Clinical feature	4T score: Score points 0, 1 or 2 for each category. *		
	2	1	0
Thrombocytopenia	>50% fall from baseline OR to nadir of $\geq 20 \times 10^9/L$	30–50% fall from baseline OR to nadir of $10-19 \times 10^9/L$	<30% fall from baseline or to nadir of $< 10 \times 10^9/L$
Timing of thrombocytopenia or other sequelae (after heparin exposure)	Clear onset between 5 and 10 days (earlier if recent heparin exposure – within 100 days)	Onset after 10 days OR Time of onset not clear (missing platelet counts etc.)	Onset before 4 days (without heparin exposure within last 100 days)
Thrombosis or other sequelae	New thrombosis Skin necrosis Post-heparin anaphylactoid reaction	Progressive or recurrent thrombosis Erythematous skin lesions Thrombosis not yet proven	None
Other causes of thrombocytopenia evident	No other cause of platelet fall is evident	Possible other cause is evident	Definite other cause present

*Add score for each clinical category; maximum score = 8
0–3 = Low, 4–5 = Intermediate, 6–8 = High

LOW PROBABILITY (Score 0-3)

- No change in management required
- Continue heparin if still clinically indicated
- No laboratory tests required except for ICCU patients

INTERMEDIATE/HIGH PROBABILITY (SCORE 4-8)

- STOP HEPARIN
- Send sample for HIT screen
- Commence alternative anticoagulant at a treatment dose even if a thrombus is not confirmed (see page 3 for anticoagulant options)

- Update allergy status on EPMA and document diagnosis in medical notes
- Switch to oral anticoagulant once platelet count is $>100 \times 10^9 /l$ (see page 4 for options and durations)

Management

Contact Consultant Haematologist for advice as soon as possible. A management plan should be agreed between the clinical team managing the patient and the haematologist.

Remember just stopping heparin is not enough.

Therapeutic anticoagulation is required for both HITT and isolated HIT as the risk of thrombosis is very high. If the pre-test probability score is not low, heparin must be stopped, and an alternative anticoagulant started at a therapeutic dosage whilst laboratory tests are performed.

Do **not** start warfarin in the initial phase of treatment. If warfarin has already been started, omit further doses and give Vitamin K1 (phytomenadione) 5 mg by slow IV injection while introducing alternative anticoagulation.

Platelet transfusion is relatively contraindicated and must be discussed with a haematologist. Thrombocytopenia in HIT is rarely severe and is usually not associated with bleeding

History of HIT (>100 days)

Use of enoxaparin sodium in patients with a history of immune mediated HIT within the past 100 days or in the presence of circulating antibodies is contraindicated. Circulating antibodies may persist several years.

Enoxaparin sodium is to be used with extreme caution in patients with a history (>100 days) of heparin-induced thrombocytopenia without circulating antibodies. The decision to use enoxaparin sodium in such a case must be made only after a careful benefit risk assessment and after non-heparin alternative treatments are considered (e.g. danaparoid sodium).

ANTICOAGULANT OPTIONS FOR ADULT PATIENTS WITH HIT

Treatment in Pregnancy

BSH guidance¹ recommends that women with HIT in pregnancy should be treated with a non-cross-reacting anticoagulant. Specialist advice should be sought before starting treatment.

1st LINE: Argatroban (Exembol)

Argatroban is a synthetic, direct thrombin inhibitor, approved for the treatment of patients with heparin-induced thrombocytopenia (HIT) type II who require parenteral anti-thrombotic therapy. Argatroban is a direct thrombin inhibitor which is cleared mainly by the liver and shows pharmacokinetic properties independent of renal function.

It has a fast onset of action, short half-life and rapid elimination which allows ease of control of anticoagulation and dose titration. The anticoagulant effects of argatroban can be monitored by the activated partial thromboplastin time (APTT)

See Appendix 1 for prescribing and monitoring guidance

See CP58 Attachment 9b for Argatroban Infusion Record Chart

2nd LINE: Danaparoid

Danaparoid is a low-molecular-weight heparinoid, chemically distinct from heparin, used for treatment of suspected or proven HIT (with or without thrombosis) and for prevention of venous thrombosis in patients with a history of HIT **but must be discussed with the Consultant**

Haematologist prior to initiation.

Danaparoid has a long half-life and there is no specific antidote available. It should not be considered if any procedure or emergency surgery is anticipated. Danaparoid Sodium shows low cross-reactivity (<10%) with the heparin induced antibody.

See Appendix 2 for prescribing and monitoring guidance

3rd LINE: Fondaparinux

Fondaparinux at a therapeutic dose may be an acceptable alternative anticoagulant for managing HIT **but must be discussed with the Consultant Haematologist prior to initiation.**

Fondaparinux is a synthetic pentasaccharide. It is not specifically licensed for the treatment of HIT but may be an acceptable alternative anticoagulant.

See Appendix 3 for prescribing and monitoring guidance

CONVERSION TO ORAL ANTICOAGULATION THERAPY

Conversion to oral anticoagulants should be delayed **until platelet count is $>100 \times 10^9 / l$** to avoid coumarin associated microvascular thrombosis and venous limb gangrene.

Patients should be therapeutically anticoagulated for 3 months after HIT with a thrombotic complication and for 4 weeks following HIT without a thrombotic complication.

Warfarin, a coumarin derivative, inhibits clotting by limiting hepatic production of the biologically active vitamin K-dependent clotting factors (activated factors II, VII, IX, and X). Normally, the precursors of these factors undergo a carboxylation reaction to be converted to their activated forms. Warfarin, as a vitamin K antagonist, interferes with this reaction. The reduction in the amount and activity of these factors produces the anticoagulant response. However, warfarin also interferes with production of the body's natural anticoagulants, protein C and protein S, these have a shorter half-life than the clotting factors and warfarin can therefore paradoxically increase the coagulation tendency when treatment is first begun, leading to massive thrombosis with skin necrosis and gangrene of limbs.

Conversion from argatroban to oral anticoagulation with Vitamin K agonist (e.g. warfarin)

Argatroban affects the INR and co-administration with warfarin produces an additive effect on the INR.

See Appendix 1 – for Guidance on Conversion of Argatroban to Warfarin

Conversion from danaparoid sodium to oral anticoagulation with Vitamin K agonist (e.g. warfarin)

PT and INR are not affected by danaparoid. When the INR is in target range, co-administer danaparoid and warfarin for 2 consecutive days before stopping the danaparoid infusion.

Conversion from fondaparinux sodium to oral anticoagulation with Vitamin K agonist (e.g. warfarin)

PT and INR are not affected by fondaparinux. When the INR is in target range, co-administer fondaparinux and warfarin for 2 consecutive days before stopping the fondaparinux injections.

Conversion to oral anticoagulation with Direct Oral Anticoagulant (DOAC)

Use of a DOAC is not licensed for this indication though there is increased use of rivaroxaban in practice. DOACs are not suitable for those with a high bleeding risk or CrCl < 15 or dialysis patients. Discuss options and dosing with a Consultant Haematologist.

If a DOAC is selected, ensure parenteral anticoagulant is stopped (must NOT overlap).

Appendix 1

Argatroban

Formulation

50mg/50ml solution for infusion

Preparation

Argatroban is available as a 50mg/50ml solution for infusion.

This product is ready to use and requires no dilution before administration.

It is single use only and should be used immediately after opening. Any unused solution should be discarded in accordance with Trust policy.

Preferably administer via central venous access to avoid potential venous irritation as preparation has a low pH.

Cautions/Contra-indications

- Mild/moderate hepatic impairment, start at lower dose (see table 1).
- Argatroban is contra-indicated in patients with severe hepatic impairment.
- Use with extreme caution in disease states and other circumstances in which there is an increased danger of haemorrhage.

Adverse effects

Enhanced bleeding, nausea, purpura, liver abnormalities.

Monitoring

Argatroban is monitored using patient's own APTT baseline (obtained before argatroban is started). Subsequent APTT values are then compared to this baseline. (Not to be confused with APTT ratio which uses a laboratory control).

Target APTT (sec): 1.5 to 3.0 times the baseline (but not exceeding 100 secs)

In order to use argatroban infusion you will need to :

- STEP 1.** Measure patient's baseline APTT (seconds).
- STEP 2.** Choose initial infusion rate (see Tables 1 and 2)
- STEP 3.** Recheck APTT after required time (see Table 1)
- STEP 4.** Adjust rate of argatroban according to APTT (see Tables 3 and 4)

Table 1: Argatroban dosing options

Patient Group	Initial I.V. infusion
Adult patients with HIT including patients with renal failure (Standard Dosing)	2 micrograms/kg/min (check APTT after 2 hours)
Critically ill patients with severe organ system failure*	0.5 micrograms/kg/min (check APTT after 4 hours)
Postoperative cardiac surgery patients	0.5 micrograms/kg/min (check APTT after 4 hours)
Moderate hepatic impairment (Child-Pugh Class B)	0.5 micrograms/kg/min (check APTT after 4 hours)

***NB: Critically ill patients on haemofiltration should also be initiated on an infusion rate of 0.5mcg/kg/min.**

Initial infusion rate

To calculate the initial infusion rate in mL/hr, use the following equation:

Initial rate (ml/hr) = [Initial rate (mcg/kg/min) x patient weight (kg) x 60] / 1000

Table 2: Example initial infusion rates based on patient weight

Body weight (kg)	STANDARD 2mcg/kg/min	CRITICALLY ILL/ HEPATIC IMPAIRMENT 0.5mcg/kg/min
	Rate (ml/hr)	Rate (ml/hr)
45	5.4	1.35
50	6	1.5
55	6.6	1.65
60	7.2	1.8
65	7.8	1.95
70	8.4	2.1
75	9	2.25
80	9.6	2.4
85	10.2	2.55
90	10.8	2.7
95	11.4	2.85

(Infusion rate must be given as stated – DO NOT round up or down)

For non-Braun syringe pump areas collect designated Fresenius syringe pump from the medical equipment library (CERL location C11). This pump is configured for these infusion rates. Please return to library after use.

Infusion rate adjustments

To calculate the rate adjustment, use the following equation:

$$\text{Rate change (ml/hr)} = [\text{Rate change (as per table 3)} \times \text{patient weight(kg)} \times 60] / 1000$$

Table 3: Dose adjustment table

	Standard dosing schedule Initial Infusion Rate 2 mcg/kg/min		Critically ill/ Hepatically impaired patients Initial infusion rate 0.5mcg/kg/min	
APTT(s)	Infusion Rate change	Next APTT	Infusion Rate change	Next APTT
<1.5 times baseline	Increase by 0.5 mcg/kg/min	2 hours	Increase by 0.1 mcg/kg/min.	4 hours
1.5-3.0 times baseline (not exceeding 100 s)	No change	2 hours; after 2 consecutive APTT's within target range, check at least once per day	No change	4 hours; after 2 consecutive APTT's within target range, check at least once per day
> 3.0 times baseline or > 100 s	Stop infusion until the APTT is 1.5-3.0 times baseline; Resume at half of the previous infusion rate	2 hours	Stop infusion until the APTT is 1.5-3.0 times baseline; Resume at half of the previous infusion rate	hours

Table 4: Example rate adjustments based on patient weight

Body weight (kg)	STANDARD (0.5mcg/kg/min) Rate increase (ml/hour)	CRITICALLY ILL/ HEPATIC IMPAIRMENT (0.1mcg/kg/min) Rate increase (ml/hour)	The maximum total infusion rate is 10mcg/kg/min
40	1.2	0.24	
45	1.35	0.27	
50	1.5	0.3	
55	1.65	0.33	
60	1.8	0.36	
65	1.95	0.39	
70	2.1	0.42	
75	2.25	0.45	
80	2.4	0.48	
85	2.55	0.51	
90	2.7	0.54	
95	2.85	0.57	
100	3.0	0.6	

(Infusion rate must be given as stated – DO NOT round up or down)

For non-Braun syringe pump areas collect designated Fresenius syringe pump from the medical equipment library (CERL location C11). This pump is configured for these infusion rates. Please return to library after use.

Monitoring

Check first systemic APTT 2 hours after commencing infusion. Recheck the APTT 2 hours after every dose change; if stable in the therapeutic range, repeat APTT every 24 hours. Steady state levels are attained within 3 hours following initiation.

Patients with HIT undergoing percutaneous coronary intervention (PCI)

Based on limited data, therapy could be initiated with a bolus dose of 350 microgram/kg over 3 to 5 minutes followed by an infusion dose of 25 microgram/kg/min. ACT should be checked 5 to 10 minutes after the bolus dose is completed. The procedure may proceed if the ACT is greater than 300 sec. If the ACT is below 300 sec, an additional bolus dose of 150 microgram/kg should be administered, the infusion rate be increased to 30 microgram/kg/min, and the ACT should be checked 5 to 10 minutes later. If the ACT is higher than 450 sec, the infusion rate should be decreased to 15 microgram/kg/min and ACT values be checked 5 to 10 min later. Once a therapeutic ACT between 300 to 450 sec has been achieved, the infusion dose should be continued for the duration of the procedure. After the procedure the patient should be dosed and monitored as per Tables 1 and 2.

Patients on haemofiltration

Administer via intravenous infusion (**Do not administer via filter**)

Procedures with moderate to high bleeding risk e.g. spinal puncture, tracheostomy, central catheter removal

Argatroban should be withheld for 4 hours prior to spinal puncture/catheter removal and for 2 hours afterwards.

Management of bleeding

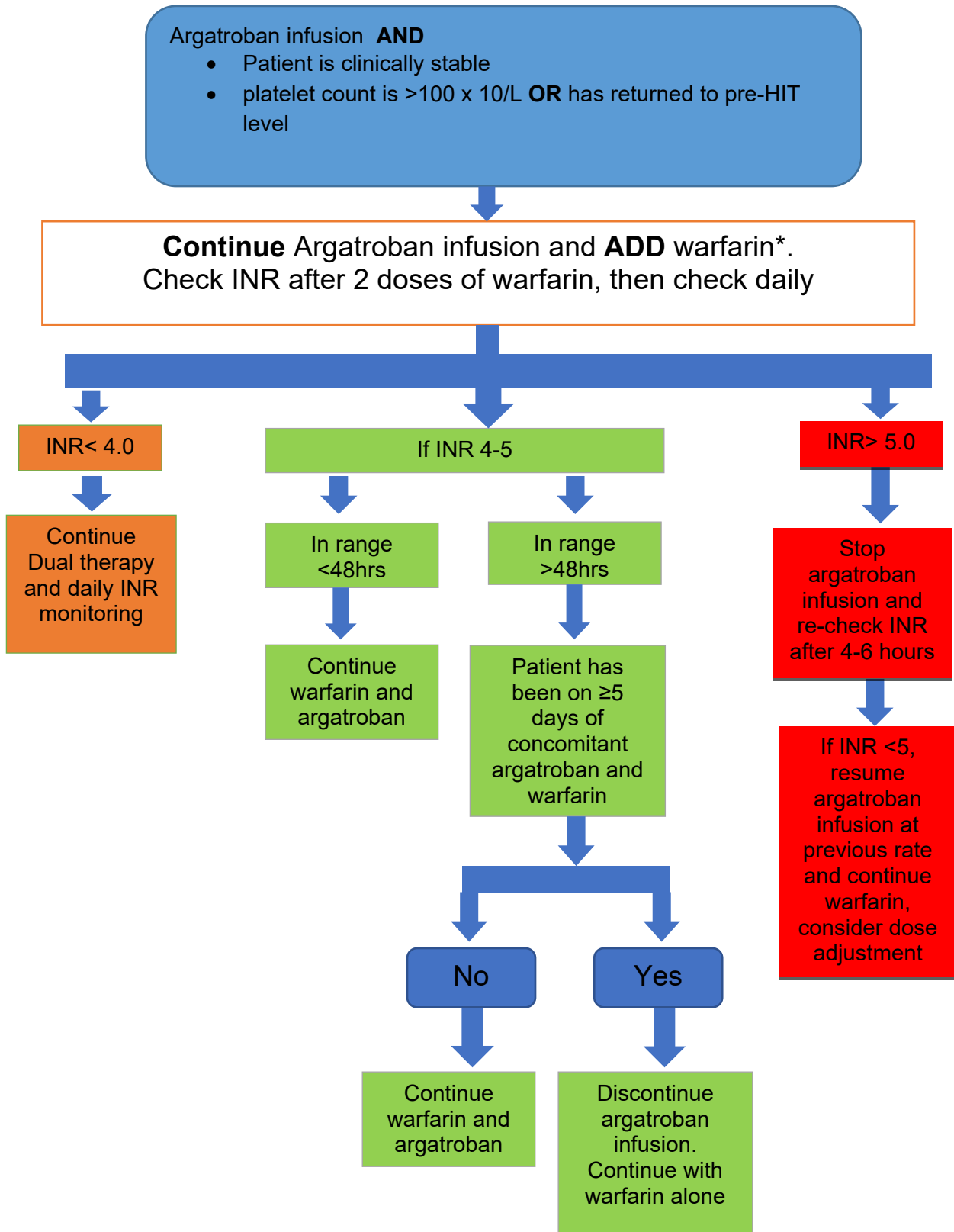
In the event of life-threatening bleeding with argatroban the infusion should be discontinued. Re-check the APTT and other coagulation tests after 4 hours.

No specific reversal therapy is available. In patients with hepatic or multi-organ failure, full reversal of anticoagulant effects may take longer than 4 hours. Prothrombin Complex Concentrate may be considered after discussion with Haematology where symptomatic treatment is necessary.

Conversion to oral anticoagulation

Conversion to warfarin should be commenced after platelet counts are above 100×10^9 . Warfarin therapy should be overlapped with argatroban for at least 5 days. Co-administration of argatroban and warfarin produces an additive and occasionally an unpredictable effect on INR. See flow diagram below for further details and consult Haematologist.

Argatroban to Warfarin Conversion



*Warfarin should be started using the lower dose loading regimen (First dose no higher than 5mg daily)

Appendix 2

Danaparoid Prescribing and Monitoring Guidance

Formulation: 750units/0.6ml ampoule

Preparation: Dilute 2.4ml (3000units) Danaparoid with Sodium Chloride 0.9% or Glucose 5% up to 30ml to make a 100units/ml solution

Table 5 Danaparoid dosing for HIT

Intravenous dose of danaparoid	Body weight under 55kg	Body weight 55kg to 90kg	Body weight greater than 90kg
Bolus loading dose	1250 units	2500 units	3750 units
Infusion	400 units/hour for 2 hours, then 300 units/hour for 2 hours, then 200 units/hour for 5 days		

Refer to the injectable medicines guide (MEDUSA)

<https://medusa.wales.nhs.uk/IVGuideDisplay.asp>

Monitoring

Monitor danaparoid therapy (using anti-Xa assay) only if the patient:

- weighs <55 kg or >90 kg
 - has renal impairment
 - has a life- or limb-threatening thrombosis
 - has a high risk of haemorrhage
 - Contact coagulation lab (ext 8245) for anti-Xa assay. Test can be done only during normal working hours after discussion with Consultant Haematologist
 - ❖ take sample between 6–24 hrs of starting IV treatment
 - ❖ repeat at 72 hr in patients with renal failure
- Target concentration 0.5–0.8 Units/mL

Contra-indications

- haemorrhagic stroke in the acute phase
- uncontrollable active bleeding state
- severe renal- and/or hepatic insufficiency, unless the patient also has HIT and no alternative anti-thrombotic treatment is available
- severe uncontrolled hypertension
- active gastroduodenal ulcer, unless it is the reason for operation
- acute bacterial endocarditis
- a positive *in vitro* aggregation test for the heparin-induced antibody in the presence of Danaparoid Sodium in patients with a history of thrombocytopenia induced by heparin or heparin-like anticoagulants
- hypersensitivity to sulphite, to the active substance or to any of the excipients.

Management of bleeding

No specific antidote is available. Discontinue danaparoid infusion. Transfusion of fresh frozen plasma or, if uncontrollable, plasmapheresis should be considered. Although protamine partially neutralises the anticoagulant activity of Danaparoid Sodium the relevance for the reversal of the bleeding is not clear and therefore cannot be recommended. **Refer to Consultant Haematologist for advice.**

Fondaparinux Prescribing and Monitoring Guidance

Formulation

2.5mg/0.5ml, 7.5mg/0.6ml, and 10mg/0.8ml pre-filled syringes.

Preparation

Pre-filled syringes are ready to use, no dilution required.

Dose and administration

It is given once daily by subcutaneous injection as per schedule below.

Fondaparinux is renally excreted and is therefore not recommended in persons with severe renal impairment (eGFR <30ml/min).

Use with caution in severe liver insufficiency.

Body weight	Treatment Dose of fondaparinux
Less than 50kg	5mg once daily
50 – 100kg	7.5mg once daily
Greater than 100kg	10mg once daily

Monitoring

Anti Xa monitoring is not required providing eGFR > 30ml/min

Fondaparinux has a long half life (17-21 hours). There is no reversal agent for fondaparinux

Contra-indications

- active clinically significant bleeding
- acute bacterial endocarditis
- severe renal impairment defined by creatinine clearance < 30 ml/min.

Management of bleeding

No specific antidote is available. Initiation of appropriate therapy such as surgical haemostasis, blood replacements, fresh plasma transfusion, plasmapheresis should be considered. Refer to Consultant Haematologist for advice.

Argatroban Infusion Record Chart

Patient weight (kg):

Surname	Unit No
Forename	NHS No
Address	DOB
Postcode	(or affix patient label)

Complete the below table to identify the APTT target, and infusion rate adjustment if the APTT is low.

Baseline APTT:		
Initial infusion rate: ml/hr		
APTT must be checked 2 hours after starting Argatroban infusion and every time a new change is made. Critically ill patients, or patients with hepatic impairment, require 4 hourly monitoring.		
APTT(s)	Infusion Rate Change	Next APTT
< 1.5 times baseline:	Increase by ml/hr	4 hours
1.5-3.0 times baseline (not exceeding 100s)	No change	4 hours: If 2 consecutive APTT's are within target range, check at least once per day
> 3.0 times baseline or > 100s	Stop infusion until APTT (s) is 1.5- 3.0 times baseline. Resume at half of the previous infusion rate.	4 hours

Argatroban should be diluted to give a final concentration of 1mg/ml (i.e. 250mg of Argatroban should be diluted in 250ml of either sodium chloride 0.9% or 5% glucose).

Initial infusion rate table:

Body weight (kg)	Standard 2mcg/kg/min Rate (ml/hr)	Critically Ill / Hepatic Impairment 0.5mcg/kg/min Rate (ml/hr)
40	4.8	1.2
45	5.4	1.35
50	6.0	1.5
55	6.6	1.65
60	7.2	1.8
65	7.8	1.95
70	8.4	2.1
75	9.0	2.25
80	9.6	2.4
85	10.2	2.55
90	10.8	2.7
95	11.4	2.85
100	12	3
105	12.6	3.15
110	13.2	3.3
115	13.8	3.45
120	14.4	3.6
125	15	3.75
130	15.6	3.9
135	16.2	4.05
140	16.8	4.2
145	17.4	4.35

Infusion rate adjustment table:

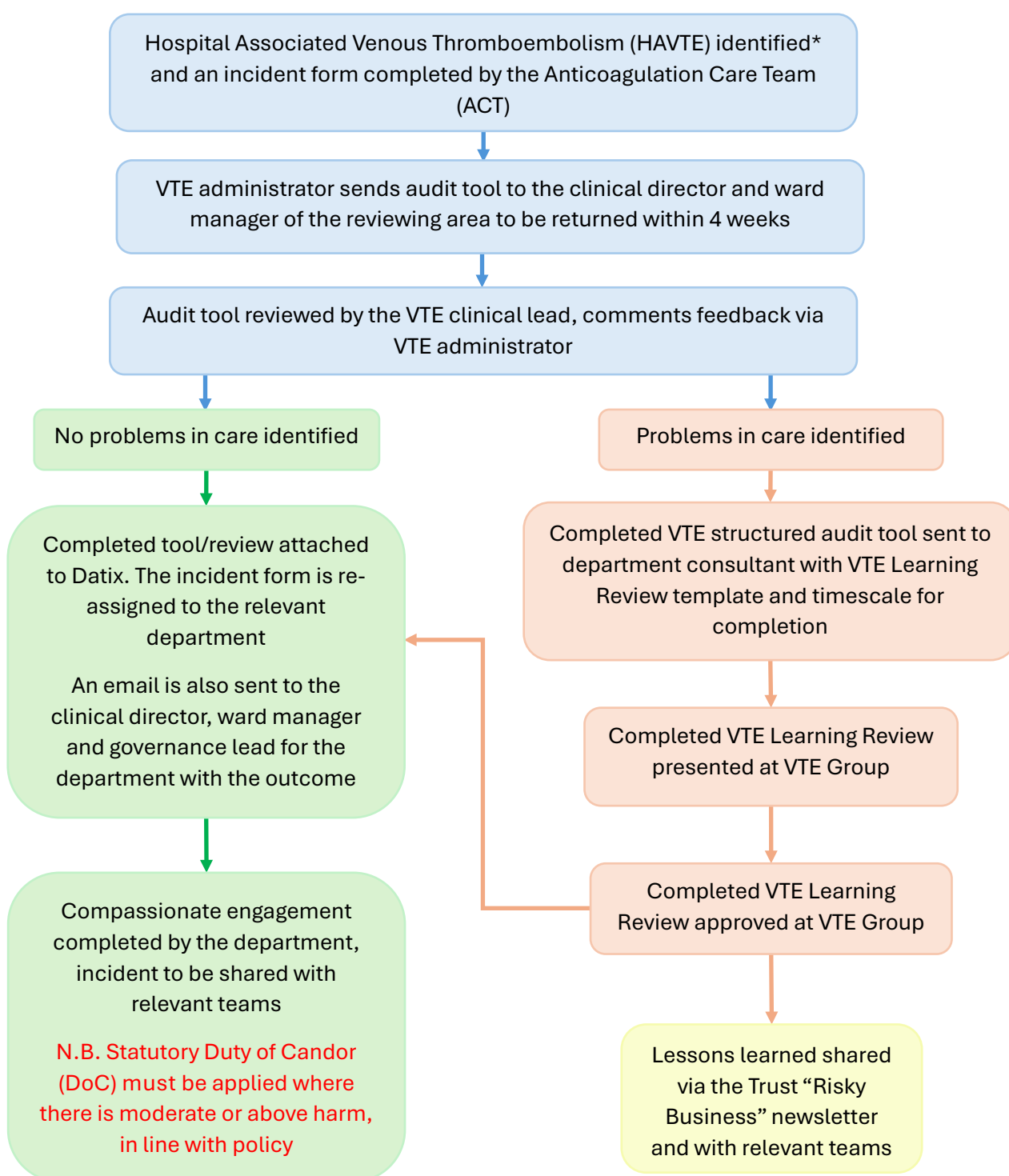
Body weight (kg)	Standard 0.5mcg/kg/min Rate increase (ml/hour)	Critically Ill / Hepatic Impairment 0.1mcg/kg/min Rate increase (ml/hour)	Body weight (kg)	Standard 0.5mcg/kg/min Rate increase (ml/hour)	Critically Ill / Hepatic Impairment 0.1mcg/kg/min Rate increase (ml/hour)
40	1.2	0.24	95	2.85	0.57
45	1.35	0.27	100	3.0	0.6
50	1.5	0.3	105	3.15	0.63
55	1.65	0.33	110	3.3	0.66
60	1.8	0.36	115	3.45	0.69
65	1.95	0.39	120	3.6	0.72
70	2.1	0.42	125	3.75	0.75
75	2.25	0.45	130	3.9	0.78
80	2.4	0.48	135	4.05	0.81
85	2.55	0.51	140	4.2	0.84
90	2.7	0.54	145	4.35	0.87

Maximum total infusion rate is 10mcg/kg/min

- For non-Braun syringe pump areas, collect designated Fresenius syringe pump from the medical equipment library (CERL location C11). This pump is configured for these infusion rates. **Please return to library after use.**
- If the patient's weight is outside those in either the initial infusion or adjustment table, please refer to the equations on pages 2 and 3 of Appendix 1 to calculate the appropriate rates.

Date	Time	APTT(s)	Infusion rate change (Reduce, no change or increase)	New infusion rate (mL/hr)	Time and date next APTT test required	Name / Signature / Designation / Stamp

Review process for Hospital Associated Venous Thromboembolism



*HAVTE – VTE developed as inpatient or within 90 days from admission. HAVTE identified via discharge coding data, radiology reports, bereavement office, audits and other relevant sources.

Divisional representation required at VTE group to update on incidents, themes, findings etc. this is also an opportunity to share positive outcomes/workstreams and seek support/guidance from the group.

Hospital Acquired Thrombosis Structured Audit Tool

1. AUDIT DETAILS

Auditor name:		Date of audit:	Click to enter date.
Datix ID:		Date HAT confirmed:	Click to enter date.
Location:		Division:	

2. PATIENT DETAILS

Patient initials:		Age:		Hospital number:	
Weight (kg):		BMI:		Patient consultant:	
eGFR:		PLT:		Type of admission:	Choose an item.
Ethnicity:		Date of admission:	Click to enter date.	Date of discharge:	Click to enter date.

3. HAT DETAILS

Type of HAT:	Choose an item.	Did the patient die from this HAT?	Select	When did the death occur?	Select
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4. VTE RISK ASSESSMENTS DURING ADMISSION PRIOR TO DIAGNOSIS

1 st Assessment				2 nd Assessment			
Date:	Click to enter date.	Time:		Date:	Click to enter date.	Time:	
Was an initial VTE risk assessment completed within 14 hours?			Select	Was the risk assessment reviewed 24 hours after admission?			Select
Assessment Outcome				Assessment Outcome			
Thrombosis risk			Select	Thrombosis risk			Select
Bleeding risk			Select	Bleeding risk			Select
Was the risk assessment correct?			Select	Was the risk assessment correct?			Select

5. THROMBOPROPHYLAXIS

Chemical (e.g. LMWH, DOAC)

Was chemical prophylaxis prescribed?	Select	If no, explain the reason(s)			
Type of chemical prophylaxis		Date first dose administered:	Click to enter date.	Time first dose administered:	
Dose:		Was it administered within 14hr of admission?			Select
Were any doses of chemical prophylaxis omitted?	Select	If yes, give details:			

Mechanical (e.g. T.E.D.s, Flowtron)

Was mechanical prophylaxis prescribed?	Select	If no, explain the reason(s)			
Type of mechanical prophylaxis		Is there evidence of measurement and fitting of mechanical devices?			Select
Were any application of mechanical prophylaxis omitted?	Select	If yes, give details:			

Extended (out of hospital) prophylaxis

Was OOH prophylaxis indicated?	Select	If yes, was it prescribed?	Select	What was prescribed?	
		If no, what reasons were documented?			

Hospital Acquired Thrombosis Structured Audit Tool

6. SURGERY (if applicable)			Not applicable (✓)	☐
Date of surgery:	Click to enter date.	Duration of surgery:		
Type of surgery:		Blood loss:		
Consultant surgeon:		Complications (intra and post-op)		

7. OTHER CLINICAL DETAILS			
Medical history:		Blood results:	
Any other VTE risk factors:			
Any other input:			

8. SUMMARY				
Problems in care identified?	Select	Is further review required?	Select	Lead consultant?
Rationale for decision:				
If problems in care have been identified and this requires further review, please complete the learning review summary report				

Hospital Acquired Thrombosis Learning Review

Brief History of the Patient and Sequence of Events	Any Learning / Positive Practice Identified?	Proposals to improve performance or reduce risk
Patient Assessments	Any Learning / Positive Practice Identified?	Proposals to improve performance or reduce risk
e.g. VTE assessments		
Implementation of VTE Preventative Care	Any Learning / Positive Practice Identified?	Proposals to improve performance or reduce risk
e.g. consider planned interventions, monitoring, care plans.		
Patient Involvement - Education and Advice	Any Learning / Positive Practice Identified?	Proposals to improve performance or reduce risk
Patient/NOK and staff support		
Post-operative Care/ Discharge Management	Any Learning / Positive Practice Identified?	Proposals to improve performance or reduce risk
e.g. Detail, accuracy and level of completion		

Hospital Acquired Thrombosis Learning Review

Systems Analysis Factors (SEIPS Model)	Describe how the following factors contributed to the incident if applicable.	Any action required to reduce future risk?
External Environment e.g. External regulations, national policies, economic factors, and the overall healthcare system landscape that influence the Organisation's VTE prevention efforts.		
Organisation e.g. the wider institutional factors. This involves policies, guidelines (e.g., NICE guidance), safety culture, leadership commitment, and training programs related to VTE prevention.		
Internal Environment e.g. the specific clinical setting where care is delivered (e.g., ward, operating room, clinic). Factors include staffing levels, physical layout of the unit, and availability of necessary supplies (e.g., compression stockings, heparin doses).		
Tools and Technology e.g. the equipment and systems used. This includes electronic health records (EHR) with integrated VTE risk assessment tools and order sets, mechanical compression devices (IPC), and specific medications (e.g., LMWH, apixaban).		
Tasks e.g. the specific activities involved in VTE prevention. Examples include performing timely VTE risk assessments on admission, prescribing appropriate prophylaxis (pharmacological or mechanical), administering medications correctly, and patient education.		
Person e.g. patients, healthcare providers (doctors, nurses, pharmacists), and family members. Factors include staff knowledge about VTE guidelines, patient risk factors (e.g., age, obesity, personal history of VTE), and patient mobility levels.		

Hospital Acquired Thrombosis Learning Review

Interactions in the system for VTE prevention	Interaction	Impact on processes

Examples of Interactions in the system for VTE prevention <i>(delete this table once completed)</i>	Interaction	Impact on processes
1. Person(s) and Tools/Technology	A nurse or doctor (Person) uses the Electronic Patient Record (EPR) (Tools/Technology) to perform a VTE risk assessment (Task).	If the EPR system is not user-friendly or has a cumbersome interface (poor usability characteristic of the tool), it can increase the clinician's cognitive workload and lead to them missing risk factors or "working around" the system, thus failing to initiate appropriate VTE prophylaxis.
2. Organisation and Tasks	The Trust policy (Organisation) mandates VTE risk assessments be completed within two hours of admission (Task).	If the policy does not align with the reality of high patient turnover and short staffing levels (Internal Environment/Organisation), staff may rush the task or skip it entirely, leading to non-compliance and potential patient harm.
3. Internal Environment and Tools/Technology	A busy, noisy ward (Internal Environment) makes it difficult for a pharmacist to concentrate while verifying anticoagulant doses using a computer system (Tools/Technology).	The physical environment can introduce distractions that increase the likelihood of medication errors during the prescribing or verification process, which is a key part of VTE care processes.
4. Tasks and Person(s)	The task of managing VTE prophylaxis for a complex patient (e.g., one with a history of bleeding and clotting) requires coordination and communication among multiple specialists (Person(s) as a team).	If team communication is poor or roles are not clearly defined (Person(s) factor), delays in prescribing or administering the correct VTE prevention strategy can occur.
5. External Environment and Organisation	National regulatory guidelines (External Environment) influence the hospital's VTE policies, quality improvement targets, and resource allocation (Organisation).	A lack of clear national guidance on specific patient groups might lead to variation in VTE care protocols across different hospital wards (Organisation factors), affecting the standardisation and safety of care.

	Desired outcomes	Actual outcome	Explain the variance
Patient	Reduced incidence of deep vein thrombosis (DVT) and pulmonary embolism (PE), improved patient safety, and better health status.		
Staff/ Organisational	Improved quality of work life for staff, guideline compliance, and cost-effectiveness for the hospital.		

Hospital Acquired Thrombosis Learning Review

Summary of Learning and Actions

Learning	Desired Outcome	Actions	Owner	Timeline	Progress

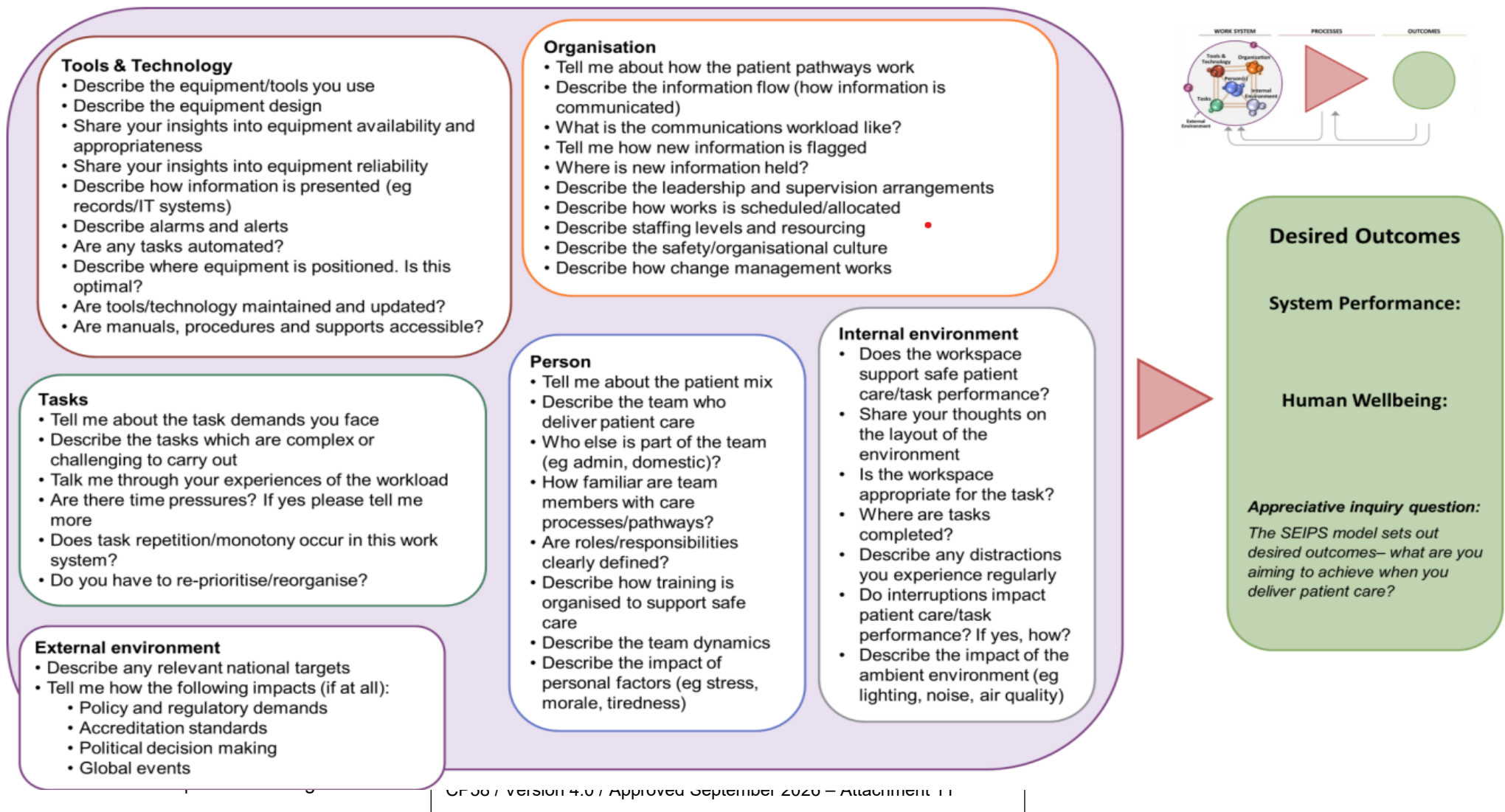
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System Engineering Initiative for Patient Safety framework (SEIPS)

Quick Reference Guide

SEIPS is a framework for understanding outcomes within complex socio-technical systems. Patient safety incidents result from multiple interactions between work system factors. SEIPS prompts us to look for interactions rather than simple linear cause and effect relationships. When a learning response thoroughly examines the different work system components and their interactions, safety actions can focus on wider system issues, not individuals.



Attachment 12 (CP58)

Risk Assessment Cohort Groups

A cohort approach allows medical directors to make a clinical decision regarding a group of patients admitted for the same procedure, who are felt as a group to have a low risk of VTE using the DH/NICE risk assessment categories. These patients are considered low risk for VTE as a whole and do not require individual risk assessments. Cohorts are:

Medical day case patients

Medical day case reviews not associated with any invasive interventional procedure.

Haemodialysis

Diagnostic and therapeutic interventional cardiology day case procedures

Endoscopy procedures – upper and lower GI endoscopy.

Bronchoscopy

Routine day case chemotherapy

Pain team local and regional anaesthetics

Medical minor day case procedures performed under local anaesthetic

Interventional radiological procedures

Lithotripsy

Surgical day case patients

Patients undergoing a surgical procedure with local anaesthetic

Ophthalmological procedures with local anaesthetic/regional/sedation.

Endoscopy procedures – cystoscopy, upper and lower GI endoscopy.

Other similar minor procedures lasting less than 90 minutes that do not require full general anaesthetic.

In addition to the above groups the Chief Medical Director has agreed a low-risk cohort approach can be used for the following areas:

Gynaecology assessment ward is cohort assessed providing they remain in the assessment ward, are discharged from this ward following specialist opinion or non-invasive diagnostics. Patients attending the Gynaecology assessment ward as described above will have a separate CareFlow EPR code and all be classed as cohort assessed.

Patients attending the Gastro day case unit Cannock (CareFlow EPR 'C41 Nurse Led Day Unit') for elective gastroenterology day case treatment or procedures under local anaesthetic such as infusions for treatment of inflammatory bowel disease, paracentesis for treatment of ascites and blood transfusions.

Ante natal patients attending obstetric areas for assessments/minor interventions where the length of stay is less than 4 hours.

Emergency eye clinic patients attending for assessment or requiring procedures under local anaesthetics.

Same Day Emergency Care (SDEC) criteria CareFlow EPR codes: C55a Acute Medicine, C12 Frailty SDEC, Head & Neck SDEC, Surgical SDEC.

- patients attending for time limited treatment less than 14 hours (Manual adjustment for C55 for time limited treatment less than 24 hours)
- patients requiring short term observation, investigations or awaiting results
- patients where discharge is anticipated on the same day
- patients on home leave returning to a booked appointment for review or investigation.

Exclusions: Patients with a decision to admit, those transferred to a ward area or those who require a general anaesthetic are excluded from cohort groups and an individual VTE risk assessment must be completed.



Brian McKaig
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The Royal Wolverhampton NHS Trust
21/01/26