Promoting safe anticoagulation practice

The Rotherham NHS Foundation Trust

APPENDIX 1 to
ANTICOAGULATION / VTE POLICY FOR ADULTS

CLINICAL PROCEDURAL DOCUMENT

PROCEDURAL DOCUMENT

Stand-alone document promoting safe anticoagulation practice

This document does not cover identification of risk and the management of venous thromboembolism in pregnancy and the puerperium and paediatrics

Section 1 Content

Section 1 Appendices

Document History Summary

Version	Date	Author	Status	Comment
1a	January – April 2017	Consultant Haematologists Pathology Clinical Services Governance Manager / Lead Anticoagulation Nurse / Medicines Evaluation Pharmacist / CCG	Draft	Rearranged the content. Updated guidance on perioperative management/ Added Prescribing Checklists/ Updated Tinzaparin shared care protocol/ Added VTE prophylaxis flow charts See Appendix 2
1b	September 2017 October 2017	Consultant Haematologists Pathology Clinical Services Governance Manager / Lead Anticoagulation Nurse / Medicines Evaluation Pharmacist / CCG	Draft	Feedback from specialists
1	23 March 2018	Consultant Haematologists Pathology Clinical Services Governance Manager / Lead Anticoagulation Nurse / Medicines Evaluation Pharmacist / CCG	Final	Document ratified by DRG

i DEFINITIONS

Deep vein thrombosis	Deep vein thrombosis (DVT) is the development of a blood clot in a major deep vein in the leg, thigh, pelvis, or abdomen, which may result in impaired venous blood flow and consequent leg swelling and pain. DVT may also occur in the upper extremities or the brain. Venous thromboembolism (VTE) includes DVT and pulmonary embolism.
Massive pulmonary embolism	PE associated with Life threatening Medical Emergency with unexplained collapse and signs of Shock (systolic BP<100mmHg, HR >120bpm minute)
Mechanical prophylaxis	Physical agents used to reduce the likelihood of thrombosis
Pharmacological prophylaxis	Chemical agent used to reduce the likelihood of thrombosis
Pulmonary embolism (PE)	Obstruction of a blood vessel in the lungs, usually due to a blood clot, which blocks a coronary artery.
Thromboprophylaxis	The measure taken to reduce the risk of thrombosis
Significant reduced mobility	Patients who are bed-bound, unable to walk unaided or likely to spend a substantial proportion of their day in bed or in a chair'
Venous Thromboembolism	The blocking of a blood vessel by a blood clot dislodged from its site of origin. It includes both DVT and PE.

ii ABBREVIATIONS

ABCD	Airway, Breathing, Circulation, Disability
ACG	Anticoagulation Group
ACT	Anticoagulation Team
AES	Anti-embolism stockings
AF	Atrial Fibrillation
AMU	Acute Admissions Unit
APTT	Activated Partial Thromboplastin Time
BCSH	British Committee for Standards in Haematology
BP	Blood Pressure
Bpm	Beats per minute
CCC	Care Co-ordination Centre
CCG	Clinical Commissioning Group
CDU	Clinical Decision Unit
CSU	Clinical service unit
COPD	Chronic Obstructive Pulmonary Disease
CrCl	Creatinine Clearance
CTPA	Computerised Tomography Pulmonary Arteries
CVA	Cerebral Vascular Accident
DOACs	Direct Oral Anticoagulants
DVT	Deep vein thrombosis
ECG	Electrocardiogram
eGFR	Estimated glomerular filtration rate
FBC	Full Blood Count
FFP	Fresh Frozen Plasma
GP	General Practitioner
Hb	Haemoglobin
HIT	Heparin induced Thrombocytopenia
HOD	Head of Department
HBAT	Hospital Based Anticoagulation Team
IHD	Ischaemic Heart Disease
INR	International Normalized Ratio
IV	Intravenous
Kg	Kilogramme
LFT	Liver Function Tests
LMWH	Low molecular weight heparin
mmHg	millimetres/mercury
NGH	Northern General Hospital
NICE	National Institute for Clinical Excellence
OPD	Outpatient department
PCC	Prothrombin Complex Concentrate
PE	Pulmonary embolism
RCA	Root Cause Analysis
RCOG	Royal College of Obstetricians and Gynaecologists
SOP	Standard Operating Procedure
TIA	Trans ischaemic attack
TRFT	The Rotherham Foundation Trust
U&E	Urea and Electrolytes
UECC	Urgent and Emergency Care Centre
UROL	Urology
USS	Ultrasound Scan
VTE	Venous thromboembolism (includes both DVT &PE)

1. ANTICOAGULANTS AND REVERSING AGENTS ON THE FORMULARY

Anticoagulants on the formulary are:

Anticoagulant Type	Anticoagulants	Reversing agents
Vitamin K antagonists	Warfarin 1 mg tablets only Acenocoumarol Phenindione tablets	 Phytomenadione injection Phytomenadione tablets Menadiol tablets *Beriplex®
Direct oral anticoagulants (DOACs)	Apixaban tablets Dabigatran capsules Rivaroxaban tablets	No reversing agent currently Idarucizumab injection No reversing agent currently
Low molecular weight Heparin (LMWH)	Tinzaparin prefilled syringes	Protamine
Heparin - unfractionated	Injections: 20000 units/mL 1000 units/mL	Protamine
Fondaparinux	2.5 mg injection (for acute coronary syndromes) Other strengths if needed	No reversing agent

*Prothrombin Complex Coagulation Factors (Beriplex®)		

The choice of anticoagulant should depend on clinical indication, patient factors and patient choice.

2. ANTICOAGULANTS - GOOD PRACTICE POINTS

Important: anticoagulants are high risk medicines, therefore before prescribing:

1. Clinically assess the patient
2. Undertake baseline investigations
3. Consider the risks and benefits of anticoagulation prior to commencement of therapy
4. Provide patient information/ alert cards
5. Arrange appropriate follow up and review

3. PATIENT INFORMATION AND CONSENT

Please refer to the Trust policy for ‘Consent to Examination or Treatment’

Patients must be given information on the treatment they are being offered, and available alternatives. The need for anticoagulation therapy, VTE prophylaxis and any associated risks must be discussed with the patient, and remains the responsibility of the prescribing health care professional.

Patient Information leaflets:

Anticoagulant booklets should be issued to all patients or their carers.

The Trust booklets are:

- Life with Warfarin
- Blood clots: reducing risk in hospital and at home
- DOAC use leaflet (TRFT, in development)

In addition, Pharmacy supplies manufacturer’s Patient Information Leaflets and Alert Cards when dispensing anticoagulants.

4. ORAL ANTICOAGULATION – VITAMIN K ANTAGONISTS

Three licensed vitamin K antagonists are available on the formulary: warfarin, acenocoumarol and phenindione. Warfarin is the first line choice, others when warfarin is not tolerated.

A risk assessment of the benefits versus the risks of oral anticoagulation therapy for individual patients must be carried out before commencing oral anticoagulants, supported with a comprehensive clinical assessment.

This assessment should take into consideration patient suitability for oral anticoagulation therapy, and should also include detailed patient counselling to ensure that the patient fully understands the need for oral anticoagulant therapy and any risks/benefits associated with the anticoagulation

Patient counselling should also stress the importance of compliance when taking oral anticoagulant therapy with particular emphasis on the need for regular monitoring of INR when on warfarin.

All prescribers that initiate, continue or dose adjust anticoagulants must have the appropriate work competencies/evidence of training to undertake their work safely. Information of training requirements is detailed in the Anticoagulation Policy for Adults Section 2 Paragraph 14.

Indications

Warfarin is indicated for DVT, PE, AF, prosthetic valves.
See Clinical indications, target INR and length of treatment Appendix 1.

Patient assessment and investigations

Please see yellow Anticoagulation Prescription and Referral Chart Appendix 2

Prescribing Induction doses

Induction regimes are detailed on the yellow Anticoagulation Prescription and Referral form (Appendix 2),

Loading dose:	Day 1	10 mg
	Day 2	10 mg
	Day 3	5 mg

Consider reducing the doses if the patient has hepatic/renal impairment, cardiac failure, is elderly or at risk of possible drug interactions.

Maintenance and monitoring (Vitamin K antagonists)

Treatment with warfarin, acenocoumarol and phenindione require monitoring and dose adjustment guided by the measurement of the INR. The

International Normalised Ratio (INR) measures the time it takes for blood to clot and compares to the average.

Once therapeutic range has been reached, newly initiated patients require weekly or sometimes twice weekly INR review

As the INR settles into the therapeutic range INR interval testing can be increased to once a fortnight, increasing to once a month.

Where control is very stable, testing can be increased to 8-12 weekly, **however, testing frequency should never be greater than 12 weeks.**

In patients where an INR is outside the therapeutic range, a dose adjustment will be required. The dose adjustment required will be determined by the deviation of the INR from the target, the usual maintenance dose, the presence of any destabilizing factors (i.e. concurrent illness, medication changes), presence of known risk factors for bleeding/VTE and the ease of monitoring the patient.

Following a dose adjustment, testing should be brought forward to assess the effect of the dose change.

When a patient has an elevated INR, consideration should be given to:

- Presence of abnormal bleeding/bruising (if present reversal should be considered)
- Reasons for poor control could be change in medication, concurrent illness, alcohol use/abuse, change in diet (especially fasting), compliance or other lifestyle changes.

Always seek advice from the Consultant in charge of the patients care or a Consultant Haematologist if you have any concerns or you have identified any contraindications before commencing or continuing anticoagulation.

Please refer to the Anticoagulation Specialist Nurses and Trust Yellow Anticoagulation Prescription and Referral form for further advice.

Note***:** Patients with a very low INR (i.e. <1.4) should also be seen and assessed before a major dose change. Occasionally re loading may be required, but this is rare.

*****within the first 6 weeks of clot formation if the INR is < 2.0 for two consecutive days (24-hour periods). Please contact a Consultant Haematologist for further advice

Monitoring: If in doubt, contact the Consultant Haematologist or Anticoagulation Nurse Specialist for advice.

Patient information
When a patient is commenced on oral anticoagulant therapy they must receive:

- verbal counselling,
- a copy of the patient information leaflet; Life with Warfarin (where appropriate),
- a temporary monitoring record, where INR results can be noted by the current medical team until anticoagulation management of the patient has been formally accepted by another care provider.

A referral should also be made to the relevant professional who will be responsible for the continuous monitoring of the oral anticoagulation

See Paragraph 20

Prescribing a vitamin K antagonist (inpatient)

For inpatients warfarin, acenocoumarol and phenindione must be prescribed on the yellow Anticoagulation Prescription and Referral form (Appendix 2)

All sections must be completed in full adherence with the Trust Medicines Management policy including patient details (an addressograph sticker may be used), drug, indication, target INR and most recent result for the day of prescription, time drug to be given (where possible 12:00) and prescriber signature.

For each dose the date and INR result (if available and required) must be completed, as well as the dose (mg), route and prescriber signature.

Where possible, blood taken for the INR must be taken in the morning, the result reviewed and daily dose prescribed in order for the dose to be given at 12:00 for all inpatients; to avoid on call staff being asked to review the patient and result.

Non-medical prescribers must ensure that they have completed the correct competencies for warfarin. The dose is INR dependant therefore; they must review the INR as per the identified target range requirements for their patient (Appendix 1). They must prescribe the correct anticoagulant at the correct dose on the yellow Anticoagulation Prescription and referral form and seek senior advice if necessary.

Drug Interactions with Vitamin K antagonists (primarily warfarin)

Many drugs have a potential, but unpredictable interaction with the Vitamin K antagonists, therefore any change in medication (addition or removal) a repeat INR must be taken within 2- 4 days.

The co-prescribing of anti-platelet agents with oral anticoagulants requires careful safety evaluation as this will significantly increase the risk of bleeding.

Patients on antiplatelet medication
See Appendix 27

The use of combination of warfarin and antiplatelet therapy should be assessed on an individual patient basis, considering the disease-specific thrombotic risk and the patient-specific bleeding risk and advice should be sought from the relevant medical team e.g. Cardiology, Stroke team, Vascular team.

Some drugs may increase clearance of anticoagulant therapy, i.e. may take up to 2-3 weeks to have an effect and so weekly INR reviews are recommended until the INR has stabilised.

Associated documents

- Anticoagulation – guideline for perioperative management of patients taking warfarin - Appendix 23
- Guideline for management of warfarin /acenocoumarol related bleeding – Appendix 28
- Protocol for the use of Beriplex – Appendix 35
- Protocol for the use of Pro Thrombin Complex Concentrate (Beriplex ®) in reversal of over anti-coagulation – Appendix 36
- Referral to Hospital Based Anticoagulation Team – Appendix 37
- Referral to GPs – Paragraph 20
- Referral to thrombosis clinic for a three-month review – Paragraph 20
- Guideline for converting from anticoagulant to another - Appendix 39

5. ORAL ANTICOAGULANTS - DIRECT ORAL ANTICOAGULANTS (DOACs)

Three DOACs are available on the formulary: apixaban, dabigatran and rivaroxaban. Apixaban and rivaroxaban are both direct factor Xa inhibitors and dabigatran a direct thrombin inhibitor.

All three DOACs are licensed for the treatment and prevention of DVT and PE, prophylaxis post-elective hip and knee surgery and for stroke prevention in patients with AF. They offer an oral alternative to warfarin.

The choice of a DOAC should be based on licensed indications, patient anticoagulant history, contraindications, interactions and patient compliance.

Apixaban may be offered as prophylaxis to patients with lower limb plaster cast as an option to subcutaneous tinzaparin. The trust has approved the prescribing of apixaban for this unlicensed indication.

Patient assessment and investigations

Once the decision has been made to prescribe a DOAC, the Prescribing Checklist for each drug provides relevant information to assess patient's suitability for that DOAC. The relevant drug will only be dispensed after all sections of the prescribing checklist have been completed.

Baseline tests and the doses are also given in the checklists.

See	Apixaban Prescribing Checklist	Appendix 4
	Apixaban Prescribing Checklist – Orthopaedics	
	VTE prophylaxis	Appendix 5
	Dabigatran Prescribing Checklist	Appendix 6
	Rivaroxaban Prescribing Checklist	Appendix 7
	Lower limb plaster cast Checklist	Appendix 16

Always seek pharmacy advice when managing children/adolescents, pregnant or breast-feeding mothers.

Doses

The doses are based on age, body weight and renal function.

Renal function is assessed by calculating creatinine clearance using the Cockcroft and Gault equation, (eGFR is not appropriate).

The doses are stated in the Prescribing Checklist for each medicine.

See Apixaban, Dabigatran, Rivaroxaban Prescribing guide – Appendix 3

Prescribing apixaban, dabigatran and rivaroxaban for inpatients

Once a full risk assessment has taken place, and it is deemed safe for the patient to commence a DOAC it **must** be prescribed on the medicines prescription chart.

Monitoring of treatment in patients taking DOACs

Patients on DOACs **do not** require regular monitoring of anticoagulation level but do require monitoring of the following:

- **Annual Follow up and treatment counselling:** Hb, renal and liver function
- **Six monthly review** of renal function and treatment counselling if CrCl 30-60 mL/minute, age over 75 years or frail.
- **Three monthly review** of renal function and treatment counselling if CrCl 15 – 30 mL/minute.

More frequent review and treatment counselling should be considered for any patient with a co morbidity that has an impact on renal and/or liver function.

Monitoring of a DOAC using Anti-Xa levels for apixaban and rivaroxaban may be necessary in certain clinical situations e.g. urgent surgery, extremes of body weights, impaired renal function etc. In such circumstances please discuss with Haematologist on call.

Perioperative management of patients taking DOACs - Appendix 24

Reversal of anticoagulation
Guideline for the management of apixaban related bleeding - Appendix 30
Guideline for management of bleeding or emergency surgery in patients taking dabigatran - Appendix 31
Guideline for management of rivaroxaban related bleeding – Appendix 32
Guideline for management for edoxaban related bleeding - Appendix 33
Protocol for the use of Beriplex – Appendix 35
Protocol for the use of Prothrombin Complex Concentrate (Beriplex ®) in reversal of over anti-coagulation – Appendix 36

Associated documents

- Apixaban Prescribing Checklist — Appendix 4
- Apixaban Prescribing Checklist – Orthopaedic VTE prophylaxis — Appendix 5
- Dabigatran Prescribing Checklist — Appendix 6
- Rivaroxaban Prescribing Checklist — Appendix 7
- Guideline for perioperative management of adult patients taking DOACs — Appendix 24
- Guideline from converting from one anticoagulant to another — Appendix 39

6. PARENTERAL HEPARIN - LOW MOLECULAR WEIGHT HEPARIN (LMWH)

Tinzaparin is the low molecular weight heparin (LMWH) of choice at the Rotherham NHS Foundation Trust. Alternatives are available for patients if tinzaparin is not suitable.

Licensed indications are:

- Treatment of deep vein thrombosis
- Treatment of pulmonary embolism
- VTE prophylaxis - general surgery and orthopaedic surgery
- Extended treatment of venous thromboembolism in patients with solid tumours
- VTE prophylaxis in medical patients (unlicensed)
- Treatment of venous thromboembolisms in pregnancy (unlicensed)
- VTE prophylaxis in pregnancy (unlicensed)

Patient assessment and investigations

Patients' suitability for tinzaparin must be assessed before prescribing tinzaparin.

Base line investigations are: FBC, U&E, eGFR, LFTs, Clotting screen

Renal function:

- eGFR for prophylactic doses
- Creatinine clearance for treatment doses.

In pregnancy, base line renal function is required only in patients with renal impairment or older patients (over 40 years) or patients started on treatment dose.

For prophylactic doses, the assessment is embedded in the Drug Prescription and Administration Chart (Appendix 14).

For treatment doses, complete Tinzaparin Prescribing Checklist (Appendix 8) before writing the prescription on the Drug Prescription and Administration Chart. Tinzaparin will only be dispensed once all the sections of the checklist have been completed.

Base line investigations are: FBC, U&E, eGFR, LFTs, Clotting screen

Renal function: eGFR for prophylactic doses
Creatinine clearance for treatment doses.

Tinzaparin Doses

See Prescribing Tinzaparin Advice Appendix 9

- The dose is based on patient body weight
- eGFR for prophylactic dose
- Creatinine clearance for treatment doses
- At extremes of weight, anti Xa monitoring may be necessary (on the advice of Consultant Haematologists)

Do not delay the first dose if patient's weight and renal function is not available, but ensure that these parameters are checked as soon as possible and then adjust the next dose accordingly.

Prescribing tinzaparin on the prescription chart

When co-administering with Warfarin, tinzaparin should be given for a minimum of 5 days and until the INR is >2 for 2 consecutive days.

Monitoring platelets for heparin induced thrombocytopenia

Medical patients and obstetric patients receiving LMWH do not need routine platelet monitoring.

Post-operative patients (other than cardiopulmonary bypass patients) receiving LMWH do not need routine platelet monitoring.

Post-operative patients and cardiopulmonary bypass patients who have been exposed to heparin the previous 100 days and are receiving any type of heparin should have a platelet count determined 24 hours after starting heparin.

Post-operative patients including obstetric cases receiving unfractionated heparin should have platelet count monitoring performed every 2–3 d from days 4 to 14 or until heparin is stopped.

Post-cardiopulmonary bypass patients receiving low molecular weight heparin (LMWH) should have platelet count monitoring performed every 2–3 d from days 4 to 14 or until heparin is stopped.

Heparin induced thrombocytopenia (HIT)

If the platelet count falls by 30% or more and/or the patient develops new thrombosis or skin allergy or any of the other rarer manifestations of heparin-induced thrombocytopenia (HIT) between days 4 and 14 of heparin administration, HIT should be considered and a clinical assessment made.

If HIT is suspected, contact the Consultant Haematologist immediately for advice.

Transfer of care to GPs

Please see Tinzaparin transfer of prescribing and monitoring Appendix 38

For medical and surgical patients, TRFT Pharmacy will dispense 14 days' supply. Patients requiring longer treatment should be referred to GPs for prescribing and monitoring. A transfer of care form should be completed and the referral made via the care co-ordination centre.

The completed form should be filed in patient's case notes.

Postnatal patient patients will be dispensed the full 6 weeks course.

Associated documents:

- Tinzaparin Prescribing Checklist — Appendix 8
- Anticoagulation - perioperative management patients taking warfarin — Appendix 23
- Transfer of care to GPs — Paragraph 20
- Tinzaparin transfer of prescribing and monitoring — Appendix 38

7. PARENTERAL HEPARIN – UNFRACTIONATED HEPARIN

The use of unfractionated heparin within the Trust is restricted to the Critical Care and Coronary Care Units, where the treatment is managed by Consultant Anaesthetists and Cardiologists respectively, supported by the Consultant Haematologists

If heparin treatment is required for patients on general wards, please discuss with Consultant Anaesthetists, Cardiologists and Haematologists.

Preparations stocked

Pharmacy procures only one strength of unfractionated heparin:

- 1000 units /mL – 1mL and 20 mL ampoules

8. PARENTERAL - FONDAPARINUX

Fondaparinux is a synthetic selective factor Xa inhibitor approved for use within TRFT for preventing thrombus formation in patients with acute coronary syndromes.

It may also be considered in patients who are allergic to tinzaparin / low molecular weight heparin or for those with history of HIT.

Preparations

For acute coronary syndromes	1.5 mg and 2.5 mg
For VTE	other strengths

Indications

Acute coronary syndrome
VTE prophylaxis/treatment

Prescribing and monitoring

See Fondaparinux Prescribing Checklist - Appendix 10

9. GUIDELINE FOR DIAGNOSIS AND MANAGEMENT OF DEEP VEIN THROMBOSIS

9.1. Presentation and examination

Undertake history and clinical examination.

9.2. Risk Assessment

Risk assess the patient completing the Two Level DVT WELLS score see Appendix 11

Note: Previous DVT same leg/IVDU/Pregnancy and known thrombophilia are automatically regarded as likely DVT and should be investigated with USS.

Obstetrics and Gynaecology to be informed of pregnant patient on admission

9.3. Investigations

- D-dimer where indicated should only be considered following assessment of clinical probability

Note: Patients with **high clinical probability for DVT should not** have D-dimer performed prior to imaging, as it is of no value in the diagnostic process for this group

(D-dimers can be raised in high probability PE, coagulated patients, infection, malignancy, postoperatively, pregnancy, and disseminated intravascular coagulopathy, inflammatory conditions.)

- FBC, LFT, U&E, Coagulation Screen, eGFR, CRP, CrCl
- Weight, Urinalysis, Complete record of Vital Signs
- Where relevant, **all female patients** to have urine pregnancy test to rule out pregnancy prior to any imaging
- ECG, Chest X ray if relevant.

Imaging

If Low probability DVT and a negative D-dimer test, do not request USS.

Complete USS request form including clinical details arrange Doppler ultrasound scan with radiology department ((ext. 4359) available Mon-Fri 9 am- 5 pm.

Note: Where USS doppler is not available on the same day, see Page 27 Guidance for discharge and return where ultrasound scan is not available on the same day

9.4. Diagnosis

- **If positive** USS for DVT treat and follow Anticoagulation treatment pathway

- If negative USS for DVT and negative d-dimer consider alternative diagnosis

- If negative USS for DVT and **positive d-dimer re scan 7 days**

- If negative USS but **high probability and still suspect VTE** event consider further imaging and discuss with consultant radiologist.

If there are symptoms or signs to suggest malignant disease request appropriate investigations.

9.5. Screening

Do not request thrombophilia investigations, as the results are unreliable during acute event and these will be requested by haematologist if necessary as when treatment has finished if appropriate.

Anti-phospholipid antibody testing should be performed if diagnosis anti - phospholipid syndrome suspected (DRVVT for lupus anticoagulant should not be performed whilst on warfarin).

9.6. Key Points

- Duplex compression ultrasound is performed from the groin ligament down to ankle. This means that isolated iliac vein thrombosis may not be identified.
- Calf vein thrombosis may not be detected using this imaging protocol. About 20% of calf vein thrombosis extends more proximally hence the need to re-scan in 5-7 days
- Remember the post-thrombotic syndrome as possible diagnosis in those with previous DVT in same leg- are symptoms new or chronic.
- Anti-embolic stockings applied to unaffected leg due to swelling and painful affected leg.
- Referral to be made to orthotics for graduated compression hosiery. Peripheral pulses must be felt and documented and request arterial Doppler if suspect arterial insufficiency.

Guidance for discharge and return where ultrasound scan is not available on the same day

Patients who are clinically unstable, have significant comorbidity or have significantly limited mobility should be managed as inpatients.

IMPORTANT: All patients requiring imaging should be given therapeutic LMWH unless contraindicated until scanned.

Criteria for discharge for all patients must be met.

- A health care professional must administer the initial injection of LMWH.
- The patient or provision (district nurse/carer) has been made for patient to receive further daily injections of LMWH at home/ willing to return daily for injection until scan can be performed.
- The person authorising discharge must be assured that the patient has mental capacity, is mobile, with access to telephone and transport
- Full blood count and clotting screen must have been taken and reviewed
- The patient must be counselled regarding LMWH/DVT, signs and symptoms of PE and have been instructed to seek medical advice if condition deteriorates
- A Request form must be completed by Doctor to request an USS scan.

Procedure

- Nurse to arrange USS with radiology department for the next available appointment and put patient details and time to return to correct department.
- Provide patient with appointment card and details of return and contact number of ward patient returning to.
- If unable to give an appointment out-of-hours or the referral is from Urgent and Emergency Care Centre (UECC) document patient details and telephone number in MAU Assessment Bay Ward diary. Nurse to contact following day or next weekend.

Ensure patient is provided with LMWH injections and sharps bin if scan is not available the following day i.e. over weekends and Bank Holidays

10. GUIDELINE FOR DIAGNOSIS AND MANAGEMENT OF PULMONARY EMBOLISM

10.1. First Stage

Presentation and examination

Undertake history and clinical examination.
Consider diagnosis of Pulmonary Embolism if:

- Dyspnoea, pleuritic chest pain, and haemoptysis
- Any chest symptoms and clinical features suggesting deep vein thrombosis
- Dyspnoea or chest pain and major risk factor
- Unexplained dyspnoea, chest pain and mild haemoptysis

10.2. Second Stage: All patients

Risk Assessment

Risk assess patient and complete the:

- Request for Imaging for Suspected PE - (available on intranet or contact Radiology dept.)

1st Initial treatment dose of LMWH should be given to patients with intermediate or high clinical probability before imaging.

10.3. Third Stage

Investigations

- D – Dimer

  Note: D-dimers can be raised in high probability PE, coagulated patients, Infection, malignancy, post operatively, pregnancy, and disseminated intravascular coagulopathy, inflammatory conditions.

- FBC, Clotting screen, LFT, U&E, eGFR, CRP and Troponin I
- Weight, Urinalysis, Complete record of Vital Signs
- Where relevant, **all female patients** to have urine pregnancy test to rule out pregnancy prior to any imaging
- ECG, Chest X ray
- If clinical signs of DVT proceed with USS of legs prior to further investigation

ALL *Pregnant patients to be referred to Obstetrician and have USS of both legs to rule out DVT before requesting CTPA (discuss with radiologist)***.**

Requesting CTPA

CTPA form to be completed by SpR and discussed with Radiologist

Note: If CTPA contraindicated (renal failure/allergy to contrast) consider Ventilation perfusion scan. SpR to discuss with radiologist

Out of hours/weekend contact – See Flowchart Appendix 15

Patients with a **good quality negative CTPA** do not require further investigation or treatment for PE.

Deteriorating patients to be discussed with Medical Consultant

10.4. Fourth Stage

Management and anticoagulation

Patients to be monitored using Early Warning Score System

If **confirmed PE**

if not already started, commence treatment dose of LMWH (consider alternatives if required, discuss with Consultant Haematologist).

Oral anticoagulants are the mainstay of pulmonary embolism management follow yellow anticoagulation chart for dosing and management.

Currently all patients should be managed as inpatients until oral anticoagulation is therapeutic. It is at the discretion of the medical consultant for early discharge if appropriate

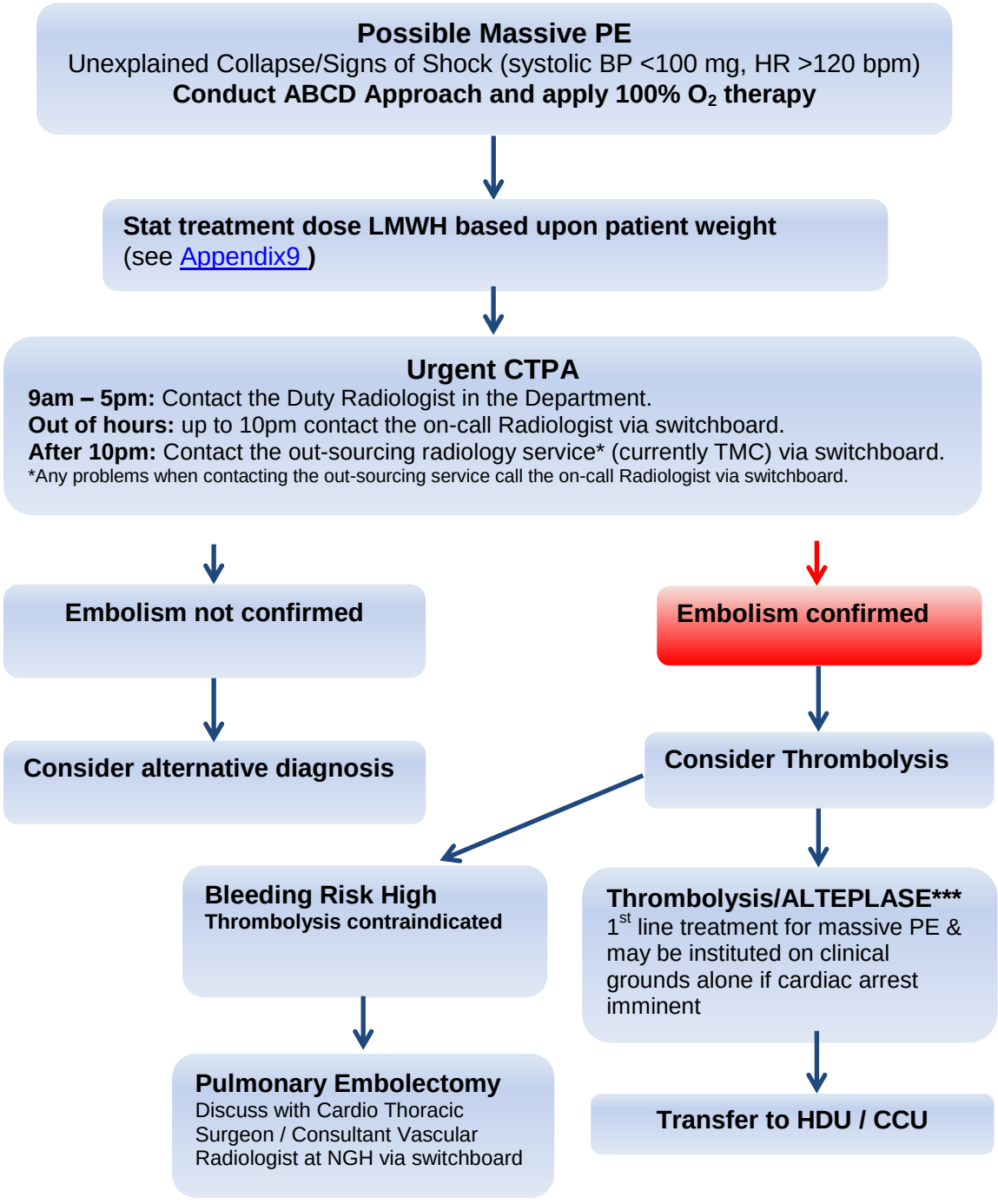
FBC, Coagulation screen, LFTS and renal biochemistry should be checked prior to anticoagulation.

Do not request thrombophilia investigations (results will not influence acute management and are unreliable during acute event).

Supportive therapy with oxygen and analgesia as required (maintain O_2 sats >92% unless underlying COPD - see oxygen guidelines)

Thigh/Knee length anti-embolism stockings should be fitted as soon as practicable if not contraindicated

11. ALGORITHM FOR THE MANAGEMENT OF MASSIVE PULMONARY EMBOLISM



*****Administration ALTEPLASE**

10 mg by intravenous injection over 1–2 minutes, followed by an infusion based on body weight

Weight	Dose infused over 2 hours	Maximum total dose (bolus + infusion)
More than 65 kg	90 mg	100 mg
Less than 65 kg	1.5 mg/kg **minus** 10 mg (the bolus dose already given)	1.5 mg/kg

On completion of the Alteplase infusion, check APTT and again at 4 hourly intervals.

12. VENOUS THROMBEMBOLISM PROPHYLAXIS

Background

All adult patients admitted into hospital must receive a full VTE risk assessment on admission unless indicated otherwise and prescribed appropriate VTE prophylaxis (NICE, 2010)

Patients requiring VTE risk assessment on admission are:

A full VTE risk assessment is required:
Surgical Patients
Trauma Patients
*Medical in patients with acute illness, e.g. MI, Stroke, Spinal Injury, Sepsis, COPD
Cancer patients
Patients requiring long term rehabilitation in hospital
Patients admitted for a day case or a surgical procedure

NB: the above lists are not exhaustive.

The patients who do not require a VTE risk assessment are:

A full VTE risk assessment is NOT required:
Patients under the age of 18 years
Patients attending as outpatients
Patients presenting to the Emergency Department not requiring admission
Elderly or immobile patients cared for at home or in external residential accommodation, unless admitted to hospital
Patients admitted to hospital with a diagnosis of or suspected diagnosis of DVT or PE

There are no exclusions or 'opt outs' however, the Department of Health has agreed for Trusts to adopt a **'cohort approach'** which allows a clinical decision to be made for a group of patients admitted for the same procedure who are felt to have a similar risk profile and as a group are assessed and considered as low risk of VTE.

The following day case procedures have been agreed as **'cohort groups'** and so are **excluded** from a VTE risk assessment

Cohort Groups excluded from VTE risk assessment
Endoscopy, gastroenterology patients

Cohort Groups excluded from VTE risk assessment
Chemotherapy patients
Ophthalmological procedures with local anaesthetic/regional/sedation/ and not full general anaesthetic
Non-cancer dental and maxillo-facial surgery last less than 90 minutes with local anaesthetic/regional/sedation/ and not full general anaesthetic
Patients undergoing Photophoresis treatment
General surgical patients lasting less than 90 minutes with local anaesthetic/regional/sedation/ and not full general anaesthetic
Patients under the age of 18 years
Patients presenting to the Emergency department not requiring admission to CDU
Oral surgery minor operations (procedures done in OPD)
Ward “UROL” activity (patients having procedures lasting less than 90 minutes with local anaesthetic/regional/sedation/ and not full general anaesthetic
Cardiology patients having procedures lasting less than 90 minutes with local anaesthetic/regional/sedation/ and not full general anaesthetic
Planned Investigation Unit patients having procedures lasting less than 90 minutes with local anaesthetic/regional/sedation/ and not full general anaesthetic
Dermatology patients having procedures lasting less than 90 minutes with local anaesthetic/regional/sedation/ and not full general anaesthetic
Gynaecology patients having procedures lasting less than 90 minutes with local anaesthetic/regional/sedation/ and not full general anaesthetic

A number of highly thrombogenic procedures are performed under local anaesthetic, or for less than 90 minutes. Clinicians need to consider this even when managing patients who are deemed within an exclusion group, apply clinical judgement and carry out an ‘exclusion check’ using the Trust VTE risk assessment if considered appropriate.

The above tables are for guidance only; it is vital to assess each patient individually as to whether the benefits of VTE prophylaxis outweigh the risk of bleeding (NHS England Alert NHS/PSA/W/2015/001)

The rationale for patients who are excluded from VTE risk assessment must be clearly documented in the health care record

Completion of VTE Risk assessment
Please see Appendix 13

All patients (excluding those highlighted above) must be risk assessed for VTE on admission. For inpatients the VTE risk assessment is embedded in

the Drug Prescription and Administration Chart (Appendix 14). For Day Case patients a VTE risk assessment form is available (Appendix 15).

The admitting Consultant must ensure that a full VTE risk assessment has been undertaken and completed, and appropriate prophylaxis prescribed.

For patients planned for elective surgery, the pre-operative assessment nurse may carry out a VTE risk assessment in the pre-operative assessment clinic **however, it is the responsibility of the surgeon** to complete the risk assessment on admission and prescribe the appropriate prophylaxis

The reasons for withholding VTE prophylaxis, whether due to exclusion criteria or patient refusal must be documented in the patient's health care record

Any concerns when completing the VTE risk assessment or subsequent clinical management must be escalated to a senior clinician as soon as possible.

Pregnancy and up to 6 weeks post-partum

See Trust document available on intranet:

> **Identification of risk and the management of venous thromboembolism in pregnancy and the puerperium.**

If in doubt seek advice from the Consultant Obstetrician or Haematologist.

Safe management of patients with VTE risk factors

- patients should not be allowed to become dehydrated.
- patients should be encouraged to mobilise as soon as possible.
- aspirin or other antiplatelet agents **should not be** considered as adequate prophylaxis for VTE.
- patients at high risk of VTE may be considered for vena caval filters, if LMWH and anti-embolism stockings are contraindicated.

For female patients having elective surgery
Discuss with female patients risks and benefits of stopping pre existing oestrogen containing contraceptive or hormone replacement therapy 4 weeks prior to surgery.

VTE prophylaxis
Please see Appendices 14, 15, 16, 17, 18, 19, 20, 21

Patients at **increased risk of VTE (i.e. with one or more VTE risk factor)** should be prescribed appropriate thromboprophylaxis until they are no longer significantly immobile, generally 5-7 days.

However, extended prophylaxis with oral anticoagulants is indicated for patients after elective hip and knee replacement surgery and with tinzaparin after hip fracture and major cancer surgery in the abdomen or pelvis.

There are two types of thromboprophylaxis: mechanical and pharmacological. Anti-embolism stockings (AES) and LMWH are first line choice.

Pharmacological prophylaxis

Tinzaparin is the low molecular weight heparin (LMWH) of choice at Rotherham Hospital. It is administered subcutaneously once daily until patients are no longer significantly immobile, generally 5-7 days.

Extended duration is recommended after some surgical procedures, e.g. orthopaedic (hip & knee replacement and hip fracture) and patients undergoing abdominal and pelvic surgery for cancer. For elective hip and knee surgery, oral DOACs are the anticoagulant of choice.

Commencing Tinzaparin and timing of dose following surgery/ epidural in relation to VTE prophylaxis

Check timings with Anaesthetists

Planned:	Tinzaparin prophylactic dose cannot be given at least 12 hours before planned epidural Tinzaparin treatment dose cannot be given at least 24 hours before planned epidural
Attempted/inserted:	Allow at least 6 hours post epidural procedure. If traumatic procedure, give after 24 hours
Removal of catheter**:**	Allow at least 12 hours after last prophylactic dose of tinzaparin with next dose at least 6 hours after removal.

High risk surgery (abdominal /pelvic/ hip)
Patients undergoing 'high risk' surgery should be considered for a prophylactic dose of Tinzaparin at 6 pm (minimum 12 hours before surgery) on the day before the surgery. Arrangements should be made for the dose to be made available for these patients.

Alternatives to Tinzaparin
All low molecular weight heparins are derived from porcine origin.

Fondaparinux may be an alternative for patients allergic to tinzaparin.

Further discussion with the Consultant Haematologist may be required.

NICE have provided detailed information and flowcharts for the management of various groups of patients and these can be located by accessing the NICE website; http://pathways.nice.org.uk/pathways/venous-thromboembolism

For management in Pregnancy please refer to NICE guidance as above, the RCOG Green Top Guide and the Trust document:

Patient Information and Education

Patients must be given information on the reasons for VTE assessment before starting prophylaxis and at discharge.

1. Before starting VTE prophylaxis

- The risks and possible consequences of VTE
- The importance of VTE prophylaxis and possible side effects
- The correct use of prophylaxis e.g. AES
- How patients can help reduce risks of VTE (keep hydrated, exercise and be mobile)
- Important information about Deep Vein Thrombosis and Pulmonary Embolism during your stay in hospital – leaflet.

2. At discharge

- The signs and symptoms of VTE and PE.
- The correct and recommended duration of VTE prophylaxis at home (if continuing at home e.g. after hip surgery).
- Contact name /number if requiring help or advice on using prophylaxis. (Your Discharge Home- Information for You and Your Carers about reducing your risk of Deep Vein Thrombosis and Pulmonary Embolism – leaflet

Mechanical Prophylaxis
Please see Paragraph 13

13. VTE PROPHYLAXIS – MECHANICAL

Mechanical prophylaxis includes anti-embolism stockings (AES), foot impulse devices and intermittent pneumatic compression devices. The choice for patients should be based on patient factors, clinical condition and patient preference.

Anti-embolism stockings

Anti-embolism stockings exert a graded circumferential pressure from distal to proximal regions of the leg. They prevent DVT in immobile patients by exerting blood flow velocity and promoting venous return. There are risks associated with their use, therefore importance should be given to fully assess patients, to carefully measure legs before fitting stockings and to carefully monitoring stocking use.

The following patients are at increased risk of VTE and should be assessed for anti-embolism stockings on admission:

- **Surgical patients** with one or more VTE risk factors
- **Trauma patients** with one or more VTE risk factors
- **Medical patients** with one or more VTE risk factors in whom tinzaparin is contraindicated.

AES should be fitted on the day of surgery. To facilitate this trained nursing staff may fit AES without a prescription provided the patient has been appropriately assessed and that there are no contraindications to AES. The assessment, measuring and fitting of AES should be documented in the 'once only medicines' section of the medicines chart. For subsequent applications and checks the prescription on the regular side should be completed.

Contraindications to anti-embolic stockings

See medication chart

Information on the contraindications to AES is detailed on the VTE risk assessment on the white medicines chart.

If arterial disease is suspected, seek expert opinion before fitting stockings

Taking measurements for and the fitting of anti-embolism stockings

The stockings should provide graduated compression and produce a calf pressure of 14 -15 mmHg.

The appropriate length of stockings - thigh or knee- should be considered.

Measurement required:

Please follow manufacturer's instructions.

Application of stockings:

If arterial disease is suspected, seek expert opinion before fitting stockings.

1. Insert hand into stockings as far as the heel pocket.
2. Grasp centre of heel pocket and turn stocking inside out to heel area.
3. Carefully position stocking over foot and heel. Be sure patient's heel is located in the heel position.
4. Begin pulling body of stocking up around the ankle and calf.
5. Smooth out any excess material.
6. Pull toe section forward to smooth ankle and instep area and allow for patient toe comfort.

Note: Patients should be encouraged to wear their stockings day and night until they no longer have significantly reduced mobility.

Daily checks

AES stockings should be removed daily for hygiene purposes and to inspect skin condition. The inspection should be two or three times daily for patients with a significant reduction in mobility, poor skin integrity or any sensory loss. Daily inspections should be documented on the medicine chart and in the patients' health records.

The use of stockings should be discontinued if there is marking, blistering or discolouration of the skin, particularly over the heels and bony prominences or the patient experiences pain or discomfort.

If suitable offer a foot impulse device or intermittent pneumatic compression device as an alternative. Patients should be counselled on:

- the importance of wearing anti-embolism stockings
- how to use them correctly
- how to monitor skin and seek advice if necessary.

Intermittent pneumatic compression device, Flowtrons

An alternative to AES is intermittent pneumatic compression device, Flowtron. These may also be prescribed intra-operatively in addition to AES or in preference to AES in patients considered to be at 'high risk' of VTE.

Consultant surgeons should specify the patients that should be prescribed Flowtrons intra-operatively with or without AES.

Flowtrons should be prescribed on the medicine chart.

Manufacturer's instructions should be followed when fitting Flowtrons.

Contraindications to Flowtrons are as for anti-embolism stockings.

14. VTE PROPHYLAXIS – MEDICAL PATIENTS

Medical patients are at increased risk of VTE if admitted with acute illness.

- On admission all medical patients must be assessed for VTE using the assessment form embedded in the medicine chart.
- Initial assessment is to determine whether the patient is at risk of significantly reduced mobility due to illness.
- If there is going to be significantly reduced mobility, then assess thrombosis risk and bleeding risk.
- The risk of thrombosis must be balanced against the risk of bleeding and if no contraindications tinzaparin prophylaxis should be prescribed on the medicine prescription chart.
- If tinzaparin is contraindicated, consider anti-embolism stockings if appropriate.
- The reason for withholding tinzaparin, whether it is inappropriate on medical grounds or the patient refuses, must be documented.
- After 24 hours review prophylaxis prescribed and thereafter whenever clinical condition changes.

VTE risk assessment must be completed as per the checklist in the medication prescription chart on admission, at 24 hours and whenever the clinical condition changes

15. VTE PROPHYLAXIS – NON-ORTHOPAEDIC SURGERY

Patients undergoing surgery are at increased risk of VTE if the procedure leads to significantly reduced mobility.

VTE risk assessment

- For planned surgery, initial VTE assessment will take place in the Pre-assessment Clinic.
    - This will be documented on the medication chart for patients admitted into hospital.
    - For Day Case Surgery, the green risk form is available.
- On admission all surgical patients must be assessed for VTE using the assessment form embedded in the medicine chart.
- If there is going to be significantly reduced mobility, then assess thrombosis risk and bleeding risk.
- The risk of thrombosis must be balanced against the risk of bleeding and if no contraindications prescribe tinzaparin in the medicine chart.
- If tinzaparin is contraindicated, consider anti-embolism stockings if appropriate.
- The reason for withholding tinzaparin, whether it is inappropriate on medical grounds or the patient refuses, must be documented.
- After 24 hours review prophylaxis prescribed and thereafter whenever clinical condition changes.

VTE prophylaxis

- On admission, patients should be assessed for and fitted AES prior to the surgery.
- Tinzaparin should be prescribed for 6 hours after surgery or when appropriate and continued for the duration recommended for the type of surgery.
- Tinzaparin prophylaxis is recommended until patients are mobile, generally for 5-7 days or until discharge.
- Extended prophylaxis is recommended in patients undergoing gynaecological/ abdominal surgery.

16. VTE PROPHYLAXIS – ORTHOPAEDIC SURGERY

Patients undergoing orthopaedic surgery are at increased risk of VTE if the procedure leads to significantly reduced mobility.

Elective hip and knee surgery
VTE risk will be assessed in the Pre-Assessment Clinic using the form embedded in the medicine chart.

1. Offer combined VTE prophylaxis with mechanical and pharmacological methods to patients undergoing elective hip replacement surgery

2. Start mechanical VTE prophylaxis at admission. Choose any one of the following based on individual patient factors:

   - anti-embolism stockings (thigh or knee length), used with caution (see Kardex for contraindications)
   - foot impulse devices
   - intermittent pneumatic compression devices (thigh or knee length)

   Continue mechanical VTE prophylaxis until the patient no longer has significantly reduced mobility.

3. Assess suitability for apixaban using Apixaban Prescribing Checklist – Orthopaedics:

   Provided there are no contraindications, prescribe:

Apixaban 2.5 mg twice daily	Starting 12-24 hours after surgery	Hip surgery 32 days Knee surgery 10 days

   or

   If apixaban contraindicated:

Tinzaparin See Appendix 9	Starting 6 hours after surgery	Hip surgery 28 days Knee surgery 10 days

Hip fracture

1 Offer combined VTE prophylaxis with mechanical and pharmacological methods to patients undergoing elective hip replacement surgery

2 Start mechanical VTE prophylaxis at admission. Choose any one of the following based on individual patient factors:

- anti-embolism stockings (thigh or knee length), used with caution (see Kardex for contraindications)

- foot impulse devices
- intermittent pneumatic compression devices (thigh or knee length)

Continue mechanical VTE prophylaxis until the patient no longer has significantly reduced mobility.

3 Provided there are no contraindications, prescribe:

- Tinzaparin starting 6 hours after surgery
- Total duration for 28 days

Other orthopaedic surgery

Consider offering combined VTE prophylaxis with mechanical and pharmacological based on an assessment of risks and after discussion with the patients.

1 Start mechanical VTE prophylaxis at admission. Choose any one of the following based on individual patient factors:

- anti-embolism stockings (thigh or knee length), used with caution (see Kardex for contraindications)
- foot impulse devices
- intermittent pneumatic compression devices (thigh or knee length)

Continue mechanical VTE prophylaxis until the patient no longer has significantly reduced mobility.

2 Provided there are no contraindications, prescribe:

- tinzaparin starting 6 hours after surgery

Continue tinzaparin until the patient no longer has significantly reduced mobility.

Do not routinely offer VTE prophylaxis to patients undergoing upper limb surgery. If a patient is at increased risk of VTE then prophylaxis may be considered.

Lower limb plaster cast
See risk assessment - Appendix 16

The risk of VTE should be assessed using Lower Limb Plaster Cast risk assessment form and apixaban prescribed if at increased risk of VTE.

Orthopaedic prophylaxis – Summary

Procedures	VTE prophylaxis assessment and prescribing			
	Pre-assessment	**On admission**	**After surgery**	**At discharge**
Elective knee replacement	VTE risk assessment	VTE risk assessment Apply AES and /or Flowtron	**Apixaban 2.5 mg BD** starting 12-24 hours after surgery or if apixaban contraindicated **Tinzaparin** Starting 6 hours after surgery	**Apixaban** to complete a 10-day course or **Tinzaparin** to complete a 10 days course
Elective hip replacement	VTE risk assessment	VTE risk assessment AES and /or Flowtron	**Apixaban 2.5 mg BD** starting 12-24 hours after surgery or if apixaban contraindicated **Tinzaparin** Starting 6 hours surgery	**Apixaban** to complete a 32-day course or **Tinzaparin** to complete a 28 days course
Hip fracture	Not applicable	VTE risk assessment AES And/ or Flowtrons	**Apixaban 2.5 mg BD** starting 12-24 hours after surgery or if apixaban contraindicated **Tinzaparin** Starting 6 hours surgery	**Apixaban** to complete a 32-day course or **Tinzaparin** to complete a 30 days course
Lower limb plaster cast	Not applicable	VTE risk assessment	**Apixaban 2.5 mg BD** **or** **Tinzaparin**	To complete a 42-day course or until removal of plaster cast
Ankle injury	Not applicable	VTE risk assessment		
Upper limb surgery	Risk assessment if elective surgery	Risk assessment Consider if at increased risk	Consider if at increased risk	

17. ANTICOAGULATION FOR THE PREVENTION OF STROKE IN PATIENTS WITH NON-VALVULAR ATRIAL FIBRILLATION

All patients diagnosed with non-valvular atrial fibrillation should be risk assessed for stroke and for risk of bleeding and offered anticoagulation (NICE, 2014).

Patient assessment

Risk of stroke:
CHADS2-VASC - Appendix 21
This defines 'major' and 'clinically non-major risk factors' which increase the risk of stroke.

Patients with a CHADS2-VASC score of 2 should be offered anticoagulation, and considered offering to men with CHADS2-VASC score of 1, after taking into account the person's bleeding risk assessed using the HAS-BLED score.

Risk of bleeding:
HAS-BLED score - Appendix 23
This assesses the risk of a major bleed and to identify and manage modifiable risk factors for bleeding, such as uncontrolled hypertension, harmful alcohol consumption, and concurrent use of aspirin or a nonsteroidal anti-inflammatory drug.

Anticoagulation
The choice of anticoagulation will depend on patient's factors e.g. renal function, age and weight and patient choice.

Prescribing
Use the Prescribing Checklist for the anticoagulant selected, e.g. warfarin, apixaban, dabigatran, rivaroxaban (Appendices 2. 4, 6, 7)

Monitoring

Warfarin	Monitor INR as per warfarin guidelines
DOACs	See Paragraph 5 (Page 15)

18. PERIOPERATIVE MANAGEMENT OF PATIENTS UNDERGOING SURGERY / PROCEDURES

1. Elective surgery
    a. Patients taking vitamin K antagonists (Appendix 22)
    b. Patients taking DOACs (Appendix 23)
    c. Patients taking antiplatelets (Appendix 26)
2. Emergency surgery in patients taking warfarin (Paragraph 18.2)
3. Dental surgery (Appendix 24)
4. Endoscopic procedure (Appendix 25)
5. Cancellation of surgery (Paragraph 18.5)

18.1. Elective surgery

Assessment of all elective patients should be carried out at pre-operative assessment. Where the procedure does not require a formal pre-operative assessment, the clinician ordering the procedure must ensure that management of anticoagulant therapy is as per this document or advice of the Consultant Haematologist.

When a patient requires bridging management the Consultant in charge of the patient for their primary diagnosis during the admission/visit remains responsible for the patient's care supported by clinical advice from the Consultant Haematologist or Anticoagulation Nursing Team. Staff are always advised and encouraged to discuss management of anticoagulation the Consultant Haematologist or Anticoagulation Specialist Nurses

Where patients are receiving a short (3-6 months) course of anticoagulation therapy (specifically warfarin), where possible surgery should be deferred until the course of anticoagulation therapy has been completed.

In patients where the thromboembolic event is particularly extensive, surgery should be delayed unless essential.

For those patients who require planned surgery, it is necessary to balance the thrombotic risks of stopping anticoagulation with the haemorrhagic risk of surgery in the presence of anticoagulation.

Based on individual assessment it may be necessary to stop the oral anticoagulant (e.g. warfarin) and replace it with LMWH until after the procedure - **bridging therapy.** For patients at high risk of thrombosis, consider bridging with tinzaparin.

Prior to any procedure the clinician responsible for the management of the patient whilst undergoing the procedure must clearly document in the patients' Health Care Record and communicate the anticoagulation therapy management plan.

If anticoagulation therapy is to be interrupted patients must be given clear instructions and when to attend for INR checks prior to their procedure.

The patients at high risk of thrombosis should be considered for bridging with tinzaparin if taking warfarin (BSH 2016). They are:

The following steps should be followed (Appendix 23)

1. Establish thrombosis risk
2. Establish bleeding risk associated with procedure/surgery
3. Establish need for bridging
4. Follow recommendations for stopping warfarin
5. Follow bridging with tinzaparin

Although some have grouped procedures together into lower and higher risk (Spyropoulos & Douketis 2012 and Baron et al 2013), the operating surgeon, dentist, or interventional radiologist has to assess the risk of bleeding for the individual patient and discuss both this and the plan for perioperative anticoagulation with them. The plan must be clearly in the notes, including a plan for when the patient is discharged.

Risk of thrombosis and bleeding can be assessed using the T 1 and 2 below and Appendix 23.

Table 1 Patients at high risk of thrombosis are those with:

VTE	VTE within previous three months Previous VTE whilst on therapeutic anticoagulation who now have target INR of 3.5
AF	Previous stroke/TIA in last three months Previous stroke /TIA and three of the following risk factors: • Congestive cardiac failure • Hypertension >140/90 mmHg or on medication • Age >75 years • Diabetes mellitus
Metallic heart valve	All patients except those with a bileaflet aortic valve and no other risk factors

Table 2 Bleeding risks associated with procedures

Procedures with major risk of bleeding • Spinal or epidural anaesthesia; lumbar diagnostic puncture • Thoracic surgery • Abdominal surgery • Major orthopaedic surgery • Liver biopsy • Transurethral prostate resection • Kidney biopsy • Multiple tooth extractions (see Appendix 25) • Extracorporeal shockwave resection
Procedures with minor risk of bleeding • *Endoscopy with biopsy (Please refer to endoscopy guidance Appendix 26) • *Prostate or bladder biopsy • Pacemaker or ICD implantation (unless complex anatomical setting, e.g. congenital heart disease) * *Patients with renal/liver impairment may have elevated bleeding risk and should be considered individually*

Procedures not requiring discontinuation of anticoagulation
• Dental procedures (Please refer to Appendix 25)
  ○ Extraction of one to three teeth
  ○ Periodontal surgery
  ○ Incision of abscess
  ○ Implant positioning
• Ophthalmology
  ○ Cataract or glaucoma procedure
• Endoscopy without surgery
• Superficial surgery (e.g. abscess incision, small dermatologic excisions, etc.)

18.2. Emergency surgery in patients taking warfarin

Please discuss with haematologists on call.

If surgery can wait for 6-8 hours then 5 mg intravenous phytomenadione can restore coagulation factors. If this is not possible anticoagulation can be reversed with 25-50 unit/kg of Beriplex®. Consider giving at lower end of this range and check INR.

Seek advice form Consultant Haematologists

18.3. Patients undergoing dental procedures

See Perioperative management of patient undergoing dental surgery – Appendix 25.

18.4. Patients undergoing endoscopic procedures

See Perioperative management of patient undergoing endoscopic surgery – Appendix 26.

18.5. Cancellation of Surgery

Continue with the LMWH and restart the oral anticoagulant at the usual dose. **Stop the LMWH once the INR = > 2.0**

19. MANAGEMENT OF BLEEDING AND REVERSAL OF OVER-ANTICOAGULATION

Warfarin/acenocoumarol	Appendix 28
Heparin LMWH	Appendix 29
Apixaban	Appendix 30
Dabigatran	Appendix 31
Rivaroxaban	Appendix 32
Edoxaban	Appendix 33
Fondaparinux	Appendix 34
Protocol for Beriplex	Appendix 35, 36

Please refer to the following Trust Documents available on intranet:

- Beriplex User Information (appendix)
- SOP Administration of Blood Products
- Guidelines for managing bleeding associated with excessive Anticoagulation

If in doubt, consult the Haematologist.

19.1. Bleeding whilst on warfarin / acenocoumarol (Vitamin K antagonists)

Please refer to the yellow Anticoagulation Prescription and referral form (Appendix 2)

19.1.1. **Major bleed** – contact the consultant haematologists

STOP anticoagulants – EVEN IF INR IN THERAPEUTIC RANGE

- Consider activating the massive haemorrhage protocol by dialling '2222' Obtain FBC, Cross match, Clotting screen
- Give IV vitamin K 5 mg and repeat as necessary after 24 hours
- Intracerebral bleeds and major gastrointestinal bleeds require reversal with
- Prothrombin Complex Concentrate. This must be discussed with Consultant haematologists

Important Note: INR >10

Outpatients with INR >10, but no obvious sign of bleeding must attend AMU to be assessed for 'bleeding risk' and an INR re check.

19.1.2. **INR more than 8** No bleeding or minor bleed

STOP anticoagulant for 1-3 days and restart when INR is less than 5 at 1 mg or less than the last dose.

If bleeding risk e.g. 70 years of age or had recent injury, give IV vitamin K 2 mg.

19.1.3. **INR 6-8** - No bleeding

STOP anticoagulant for 1-3 days and restart when INR is less than 5 at 1 mg or less than the last dose.

Consider other causes of bleeding:

- Drugs (aspirin, NSAIDs)
- Low platelet count
- Abnormal liver function tests
- Other pathology

For further information staff are referred to guidance available on intranet.

Anticoagulation reversal for non-major bleeding should be with 1-3 mg intravenous vitamin K

This must include major haemorrhage. Seek advice about the use of Beriplex for immediate reversal.

19.2. Bleeding whilst on DOACs
See Appendices 30, 31, 32, 33

Currently there is a reversal agent available only for dabigatran.

For patients taking a DOAC who develop bleeding problems, please discuss with a Consultant Haematologist.

19.3. Bleeding whilst on Tinzaparin, if suspected overdose:
See Appendix 29

- Request APTT and state 'overdose' on request form.
- Inform Consultant Haematologist as reversal with protamine sulphate may be required.
- APTT after 24 hours if needed.

19.4. Bleeding whilst on Heparin, if suspected overdose:

- Request APTT and state 'overdose' on request form
- Inform Consultant Haematologist as reversal with protamine sulphate may be required.
- APTT after 24 hours if needed.

19.5. Bleeding whilst on fondaparinux, if suspected overdose:
See Appendix 35

20. REFERRAL AND DISCHARGE OF PATIENTS

20.1. Referral of patients requiring initiation or on-going monitoring of oral Anticoagulation

Responsibility for the patient's anticoagulation remains with the Consultant in charge of the patient's care until the patient is seen in the Anticoagulant Clinic or by another monitoring team.

All inpatients and established patients on warfarin must be referred in the first instance to the Hospital Based Anticoagulation Nurse Service.
See Appendix 30

20.2. Referral to Hospital Based Anticoagulation Nurse Service

The Hospital Based Anticoagulation Nurse Service can be contacted on 01709 424016. It is a Monday to Friday, 09.00 – 17.00 service. Patients' blood can be taken at their place of choice by phlebotomy service based within the hospital or GP Surgery.

The hospital-based Anticoagulation Nurse Service use a computer aided dosing management system to dose patients according to a pre-set algorithm.

Where dosing is required outside of the pre-set algorithm the Consultant Haematologist may be contacted for advice by the Anticoagulation Nurse Specialists.

All results that are available before the end of the working day will be dosed and patients contacted, however, any results available out of hours will be dosed the next day. Pathology will escalate any raised INRs as stated within their SOPs to the Haematology Consultant on call who will then decide on action to be taken.

Please Note: Routine INRs will not be monitored on a Friday unless the patient is able to attend the Phlebotomy service based within the hospital.

For an **outpatient clinic** appointment, the yellow anticoagulation prescription and referral form must still be completed or send a letter to the Anticoagulation Nurses office by fax or post.

Tertiary Referrals for patients established on Warfarin referrals can be telephoned or faxed to Hospital Based Anticoagulation Nurse Service.

GP Referrals into the Hospital Based Anticoagulation Nurse Service can also be telephoned or faxed into the service. Please ensure all referrals contain all information as detailed in the yellow anticoagulation prescription and referral form (see Appendix 1)

Out of hours management of patients with INR > 10 Pathology staff, as directed by their SOP will contact the Clinical Site Team who will contact the patient and arrange for the patient to be reviewed on the Medical Admissions Unit. Patients on warfarin must attend AMU to be assessed for 'bleeding risk', and a repeat INR

Patients with an INR >8.0 and no signs of bleeding should receive 1 – 5mg of oral vitamin K (phytomenadione).

20.3. Referral to GP Services

When referring to the GP services, a copy of the yellow Anticoagulation prescription and referral form can be faxed or sent with the patients discharge letter however, before completing discharge medical/nursing staff must also confirm the additional information to that identified above:

- Confirmation of and the name of the GP that has accepted the patient for anticoagulation management (there is a section on the yellow form to indicate this.)
- Confirmation that the patient has been appropriately counselled and educated regarding their anticoagulation.
- Name of the Doctor discharging the patient and the clinical team who has been responsible for inpatient care

Note: For patients discharged on LMWH using a shared care agreement please refer to Appendix 31

20.4. Referral to the Thrombosis Clinic for a 3-month review

All patients who are diagnosed with a VTE and receive anticoagulation should receive a review within 3 months of diagnosis to discuss the risks and benefits of continuing anticoagulation therapy (NICE Guidance).

This should be requested through the Anticoagulation Nurse Specialist Team by either contacting the team via telephone on Ext 4016, or completing an internal referral form and sending it to the Anticoagulation Nurses via internal post.

The referral will be triaged by the Anticoagulation Nurse Specialists and the patient will be appointed to see either a Consultant Haematologist or the Anticoagulation Nurse Specialists.

20.5. Discharging patients with VTE Prophylaxis

Before discharging a patient on VTE prophylaxis the responsible clinician must:

- Offer verbal and written (via the Patient Information Leaflet) information on correct use and duration of VTE prophylaxis to be used at home and who to contact for help.
- Ensure patients are able to use the VTE prophylaxis at home, or have someone available to help them.
- Offer information on signs and symptoms of adverse events related to VTE prophylaxis and who to contact for help.

Sharps bins for patients discharged with tinzaparin

Patients will be dispensed tinzaparin and provided a sharps bin, education and an information leaflet offering guidance on how to administer subcutaneous injection. Patients should be encouraged to self-administer and practitioners should counsel patients on discharge regarding sharps safety and disposal.

If patient or carer is unable to self-administer then arrangements should be made with the district nurses.

Staff should refer to the SOP: Safe Disposal of Used Tinzaparin Syringes to ensure that they advise patients correctly regarding the safe disposal of syringes and collection of Sharps bin when discharged.

In addition, patient should be advised to give their GP/Pharmacy 48-72 hours' notice if further supplies of Tinzaparin are required.

Patients discharged with anti-embolism stockings must be given an information sheet/leaflet.

21. GENERAL INFORMATION

21.1. Administration of anticoagulant therapy

- The Rotherham NHS Foundation Trust Patient Identification Policy.
- The Rotherham NHS Foundation Trust Medicines Management Policy.

Before administering any medication, the nurse should ensure the patients identity in adherence with Trust Patient identification policy

For patients taking Warfarin the nurse should also ensure the following

- A recent INR has been performed, reviewed and documented and that any dose adjustments required have been made
- The dose to be given for that day has been correctly completed on the yellow anticoagulation chart
- Correctly complete and sign the yellow anticoagulation chart once the dose has been given.

For patients taking a DOAC the nurse should also ensure the following

- A risk assessment has been completed by the responsible clinical team
- Renal function (creatinine clearance) has been, reviewed and documented and that any dose adjustments required have been made
- The dose to be given for that day has been correctly completed on the medicine prescription chart
- Correctly complete and sign the white medicines chart once the dose has been given.

21.2. Converting from one anticoagulant to another

See Appendix 39

Staff are also advised to discuss with the Consultant Haematologist and /or Pharmacy staff.

21.3. Pregnancy

Practitioners are referred to BCSH guidelines and advised to discuss with the Consultant Obstetrician/Haematologist

21.4. Travel

Practitioners are referred to BCSH guidelines and advised to discuss with the Consultant Haematologist and/or Anticoagulation Nurse Specialist

22. MANAGEMENT OF ADVERSE EVENTS, SURVEILLANCE AND REPORTING OF INCIDENTS

Process for reporting a VTE see Appendix 40

All patients developing an unexpected VTE during an admission will be reviewed by representatives of the ACG/VTE and Risk and Quality Department.

Where required these patients will be escalated for a Root Cause Analysis Investigation by the clinical team responsible for the patients care during that admission.

The findings of the RCA will be reviewed by the ACG/VTE Group and a decision made regarding the need for a Datix.

Monitoring of patients for DVT/PE
See statement above

There is an increased risk of developing DVT /PE for up to three months following hospitalisation. Anyone admitted to hospital with DVT/PE will be checked for recent admissions to hospital. Instances of patients being admitted to hospital with a DVT/PE who have been an inpatient within the Trust in the previous three months must be reported utilising the Trust's incident reporting system and investigated by the appropriate staff / CSU/ wards.

If an anticoagulation adverse incident is discovered it must be reported as soon as possible to the ward or departmental manager (or nominated deputy in charge of the area at the time of discovering the error) using the Datix incident reporting system and ensure that a full investigation takes place.

Managers are required to inform the patients and/or their family in line with the Trust's 'Being Open' Policy and procedures for Communicating with Patients/Relatives/Carers following an incident complaint or claim.

Managers working with Anticoagulation Group members required to take action and ascertain cause of error and investigate in line with the 'Incident Management Checklist contained within the Trust's 'Policy for the reporting, investigation, management and analysis of Incidents, complaints, concerns and claims Including the Management of Serious Incidents'.

This action alone will not prevent errors but a robust reporting process will be used to facilitate organisational learning through the findings of thorough investigations using the root cause analysis framework at a local level.

All incidents of INR>8 when known to the Anticoagulation Group are reviewed and reported at the Anticoagulation Group meeting.

Note: Adverse events associated with the administration of licensed fractionated plasma derivatives must be reported to the UK Medicines Control Agency using the 'yellow card' system
http://yellowcard.mhra.gov.uk/

23. REPORTING INCIDENTS VIA DATIX

Anticoagulants are high risk medicines. Any incidents involving prescribing, administration, including dose omission, dispensing and monitoring should be reported via Datix.

These incidents will be reviewed by the ACT/VTE Group.

24. REFERENCES

- Bayer PLC. Summary Products Characteristics Rivoroxaban (accessed March 2017)
- Boehringer Ingelheim Limited. Summary Products Characteristics Dabigatran (accessed March 2017)
- Boehringer Ingelheim Limited. Summary Products Characteristics Idarucizumab (accessed July 2017)
- Bristol Myers Squibb- Pfizer. Summary Products Characteristics Apixaban (accessed March 2017)
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- British Committee for Standards in Haematology (2011) Guidelines on travel related venous thrombosis, BCSH
- Department of Health (2013) Commissioning Services that deliver High Quality VTE Guidance for Commissioners Including a practical guide to the Root Cause Analysis of Hospital Associated Thrombosis (including associated quality standards)
- Daiichi-Sankyo (2017) Summary of Product Characteristics Edoxaban (accessed July 2017)
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- Dolan et al (2005) Intensive care and Emergency medicine
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- Heidbuchel H, Verhamme, Alings M et al. Updated European Heart Rhythm Association Practical Guide on the use of new oral anticoagulants in patients with non-valvular atrial fibrillation. Europace August 20151.
- Keeling D, Campbell Tait R, Watson H Perioperative management of anticoagulation and antiplatelet therapy British Society for Haematology 2016 http://www.b-s-h.org.uk/media/2639/bsh_periop_guideline_for_editor.pdf
- National Institute of Clinical Excellence (NICE) (2010) Venous thromboembolism: Reducing the risk of venous thromboembolism (deep vein thrombosis and pulmonary embolism) in patients admitted to hospital (including associated quality standards)
- National Institute of Clinical Excellence (NICE) (2014) Dabigatran etexilate for the treatment and secondary prevention of deep vein thrombosis and/or pulmonary embolism - technological appraisal

- National Institute of Clinical Excellence (NICE) (2015) Clinical Knowledge Summaries:
    - **Apixaban:** the management of adults receiving apixaban for the prevention of stroke and systemic embolism who have non-valvular atrial fibrillation.
    - **Dabigatran:** the management of adults receiving dabigatran for the prevention of stroke and systemic embolism who have non-valvular atrial fibrillation.
    - **Rivoroxaban:** The prevention of prevention of stroke and systemic embolism in adults with non-valvular atrial fibrillation.
    - Treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE), and prevention of recurrent DVT and PE in adults.
- National Patient Safety Agency (NPSA) (2007) Actions that can make anticoagulant therapy safer: Alert and other information NPSA/2007/18
- National Patient Safety Agency (NPSA) (2010) Reducing harm from dose omissions
- NHS England Patient Safety Alert. Harm from using Low Molecular Weight Heparins when contraindicated NHS/PSA/W/2015/001
- Scottish Dental Clinical Effectiveness Programme. Management of dental patients taking anticoagulant and antiplatelet drugs. August 2015
- Sheffield Hospitals Guidelines (accessed July 2017)
- Spyropoulos AC and Douketis JD. How I treat anticoagulated patients undergoing an elective procedure or surgery. JD American Society of Haematology (2011);
- Watson H, Davidson S, Keeling T Guidelines on the diagnosis and of heparin induced thrombocytopenia: second edition British Journal of Haematology, 2012, 159, 528–54

25. ASSOCIATED DOCUMENTATION

- The General Medical Council (GMC) (current) Code of Conduct – Good Medical Practice
- The Nursing & Midwifery Council (NMC) (2015) Standards of conduct, performance and ethics for nurses and midwives.
- The Rotherham NHS Clinical Commission Group Atrial Fibrillation guidance 2015
- The Rotherham Foundation Trust Policy – Consent to Treatment
- The Rotherham Foundation Trust - Patient Identification Policy
- The Rotherham Foundation Trust. Medicines Management Policy

- The Rotherham Foundation Trust Anticoagulation Prescription and Referral Document
- The Rotherham NHS Foundation Trust. Policy for the Reporting, investigation, management and analysis of Incidents, complaints, concerns and claims - Including the Management of Serious Incidents
- The Rotherham NHS Foundation Trust Policy Identification of risk and the management of venous thrombo-embolism in pregnancy and the puerperium
- The Rotherham NHS Foundation Trust. Policy for the management of massive haemorrhage
- The Rotherham NHS Foundation Trust. Beriplex User Information guidance
- The Rotherham NHS Foundation Trust. SOP Administration of Blood Products
- The Rotherham NHS Foundation Trust. Guidelines for managing bleeding associated with excessive Anticoagulation

Warfarin: clinical indications, target INR and duration of therapy

Condition	Target INR	Duration
THROMBOSIS		
DVT PE	2.5	Start on warfarin and refer to Anticoagulation Clinic and to Thrombosis Clinic
VTE associated with malignancy	2.5	Initially 6 months LMWH **then** consider lifelong
ATRIAL FIBRILLATION: CONSIDER RISK VS BENEFIT		
Non-valvular AF: CHADS2-VASC score: 1 or more	2.5	Life long
Clinical evidence of heart disease Thyrotoxicosis ECHO evidence of: LA > 45mm LV dysfunction & dilatation Proven cardiac source of thrombus Mitral valve disease Mitral annulus calcification Consider IHD	2.5	Lifelong
AF for cardioversion	2.5	Minimum of 3 WEEKS before and 4 WEEKS AFTER, if remains in sinus rhythm
HEART VALVES REPLACEMENT		
Mitral valve stenosis or regurgitation with additional risk factors: • AF • history of systemic embolism • atrial thrombus • enlarged heart	2.5	Discuss
Bioprostheic heart valve: • in the mitral valve position • history of systemic embolism • left atrial thrombus at surgery • prothrombotic risk factors e.g. AF, low ventricular ejection fraction	2.5	3-6 months post-op (discuss)
Mechanical heart valve prosthesis Depends on thrombogenicity of prosthesis and other risk factors	3.5	Lifelong
OTHERS		
Mural thrombus after myocardial infarct	2.5	Review after 3 months with ECHO
Myocardial infarction (if warfarin prescribed)	2.5	Lifelong
Dilated cardiomyopathy	2.5	Lifelong
Prophylaxis in patients with thrombophilia post-operative	2.5	8 weeks

BCSH 2011 Guidance 4th edition

Patient Assessment: Vitamin K antagonists (e.g. warfarin)

The Rotherham NHS Foundation Trust

Anticoagulation prescription and referral

This is a legal document, all sections must be completed. Failure to do so may delay treatment for the patient. BLACK ink must be used at all times.

Please Note Responsibility for the patient's anticoagulation remains with the Consultant in charge of the patient's care until the patient is seen in the Anticoagulant Clinic or by another monitoring team. Send a copy of this anticoagulation referral form when completed to the Anticoagulant clinic, GP or other monitoring team, with a copy of the discharge letter.

Stockings – Refer to the Orthotics Dept for graduated compression stockings, if appropriate following a Deep Vein Thrombosis (DVT)

Always seek advice from the Consultant in charge of the patient's care or a Consultant Haematologist if you have any concerns or you have identified any contraindications before commencing or continuing anticoagulation

Patient Full Name
Date of Birth
Hospital Number
NHS Number Allergies
Clinical Area
Consultant

Indication for treatment

Treatment initiation? Yes ☐ No ☐

(usual dose _____ mg)

Target INR Range

Duration of therapy:

3 months ☐ 6 months ☐ Permanent* ☐

Stop **only** after review by Medical Consultant, review date

* Consider permanent anticoagulation therapy if unprovoked Venous Thromboembolism

INR monitored by: Rotherham Hospital Clinic ☐ GP* ☐ Other Hospital ☐

If other, please state where

If referring a new patient to GP services and initiating anticoagulation please complete the following:

Name of GP the discharge has been discussed with:

Practice Address

Has the GP accepted the patient? Yes ☐ No ☐ *A Copy of this form must be sent to the GP with the discharge letter*

The usual prescriber has been informed of this admission and an appointment has been made for the patient.

Date of Appointment Signature Print Name

Designation Date

All patients must have INR check within 7 days of discharge

Relevant Information

Reason for anticoagulation

Reason for this admission

Other relevant medical history

Past history of thrombosis Yes ☐ No ☐ Give details

Family history of thrombosis Yes ☐ No ☐ Give details

Concurrent antiplatelet therapy required? Yes ☐ No ☐ Give details

If applicable, please tick the appropriate box for any predisposing factors:

Hormone Replacement Therapy ☐ Contraceptive Pill ☐ Pregnancy ☐ Surgery ☐ Air Travel ☐ Other

Medication ☐ Trauma ☐

Date: Signature Print Name Designation

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Contraindications To Anticoagulation Therapy.	Yes	No
Subacute Endocarditis		
Known bleeding disorder or Thrombocytopenia		
Hypersensitivity to Heparin / Warfarin		
Recent peptic ulceration or known symptoms of peptic ulceration		
Cerebral Haemorrhage/Recent head injury/Visual problems/Headaches		
Ischaemic stroke less than 14 days prior to anticoagulation		
Recent surgery with risk of bleeding		
Uncontrolled hypertension		
Pregnancy (Warfarin contraindicated only)		
Social Circumstances, i.e falls risk, confused, unable to self-medicate or follow instructions not supported by a carer/relative		

	Signature	Profession	Date
Patient counselled (new patients only)			
Temporary warfarin record issued			
Discharge dose in record			
Referral form completed			
'Life with Warfarin" booklet issued			

Warfarin Treatment Management Guidelines

A. General guidance on initiating warfarin

- Ensure baseline blood results (i.e. Full Blood Count, Liver Function Tests, Urea & Electrolytes, coagulation screen and baseline INR) are within normal ranges before commencing warfarin
- Explain to the patient the indication for warfarin treatment, risk and benefits
- Measure INR daily when initiating warfarin in conjunction with low molecular weight heparin
- Continue low molecular weight heparin for a minimum of 5 days and until INR is more than 2 for 2 consecutive days. Check platelet count on Day 5.

Elderly Patients

1. High risk of drug interaction with warfarin due to likelihood of higher co-morbidity and polypharmacy.
2. Decision to initiate should take into account likely compliance, attendance for INR checks and risk of falling.
3. Normal ageing and/or acute ill health may require treatment to be reviewed taking into account above point.

Cancer Patients

Patients with active malignancy, particularly those receiving chemo/ radiotherapy should be considered for ongoing treatment with low molecular weight heparin. Discuss with the Oncologist or Haematologist for advice.

Thromboembolic Disease in Pregnancy and the Puerperium

Avoid warfarin therapy during pregnancy. Discuss with an Obstetrician those patients requiring heparin treatment in pregnancy and warfarin initiation in the puerperium.

ORAL ANTICOAGULANT

Warfarin ☐	Consultant
Acenocoumarol (Nicoumalone) ☐	Patient name
	Unique Identification Number
Date	Signature
Print Name	Designation

Start warfarin when diagnosis confirmed.
Give warfarin once daily at 12 midday (whilst in hospital):
DOSE 1 - 10mg
DOSE 2 - 10mg
DOSE 3 - 5mg (refer to chart below for suggested warfarin dose on Day 4)

Decrease these doses if the patient has hepatic/renal impairment, cardiac failure, is elderly or at risk of possible drug interactions.

Warfarin dosing for Day 4 ONLY when loaded 10mg, 10mg, 5mg

DAY 4	INR	DOSE mg
	<1.4	Refer to Haematology Dept, for advice.
	= 1.4	8mg
	=1.5	7mg/8mg on alternate days
	1.6 - 1.7	7mg
	=1.8	6mg/7mg on alternate days
	=1.9	6mg
	2.0 - 2.1	5mg/6mg on alternate days
	2.2 - 2.3	5mg
	2.4 - 2.6	4mg/5mg on alternate days
	2.7 - 3.0	4mg
	3.1 - 3.5	4mg/3mg on alternate days
	3.6 - 4.0	3mg
	4.1 - 4.5	Miss out one days' dose, then give 2mg
	>4. 5	Miss out two days' dose, then give 1mg
DAY 5		Monitor INR daily until in range and stable. Heparin can be stopped when two consecutive INR results are in therapeutic range.

Monitoring and Dosing Chart

WARFARIN: if the baseline INR is less than 1.4 seek advice from the responsible Consultant. ** The prescribing doctor must know the baseline INR before signing the first dose of warfarin

DATE	INR	Oral dose in milligrams (to be given @.....)	TIME	Signature of prescriber	Signature of administering nurse
	Baseline**		12 midday		
			12 midday		
			12 midday		
			12 midday		
			12 midday		
			12 midday		
			12 midday		
			12 midday		
			12 midday		
			12 midday		

B. Maintenance Dosing of Warfarin for Patients

General Principles:

- Dose changes should usually only be +/- 10%
- It will take 3 to 4 days for a dose change to significantly change the INR
- When starting or stopping ANY additional medication check the current BNF for any interaction with warfarin
- When starting ANY new drug (or discontinuing one known to interact with warfarin), check the INR in 3 to 4 days to observe effect.
- Any uncertainty regarding dosing contact the Anticoagulation Nurses ext 4016 or Consultant Haematologist on call for advice.

C. Recommended Target Ranges for INR

A target INR of 2.5 (range 2 - 3) is sufficient for most indications EXCEPT

- Recurrent DVT/Pulmonary Embolism when fully anticoagulated:- a target INR of 3.5 is recommended.
- All patients with prosthetic heart valves should be discussed with Cardio Thoracic Surgeon

Bleeding whilst on Anticoagulation: If in doubt, consult the Haematologist.

1. Bleeding whilst on heparin, if suspected overdose:

1. Request APTT and state 'overdose' on request form.
2. Inform Consultant Haematologist as reversal with protamine sulphate may be required.
3. Repeat APTT after 24 hours if needed.

2. Bleeding whilst on warfarin/acenocoumarol

I. Major bleed – Contact the Consultant Haematologist.

STOP anticoagulants – **EVEN IF INR IS IN THERAPEUTIC RANGE**
Consider activating the massive haemorrhage protocol by dialling '2222'.
Obtain FBC, Crossmatch & Clotting Screen
Give IV vitamin K 5mg and repeat as necessary after 24 hours.
Intracerebral bleeds and major gastrointestinal bleeding require reversal with prothrombin Complex concentrate. This must be discussed with the Consultant Haematologist on call.

II. INR more than 8 No bleeding or minor bleed

STOP anticoagulant for 1-3 days and restart when INR is less than 5 at 1mg or less than the last dose.

If bleeding risk, e.g. 70 years of age or had recent surgery, give IV vitamin K 2mg

III. INR 6.0 – 8.0 No bleeding

STOP anticoagulants for 1-3 days and restart when INR is less than 5.0 at 1mg or less than the last dose.

3. Consider other causes for bleeding, e.g.

Drugs (aspirin)
Low platelet count
Abnormal liver function tests
Other pathology.

For further information staff are referred to guidance available on InSite or contact the Anticoagulation Nurse (x 4016) or Consultant Haematologist on call for advice (via Switchboard)

For Anticoagulant Nurse use only			
Anticoagulant Clinic			
Date	INR	Warfarin dose	Signed Print Name

Version 5: June 2015 Authors: Anticoagulation Team Ratified by: Drugs & Therapeutics Group
Date: June 2015 Next Review: May 2018

Drug/Indication	Dose	Duration	Notes
APIXABAN Contraindicated if CrCl<15 mL/minute			
Prevention of stroke and systemic embolism in non-valvular AF with one or more risk factors	**5 mg TWICE a day** Reduce dose to 2.5 mg TWICE a day if • CrCl 15-29 ml/minute • OR if TWO of the following: - serum creatinine ≥133 micromol/litre - age ≥ 80 years - body weight ≤60 kg CrCl <15 mL/minute – contraindicated	Usually lifelong	Dosette boxes - suitable NG/PEG tubes - crush and disperse in water (unlicensed) Contains lactose
Treatment of DVT or PE	**Day 1 to 7: 10 mg TWICE a day** **From day 8: 5 mg TWICE a day** CrCl 15-29 mL/minute – use with caution CrCl <15 mL/minute – contraindicated	Usually 3-6 months	
Prevention of recurrent DVT or PE	**2.5 mg TWICE a day** CrCl 15-29 mL/minute – use with caution CrCl <15 mL/minute – contraindicated	Usually lifelong following 6 months treatment dose	
Prevention of VTE post elective hip/knee replacement surgery or lower plaster cast (unlicensed)	**2.5 mg TWICE a day** Commencing 12-24 hours after surgery CrCl 15-29 mL/minute – use with caution CrCl <15 mL/minute – contraindicated	Hip 32 days Knee 10 days Lower limb 42 days or until load bearing	
DABIGATRAN Contraindicated if CrCl <30 mL/minute			
Prevention of stroke and systemic embolism in non-valvular AF with one or more risk factors.	**150 mg TWICE a day** Reduce dose to 110 mg TWICE a day if • Age ≥ 80 years • OR concomitant verapamil Individual patient assessment and reduced dose to 110 mg twice a day if • Age 75-80 years • OR CrCl 30 – 50 mL/minute • OR gastritis, oesophagitis • OR at increased risk of bleeding CrCl <30 mL/minute – contraindicated	Usually life long	Dosette box – not suitable NG/PEG tubes- do not crush and disperse in water (unlicensed) Lactose free
Treatment of DVT or PE / Prevention of recurrent DVT or PE	**150 mg TWICE a day following treatment with LMWH Day 1 to 5** Reduce dose in patient groups as above CrCl <30 mL/minute - contraindicated	Usually 3-6 months	
Prevention of VTE post elective hip/knee replacement surgery	**110 mg (first dose) then 220 mg ONCE a day** Reduce dose to 75 mg (first dose) then 150 mg ONCE a day if • renal function <50 mL/minute • OR age ≥ 75 years • OR receiving concomitant amiodarone, verapamil or quinidine CrCl <30 mL/minute - contraindicated	Hip 30 days Knee 10 days	
RIVAROXABAN (MUST be taken with food) Contraindicated if CrCl <15 mL/minute			
Prevention of stroke and systemic embolism in non-valvular AF with one or more risk factors	**20 mg ONCE a day** CrCl 15-49 mL/minute - reduce dose to **15 mg ONCE a day** CrCl <15 mL/minute - contraindicated	Usually life long	Take with food Dosette box - not suitable NG/PEG tubes - crush and disperse in water (unlicensed) Contains lactose
Treatment of DVT or PE	**Day 1-21 15 mg TWICE a day** **From day 22 20 mg ONCE a day** Reduce dose to 15 mg ONCE a day if • CrCl 15-49 mL/minute • OR consider if bleeding risk outweighs risk of recurrent VTE CrCl <15 mL/minute - contraindicated	Usually 3-6 months	
Prevention of recurrent DVT or PE	**20 mg ONCE a day** Reduce dose as above for treatment dose CrCl <15 mL/minute - contraindicated		
Prevention of VTE post elective hip/knee surgery	**10 mg ONCE a day** CrCl < 15 mL/minute - contraindicated	Hip 35 days Knee 14 days	

References: SPCs Apixaban, Dabigatran, Rivaroxaban,

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Appendix 4 - Apixaban Prescribing Checklist.pdf

Apixaban Prescribing Checklist

All sections must be completed before prescribing, administration and dispensing

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Appendix 4

Weight (kg)	Calculate creatinine clearance (mL/minute) (140- Age) x Weight (kg) x Factor (Male 1.23/Female 1.04) Serum creatinine =

Allergies

Patient Sticker

Name:

Hosp. No:

DOB:

Consultant:

Ward:

Baseline tests	FBC ☐	U&E ☐	LFT ☐	Clotting screen ☐

Indications	**YES**	**NO**
VTE Prophylaxis - elective hip and knee surgery		
Non-valvular AF: - warfarin contraindicated - inability to adhere to monitoring requirements for warfarin - difficulty in achieving INR within target		
Treatment DVT ☐ PE ☐		
Prevention DVT ☐ PE ☐		
Other:		

Contraindications	**YES**	**NO**
Hypersensitivity to excipients		
Clinically significant active bleeding		
Hepatic disease associated with coagulopathy and clinically relevant bleeding risk		
Concomitant treatment with other anticoagulants eg unfractionated heparin, LMWH, fondaparinux, oral anticoagulants except when switching therapy to or from apixaban or when unfractionated heparin is given at doses to maintain a patent central venous catheter		
Pregnancy and breast feeding		
Conditions with increased risk of haemorrhage		
Concomitant administration of platelet aggregation inhibitors		
Mild to moderate hepatic impairment (Child Pugh A or B)		
Creatinine clearance <15 mL/minute		

Interactions	
Use with caution	Antiplatelets (aspirin, clopidogrel, dipyridamole, ticargrelor). NSAIDs, Consider adding a PPI.
Use with caution No dose adjustment necessary	Moderate CYP3A4 and P-gp inhibitors: diltiazem, naproxen, amiodarone, verapamil, quinidine,
Use with caution Dose adjustment necessary	CYP3A4 + P-gp inducers: rifampicin, phenytoin, carbamazepine, phenobarbital, St John's Wort
Not recommended	Strong CYP3A4 inhibitors: ketoconazole, itraconazole, voricoanzole, posaconazole

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Patient information	YES	NO
The patient has been counselled on apixaban therapy		
The patient has been given apixaban booklet AF ☐ PE ☐ DVT ☐ Elective hip surgery ☐ Elective knee surgery ☐		
Patient Alert Card given Ensure patient understands importance of carrying it		

Apixaban doses (TICK INDICATION and DOSE PRESCRIBED)

Indication	Dose	Duration	Notes

Prevention of stroke and systemic embolism in non-valvular AF and with one or more risk factors:
• Previous stroke or TIA
• Age ≥75 years
• Heart failure
• Hypertension
• Diabetes mellitus
	5 mg TWICE a day
	Reduce dose to 2.5 mg TWICE a day
	• CrCl 15-29 ml/minute
	• OR if TWO of the following:
	  ◦ serum creatinine ≥133 micromol/litre
	  ◦ age ≥ 80 years
	  ◦ body weight ≤60 kg
	CrCl <15 mL/minute – contraindicated
		Usually lifelong	Dosette boxes – suitable for use
			NG/PEG tubes – crush and disperse in water (unlicensed)
			Contains lactose

Treatment of DVT or PE	**Day 1 to 7: 10mg TWICE a day** **Day 8 onwards: 5mg TWICE a day** CrCl <15-29 mL/minute – use with caution CrCl <15 mL/minute – contraindicated	Usually 3-6 months	
Prevention of recurrent DT or PE	**2.5 mg TWICE a day** CrCl <30mL/minute – use with caution CrCl <15 mL/minute – contraindicated	Usually lifelong following 6 months treatment dose	
Prevention of VTE post hip/knee replacement surgery OR lower limb injury (unlicensed)	**2.5 mg TWICE a day** Commencing 12-24 hours after hip and knee surgery CrCl <30mL/minute – use with caution CrCl <15 mL/minute – contraindicated	Hip 32 days Knee 10 days Lower limb 42 days or until load bearing	

Overdose/sign of bleeding
There is no antidote to apixaban. See Guideline for management of apixaban related bleeding (Appendix 30)

Spinal anaesthesia or removal of indwelling catheter:
- allow 24 hours (if CrCl >30 mL/minute) or 48 hours (if CrCl <30 mL/minute) after last dose of apixaban before performing spinal anaesthesia or removing catheter
- next dose of apixaban should be at least 6 hours after removal

Apixaban appropriate and prescribed on the medicine chart	Give reasons if not prescribed
Signature Print Bleep Date	

Reference SPC Apixaban
Approved by Rotherham Medicines Optimisation Group V2 Issue November 2017 Review November 2020

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Appendix 5 - Apixaban Prescribing Checklist ORTHOPAEDICS.PDF

Apixaban Prescribing checklist - Orthopaedics

All sections must be completed before prescribing, administration and dispensing

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NHS Foundation Trust

Appendix 5

Weight (kg)	Calculate creatinine clearance (mL/minute) (140- Age) x Weight (kg) x Factor (Male 1.23/Female 1.04) Serum creatinine =

Allergies

Patient Sticker

Name:

Hosp. No:

DOB:

Consultant:

Ward:

Baseline tests	FBC ☐	U&E ☐	LFT ☐	Clotting screen ☐

Indications

Elective hip surgery ☐	Hip fracture ☐
Elective knee surgery ☐	Ankle injury ☐
Lower limb plaster cast ☐	Lower limb non fracture operation reducing mobility (tendon injuries) ☐
Other:	

Contraindications	YES	NO
Hypersensitivity to the active substance or to the excipients		
Clinically significant active bleeding		
Hepatic disease associated with coagulopathy and clinically relevant bleeding risk		
Concomitant treatment with other anticoagulants eg unfractionated heparin, LMWH, fondaparinux, oral anticoagulants except when switching therapy to or from apixaban or when unfractionated heparin is given at doses to maintain a patent central venous catheter.		
Pregnancy and breast feeding		
Conditions with increased risk of haemorrhage		
Concomitant administration of platelet aggregation inhibitors eg. Aspirin		
Mild to moderate hepatic impairment (Child Pugh A or B)		
Creatinine clearance <15 mL/minute		

Interactions

Use with caution	Antiplatelets (aspirin, clopidogrel, dipyridamole, ticargrelor). NSAIDs, Consider adding a PPI.
Use with caution No dose adjustment necessary	Moderate CYP3A4 and P-gp inhibitors: diltiazem, naproxen, amiodarone, verapamil, quinidine,
Use with caution Dose adjustment necessary	CYP3A4 + P-gp inducers: rifampicin, phenytoin, carbamazepine, phenobarbital, St John's Wort
Not recommended	Strong CYP3A4 inhibitors: ketoconazole, itraconazole, voricoanzole, posaconazole

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Patient information	YES	NO
The patient has been counselled on apixaban therapy		
The patient has been given apixaban booklet AF ☐ PE ☐ DVT ☐ Elective hip surgery ☐ Elective knee surgery ☐		
Patient Alert Card given Ensure patient understands importance of carrying it		

Apixaban doses			
Indication	**Dose**	**Duration**	**Notes**
Prevention of VTE post elective hip/knee replacement surgery Lower limb plaster cast (unlicensed)	**2.5 mg TWICE a day** Commencing 12-24 hours after surgery CrCl 15-29 mL/minute – use with caution CrCl <15 mL/minute – contraindicated	Hip 32 days Knee 10 days Lower limb 42 days or until load bearing	Dosette boxes – suitable for use NG/PEG tubes – crush and disperse in water (unlicensed) Contains lactose
Overdose/sign of bleeding There is no antidote to apixaban. See Guideline for management of apixaban related bleeding (Appendix 30)			
Spinal anaesthesia or removal of indwelling catheter: • allow 24 hours (if CrCl >30 mL/minute) or 48 hours (if CrCl <30 mL/minute) after last dose of apixaban before performing spinal anaesthesia or removing catheter • next dose of apixaban should be at least 6 hours after removal			
Apixaban appropriate and prescribed on the medicine chart Signature Print Bleep Date	**Give reasons if not prescribed**		

Reference SPC Apixaban
Approved by Rotherham Medicines Optimisation Group

V2 Issue November 2017 Review November 2020

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Appendix 6 - Dabigatran Prescribing Checklist.pdf

Dabigatran Prescribing Checklist

All sections must be completed before prescribing, administration and dispensing

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Appendix 6

Weight (kg)	Calculate creatinine clearance (mL/minute) (140- Age) x Weight (kg) x Factor (Male 1.23/Female 1.04) Serum creatinine =

Patient Sticker

Name:

Hosp. No:

DOB:

Consultant:

Ward:

Allergies

Baseline tests	FBC ☐	U&E ☐	LFT ☐	Clotting screen ☐

Indications	YES	NO
VTE Prophylaxis - elective hip and knee surgery		
Non-valvular AF: - warfarin contraindicated - inability to adhere to monitoring requirements for warfarin - difficulty in achieving INR within target		
Treatment DVT ☐ PE ☐		
Prevention DVT ☐ PE ☐		
Other:		

Contraindications	YES	NO
Hypersensitivity to the active substance or to the excipient lactose		
Clinically significant active bleeding		
Hepatic impairment (patients with elevated liver enzymes > 2 ULN) or liver disease expected to have any impact on survival		
Concomitant treatment with other anticoagulants eg unfractionated heparin, LMWH, fondaparinux, oral anticoagulants except when switching therapy to or from apixaban or when unfractionated heparin is given at doses to maintain a patent central venous catheter		
Pregnancy and breast feeding		
Conditions with increased risk of haemorrhage		
Concomitant administration of platelet aggregation inhibitors eg. Aspirin		
Creatinine clearance <30 mL/minute		

Interactions	
Use with caution	Antiplatelets (aspirin, clopidogrel, dipyridamole, ticargrelor). NSAIDs, Consider adding a PPI.
Use with caution No dose adjustment necessary	Moderate CYP3A4 and P-gp inhibitors: diltiazem, naproxen, amiodarone, verapamil, quinidine,
Use with caution Dose adjustment necessary	CYP3A4 + P-gp inducers: rifampicin, phenytoin, carbamazepine, phenobarbital, St John's Wort
Not recommended	Strong CYP3A4 inhibitors: ketoconazole, itraconazole, voricoanzole, posaconazole

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Patient information	YES	NO
The patient has been counselled on dabigatran therapy		
The patient has been given dabigatran booklet AF ☐ PE ☐ DVT ☐ Elective hip surgery ☐ Elective knee surgery ☐		
Patient Alert Card given Ensure patient understands importance of carrying it		

Dabigatran Doses (TICK INDICATION and DOSE PRESCRIBED)			
Indication	**Dose**	**Duration**	**Notes**
Prevention of stroke and systemic embolism in non-valvular AF with one or more risk factors: • Previous stroke or TIA • Age ≥75 years • Heart failure • Hypertension • Diabetes mellitus	**150 mg TWICE a day** Reduce dose to 110 mg TWICE a day if: • Age ≥80 years • OR concomitant verapamil Individual patient assessment and reduced dose to 110 mg TWICE a day if: • Age 75-80 years • OR CrCl 30-50 mL/minute • OR gastritis, oesophagitis • OR at increased risk of bleeding CrCl <30 mL/minute - contraindicated	Usually life long	Dosette box – not suitable for use NG/PEG tubes – do not crush and disperse in water (unlicensed) Lactose free
Treatment of DVT or PE Prophylaxis of recurrent DVT or PE	**150 mg TWICE a day following treatment with LMWH Day 1 to 5** Reduce dose if patient group as for non-valvular AF CrCl <30 mL/minute - contraindicated	Usually 3-6 months	
Prevention of VTE post hip/knee replacement surgery	**110 mg commencing 1-4 hours after surgery followed by 220 mg ONCE a day** Reduce first dose to 75 mg followed by 150 mg ONCE a day if: • CrCl 30-50 mL/minute • OR age ≥75 years • OR concomitant amiodarone, verapamil, quinidine CrCl <30 mL/minute - contraindicated	Hip 30 days Knee 10 days	
Overdose/sign of bleeding: There is a specific antidote Idarucizumab (Praxabind®) (see Appendix 31)			
Spinal anaesthesia or removal of indwelling catheter: • allow 24 hours (if CrCl >80 ml/minute), 24-48 hours (if CrCL 51-80 mL/minute), 48-72 hours if CrCl 30-50 mL/minute) after last dose of dabigatran before performing spinal anaesthesia or removing catheter • next dose of dabigatran should be at least 6 hours after removal			
Dabigatran appropriate and prescribed on the medicine chart Signature Print Bleep Date		**Give reasons if not prescribed**	

Reference SPC Dabigatran
Approved by Rotherham Medicines Optimisation Group

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Appendix 7 - Rivaroxaban Prescribing Checklist.pdf

Rivaroxaban prescribing checklist

All sections must be completed before prescribing, administration and dispensing

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Appendix 7

Weight (kg)	Calculate creatinine clearance (mL/minute) (140- Age) x Weight (kg) x Factor (Male 1.23/Female 1.04) Serum creatinine =

Patient Sticker

Name:

Hosp. No:

DOB:

Consultant:

Ward:

Allergies

Baseline tests	☐ FBC ☐ U&E ☐ LFT ☐ Clotting screen

Indications	YES	NO
VTE Prophylaxis - elective hip and knee surgery		
Non-valvular AF: - warfarin contraindicated - inability to adhere to monitoring requirements for warfarin - difficulty in achieving INR within target		
Treatment DVT PE		
Prevention DVT PE		
Other:		

Contraindications	YES	NO
Hypersensitivity to the active substance or to the excipient lactose		
Clinically significant active bleeding		
Lesions or conditions with increased risk of haemorrhage		
Concomitant treatment with other anticoagulants eg unfractionated heparin, LMWH, fondaparinux, oral anticoagulants except when switching therapy to or from apixaban or when unfractionated heparin is given at doses to maintain a patent central venous catheter		
Hepatic disease associated with coagulopathy and clinically relevant bleeding risk including patients with Child Pugh B or C		
Pregnancy and breast feeding		
Creatinine clearance <15 mL/minute		

Interactions	
Use with caution	Antiplatelets (aspirin, clopidogrel, dipyridamole, ticargrelor). NSAIDs, Consider adding a PPI.
Use with caution No dose adjustment necessary	Moderate CYP3A4 and P-gp inhibitors: diltiazem, naproxen, amiodarone, verapamil, quinidine,
Use with caution Dose adjustment necessary	CYP3A4 + P-gp inducers: rifampicin, phenytoin, carbamazepine, phenobarbital, St John's Wort
Not recommended	Strong CYP3A4 inhibitors: ketoconazole, itraconazole, voricoanzole, posaconazole

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Patient information	YES	NO
The patient has been counselled on rivaroxaban therapy		
The patient has been given rivaroxaban booklet AF ☐ PE ☐ DVT ☐ Elective hip surgery ☐ Elective knee surgery ☐		
Patient Alert Card given Ensure patient understands importance of carrying it		

Rivaroxaban Doses (TICK INDICATION and DOSE PRESCRIBED)

Indication	Dose	Duration	Notes
Prevention of stroke and systemic embolism in non-valvular AF and with one or more risk factors: • Previous stroke or TIA • Age ≥75 years • Heart failure • Hypertension • Diabetes mellitus	**20 mg ONCE a day** CrCl 15-49 mL/minute - reduce dose 15 mg ONCE a day CrCl <15 - contraindicated	Usually life long	Doses taken with food Dosette boxes - suitable for use NG/PEG tubes - crush and disperse in water (unlicensed) Contains lactose
Treatment of DVT or PE	**Day 1-21: 15 mg TWICE a day** **Day 22 onwards: 20 mg ONCE a day** CrCl 15-49 mL/minute - reduce dose Day 1-21: 15 mg TWICE a day Day 22 onwards: 20 mg ONCE a day or 15 mg ONCE a day if bleeding risk outweighs risk of recurrent VTE CrCl <15 mL/minute - contraindicated	Usually 3-6 months	
Prevention of recurrent DVT or PE	**20 mg ONCE a day** Reduce dose as above for treatment dose CrCl <15 mL/minute - contraindicated		
Prevention of VTE post hip/knee replacement surgery	**10 mg ONCE a day** Commencing 6-10 hours post surgery CrCl <15 mL/minute - contraindicated	Hip 35 days Knee 14 days	

Overdose/sign of bleeding
There is no antidote to rivaroxaban (Appendix 32)

Spinal anaesthesia or removal of indwelling catheter:
- allow 24 hours (if CrCl >30 mL/minute) or 48 hours (if CrCl <30 mL/minute) after last dose of apixaban before performing spinal anaesthesia or removing catheter
- next dose of apixaban should be at least 6 hours after removal

Rivaroxaban appropriate and prescribed on the medicine chart	Give reasons if not prescribed
Signature Print Bleep Date	

Reference SPC Rivaroxaban
Approved by Rotherham Medicines Optimisation Group

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Appendix 8 - Tinzaparin Prescribing Checklist – Treatment Doses.pdf

Tinzaparin Prescribing Checklist for Adults: Treatment doses

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Appendix 8

All sections must be completed before prescribing, administration and dispensing

Weight (kg)	Calculate creatinine clearance (mL/minute) (140- Age) x Weight (kg) x Factor (Male 1.23/Female 1.04) / Serum creatinine =

Allergies

Patient Sticker

Name:

Hosp. No:

DOB:

Consultant:

Ward:

Indication	☐ DVT ☐ PE ☐ Other.....
Baseline tests	☐ FBC ☐ U&E ☐ LFT ☐ Clotting screen

Indications	**YES**	**NO**
Acute bleeding		
Acquired bleeding disorder (eg acute liver failure)		
Uncontrolled systolic hypertension (>230/120 mmHg)		
Active peptic ulcer disease or risk of GI haemorrhage		
Thrombocytopenia (platelets less than 75x109/L)		
Previous heparin induced thrombocytopenia		
Sensitivity to heparin		
Untreated inherited bleeding disorder eg haemophilia, von Willebrand disease		
Acute stroke		
Bacterial endocarditis		
Taking anticoagulants known to increase INR >2		
Consider appropriate timing: Lumbar puncture /epidural/ spinal anaesthesia • Expected within the next 12 hours • Given within the previous 4 hours.		

Tinzaparin appropriate and prescribed on the medicine chart	**Give reasons if not prescribed**
Signature Print Bleep Date	

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Reference SPC Tinzaparin
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Tinzaparin Prescribing Advice: VTE Prophylaxis and Treatment in Adults

All prescriptions must state: INDICATION, WEIGHT, eGFR and DOSE in units (in full) & mL

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Appendix 9

General Information

Contra-indications

- Active bleeding
- Acquired bleeding disorder (eg acute liver failure)
- Uncontrolled systolic hypertension (>230/120 mmHg)
- Active peptic ulcer disease or risk of GI haemorrhage
- Thrombocytopenia (platelets less than 75x10⁹/L)
- Untreated inherited bleeding disorder eg haemophilia, von Willebrand disease
- Acute stroke
- Previous heparin induced thrombocytopenia
- Sensitivity to heparin
- Bacterial endocarditis
- Taking anticoagulants known to increase INR >2

Prescriptions for Tinzaparin must state

- Indication eg DVT treatment
- Weight
- eGFR (Prophylaxis) or CrCl (Treatment)
- Dose in units and mL
- Route subcutaneous

If continued by GP, inform GP of above and duration

Review / Monitoring Requirements:

Prophylaxis
Review within 24 hours and whenever the condition changes

Treatment

- Platelet counts on day 1, 5 and 10
- Potassium

Renal impairment: Monitor

- Renal function closely
- Signs of bruising and bleeding

Prophylaxis

Use Syringes 10,000 units/mL
Use Syringes 20,000 units/mL

Dose based on eGFR

Medical and Surgical patients

Patients with one or more VTE risk factors

Body weight	eGFR ≥ 20 mL/minute	eGFR < 20 mL/minute
31 – 49kg	2500 units 0.25mL ONCE daily	2500 units 0.25mL ONCE daily
50 - 130kg	4500 units 0.45mL ONCE daily	3500 units 0.35mL ONCE daily
Less than 30kg or more than 130 kg	Consider 50 units/kg ONCE daily Reduce dose if eGFR < 20 mL/minute	

Obstetrics patients

eGFR <20 mL/minute: discuss with consultant haematologist

Body weight Booking weight	Dose	Syringe colour
Less than 50kg	3500 units 0.35mL ONCE daily	Green
50 - 90kg	4500 units 0.45mL ONCE daily	Pale blue
91 - 130kg	3500 units 0.35mL TWICE daily	Green
131 - 170kg	4500 units 0.45mL TWICE daily	Pale blue
More than 170kg	7000 units 0.35mL TWICE daily	Orange
High prophylactic (intermediate) dose for women 50 - 90 kg	4500 units 0.45mL TWICE daily	Pale blue

Treatment

Use syringes 20,000 units/mL

Ceatinine clearance less than 20 mL/minute/: give first dose and seek advice

Creatinine clearance:

$$\frac{(140 - \text{Age}) \times \text{Weight (kg)} \times \text{Factor (Male 1.23 Female 1.04)}}{\text{Serum creatinine (micromol/L)}} = \_\_\_\_\_ \text{ mL/minute}$$

For ALL patients including in pregnancy

Dose 175 units/kg body weight ONCE daily (rounded to nearest 1000 units)

Body weight Booking weight in pregnancy	ONCE Daily dose	Injection volume	Syringe size and colour
kg	units	mL	
35 - 39	6,000	0.30	8,000 units in 0.4mL
40 - 44	7,000	0.35	
45 - 49	8,000	0.40	
50 - 54	9,000	0.45	10,000 units in 0.5mL
55 - 59	10,000	0.50	
60 - 64	11,000	0.55	12,000 units In 0.6mL
65 - 69	12,000	0.60	
70 - 74	13,000	0.65	14,000 units In 0.7mL
75 - 79	13,000	0.65	
80 - 84	14,000	0.70	
85 - 89	15,000	0.75	16,000 units In 0.8 mL
90 - 94	16,000	0.80	
95 - 99	17,000	0.85	18,000 units In 0.9 mL
100 - 104	18,000	0.90	
105 - 109	19,000	0.95	Two syringes 10,000 units in 0.5 mL
110 - 114	20,000	1.00	
115 - 119	20,000	1.00	
120 - 124	21,000	1.05	Two syringes 12,000 units In 0.7mL
125 - 129	22,000	1.10	
130 - 134	23,000	1.15	
135 - 139	24,000	1.20	
Less than 35kg or More than 140kg	=175 x body wt Units ONCE daily	= $\frac{175 \times \text{body wt}}{20000}$ mL ONCE daily	

For advice on doses: 0900 - 1700 Medicines Information (Ext 4126); 1700 – 1900 Pharmacy Dispensary (Ext 4469); 1900 – 0900 Consultant Haematologist on call

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Fondaparinux Prescribing Checklist for Acute Coronary Syndromes

All sections must be completed before prescribing, dispensing and administration

Weight (kg)	Calculate creatinine clearance (mL/minute) (140- Age) x Weight (kg) x Factor (Male 1.23/Female 1.04) Serum creatinine =

Affix address label

Name: .....

Unit No: .....

Date of Birth: .....

Consultant: .....

Allergies:

Baseline tests	□ FBC	□ U&E	□ LFT	□ Clotting screen

Indications		
Unstable angina	Yes	No
NSTEMI	Yes	No
STEMI	Yes	No
Other	Yes	No
Contraindications		
Hypersensitivity to the active substance	Yes	No
Active clinical bleeding	Yes	No
Acute bacterial endocarditis	Yes	No
Severe renal impairment (CrCl less than 20 mL/minute or serum creatinine 265 micromol/L)) *Consider unfractionated heparin*	Yes	No
Latex allergy – use with caution	Yes	No

Fondaparinux doses	
UA / NSTEMI	In patients for whom urgent invasive management is not indicated **Dose: 2.5 mg once daily** subcutaneous injection Initiated as soon as possible following diagnosis and continued for up to a maximum of 8 days or until hospital discharge if that occurs earlier.
STEMI	In adults who are managed with thromolytics or who initially are to receive no other form of reperfusion therapy **Dose 2.5 mg ONCE daily.** **First dose: 2.5 mg intravenous injection then by subcutaneous injection once daily.** Initiated as soon as possible following diagnosis and continued for up to a maximum of 8 days or until hospital discharge if that occurs earlier.

Fondaparinux appropriate and prescribed on the medicine chart	**Give reasons if not prescribed**
Signature Print Bleep Date	

References: Aspen Fondaparinux Summary of Product Characteristics (accessed April 2017)

Suspected deep vein thrombosis

Patient name.....

Patient hospital number.....

Date of assessment.....

Assessor's name (print).....Signed.....

Two-level DVT Wells score

Clinical feature	Points	Patient score
Active cancer (treatment ongoing, within 6 months, or palliative)	1	
Paralysis, paresis or recent plaster immobilisation of the lower extremities	1	
Recently bedridden for 3 days or more or major surgery within 12 weeks requiring general or regional anaesthesia	1	
Localised tenderness along the distribution of the deep venous system	1	
Entire leg swollen	1	
Calf swelling at least 3 cm larger than asymptomatic side	1	
Pitting oedema confined to the symptomatic leg	1	
Collateral superficial veins (non-varicose)	1	
Previously documented DVT	1	
An alternative diagnosis is at least as likely as DVT	−2	
Clinical probability simplified score		
DVT likely	2 points or more	
DVT unlikely	1 point or less	

Reference: NICE CG 144 (2015) Venous thromboembolic diseases: diagnosis, management and thrombophilia testing

Suspected pulmonary embolism

Patient name.....

Patient hospital number.....

Date of assessment.....

Assessor's name (print)..... Signed.....

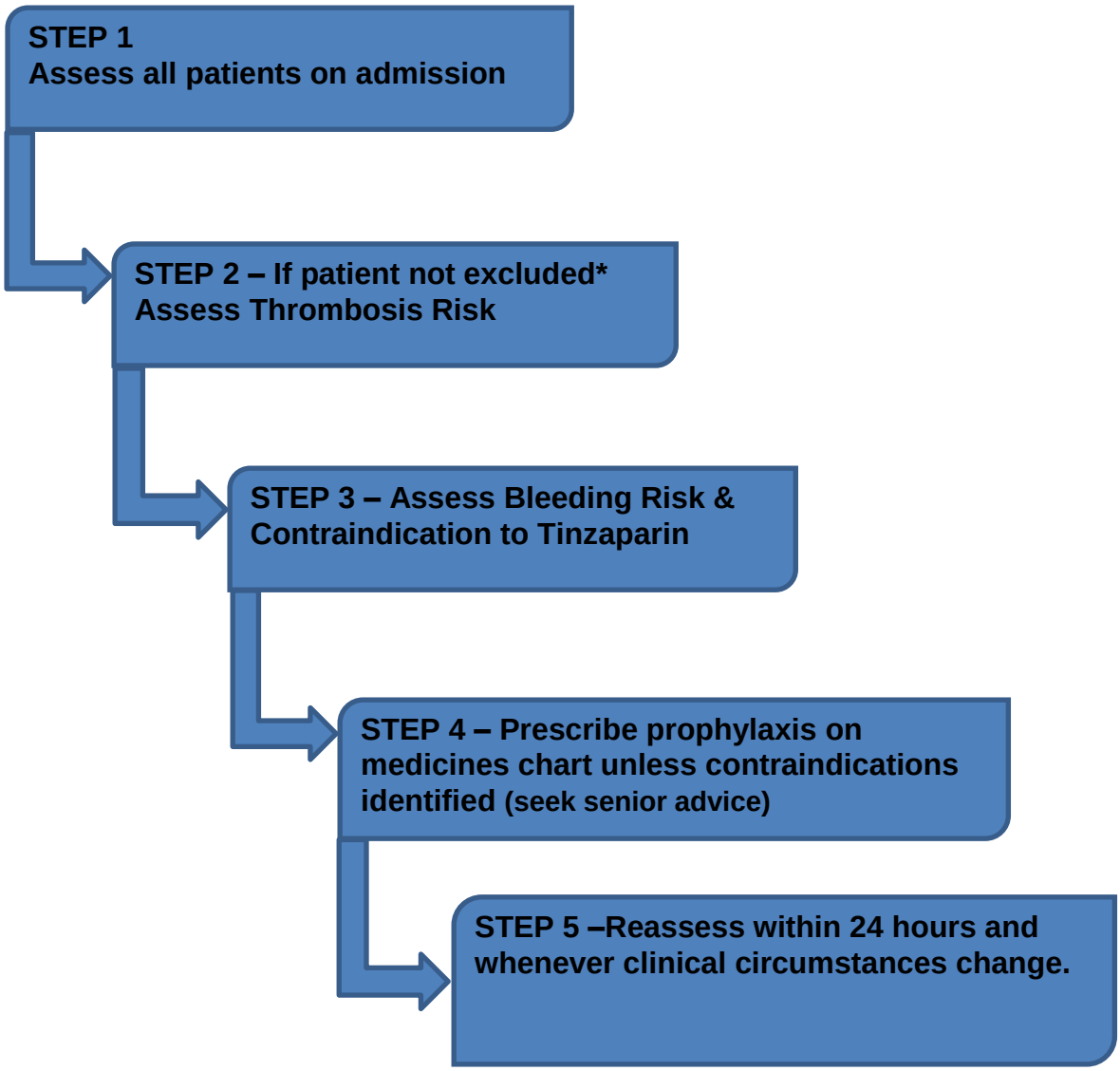
Two-level PE Wells score

Clinical feature	Points	Patient score
Clinical signs and symptoms of DVT (minimum of leg swelling and pain with palpation of the deep veins)	3	
An alternative diagnosis is less likely than PE	3	
Heart rate > 100 beats per minute	1.5	
Immobilisation for more than 3 days or surgery in the previous 4 weeks	1.5	
Previous DVT/PE	1.5	
Haemoptysis	1	
Malignancy (on treatment, treated in the last 6 months, or palliative)	1	
Clinical probability simplified scores		
PE *likely*	More than 4 points	
PE *unlikely*	4 points or less	

Adapted with permission from:

Reference: NICE CG 144 (2015) Venous thromboembolic diseases: diagnosis, management and thrombophilia testing

VTE prophylaxis: assessment and management - 5 Step Pathway



Document all actions relating to the 5 Step pathway in the patient's health care record.

*Exclusion criteria are located within paragraph 4.5 of this document

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VTE risk assessment for adults
(Page 2 of Drug Prescription and Medication Record)

NAME	CONSULTANT				
UNIT NUMBER	WARD				

CHECK ALLERGY STATUS

VTE RISK ASSESSMENT FOR ADULTS

Pregnancy and up to 6 weeks postpartum: see intranet for guidelines and contact SpR in Obstetrics

All patients must be risk assessed on admission (Adm), within 24 hours (post take/surgery ward round) and regularly thereafter to ensure appropriate prophylaxis is prescribed. **ALWAYS REASSESS** if patient deteriorates/ situation changes

All patients must be given information: ☐ Verbal ☐ Written Sign..... Date..... Grade.....

Assess thrombosis and bleeding risks and contraindication to low molecular weight heparin (more than one box can be ticked)

	Patients	Any tick for THROMBOSIS risk	Any tick for BLEEDING risk/ contraindications to LMWH
Prophylaxis	Medical patients	Low molecular weight heparin (LMWH)	Anti-embolism stockings and / or alternatives (see contraindicated to stockings)
	Surgical patients	LMWH plus anti-embolism stockings (Orthopaedic surgery - see guidelines)	

Assess all patients on admission	**Tick**	**Action**
Day Case/Surgery patients undergoing day case procedures lasting less than 90 minutes using local anaesthetic/regional/sedation (not general anaesthesia) with no reduction in mobility		No thromboprophylaxis required. Sign and date:
Medical patients NOT expected to have significantly reduced mobility to normal state		
Surgical/Orthopaedic/Trauma patients		Assess for thrombosis and bleeding risk using the form below and prescribe appropriate prophylaxis.
Medical patients acutely ill expected to have ongoing reduced mobility relative to normal state		

Thrombosis risks

Adm	24 hr	
☐	☐	Age greater than 60 years
☐	☐	Obesity (BMI more than 30kg/m²)
☐	☐	Cancer - active or on treatment
☐	☐	One or more significant co-morbidities: heart disease, metabolic, endocrine respiratory, inflammatory, acute infections
☐	☐	Varicose veins with phlebitis
☐	☐	Current use of oestrogen (OCP/HRT)
☐	☐	VTE - personal or family history
☐	☐	Acquired or inherited thrombophilia
☐	☐	Expected reduction in mobility of 3 days or more
☐	☐	Critical care admission
☐	☐	Acute surgical admission with inflammatory and abdominal condition
☐	☐	Total anaesthetic plus surgical time more than 90 minutes
☐	☐	Total anaesthesia plus surgical more time than 60 minutes involving pelvis or lower limb
☐	☐	Any surgery with significant reduction in mobility
☐	☐	Hip replacement
☐	☐	Knee replacement
☐	☐	Hip fracture
☐	☐	**None of the above**

Bleeding risks/contraindications to LMWH

Adm	24 hr	
☐	☐	Acute head injury
☐	☐	Active bleeding
☐	☐	Acute stroke
☐	☐	Acquired bleeding disorder eg acute liver failure
☐	☐	Neurosurgery, spinal surgery or eye surgery
☐	☐	Procedures with high bleeding risk
☐	☐	Uncontrolled hypertension (> 230/120mm Hg)
☐	☐	Anticoagulated (oral anticoagulants/treatment dose LMWH/ i/v heparin/fondaparinux)
☐	☐	Platelet count less than 75 x 10^9/L
☐	☐	Untreated inherited bleeding disorders: eg haemophilia, von Willebrand disease
☐	☐	Previous Heparin Induced Thrombocytopenia
☐	☐	Allergy to LMWH /heparin
☐	☐	Bacterial endocarditis
☐	☐	**None of the above**

Consider appropriate timing:
If lumbar puncture/epidural/spinal anaesthesia
- *expected within the next 12 hours*
- *given within the previous 4 hours*

State reason if not given	Assessment at admission	Assessment at 24 hours
	Sign Grade/bleep Date Time	Sign Grade/bleep Date Time

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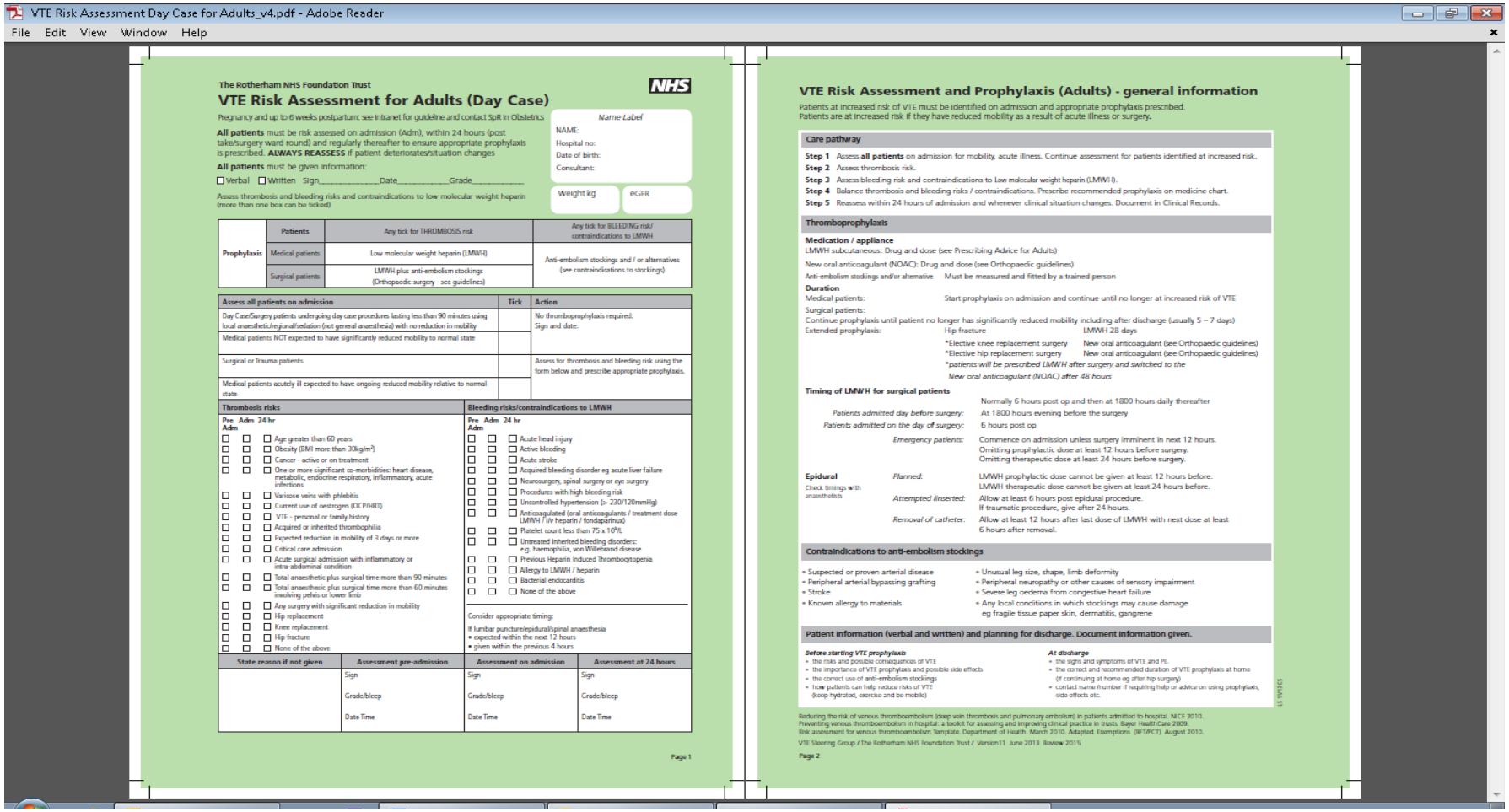
VTE Risk assessment for adults (Day Case)



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VTE Risk Assessment for Adults (Day Case)

Pregnancy and up to 6 weeks postpartum: see intranet for guideline and contact SpR in Obstetrics

All patients must be risk assessed on admission (Adm), within 24 hours (post take/surgery ward round) and regularly thereafter to ensure appropriate prophylaxis is prescribed. **ALWAYS REASSESS** if patient deteriorates/situation changes

All patients must be given information:

☐ Verbal ☐ Written Sign_____Date_____Grade_____

Assess thrombosis and bleeding risks and contraindications to low molecular weight heparin (more than one box can be ticked)

Name Label

NAME:
Hospital no:
Date of birth:
Consultant:

Weight kg | eGFR

	Patients	Any tick for THROMBOSIS risk	Any tick for BLEEDING risk/ contraindications to LMWH
Prophylaxis	Medical patients	Low molecular weight heparin (LMWH)	Anti-embolism stockings and / or alternatives (see contraindications to stockings)
	Surgical patients	LMWH plus anti-embolism stockings (Orthopaedic surgery - see guidelines)	

Assess all patients on admission	Tick	Action
Day Case/Surgery patients undergoing day case procedures lasting less than 90 minutes using local anaesthetic/regional/sedation (not general anaesthesia) with no reduction in mobility		No thromboprophylaxis required. Sign and date:
Medical patients NOT expected to have significantly reduced mobility to normal state		
Surgical or Trauma patients		Assess for thrombosis and bleeding risk using the form below and prescribe appropriate prophylaxis.
Medical patients acutely ill expected to have ongoing reduced mobility relative to normal state		

Thrombosis risks

Pre Adm | 24 hr Adm

- ☐ ☐ Age greater than 60 years
- ☐ ☐ Obesity (BMI more than 30kg/m²)
- ☐ ☐ Cancer - active or on treatment
- ☐ ☐ One or more significant co-morbidities: heart disease, metabolic, endocrine respiratory, inflammatory, acute infections
- ☐ ☐ Varicose veins with phlebitis
- ☐ ☐ Current use of oestrogen (OCP/HRT)
- ☐ ☐ VTE - personal or family history
- ☐ ☐ Acquired or inherited thrombophilia
- ☐ ☐ Expected reduction in mobility of 3 days or more
- ☐ ☐ Critical care admission
- ☐ ☐ Acute surgical admission with inflammatory or intra-abdominal condition
- ☐ ☐ Total anaesthetic plus surgical time more than 90 minutes
- ☐ ☐ Total anaesthetic plus surgical time more than 60 minutes involving pelvis or lower limb
- ☐ ☐ Any surgery with significant reduction in mobility
- ☐ ☐ Hip replacement
- ☐ ☐ Knee replacement
- ☐ ☐ Hip fracture
- ☐ ☐ None of the above

Bleeding risks/contraindications to LMWH

Pre Adm | 24 hr Adm

- ☐ ☐ Acute head injury
- ☐ ☐ Active bleeding
- ☐ ☐ Acute stroke
- ☐ ☐ Acquired bleeding disorder eg acute liver failure
- ☐ ☐ Neurosurgery, spinal surgery or eye surgery
- ☐ ☐ Procedures with high bleeding risk
- ☐ ☐ Uncontrolled hypertension (> 230/120mmHg)
- ☐ ☐ Anticoagulated (oral anticoagulants / treatment dose LMWH / i/v heparin / fondaparinux)
- ☐ ☐ Platelet count less than 75 x 10⁹/L
- ☐ ☐ Untreated inherited bleeding disorders: e.g. haemophilia, von Willebrand disease
- ☐ ☐ Previous Heparin Induced Thrombocytopenia
- ☐ ☐ Allergy to LMWH / heparin
- ☐ ☐ Bacterial endocarditis
- ☐ ☐ None of the above

Consider appropriate timing:

If lumbar puncture/epidural/spinal anaesthesia
- expected within the next 12 hours
- given within the previous 4 hours

State reason if not given	Assessment pre-admission	Assessment on admission	Assessment at 24 hours
	Sign Grade/bleep Date Time	Sign Grade/bleep Date Time	Sign Grade/bleep Date Time

Page 1

VTE Risk Assessment and Prophylaxis (Adults) - general information

Patients at increased risk of VTE must be identified on admission and appropriate prophylaxis prescribed.
Patients are at increased risk if they have reduced mobility as a result of acute illness or surgery.

Care pathway

Step 1 Assess **all patients** on admission for mobility, acute illness. Continue assessment for patients identified at increased risk.
Step 2 Assess thrombosis risk.
Step 3 Assess bleeding risk and contraindications to low molecular weight heparin (LMWH).
Step 4 Balance thrombosis and bleeding risks / contraindications. Prescribe recommended prophylaxis on medicine chart.
Step 5 Reassess within 24 hours of admission and whenever clinical situation changes. Document in Clinical Records.

Thromboprophylaxis

Medication / appliance
LMWH subcutaneous: Drug and dose (see Prescribing Advice for Adults)
New oral anticoagulant (NOAC): Drug and dose (see Orthopaedic guidelines)
Anti-embolism stockings and/or alternative: Must be measured and fitted by a trained person

Duration
Medical patients: Start prophylaxis on admission and continue until no longer at increased risk of VTE
Surgical patients:
Continue prophylaxis until patient no longer has significantly reduced mobility including after discharge (usually 5 – 7 days)
Extended prophylaxis:
- Hip fracture: LMWH 28 days
- *Elective knee replacement surgery: New oral anticoagulant (see Orthopaedic guidelines)
- *Elective hip replacement surgery: New oral anticoagulant (see Orthopaedic guidelines)

**patients will be prescribed LMWH after surgery and switched to the New oral anticoagulant (NOAC) after 48 hours*

Timing of LMWH for surgical patients

Normally 6 hours post op and then at 1800 hours daily thereafter
Patients admitted day before surgery: At 1800 hours evening before the surgery
Patients admitted on the day of surgery: 6 hours post op
Emergency patients: Commence on admission unless surgery imminent in next 12 hours. Omitting prophylactic dose at least 12 hours before surgery. Omitting therapeutic dose at least 24 hours before surgery.

Epidural (Check timings with anaesthetists)
Planned: LMWH prophylactic dose cannot be given at least 12 hours before. LMWH therapeutic dose cannot be given at least 24 hours before.
Attempted linserted: Allow at least 6 hours post epidural procedure. If traumatic procedure, give after 24 hours.
Removal of catheter: Allow at least 12 hours after last dose of LMWH with next dose at least 6 hours after removal.

Contraindications to anti-embolism stockings

- Suspected or proven arterial disease
- Peripheral arterial bypassing grafting
- Stroke
- Known allergy to materials
- Unusual leg size, shape, limb deformity
- Peripheral neuropathy or other causes of sensory impairment
- Severe leg oedema from congestive heart failure
- Any local conditions in which stockings may cause damage eg fragile tissue paper skin, dermatitis, gangrene

Patient information (verbal and written) and planning for discharge. Document information given.

Before starting VTE prophylaxis
- the risks and possible consequences of VTE
- the importance of VTE prophylaxis and possible side effects
- the correct use of anti-embolism stockings
- how patients can help reduce risks of VTE (keep hydrated, exercise and be mobile)

At discharge
- the signs and symptoms of VTE and PE
- the correct and recommended duration of VTE prophylaxis at home (if continuing at home eg after hip surgery)
- contact name /number if requiring help or advice on using prophylaxis, side effects etc.

Reducing the risk of venous thromboembolism (deep vein thrombosis and pulmonary embolism) in patients admitted to hospital. NICE 2010.
Preventing venous thromboembolism in hospital: a toolkit for assessing and improving clinical practice in trusts. Bayer HealthCare 2009.
Risk assessment for venous thromboembolism Template. Department of Health. March 2010. Adapted. Exemptions (RFT/PCT) August 2010.

VTE Steering Group / The Rotherham NHS Foundation Trust / Version11 June 2013 Review 2015

Page 2

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VTE risk assessment – lower limb plaster cast

Affix Patient label Name: DoB: Hosp. No.:	**LOWER LIMB CAST IMMOBILISATION VTE RISK SCORE** For all patients immobilised in a lower limb cast DATE: _____ STAFF NAME: _____

Thrombosis Risks	**Points (Circle if applicable)**
Age 60yrs or above	1
Obese; BMI above 30	1
Thrombophilia – acquired or inherited	1
Oral Contraceptive pill	1
Hormone Replacement Therapy	1
Raloxifene or Tamoxifen	1
Close family history (father/mother, brother/sister) of DVT or PE	1
Varicose veins with phlebitis)	1
Heart Disease / MI / CVA in last 6 months	1
Lung Disease e.g. COPD/Asthma	1
Inflammatory Disease (Bowels or joints)	1
Severe mobility problems	2
Recent surgery or in-patient hospital stay in last 6 weeks	2
Cancer – active or on treatment	3
Previous DVT	3
Previous PE	3
Pregnant or within 6 weeks of childbirth	3
Complex lower limb surgery or pelvic fracture	3
None of the above	0
TOTAL SCORE	

TOTAL SCORE	**Recommendation**
0 – 2	Lower Risk Category: Keep active & drink plenty of water to keep hydrated
3 or more	Higher Risk Category: As above. Discuss with patient risk of DVT (until cast removed) and to consider patient for Apixaban. See Contra-indications and Investigations required.

Contra-indications to Apixaban:	
Hypersensitivity to the active substance	
Concomitant treatment with other anticoagulant e.g. LMWH, unfractionated heparin, fondaparinux	
Pregnancy or Breast Feeding	
Hepatic Impairment	
Active Bleeding	
Significant risk of major bleeding: Recent gastro-intestinal ulcer / Oesophageal varices Recent brain, spinal or ophthalmic surgery / Recent intracranial haemorrhage Malignant neoplasms Vascular aneurysm	
Renal impairment (refer BNF)	
If there is a Contra-indication to Apixaban but not to Tinzaparin (likely reason: Pregnancy or breast feeding. Discuss with O&G regarding Tinzaparin) Then consider treating as per hospital prophylaxis guideline	

Affix Patient label Name: DoB: Hosp. No.:

LOWER LIMB CAST IMMOBILISATION VTE RISK SCORE

For all patients immobilised in a lower limb cast

DATE: _____

STAFF NAME: _____

IF PATIENT AGREES TO START APIXABAN AND NO CONTRAINDICATIONS

Checklist:

Observations	
Check FBC, U&E, LFT, Coagulation (write results in notes or below)	
Pregnancy Test (if female)	
Contraceptive advice if female	
Counselling on Apixaban therapy (unlicensed indication)	
Prescription for Apixaban (5 days duration) during pharmacy opening hours & collect at pharmacy i.e. Apixaban 2.5mg TWICE daily orally 5/7 (TEN DOSES IN TOTAL) if CrCl > 30mL/minute	
Provide patient with 1st dose of Apixaban (only during out of hours pharmacy) and Prescription for further 9 doses to be collected at pharmacy i.e. 2.5mg Apixaban in Emergency department Prescription: Apixaban 2.5mg BD for 5/7 (NINE DOSES IN TOTAL) if CrCl > 30mL/minute	
Fracture clinic appointment < 5 days	

Overdose/signs of bleeding There is no antidote to Apixaban Minor bleeding – stop Apixaban immediately Moderate/severe bleeding – stop Apixaban immediately and go to Emergency Department (discuss with Consultant Haematologist)

Notes:

Allergies (Avoid if hypersensitive to the active substance)	
Age	years old
Weight	Kg
Serum Creatinine	
Creatinine Clearance (mL/minute): (140 – Age) x Weight (kg) x Factor (Male 1.23 / Female 1.04) Serum Creatinine	
Coagulation	
LFTs (Avoid in severe hepatic disease)	
Pregnancy Test Result (if female) (Avoid if pregnant)	
Fracture Clinic Appointment Date (Within 5 days)	
Fax Copy of this form to Coagulation Clinic (Fax Number:)	

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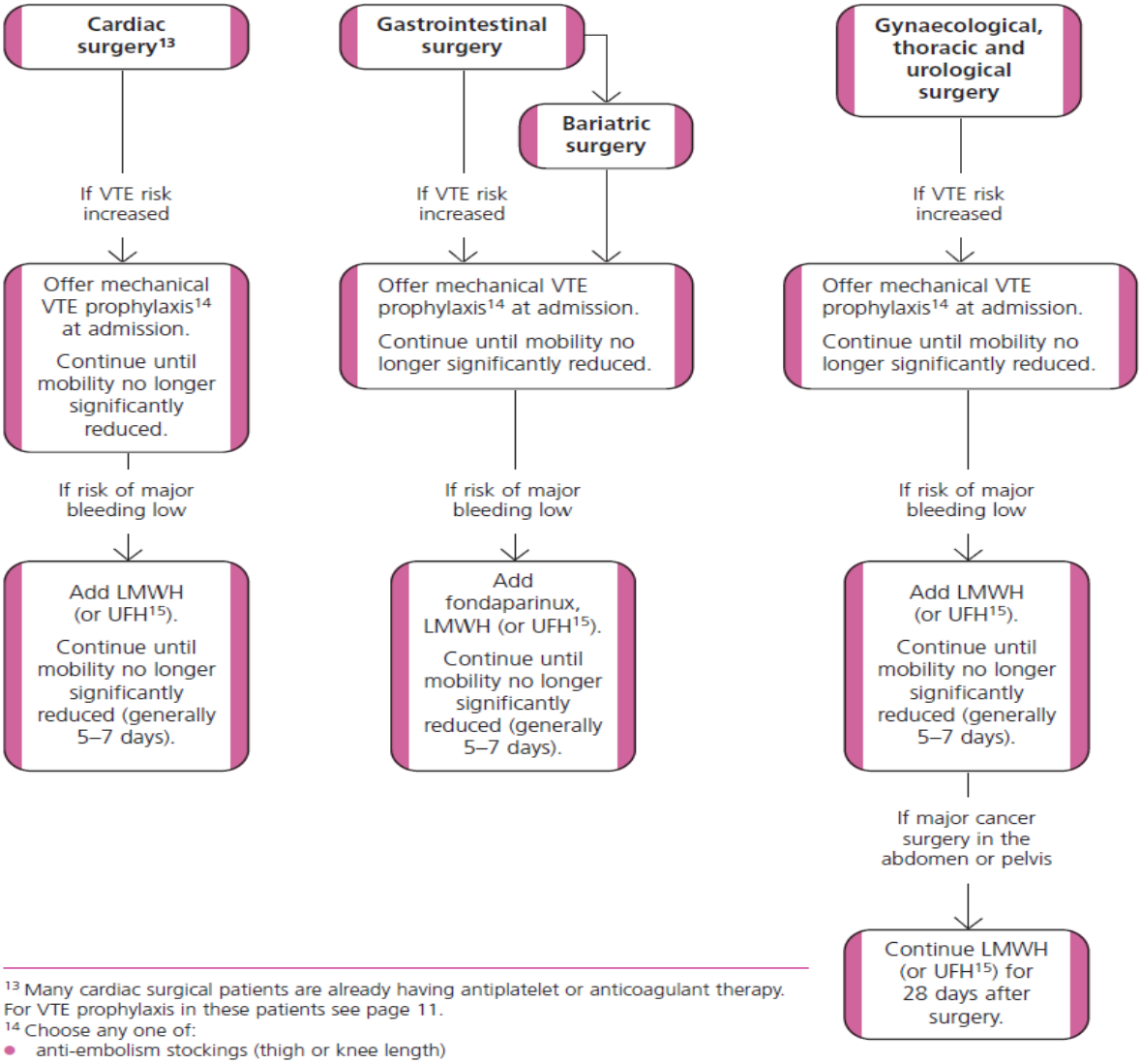
VTE prophylaxis – Non-orthopaedic surgery 1

Important: Thromboprophylaxis at Rotherham Hospital		
Low molecular weight heparin	**AES**	**Flowtrons**
Tinzaparin subcutaneously See VTE proforma	Thigh length or knee length	Intermittent pneumatic compression devices

Venous thromboembolism: reducing the risk | Non-orthopaedic surgery

Balance risks of VTE and bleeding before offering VTE prophylaxis. See page 3.

Non-orthopaedic surgery



[13] Many cardiac surgical patients are already having antiplatelet or anticoagulant therapy. For VTE prophylaxis in these patients see page 11.

[14] Choose any one of:
- anti-embolism stockings (thigh or knee length)
- foot impulse devices
- intermittent pneumatic compression devices (thigh or knee length).

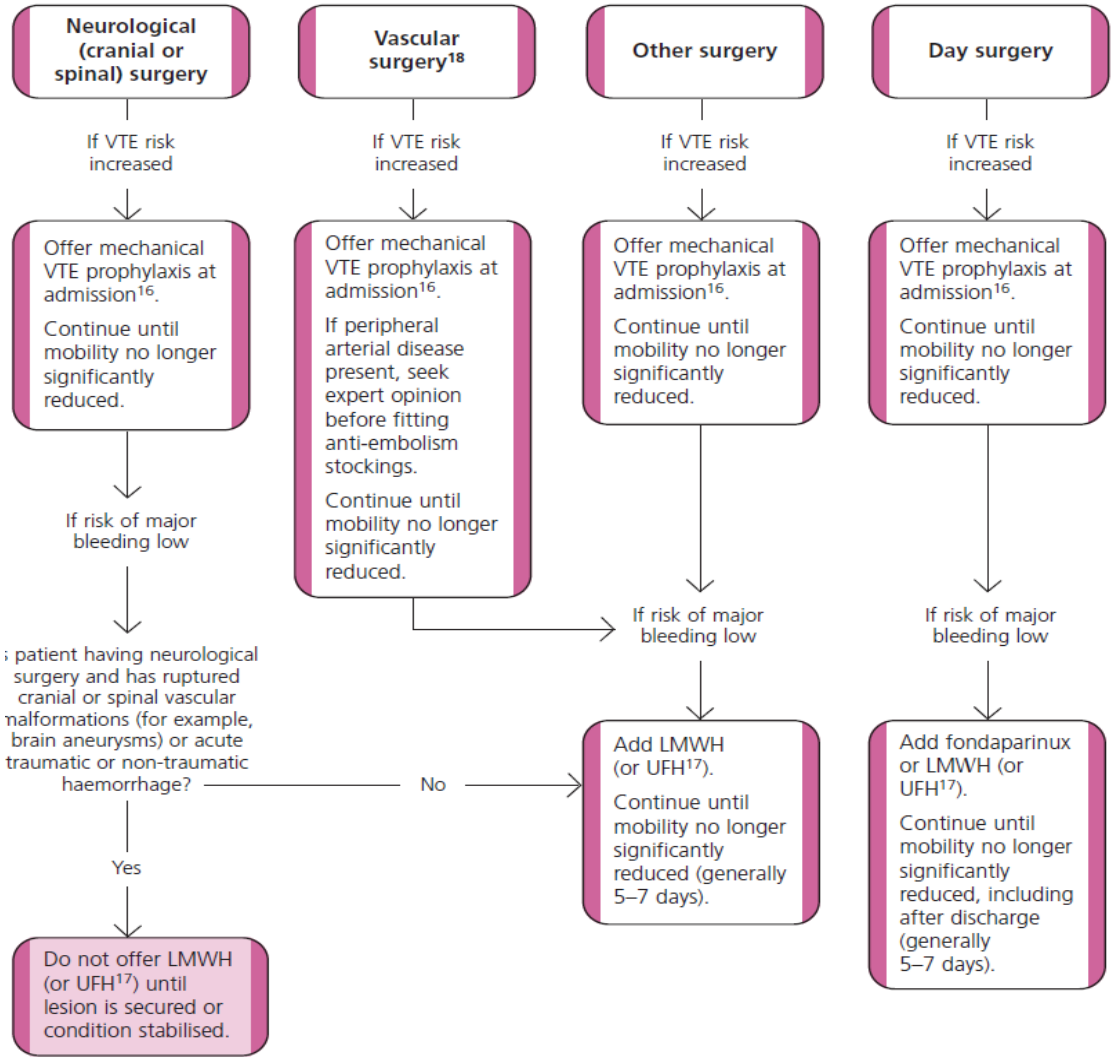
[15] For patients with renal failure.

VTE prophylaxis – Non-orthopaedic surgery 2

Important: Thromboprophylaxis at Rotherham Hospital		
Low molecular weight heparin	**AES**	**Flowtrons**
Tinzaparin subcutaneously See VTE proforma	Thigh length or knee length	Intermittent pneumatic compression devices

Venous thromboembolism: reducing the risk | Non-orthopaedic surgery

Balance risks of VTE and bleeding before offering VTE prophylaxis. See page 3.



[16] Choose any one of:
- anti-embolism stockings (thigh or knee length)
- foot impulse devices
- intermittent pneumatic compression devices (thigh or knee length).

[17] For patients with renal failure.

[18] Many vascular surgical patients are already having antiplatelet or anticoagulant therapy. For VTE prophylaxis in these patients see page 11.

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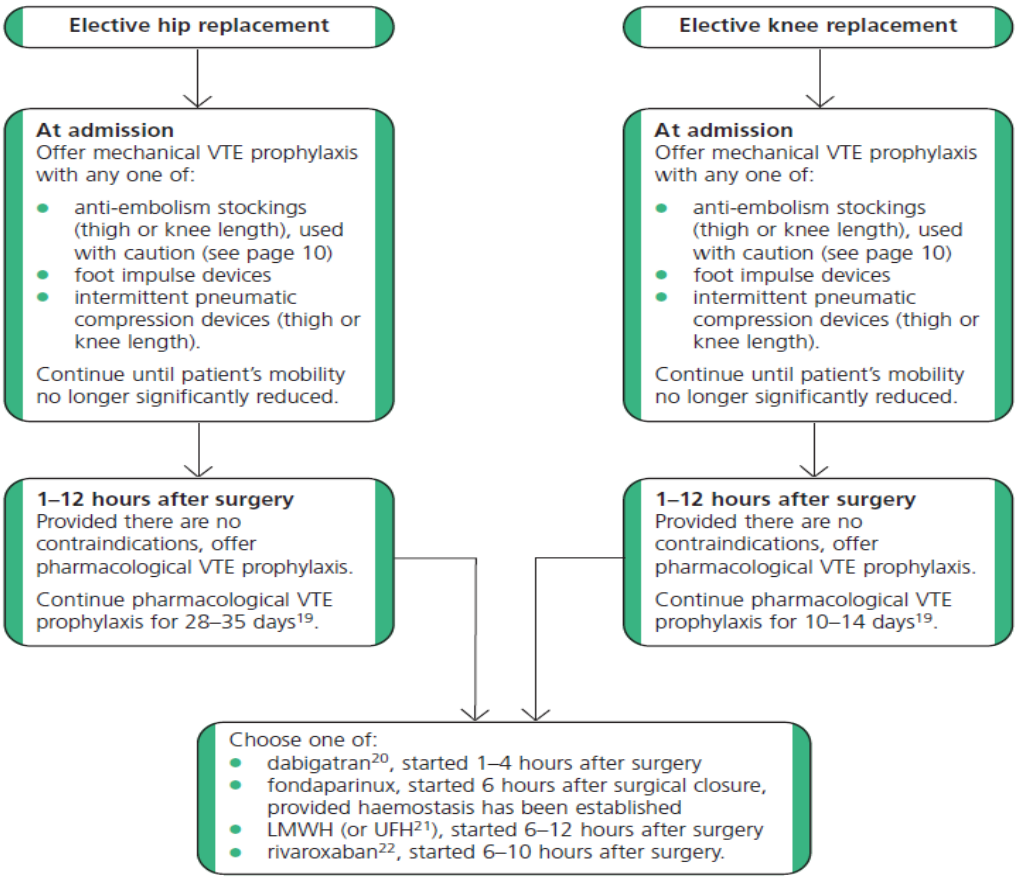
VTE prophylaxis – Orthopaedic surgery

Important: Thromboprophylaxis at Rotherham Hospital		
Apixaban oral Starting 12-24 hours after surgery	**AES** Thigh length or knee length	**Flowtrons** Intermittent pneumatic compression device

Venous thromboembolism: reducing the risk | Orthopaedic surgery

Balance risks of VTE and bleeding before offering VTE prophylaxis. See page 3.

Orthopaedic surgery



[19] According to the summary of product characteristics for the individual agent being used.
[20] In line with 'Dabigatran etexilate for the prevention of venous thromboembolism after hip or knee replacement surgery in adults' (NICE technology appraisal guidance 157), dabigatran etexilate, within its marketing authorisation, is recommended as an option for the primary prevention of venous thromboembolic events in adults who have undergone elective total hip replacement surgery or elective total knee replacement surgery.
[21] For patients with renal failure.
[22] In line with 'Rivaroxaban for the prevention of venous thromboembolism after total hip or total knee replacement in adults' (NICE technology appraisal guidance 170), rivaroxaban, within its marketing authorisation, is recommended as an option for the prevention of venous thromboembolism in adults having elective total hip replacement surgery or elective total knee replacement surgery.

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Hip fracture and other orthopaedic surgery

Important: Thromboprophylaxis at Rotherham Hospital		
Low molecular weight heparin	**AES**	**Flowtrons**
Tinzaparin subcutaneously See VTE proforma	Thigh length or knee length	Intermittent pneumatic compression device

Venous thromboembolism: reducing the risk | Orthopaedic surgery

Balance risks of VTE and bleeding before offering VTE prophylaxis. See page 3.

Hip fracture

At admission
- Offer mechanical VTE prophylaxis with any one of:
  - anti-embolism stockings (thigh or knee length), used with caution (see page 10)
  - foot impulse devices
  - intermittent pneumatic compression devices (thigh or knee length).

Continue until patient's mobility no longer significantly reduced.

- Provided there are no contraindications, offer LMWH (or UFH[23]) if using.

24 hours before surgery
Stop fondaparinux if it has been used (only recommended after surgery).

12 hours before surgery
Stop LMWH (or UFH[23]) if using.

6 hours after surgical closure
Offer fondaparinux if using, provided haemostasis has been established and there is no risk of bleeding. Continue for 28–35 days[24].

6–12 hours after surgery
Restart LMWH (or UFH[23]) if using. Continue for 28–35 days[24].

Other orthopaedic surgery

Upper limb surgery

Do not routinely offer VTE prophylaxis.

At admission
Assess patient's risk of VTE.

If VTE risk increased

After assessing risks and discussing with patient:
- Consider offering mechanical VTE prophylaxis with any one of:
  - anti-embolism stockings (thigh or knee length), used with caution (see page 10)
  - foot impulse devices
  - intermittent pneumatic compression devices (thigh or knee length).
- Consider offering LMWH (or UFH[23]) 6–12 hours after surgery.

Continue mechanical VTE prophylaxis and LMWH (or UFH[23]) until patient's mobility no longer significantly reduced.

[23] For patients with renal failure.
[24] According to the summary of product characteristics for the individual agent being used.

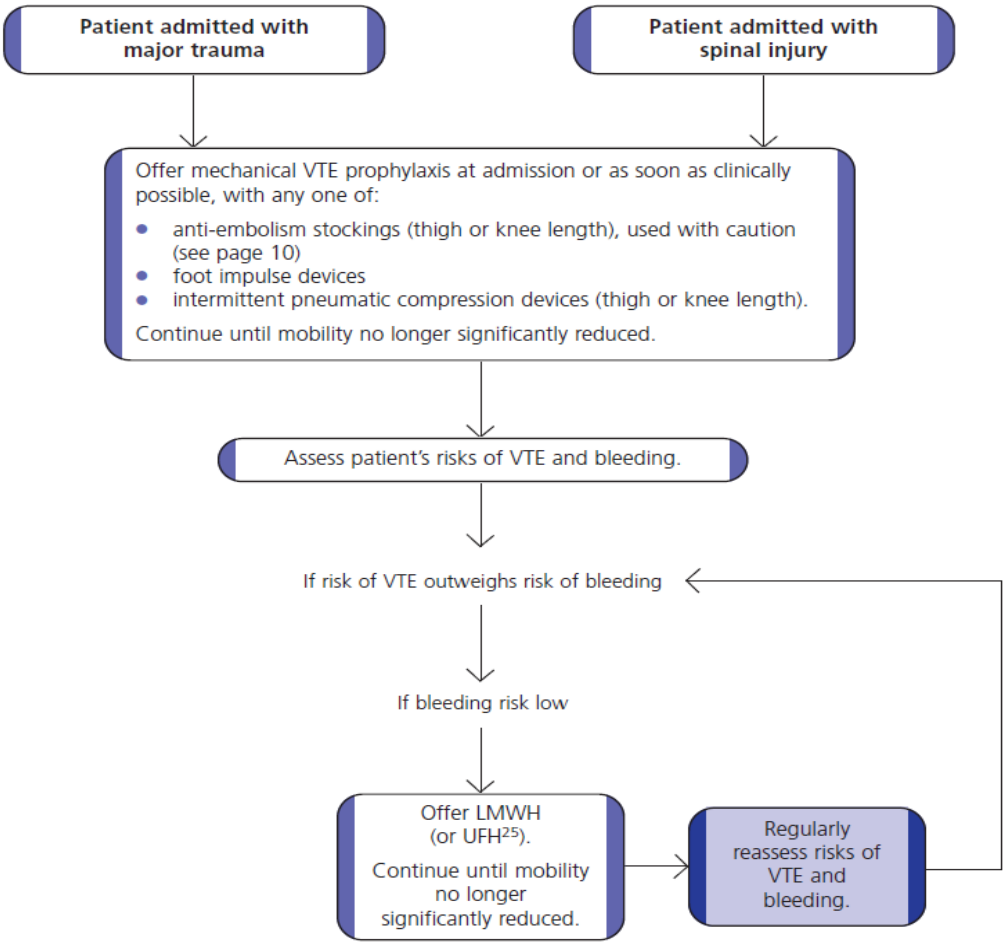
VTE prophylaxis – Major trauma and spinal injury

Important: Thromboprophylaxis at Rotherham Hospital		
Low molecular weight heparin	**AES**	**Flowtrons**
Tinzaparin subcutaneously See VTE proforma	Thigh length or knee length	Intermittent pneumatic compression device

Venous thromboembolism: reducing the risk | Major trauma or spinal injury

Balance risks of VTE and bleeding before offering VTE prophylaxis. See page 3.

Major trauma or spinal injury



[25] For patients with renal failure.

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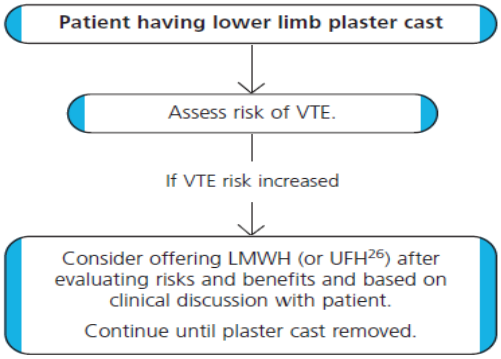
VTE prophylaxis – Patients with lower limb plaster cast

Important: Thromboprophylaxis at Rotherham Hospital	
Apixaban oral **See Lower limb risk assessment**	

Balance risks of VTE and bleeding before offering VTE prophylaxis. See page 3.

Lower limb plaster casts



[26] For patients with renal failure.

Assessment of risk of stroke and bleeding in patients with non-valvular atrial fibrillation

Patient name.....

Patient hospital number.....

Date of assessment.....

Assessor's name (print)..... Signed.....

Risk of stroke: CHADS2-VASC

Clinical feature	Points	Patient score
Hypertension systolic BP >160mmHg	1	
Abnormal renal or liver function	1	
Stroke	1	
Bleeding	1	
Labile INR (<60% in therapeutic range)	2	
Elderly ≥65 years	1	
Drugs or alcohol	2	
Total		

Risk of bleeding: HAS-BLED score

Clinical feature	Points	Patient score
Congestive heart failure or LV dysfunction ≤40%	1	
Hypertension	1	
Age 65 to 74	1	
Diabetes Mellitus	1	
Stroke / TIA / thromboembolism	2	
Vascular disease (MI, complex aortic plaque, PAD)	1	
Age ≥ 75 years	2	
Sex (1 point for female)	1	
Total		

ANTICOAGULATION - PERIOPERATIVE MANAGEMENT OF PATIENTS ON WARFARIN

Patient name
Hosp No.
Date of Birth
Consultant

NB Dental Surgery see Dental Surgery guidelines. Emergency Surgery- discuss with Consultant Haematologists
For DOACs (Apixaban, Dabigatran, Rivaroxaban), see Appendix 24

[ ] Tick as appropriate

Assessed by | Date

These patients require careful planning- assess preoperatively and seek advice from Hameatology if necessary

1.Establish patient risk of thromboembolism

INDICATION FOR WARFARIN	PATIENT RISK OF THROMBOEMBOLISM	
	High risk	**Lower risk**
Venous thromboembolism	[ ] Patient with a VTE within previous three months [ ] Previous VTE whilst on therapeutic anticoagulation and now have a target INR of 3.5	[ ] All other patients
Atrial fibrillation	[ ] Patients with a previous stroke in the last three months [ ] Patients with a previous stroke/TIA and three of the following: [ ] Congestive cardiac failure [ ] Hypertension >140/90 or taking medication [ ] Age >75 years [ ] Diabetes mellitus	
Metal heart valves	[ ] All patient except those with bileaflet aortic valves and no other risk factors	

2. Establish the need for bridging anticoagulant therapy with LMWH

Bridging anticoagulant therapy	Strongly recommend Treatment dose LMWH	Prophylactic dose LMWH while an inpatient or Consider treatment dose in some patients (discuss with consultant haematologists)

3. Discontinuation of warfarin before surgery to achieve INR 1.5 - 2.0 or less than 1.5 if regional anaesthesia

Check INR **5 days before surgery**	INR > 4 seek advice	INR 3.1 - 4 Stop warfarin 5 days before surgery	INR < 2 Stop warfarin 4 days before surgery
Check INR **the day before surgery**	If INR higher than the required Give 1 mg/ 0.1mL oral phytomenadione (vitamin K) in 10 mL water (unlicensed indication)		
Check INR **on the morning of surgery**	To confirm that the required INR achieved If INR higher than the required - seek advice from haematologist		

AF Atrial fibrillation; CHF Congestive heart failure; LMWH Low molecular weight heparin; LVF Left ventricular failure; TIA Transient ischaemic attack; VTE venous thromboembolism; ICD Implantable cardioverter defibrillator dev

ANTICOAGULATION - PERIOPERATIVE MANAGEMENT OF PATIENTS ON WARFARIN

4. Bridging with LMWH when INR expected to be sub-therapeutic

	RISK OF THROMBOEMBOLISM	
	High risk	**Lower lisk**
Commencing LMWH Doses: see tinzaparin prescribing advice Adjust doses for renal impairment	Check INR 3 days before surgery If INR <2.5 commence Treatment dose tinzaparin 175 units/kg OD '3 days' preop 175 units/kg OD '2 days' preop 175 units/kg OD '1 day' preop, given no later than 24 hours preop	If inpatient prior to surgery/procedures: Prophylactic dose tinzaparin 4500 units OD or as advised by Consultant Haematologist
Discontinuing LMWH	Last treatment dose 24 hours before surgery	Last prophylactic dose at least 12 hours before surgery, epidural and anaesthesia
Recommencing oral anticoagulants Post surgery	According to the bleeding risk associated with surgery (see below)	

5. Establishing risk of bleeding associated with surgery or procedure

Need to take into account surgeons opinion

MAJOR risk of bleeding	**MINOR risk of bleeding**
• Spinal or epidural anaesthesia; lumbar diagnostic puncture • Thoracic surgery • Abdominal surgery • Major orthopaedic surgery • Liver biopsy • Transurethral prostate resection • Kidney biopsy • Multiple tooth extractions (see Appendix 25) • Extracorporeal shockwave resection	• Endoscopy guidance (Appendix 26) • *Prostate or bladder biopsy • Pacemaker or ICD implantation (unless complex anatomical setting eg congenital heart disease) * Patients with renal/liver impairment may have elevated bleeding risk and should be considered individually

6. Recommencing anticoagulants post surgery according to bleeding risk of procedure

MAJOR risk of bleeding	**MINOR risk of bleeding**
Recommencing warfarin at patients usual dose. If nil by mouth or have epidural/ regional catheter - seek advice	
12-24 hours after surgery: evening of the day of surgery or the first day after surgery	Evening of the day of surgery
Recommencing LMWH IV heparin may be necessary in ITU/HDU in patients with renal failure or complex surgery likely to need further surgery	
Resume treatment dose LMWH 48 - 72 hours after surgery: Tinzaparin 175 units/kg OD until INR >2 if epidural insitu, 4500 units 12 hourly - omitting dose 12 hours prior to the removal of epidural	Prophylactic dose tinzaparin 4500 units 6 hours post surgery if epidural insitu, 4500 units 12 hourly - omitting dose 12 hours prior to the removal of epidural

References: Mannuci C and Douketis JD The management of patients who require temporary reversal of vitamin K antagonists for surgery: a practical guideline for clinicians. Internal and Emergency Medicine 2006; 1(2): 96-104 (Adapte
Douketis JD, Spyropoulos AC, Spencer FA et al. Perioperative managment of antithrombotic therapy. Chest 2012; 141 (2) (Suppl1(2): e326S-e350S (adapted)

Heidbuchel H, Verhamme, Alings M et al. Updated European Heart Rhythm Association Practical Guide on the use of new oral anticoagulants in patients with non-valvular atrial fibrillation. Europace Advance Access August 2015.
Keeling D, Campbell Tait R, Watson H Perioperative management of anticoagulation and antiplatelet therapy British Society for Haematology 2016

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Perioperative management of patients taking DOACS (apixaban, dabigatran, rivaroxaban. edoxaban)

*Measure renal function no more than ONE WEEK prior to the procedure

The below table is to provide guidance only. The operating surgeon, dentist, or interventional radiologist must assess the risk of bleeding for the individual patient and discuss this and the plan for peri-operative anticoagulation with them. The plan must be recorded clearly in the notes including a plan for when the patient is discharged.

1 Establish bleeding risk associated with procedures		
Procedure not requiring discontinuation of anticoagulation	Procedures/surgery with MINOR BLEEDING RISK (i.e. infrequent or with low clinical impact)	Procedures/surgery with MAJOR BLEEDING RISK (i.e. frequent and/or with high impact)

• Dental procedures (Please refer to Appendix 25)
  • Extraction of one to three teeth
  • Periodontal surgery
  • Incision of abscess
  • Implant positioning
• Ophthalmology
  • Cataract or glaucoma procedure
• Endoscopy without surgery
• Superficial surgery (e.g. abscess incision, small dermatologic excisions, etc.)
	• *Endoscopy with biopsy (Please refer to endoscopy guidance Appendix 26)
	• *Prostate or bladder biopsy
	• Pacemaker or ICD implantation (unless complex anatomical setting, e.g. congenital heart disease)
	
	** Patients with renal/liver impairment may have elevated bleeding risk and should be considered individually*
		• Spinal or epidural anaesthesia; lumbar diagnostic puncture
		• Thoracic surgery
		• Abdominal surgery
		• Major orthopaedic surgery
		• Liver biopsy
		• Transurethral prostate resection
		• Kidney biopsy
		• Multiple tooth extractions (see Appendix 24)
		• Extracorporeal shockwave resection

References: Keeling D, Campbell Tait R, Watson H Perioperative management of anticoagulation and antiplatelet therapy British Society for Haematology 2016
Heidbuchel H, Verhamme P, Alings M et al. (2016) Updated European Heart Rhythm Association Practical Guide on the use of non-vitamin K antagonist anticoagulants in patients with non-valvular atrial fibrillation; SPCs Apixaban, Dabigatran, Rivaroxaban, Edoxaban; Sheffield Teaching Hospital Guidelines
Written by Consultant Haematologists and Anticoagulation Team. Approved by Anticoagulation/VTE Group and Rotherham Medicines Optimisation Group
V1 Issue September 2017 Review 2020

Perioperative management of patients taking DOACS (apixaban, dabigatran, rivaroxaban. edoxaban)(Appendix 24 Cont)
*Measure renal function no more than ONE WEEK prior to the procedure

2 Stopping DOACs prior to surgery			
Renal function *CrCl mL/minute	Est.half- life Hours	Procedures/surgery with MINOR BLEEDING RISK (i.e. infrequent or with low clinical impact)	Procedures/surgery with MAJOR BLEEDING RISK (i.e. frequent and/or with high impact)
Apixaban, Rivaroxaban, Edoxaban			
>30	8, 9, 10-14	Omit at least 24 hours	Omit at least 48 hours
15-30		Omit at least 48 hours	Omit at least 72 hours
<15	Contraindicated – discuss with Haematology		
Dabigatran			
>80	13	Omit at least 24 hours	Omit at least 48 hours
51-80	15	Omit at least 24 – 48 hours	Omit at least 48 - 72 hours
30-50	18	Omit at least 48 - 72 hours	Omit at least 96 hours
<30	Contraindicated – discuss with Haematology		

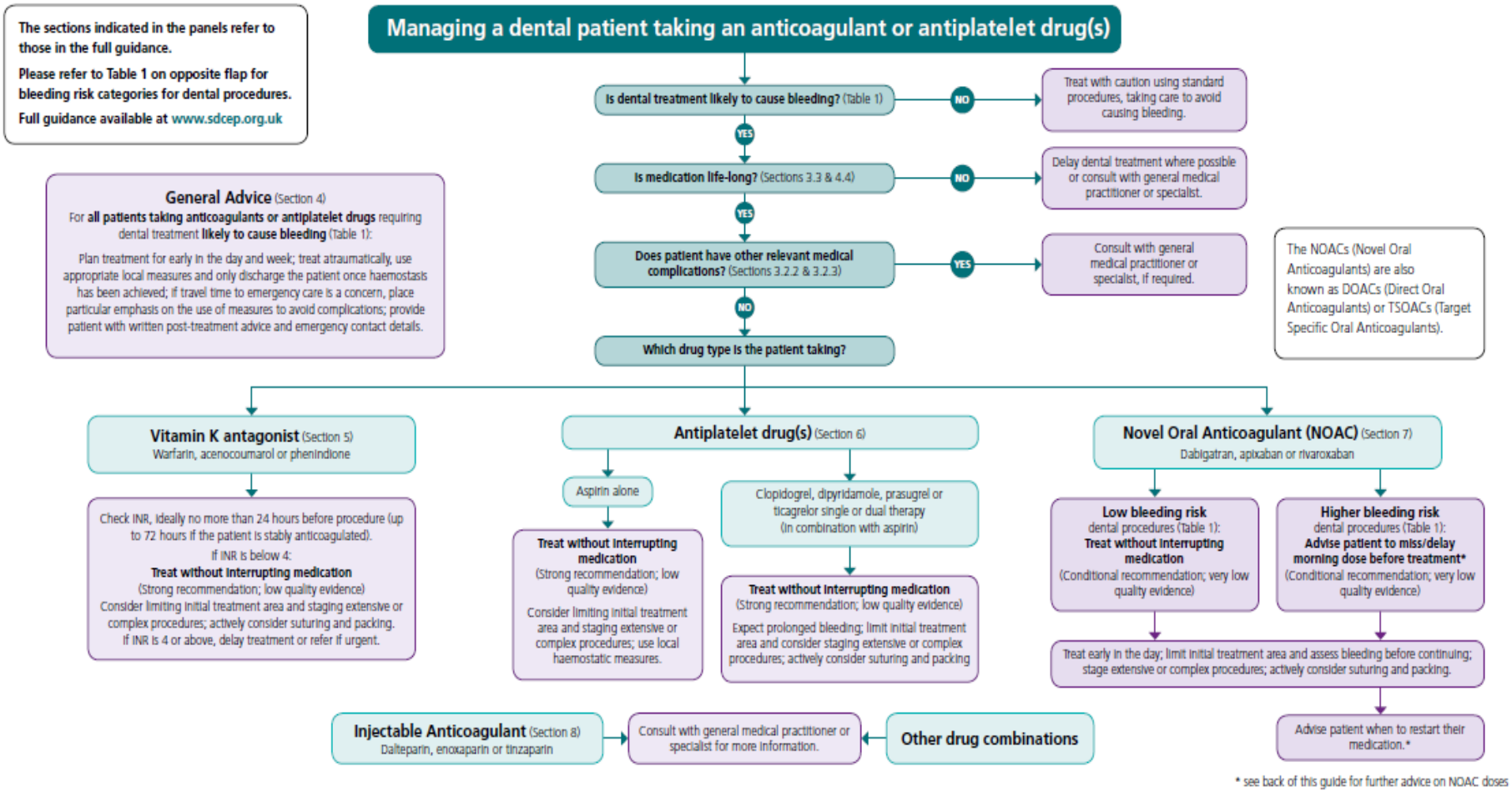
3 Restarting DOACs after surgery		
General Information: Review daily Escalate dose when haemostasis is secure. Consider risk of high bleeding risk and seek advice if there are any concerns. If overt bleeding is present, stop anticoagulation and discuss with haematologists.	• DOACs may be started at earliest 24 hours after surgery • If there is concern about absorption of DOAC, tinzaparin may be continued longer at a dose depending on the thrombotic risk. • Prophylactic dose - apixaban 2.5 mg BD - may be restarted 12-24 hours post op.	Surgery Day 0 | Day +1 | Day +2 | Day +3 | Day +4 | Day +5 | Day +6 Tinzaparin prophylactic dose starting 6-8 hours post op Restart DOAC at the earliest on Day +3, depending on bleeding. Check U&E/LFT Do not restart if epidural in situ. Restart 6-8 hours after removal of catheter Administer last dose of tinzaparin the day before restarting DOAC.

Perioperative management of dental patients taking anticoagulants and antiplatelets

The operating surgeon, dentist, or interventional radiologist must assess the risk of bleeding for the individual patient and discuss this and the plan for peri-operative anticoagulation with them. The plan must be recorded clearly in the notes including a plan for when the patient is discharged.

1. **Establish bleeding risk with dental procedure**		
Dental procedures that are unlikely to cause bleeding	**Dental procedure that are likely to cause bleeding**	
	Low risk of post-operative bleeding complications	**High risk of post-operative bleeding complications**
Local anaesthesia by infiltration, intraligamentary or mental nerve block Local anaesthesia by inferior dental block or other regional nerve blocks Basic periodontal examination Supragingival removal of plaque, calculus and stain Direct or indirect restorations with supragingival margins Endodontics – orthograde Impressions and other prosthetic procedures Fitting and adjustment of orthodontic appliances	Simple extractions (1-3 teeth, with restricted wound size) Incision and drainage of intra-oral swellings Detailed six point full periodontal examination Root surface instrumentation (RSI) and subgingival scaling Direct or indirect restorations with subgingival margins	Complex interactions, adjacent extractions that will cause a large wound or more than 3 extractions at once Flap raising procedures: Elective surgical extractions Peridontal surgery Preprosthetic surgery Periradicular surgery Crown lengthening Dental implant surgery Gingival recontouring Biopsies

Managing a dental patient taking an anticoagulant or antiplatelet drugs(s)

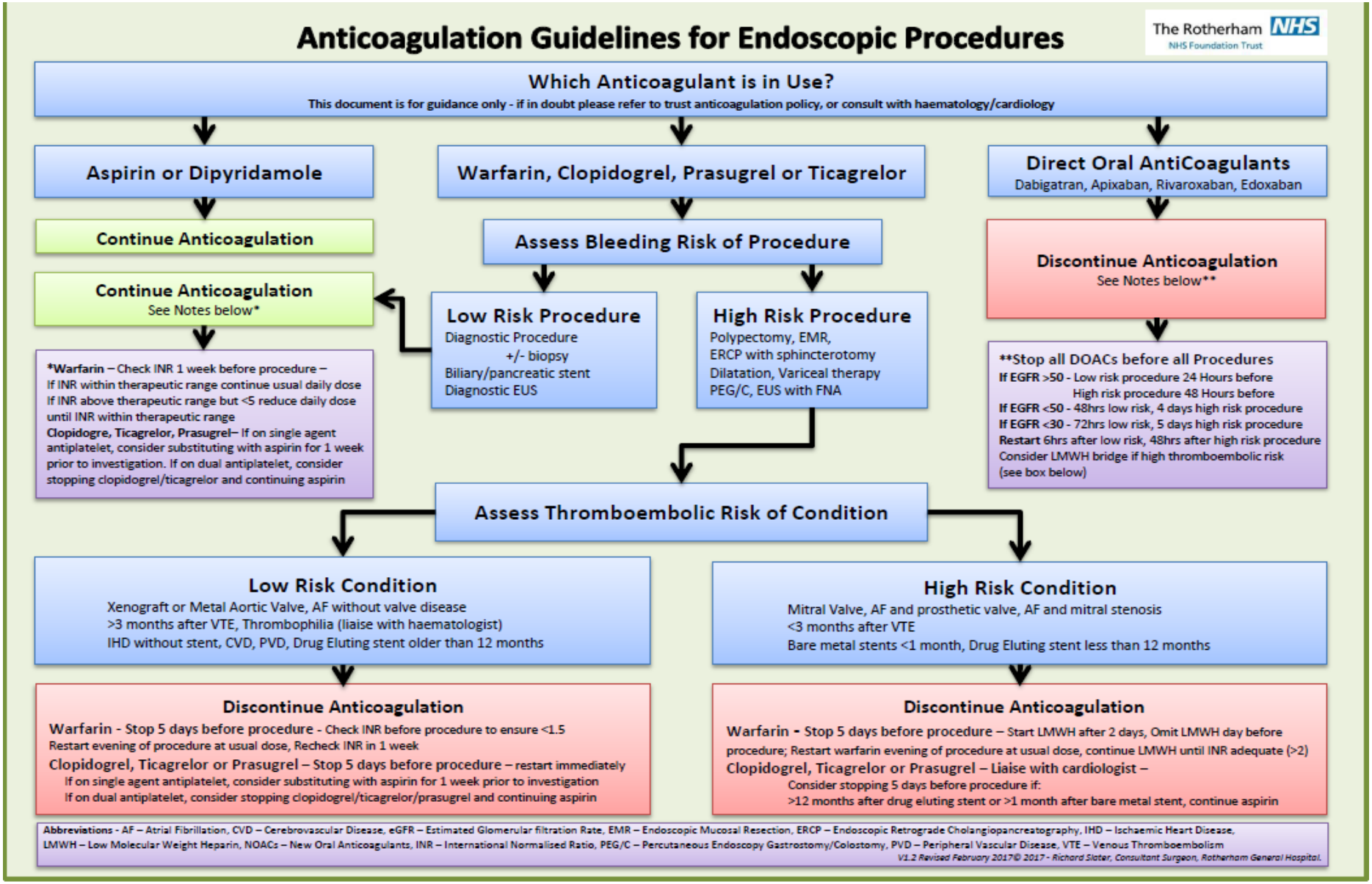


NOAC dose schedules for dental procedures with a higher risk of bleeding complications

NOAC	Usual drug schedule	Morning dose (pre-treatment)	Post-treatment dose
apixaban or dabigatran	Twice a day	Miss morning dose	Usual time in evening‡
rivaroxaban	Once a day; morning	Delay morning dose	4 hours after haemostasis has been achieved
	Once a day; evening	Not applicable	Usual time in evening‡

‡ *As long as no earlier than 4 hours after haemostasis has been achieved. The patient should continue with their usual drug schedule thereafter.*

Reference: Scottish Dental Clinical Effectiveness Programme. Management of dental patients taking anticoagulant and antiplatelet drugs. August 2015


Anticoagulation Guidelines for Endoscopic Procedures
The Rotherham NHS
NHS Foundation Trust
Which Anticoagulant is in Use?
This document is for guidance only - if in doubt please refer to trust anticoagulation policy, or consult with haematology/cardiology
Aspirin or Dipyridamole
Warfarin, Clopidogrel, Prasugrel or Ticagrelor
Direct Oral AntiCoagulants
Dabigatran, Apixaban, Rivaroxaban, Edoxaban
Continue Anticoagulation
Assess Bleeding Risk of Procedure
Discontinue Anticoagulation
See Notes below**
Continue Anticoagulation
See Notes below*
Low Risk Procedure
Diagnostic Procedure
+/- biopsy
Biliary/pancreatic stent
Diagnostic EUS
High Risk Procedure
Polypectomy, EMR,
ERCP with sphincterotomy
Dilatation, Variceal therapy
PEG/C, EUS with FNA
*Warfarin – Check INR 1 week before procedure –
If INR within therapeutic range continue usual daily dose
If INR above therapeutic range but <5 reduce daily dose until INR within therapeutic range
Clopidogre, Ticagrelor, Prasugrel– If on single agent antiplatelet, consider substituting with aspirin for 1 week prior to investigation. If on dual antiplatelet, consider stopping clopidogrel/ticagrelor and continuing aspirin
**Stop all DOACs before all Procedures
If EGFR >50 - Low risk procedure 24 Hours before
High risk procedure 48 Hours before
If EGFR <50 - 48hrs low risk, 4 days high risk procedure
If EGFR <30 - 72hrs low risk, 5 days high risk procedure
Restart 6hrs after low risk, 48hrs after high risk procedure
Consider LMWH bridge if high thromboembolic risk
(see box below)
Assess Thromboembolic Risk of Condition
Low Risk Condition
Xenograft or Metal Aortic Valve, AF without valve disease
>3 months after VTE, Thrombophilia (liaise with haematologist)
IHD without stent, CVD, PVD, Drug Eluting stent older than 12 months
High Risk Condition
Mitral Valve, AF and prosthetic valve, AF and mitral stenosis
<3 months after VTE
Bare metal stents <1 month, Drug Eluting stent less than 12 months
Discontinue Anticoagulation
Warfarin - Stop 5 days before procedure - Check INR before procedure to ensure <1.5
Restart evening of procedure at usual dose, Recheck INR in 1 week
Clopidogrel, Ticagrelor or Prasugrel – Stop 5 days before procedure – restart immediately
If on single agent antiplatelet, consider substituting with aspirin for 1 week prior to investigation
If on dual antiplatelet, consider stopping clopidogrel/ticagrelor/prasugrel and continuing aspirin
Discontinue Anticoagulation
Warfarin - Stop 5 days before procedure – Start LMWH after 2 days, Omit LMWH day before procedure; Restart warfarin evening of procedure at usual dose, continue LMWH until INR adequate (>2)
Clopidogrel, Ticagrelor or Prasugrel – Liaise with cardiologist –
Consider stopping 5 days before procedure if:
>12 months after drug eluting stent or >1 month after bare metal stent, continue aspirin
Abbreviations - AF – Atrial Fibrillation, CVD – Cerebrovascular Disease, eGFR – Estimated Glomerular filtration Rate, EMR – Endoscopic Mucosal Resection, ERCP – Endoscopic Retrograde Cholangiopancreatography, IHD – Ischaemic Heart Disease, LMWH – Low Molecular Weight Heparin, NOACs – New Oral Anticoagulants, INR – International Normalised Ratio, PEG/C – Percutaneous Endoscopy Gastrostomy/Colostomy, PVD – Peripheral Vascular Disease, VTE – Venous Thromboembolism
V1.2 Revised February 2017© 2017 - Richard Slater, Consultant Surgeon, Rotherham General Hospital.

Perioperative management of patients taking antiplatelets and NSAIDs

These recommendations relate mainly to patients requiring neuraxial blocks and to patients with normal renal function except where indicated.

Check with Cardiologists/ Anaesthetist /and Surgeon prior to withholding these medications.

Patients must be warned of the increased risk of thromboembolism in the perioperative period as a result of disturbance to their anticoagulation/ antiplatelet regimen

Recommended time for withholding a prior to surgery, anaesthesia and regional Anaesthesia

Antiplatelet drugs	**Recommended time for withholding the medication**
Aspirin	No additional precautions
Clopidogrel	7 days
Dipyridamole	No additional precautions
NSAIDs	No additional precautions
Prasugrel	7 days
Ticagrelor	5 days
Tirofiban	8 hours
Abciximab	48 hours

NSAIDs, non-steroidal anti-inflammatory drugs

Reference: AAGBI Regional Anaesthesia and Patients with Abnormalities of coagulation. Year

Guideline for management of warfarin /acenocoumarol related bleeding

1 Major bleed - contact the Consultant Hematologists

STOP anticoagulants - **EVEN IF INR IS THERAPEUTIC**

Consider activating the massive haemorrhage protocol by dialing '2222'.

Obtain FBC, Crossmatch and Clotting screen

Give vitamin K 5 mg route and repeat as necessary

Intracerebral bleeds and major gastrointestinal bleeding require reversal with Prothrombin Complex Concentrate. This must be discussed with the Consultant Haematologists on call.

2 INR more than 8 No bleeding or minor bleeding

STOP anticoagulants for 1-3 days and restart when INR is less than 5 at 1mg or less than the last dose.

If bleeding risk, e.g. 70 years of age or had recent surgery, give vitamin K 2 mg.

3 INR 6 – 8 No bleeding

STOP anticoagulants and restart or 1–3 days and restart when INR is less than 5.0 at 1 mg or less than the last dose.

Guideline for management of heparin related bleeding

If overdose suspected:

- Request APTT and state overdose on request form.
- Inform Consultant Haematologist as reversal with protamine sulphate may be required.
- Request APTT after 24 hours if needed.

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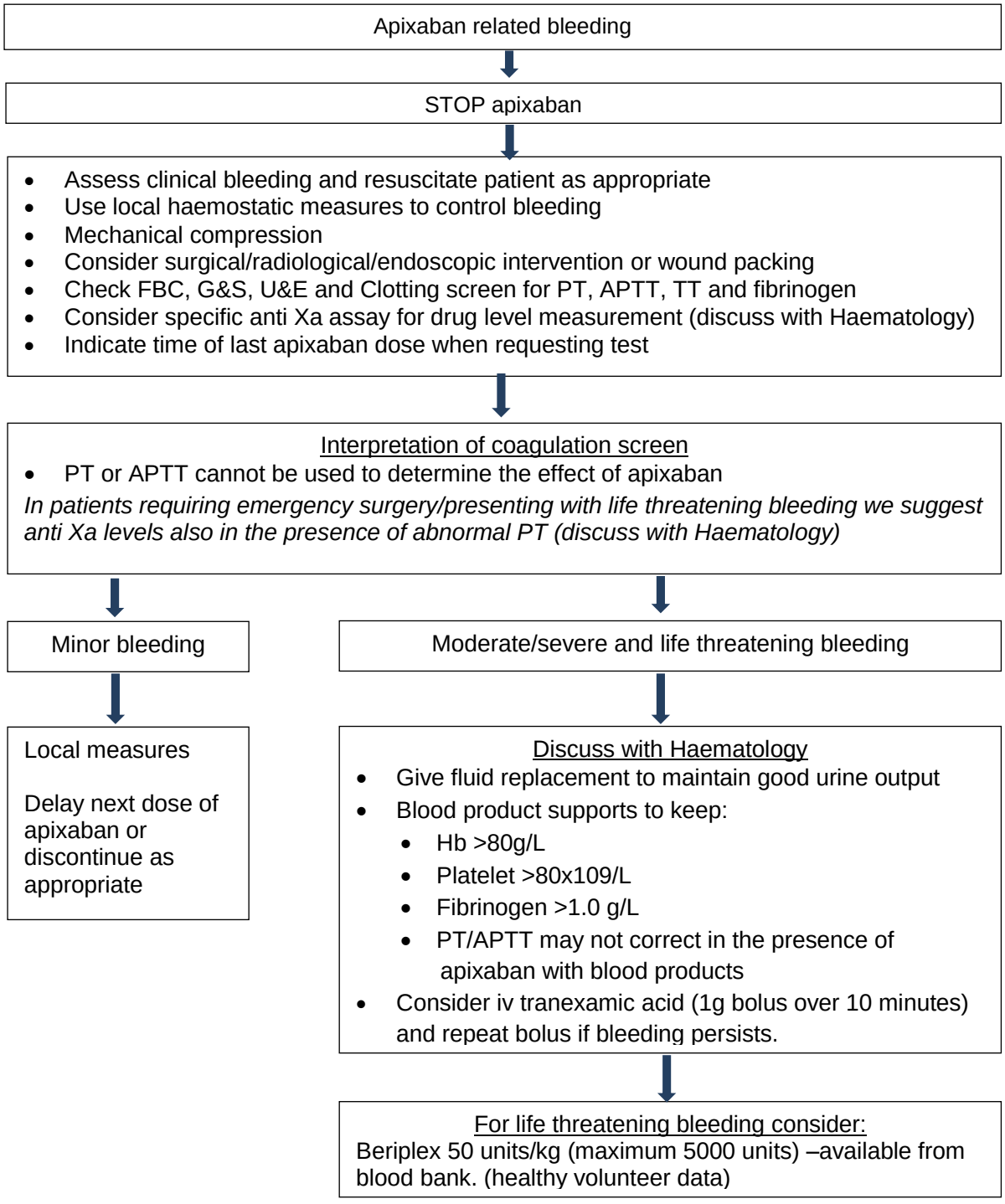
Guideline for management of apixaban related bleeding

- Apixaban is an oral direct factor Xa inhibitor.
- Apixaban has a plasma half-life of 12 hours.
- Apixaban is metabolised 25% renally and 75% hepatic.
- There is no **SPECIFIC REVERSAL** agent for apixaban.



Acknowledgements: Sheffield Teaching Hospital (2017)

Guideline for management of bleeding or emergency surgery in patients taking dabigatran (Praxbind®)

STOP dabigatran

- Assess clinical bleeding and resuscitate patient as appropriate
- Use local haemostatic measures to control bleeding
- Consider surgical/radiological/endoscopic intervention or wound packing
- Obtain bloods for the following, but do not wait for the results in life threatening bleeds or emergency
  - FBC, U&E, Cross Match
  - Coagulation screen and thrombin time
  - Consider dabigatran levels (blue top bottle, state time of last dose on request)

Dabigatran is a direct oral thrombin inhibitor with a plasma half-life of 12-18 hours. It is primarily renally excreted and the half-life is prolonged in renal impairment. Idarucizumab is specific licensed agent for reversal of dabigatran.

Interpretation of coagulation screen with dabigatran

- Dabigatran prolongs the APTT more than the PT and markedly prolongs TT.
- The PT, APTT and TT cannot be used to monitor dabigatran anticoagulation.
- A normal APTT makes therapeutic anticoagulation unlikely
- A normal TT excludes the presence of dabigatran

Clinically relevant minor bleeding
Use local measures to control bleeding
Delay next dose or discontinue treatment as appropriate
With normal renal function level of dabigatran reduces rapidly in 24 hours. In renal impairment (CrCl <50 mL/minute) it can take up to 96 hours

Calculate creatinine clearance (mL/minute
= (140-age) x weight (kg) x 1.04 (female) 1.23 (male)
Serum creatinine (micromol/L)

Life or limb threatening bleeds (including intra-cerebral, intra-cavity or critical organ bleeds
or
surgery required <24 hours

Last dose dabigatran <24 hours ago
Give Idarucizumab

Last dose dabigatran 24-48 hours ago and CrCl <50 mL/minute or suspected / confirmed Acute Kidney Injury
Give idarucizumab

Last dose dabigatran 48-72 hours ago and CrCl <30 mL/minute
Consider reversal with Idarucizumab
Discuss with haematology

Using Idarucizumab (Praxbind®) to reverse anticoagulation with dabigatran

Idarucizumab must be stored in a fridge. It is stocked in Blood Bank. Contact Pharmacy to order replacement stock.

1 **Give Idarucizumab 5g**
The pack contains two vials of 2.5g in 50mL. They are administered as a bolus or as two consecutive infusions over 5-10 minutes each. Choice depends on urgency
Flush the line with sodium chloride 0.9% before and after Idarucizumab. Do not mix with other drugs in infusion or in the line.

2 **Immediately after giving Idarucizumab**: obtain repeat bloods for APTT and Thrombin Time. Do not wait for results if proceeding to emergency surgery.

3 **24 hour after Idarucizumab, or sooner if there is continuing concern regarding bleeding:** repeat APTT and Thrombin Time, and obtain dabigatran levels (blue top bottle, state time of last dose on request). Rebound anticoagulation occurs in 15-20% of patients. If repeat APTT and Thrombin Time are elevated, discuss with haematologists.

4 **Restarting anticoagulation:** restart anticoagulation therapy when haemostasis is secure RFT guideline 'Perioperative management of patients of DOACs'. Link

Acknowledgements: Sheffield Teaching Hospital (2017)

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Guidelines for management of rivaroxaban related bleeding

- Rivaroxaban is an oral direct factor Xa inhibitor
- Rivaroxaban has a plasma half-life of 7-9 hours
- Rivaroxaban is metabolised 25% renally and 75% hepatic
- There is no **SPECIFIC REVERSAL** agent for revaroxaban

Rivaroxaban or related bleeding

↓

Stop rivaroxaban

↓

- Assess clinical bleeding and resuscitate patient as appropriate
- Use local haemostatic measures to control bleeding
- Mechanical compression
- Consider surgical/radiological/endoscopic intervention or wound packing
- Check FBC, G&S, U&E and Clotting screen for PT, APTT, TT and fibrinogen
- Consider specific anti Xa assay for drug level measurement (discuss with Haematology)
- Indicate time of last rivaroxaban dose when requesting test

↓

Interpretation of coagulation screen

- Rivaroxaban prolongs the PT more than APTT
- Neither the PT or APTT can be used to monitor rivaroxaban anticoagulation
- A normal PT makes *therapeutic* anticoagulation unlikely but cannot be fully excluded

In patients requiring emergency surgery/presenting with life threatening bleeding we suggest anti Xa levels also in the presence of abnormal PT (discuss with Haematology)

↓

Minor bleeding

↓

Local measures
Delay next dose of rivaroxaban or discontinue as appropriate

Moderate/severe and life threatening bleeding

↓

Discuss with Haematology

- Give fluid replacement to maintain good urine output
- Blood product supports to keep:
  - Hb >80g/L
  - Platelet >80x109/L
  - Fibrinogen >1.0 g/L
  - PT/APTT may not correct in the presence of rivaroxaban
- Consider tranexamic acid (1g bolus over 10 minutes) and repeat bolus if bleeding persists.

↓

For life threatening bleeding consider:
Beriplex 50 units/kg (maximum 5000 units) –available from blood bank. (Based on healthy volunteer data)

↓

Repeat FBC and clotting screen after blood product replacement

Acknowledgements: Sheffield Teaching Hospital (2017)

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Guidelines for management of edoxaban related bleeding

- Edoxaban an oral direct factor Xa inhibitor
- Edoxaban has a plasma half-life of 10-14 hours
- Edoxaban is metabolised 35% renally and 65% hepatic
- There is no **SPECIFIC REVERSAL** agent for edoxaban

Edoxaban related bleeding

↓

STOP edoxaban

↓

- Assess clinical bleeding and resuscitate patient as appropriate
- Use local haemostatic measures to control bleeding
- Mechanical compression
- Consider surgical/radiological/endoscopic intervention wound packing
- Check FBC, G&S, U&E and Clotting screen for PT, APTT, TT and fibrinogen
- Consider specific anti Xa assay for drug level measurement (discuss with Haematology)
- Indicate time of last edoxaban dose when requesting test

↓

<u>Interpretation of coagulation screen</u>

- APTT prolongs the PT more than the APTT but a normal PT does not exclude therapeutic anticoagulation
- Neither the PT or APTT can be used to monitor edoxaban anticoagulation

In patients requiring emergency surgery/presenting with life threatening bleeding we suggest anti Xa levels also in the presence of abnormal PT (discuss with Haematology)

↓

Minor bleeding

↓

Local measures
Delay next dose of edoxaban or discontinue as appropriate

↓

Moderate/severe and life-threatening bleeding

↓

<u>Discuss with Haematology</u>

- Give fluid replacement to maintain good urine output
- Blood product supports to keep:
  - Hb >80g/L
  - Platelet >80x109/L
  - Fibrinogen >1.0 g/L
  - PT/APTT may not correct in the presence of edoxaban with blood products
- Consider iv tranexamic acid (1g bolus over 10 minutes) and repeat bolus if bleeding persists.

↓

<u>For life threatening bleeding consider:</u>
Beriplex 50 units/kg (maximum 5000 units) –available from blood bank (Based on healthy volunteer data)

↓

Repeat FBC and clotting screen after blood product replacement

Acknowledgements: Sheffield Teaching Hospital (2017)

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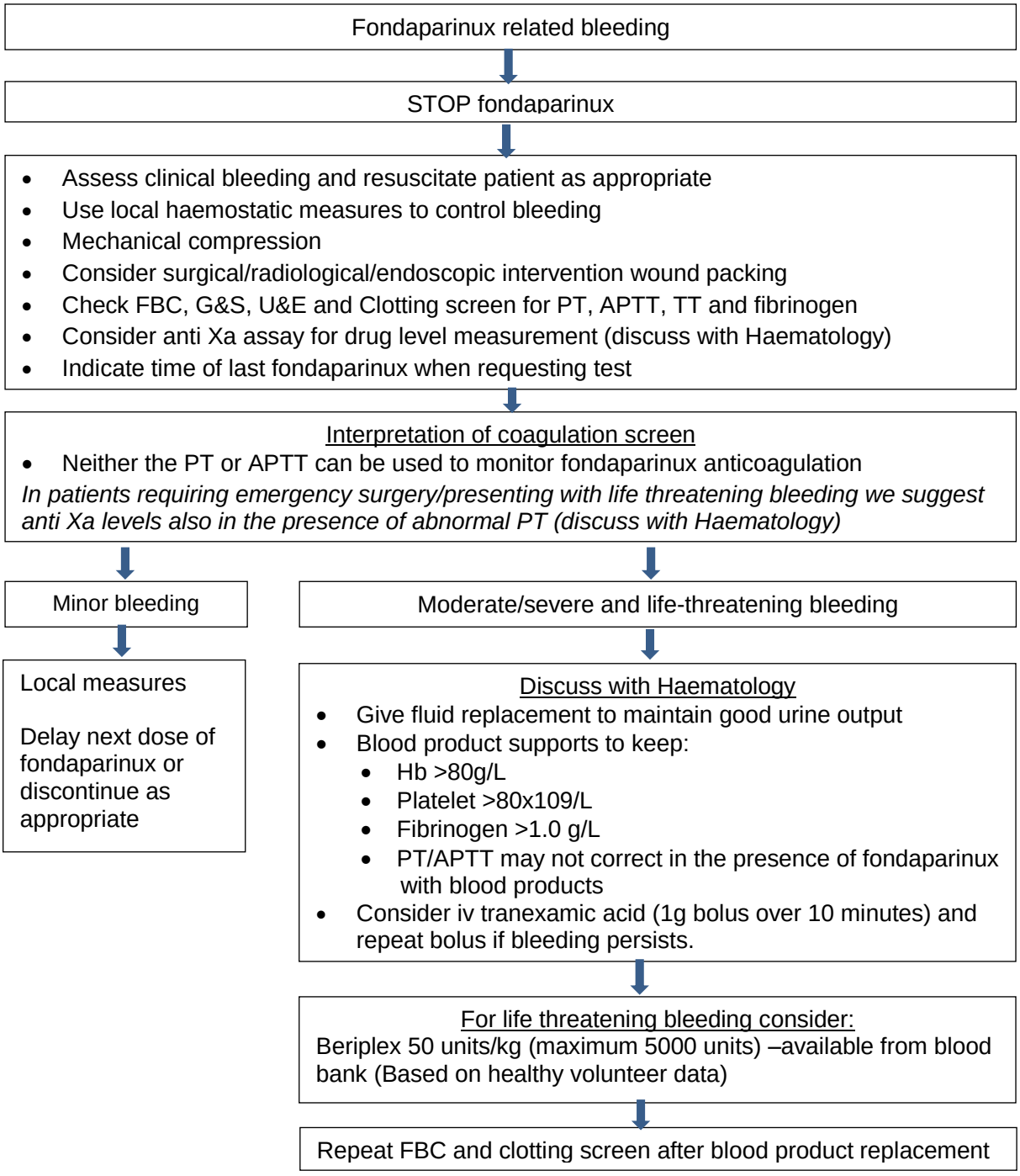
Guidelines for management of fondaparinux related bleeding

- Fondaparinux is a synthetic factor Xa inhibitor
- Fondaparinux has a plasma half-life of 17-21 hours (healthy-elderly)
- Fondaparinux is excreted unchanged by the kidney 64-77%
- There is no **SPECIFIC REVERSAL** agent for fondaparinux.



Acknowledgements: Sheffield Teaching Hospital (2017

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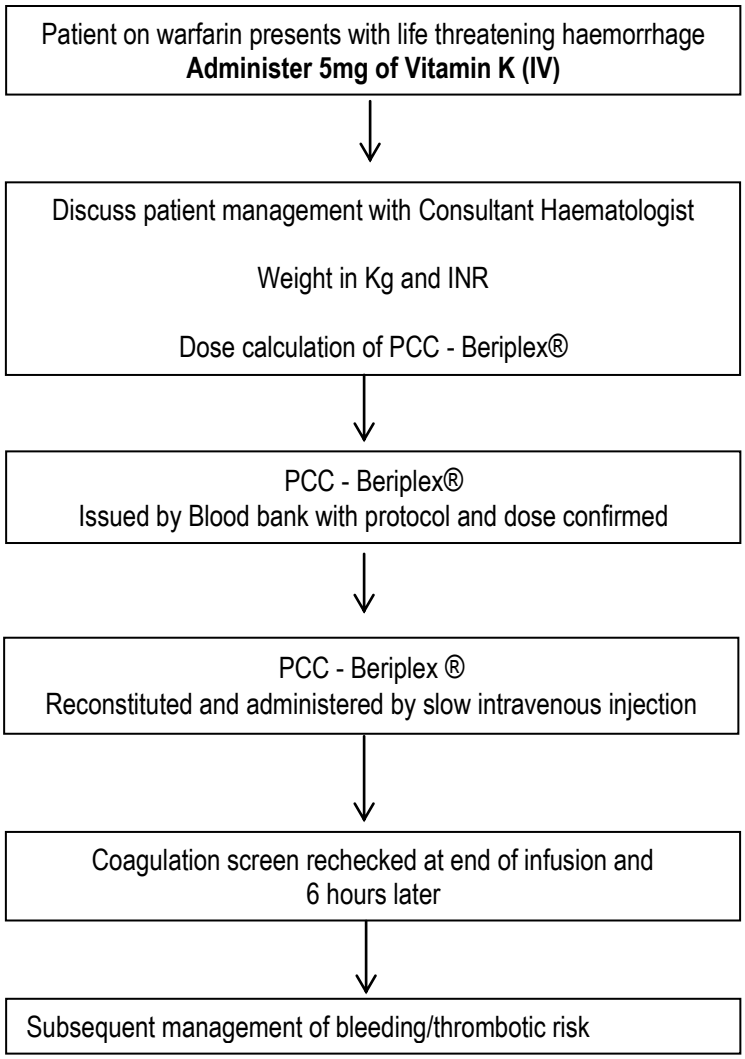
Protocol for the reversal of anticoagulation in the presence of excessive bleeding

Use of Beriplex ®



Adapted from Dolan et al (2005) Intensive care and Emergency medicine

An information sheet is provided by Blood Bank giving advice on reconstitution (Appendix 35).
Practitioners are also referred to the SOP – The Issue and Infusion of Blood Products available on intranet

The Rotherham NHS Foundation Trust

Protocol for the use of Pro thrombin Complex Concentrate (Beriplex ®) in reversal of over anti-coagulation

Patient on oral anticoagulant presents with life-threatening haemorrhage
Administer 5mg (IV) of Vitamin K (*Phytomenadione)*

↓

Discuss patient management with Consultant Haematologist
Will need:
Weight in kg and INR
Dose calculation of Beriplex ®

↓

Beriplex ® issued by Blood bank with protocol and dose confirmed

↓

Beriplex ® reconstituted and administered by intravenous injection

↓

Coagulation screen rechecked at end of infusion **and 6 hours later**

↓

Subsequent management of bleeding/thrombotic risk

INR	*Dose*
<4.5	25 IU/kg
>4.5	35 IU/kg

Example
A 75Kg patient with INR 7.0 will require a dose of 75 x 35 = 2625IU (5 vials) = 100mls*
(*1 vial = 500 IU reconstituted with 20mls water for injection. Blood Bank will always round down to the nearest 500)
Maximum single dose 5000 IU – Patients weight>100Kg, the maximum single dose must not exceed 2500iu for INR 2.0-3.9, 3500iu for INR 4.0-6.0 and 5000iu for INR>6.0
Must be prescribed on the Transfusion Integrated Care Pathway (ICP)
Rate of administration = rapid rate of up to 8mls/min (210IU/kg/min) using a venflon or the Alaris Signal Syringe Driver

Each pack contains :
1 vacuum vial with dried substance – each vial 500 IU
1 vial with 20ml water for injection – used for reconstitution
1 transfer set

The powder is mixed with the solvent provided using a sterile technique and the double ended transfer needle provided
Reconstitution (takes a max 10 mins per vial)

Step 1 – Take the larger, serrated end of the blue transfer needle and push down over the diluent bottle.

Step 2 – With the Beriplex® vial stood flat on a surface remove the safety cap from the needle (white end) and push this with the diluent vial inverted but still attached at the opposite end and push into the Beriplex® vial
Do not shake the vial.
Once the required number of vials have been re constituted and dissolved, draw the solution up into the minimum number required of 50ml **Luer lock** syringes by attaching the syringes to the white luer lock end of the transfer needle kit.
Continue to use the Beriplex® transfer needle and filter provided to do this.
Beriplex® **must not** be mixed with other medicinal products or blood components/products.
Beriplex® **must** be administered via a separate infusion line or syringe Driver

Care must be taken that blood does not enter the syringe containing the Beriplex® this may lead to risk of Fibrin clots being injected

Do not use product if a gel forms or the solution is turbid. Return the Beriplex® to blood bank and contact them immediately.

There is an immediate risk of thromboembolic episodes following administration. **It is recommended that a member of the medical staff is present throughout the administration of the medicine**

APPENDIX 37

The Rotherham NHS Foundation Trust

Hospital Based Anticoagulation Team (HBAT)
Patient Referral

Patients meeting the criteria detailed below:

- Patients admitted already established on anticoagulation
- Patients initiated on anticoagulation
- Patients requiring bridging therapy prior to a clinical intervention or conversion from one anticoagulation treatment to another

Please note: Responsibility for the patient's anticoagulation remains with the Consultant in charge of the patient's care until the patient is seen by the HBAT

HBAT must be contacted at least 72 hours prior to discharge. **The day of discharge is too late.**

Referrals should be made by telephone to HBAT on **01709 424016**

Friday afternoon referrals will only be accepted if the patient is known to the Hospital Based Anticoagulation Team

Clinical Area…… **Date** …….

Details of staff referring the patient …….

Patient details
Full Name…… Date of Birth ……

Patient Identification Number ……..

Current Anticoagulation ……

Indication for Anticoagulation ……..……

Established on Anticoagulation Yes/No **New to Anticoagulation** Yes/No

If new, date started…….

Planned discharge date …….**. Date HBAT to visit** ……

Outcome of patient review

Education given	Yes	No	N/a
Follow up appointment given	Yes	No	N/a
Escalation to Consultant	Yes	No	N/a

AC Nurse …….. Date

Print Name: …….

Tinzaparin: Transfer of prescribing and monitoring from hospital to GP available at

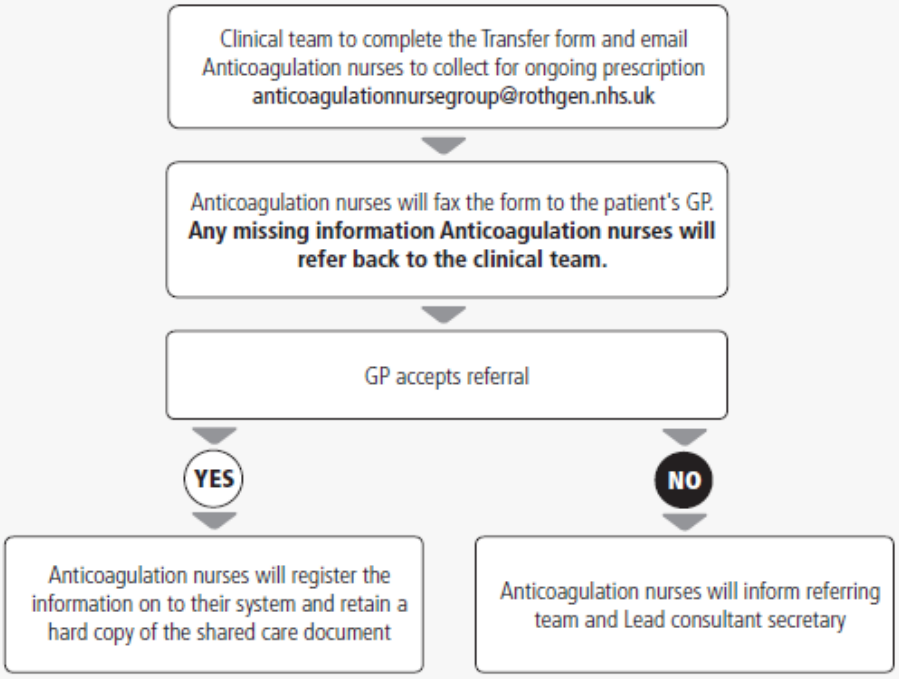
Appendix 38 – Tinzaparin: Transfer of prescribing and monitoring.pdf

Tinzaparin: Transfer of prescribing and monitoring from hospital to GP

NHS
The Rotherham
NHS Foundation Trust
Appendix 38

Shared care protocol

- It is the responsibility of the referring clinical team to complete the Transfer form
- Any missing information will delay the referral
- Referring team to email Anticoagulation nurses for ongoing prescription (anticoagulationnursegroup@rothgen.nhs.uk)
- Anticoagulation nurses will refer the patient to their GP



Please note: In the unlikely event that the Hospital Based Anticoagulation Service are required to perform the 12 - 14 day Heparin Induced Thormbocytopenia (HIT) monitoring a referral must be made to that service using usual processes

Produced by TRFT Graphic Design Service 01709 426313 ACH 07/17 CSP

Tinzaparin: Transfer of prescribing and monitoring from hospital to GP

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NOTE: Postnatal patients: TRFT to provide 6 weeks course of prophylaxis. Transfer of care form not required.

- Staff to email Anticoagulation nurses for ongoing prescription of tinzaparin anticoagulationnursegroup@rothgen.nhs.uk
- TRFT to provide 6 weeks course of prophylaxis for postnatal patients. Initial 14 days supply for all others
- Platelet monitoring will only be required if the patient has had prior exposure to unfractionated heparin. In that case TRFT will monitor full blood count on day 1 and 5-7 and GP to monitor full blood count on day 12-14
- On issuing the first tinzaparin prescription the GP practice must contact the Waste Management department (01709) 823054 and request for a sharps bin to be delivered
- GP to continue prescribing and carry out further monitoring as appropriate
- Patient's medical care remains with the hospital consultant who initiated tinzaparin until anticoagulation prescribing (and monitoring if required) is accepted by either the GP or Hospital anticoagulant clinic

Patient name _____

NHS No. _____

Date of birth _____

GP _____

Practice _____

For additional clinical advice contact the Consultant Haematologist

1. REFERRING CONSULTANT

Referring Consultant _____ Consultant contact number _____

Fax Number _____ Next consultant clinic appointment _____

2. INDICATION FOR TINZAPARIN

VTE Prophylaxis

☐ Antenatal ☐ Central line

☐ Surgery ☐ Cancer

VTE Treatment

☐ Antenatal ☐ Injectable drug use

☐ Postnatal ☐ Associated cancer/ cancer therapies

☐ Unsuitable for oral anticoagulants

3. TREATMENT INFORMATION

Patient details Weight _____kg Dose of tinzaparin _____units ONCE/TWICE daily (delete as appropriate)

Date treatment commenced _____

Proposed duration of treatment: ☐ 6 weeks ☐ 3 months ☐ 6 months ☐ long term Other _____

Tinzaparin to be administered by: ☐ Patient ☐ Carer ☐ District nurse (fax this form together with DN referral)

☐ Further relevant information (clinical problems, concurrent medication):

4. MONITORING REQUIREMENTS

Baseline results:

Date _____ eGFR (Prophylaxis)_____micromol/1.73m^2 CrCl (Treatment) _____micromol/L

Platelets_____(X10^9/L) Potassium_____(mmol/L)

Baseline renal function is not required except in patients with renal impairment or older patients (40+ years) or patient started on treatment dose.

Heparin induced thrombocytopenia (HIT) monitoring is required if exposed to unfractionated heparin:

☐ Not required ☐ Day 5-7 ☐ GP day 12-14

5. FORM COMPLETED BY

Signature_____ Print name _____

Designation_____ Contact No. (bleep/ext)_____

Faxed by:_____ Time _____ Date _____

To be completed by the GP and faxed back to the Anticoagulation nurses on 01709 427039

GPs will only contact the Anticoagulation nurses if unable to accept the referral

GP signature _____ Print name _____ Date _____

This referral has been made in line with the shared care protocol for tinzaparin.

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Guidance form converting from one anticoagulant to another

Changing from	Changing to: Parenteral anticoagulant (LMWH or UFH)	Warfarin (or a vitamin K antagonist)	Apixaban (Eliquis®)	Dabigatran (Pradaxa®)	Rivaroxaban (Xarelto®)
Parenteral Anticoagulant		**Treatment of acute VTE:** Warfarin should started in conjunction with tinzaparin. Tinzaparin should be administered for at least five days and until the INR has been ≥2 for at least 2 4 hours, whichever is longer INR must be monitored daily until tinzaparin stopped.	Apixaban should be given at the time that the next dose of LMWH tinzaparin would be due or at the time of discontinuing continuous intravenous unfractionated heparin (UFH)	Dabigatran should be given 0-2 hours prior to the next dose of tinzaparin would be due or at the time of discontinuing continuous intravenous unfractionated heparin (UFH)	Rivaroxaban should be given 0-2 hours prior to the time the next dose if LMWH tinzaparin would be due or at the time of discontinuing intravenous unfractionated heparin (UFH)
Warfarin (or vitamin K antagonist)	Discuss individual cases with the relevant specialist or the patient's condition e.g. pregnancy or malignancy		Warfarin or other vitamin K antagonist should be stopped and then apixaban started once the INR is below 2.	The warfarin or (other vitamin k antagonists) should be stopped and then dabigatran started once the INR is below 2.	**Prevention of stroke & systemic embolism (in atrial fibrillation):** warfarin (or other vitamin k antagonists) should be stopped and then rivaroxaban started once the INR is below or equal to 3.0. **For patients treated for DVT, PE and prevention of recurrence:** Warfarin or other vitamin k antagonist) treatment should be stopped and rivaroxaban therapy should be initiated once the INR is below or equal to 2.5. Note: INR values will be falsely elevated after the intake of rivaroxaban.

Changing from apixaban to other anticoagulants

		Changing to				
		Parenteral anticoagulant (LMWH or UFH)	**Warfarin (r a vitamin K antagonist**	**Apixaban (Eliquis®)**	**Dabigatran (Pradaxa®)**	**Rivaroxaban (Xarelto®)**
Changing from	**Apixaban**	Give the first dose of parenteral anticoagulant (LMWH/UFH) at the time the next scheduled dose of apixaban would be taken i.e. 12 hours after the last dose of apixaban before switching to a parenteral anticoagulant.	Converting from apixaban to warfarin: Continue administration of apixaban for at least 2 days after starting warfarin. After 2 days of co-administration of apixaban and warfarin, obtain an INR prior to the next scheduled dose of apixaban. Continue co-administration of apixaban and warfarin until the INR is ≥2.		Currently no data available. Dabigatran can be initiated 12 hours after the last dose of apixaban (i.e. when the next dose of apixaban would have been due). Caution will needed where renal impairment or where higher than therapeutic plasma concentrations are expected.	Currently, there is no data available on how to switch from apixaban to rivaroxaban. However, renal function, half-life and the daily dose need to be considered. For patients with a normal renal function rivaroxaban can be taken 12 hours after the last dose of apixaban. Patients with moderate renal impairment should consider a longer gap of at least 24 – 48 hours

Changing from dabigatran to other anticoagulants

		Changing to				
		Parenteral anticoagulant (LMWH or UFH)	**Warfarin (or a vitamin K antagonist**	**Apixaban (Eliquis®)**	**Dabigatran (Pradaxa®)**	**Rivaroxaban (Xarelto®)**
Changing from	**Dabigatran**	Give the first dose of parenteral anticoagulant at the time the next dabigatran dose would be taken (i.e. wait 12 hours after the last dose before switching to a parenteral.	Adjust the starting time of the warfarin (or other vitamin k antagonist) based on eGFR: • eGFR ≥50 mL/minute, start warfarin 3 days before discontinuing dabigatran • eGFR ≥50 mL/minute, start warfarin 2 days before discontinuing dabigatran. Standard initial dosing of warfarin should be used followed by warfarin dosing guided by INR testing. Because dabigatran can increase INR, the INR will better reflect effect only after dabigatran has been stopped for at least 2 days. Until then, INR values should be interpreted with caution.	Currently only limited data available. Apixaban can be started when the next dose of dabigatran would have been due. However, renal function, dabigatran half-life and the daily dose need to be considered: Normal renal function: Apixaban can be taken 12 – 24 hours after the last dose of dabigatran. Moderate renal function: Consider a longer gap of least 24 – 48 hours		Currently, there is no clinical data available on how to switch from dabigatran to rivaroxaban. However, renal function, dabigatran half-life and the daily dose need to be considered: Normal renal function: Rivaroxaban can be taken 12 – 24 hours after the last dose of dabigatran. Moderate renal function: Consider a longer gap of least 24 – 48 hours.

Changing from rivaroxaban to other anticoagulants

		Changing to				
		Parenteral anticoagulant (LMWH or UFH)	**Warfarin (r a vitamin K antagonist**	**Apixaban (Eliquis®)**	**Dabigatran (Pradaxa®)**	**Rivaroxaban (Xarelto®)**
Changing from	**Rivaroxaban**	Give the first dose of parenteral anticoagulant at the time the next dose of rivaroxaban would be taken.	Warfarin (or other vitamin k antagonist), should be given concurrently until the INR is greater than or equal to 2. For the first two days of conversion period, standard initial dosing of warfarin should be used Day 1 and 2: standard initial dosing of warfarin Day 3: as guided by INR While patients are on both warfarin and rivaroxaban the INR should not be tested earlier than 24 hours after the previous dose but prior to the next dose of rivaroxaban (this is because rivaroxaban affects INR). Once rivaroxaban is discontinued INR testing may be done reliably at least 24 hours after the last dose.	Currently only limited data available. Apixaban to be taken 24 afters the last dose of rivaroxaban (i.e. at the next time the next rivaroxaban dose would have been taken). Caution will be needed where renal impairment or where higher than therapeutic plasma concentrations are expected.	Currently only limited data available. Dabigatran to be taken 24 hours after the last dose of rivaroxaban (i.e. at the time next rivaroxaban dose would have been taken. Caution will be needed where renal impairment or where higher than therapeutic plasma concentrations are expected	

Process for reporting a venous thromboembolism (VTE)

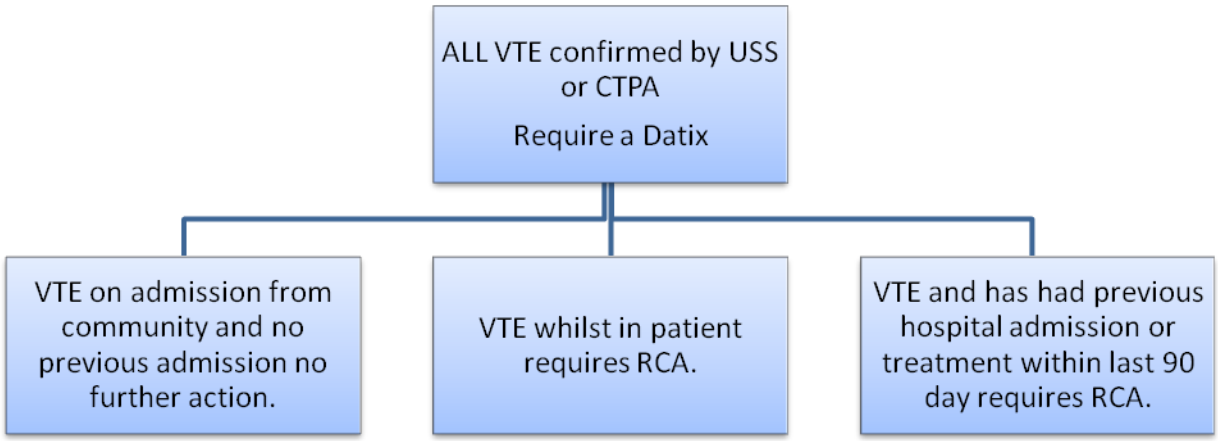
All episodes of venous thromboembolism (VTE) must be reported and recorded accurately within the Trust.

This will facilitate learning from any events and gain a greater understanding of contributing factors (patient/professional and environmental)

To take action on learning from events to reduce the risk of VTE events in the future

To enable TRFT to have a systematic robust system of incidence and prevalence monitoring that is reported local, regionally and nationally.

All Health Care Professionals are responsible for patient at time of diagnosis Registered Nurse/DR/Clinician.



The Datix web incident reference number should be written within the patient medical records.

Avoid unnecessary duplicate reporting on Datix by:

- Checking notes to see if the previous ward has already completed Datix
- Checking when a patient is re-admitted with the same VTE that has previously been reported
- All deaths of patients with suspected/confirmed diagnosis of VTE will be followed up in the mortality review process.

NOTE: Complaints in relation to VTE should be completed on Datix complaints and Datix web incident report number should be cross referenced. If a Datix web incident report has not yet been completed ensure it is added to the system within the complaints module.