Trust Guideline for the Management of Adult Patients on Therapeutic Anticoagulation who Require Elective Surgery or an Invasive Procedure

Trust Guideline for the Management of Adult Patients on Therapeutic Anticoagulation who Require Elective Surgery or an Invasive Procedure

For Use in:	All clinical areas
By:	All medical and nursing staff
For:	Adult patients who require surgery or an invasive procedure and are taking anticoagulants
Division responsible for document:	Surgical Division
Key words:	anticoagulation, warfarin, apixaban, dabigatran, edoxaban, rivaroxaban,perioperative anticoagulation, surgery, invasive procedure, Venous Thromboembolism (VTE)
Name and job title of document author:	Dr Hamish Lyall, Consultant Haematologist Dr Chris Sharpe, Consultant Anaesthetist Ilona Joryeff, Pre-operative Pharmacist
Name of document author's Line Manager:	Dr Russell Phillips
Job title of author's Line Manager:	Consultant Haematologist
Supported by:	David Loveday, Thromboprophylaxis Committee Chair
Assessed and approved by the:	Thrombosis and Thromboprophylaxis Committee 29/07/22 Committee and Clinical Guidelines Assessment Panel (CGAP) If approved by committee or Governance Lead Chair's Action; tick here ✓
Date of approval:	25th August 2022
Ratified by or reported as approved to (if applicable)**:**	Clinical Standards Group and Clinical Safety and Effectiveness Sub-Board
To be reviewed before: This document remains current after this date but will be under review	**25th August 2025**
To be reviewed by:	Dr Hamish Lyall
Reference and / or Trust Docs ID No:	1215
Version No:	10
Compliance links: *(is there any NICE related to guidance)*	None
If Yes - does the strategy/policy deviate from the recommendations of NICE? If so why?	N/A

This guideline has been approved by the Trust's Clinical Guidelines Assessment Panel as an aid to the diagnosis and management of relevant patients and clinical circumstances. Not every patient or situation fits neatly into a standard guideline scenario and the guideline must be interpreted and applied in practice in the light of prevailing clinical circumstances, the diagnostic and treatment options available and the professional judgement, knowledge and expertise of relevant clinicians. It is advised that the rationale for any departure from relevant

guidance should be documented in the patient's case notes.

The Trust's guidelines are made publicly available as part of the collective endeavour to continuously improve the quality of healthcare through sharing medical experience and knowledge. The Trust accepts no responsibility for any misunderstanding or misapplication of this document.

Trust Guideline for the Management of Adult Patients on Therapeutic Anticoagulation who Require Elective Surgery or an Invasive Procedure
For patients on antiplatelet therapy see Trustdocs Id No: 9836

Version and Document Control:

Date	Updated version number	Previous version number	Page number/section (updated version)	Details
April 2013	V4	V3	Title and content	Guideline extended to include all therapeutic anticoagulation ie LMWH and the new oral anticoagulants (NOAC) and anti-platelet therapy Appendix 3 and 4 tables added for the NOACs Appendix 5 for LMWH
April 2013	V4	V3	Page 2	**Higher thrombotic risk box** altered to 1. to include atrial fibrillation *with* past history of stroke or TIA 2. to include recurrent VTE with INR target range 3-4 3. to omit recurrent VTE on life long warfarin **Lower thrombotic risk box** renamed standard thrombotic risk and altered to 1. include atrial fibrillation *with no* history of stroke or TIA 2. include VTE >3 months previously
Oct 2013	V5	V4		Antiplatelet therapy removed from guideline risk groups clarified and now include patients with venous stent added
Nov 2013	V6	V5		Page numbers amended Bridging instructions added 'Acenocoumarol' added
Nov 2016	V7	V6		Objective/rationale updated. Authorship updated. NOAC changed to DOAC. High thrombotic risk chart for DOAC dropped. Edoxaban added
June 2018	V8	V7		Thrombotic risk assessment p3 revised. p5-6 updated to reflect new table and references to warfarin changed to anticoagulant
Sept 2018	V9	V8		Dental guidance updated
July 2022	V10	V 9		Exclusions updated. Thrombophilia updated. Thromboprophylaxis updated, Approach to procedure related bleeding risk incorporated. Grammatical/wording updates. Appendix 5 added.

This is a Controlled Document

Trust Guideline for the Management of Adult Patients on Therapeutic Anticoagulation who Require Elective Surgery or an Invasive Procedure

Printed copies of this document may not be up to date. Please check the hospital intranet for the latest version and destroy all previous versions.

Index

Trust Guideline for the Management of Adult Patients on Therapeutic Anticoagulation who Require Elective Surgery or an Invasive Procedure

1. Exclusions from this guideline

- Procedures with low bleeding risk which can be performed without interruption of anticoagulant (e.g. biopsy of compressible site, joint aspiration, cataract surgery)
- Endoscopy: see department specific guidance.
- Dental surgery.

  Warfarin: If INR < 4 surgery can proceed without interruption of warfarin.

  DOAC: continue without interruption unless high bleeding risk expected by surgeon when dose on morning of surgery should be omitted. Advise patient when to restart DOAC.
  For further guidance see Scottish dental guidelines:
  http://www.sdcep.org.uk/published-guidance/anticoagulants-and-antiplatelets/

- Plastic surgery: Patients having breast flap surgery or head and neck flap surgery are excluded from this guideline. The consequences of wound haematoma are severe in these patient groups. Anticoagulation requires individualised management. Discuss with relevant surgeon.

- Interventional radiology procedures: see department specific guidance.

.

2. Abbreviations

DOAC	Direct oral anticoagulant agent (previously termed NOAC)
LMWH	Low molecular weight heparin

3. Quick Reference Guide - Assess thrombotic risk using indication for anticoagulation

4. Objective

This guideline applies to patients taking therapeutic anticoagulants, including the direct oral anticoagulants (DOACs), requiring an invasive procedure. It aims to integrate published national guidelines into existing NNUHFT surgical patient pathways. It will be applicable to the majority of chronically anticoagulated patients undergoing elective surgery at NNUHFT.

For patients on anti-platelet agents see Trustdocs Id No: 9836

5. Rationale

Optimal perioperative management of patients taking therapeutic anticoagulants must balance the risk of a thrombotic event associated with interruption of anticoagulation and the risk of haemorrhage associated with the procedure. This balance of risks will vary between individual patients and with different procedures. A standardised, trust wide approach to managing these risks is required to facilitate safe and effective surgery.

6. Definitions

Anticoagulants:

- Coumarins: e.g. warfarin, acenocoumarol,nicoumalone, phenindione
- Direct oral anticoagulants (DOAC)
  - direct thrombin inhibitor: e.g. dabigatran
  - Xa inhibitor: e.g. apixaban, edoxaban, rivaroxaban
- Low Molecular weight Heparin (LMWH)

Bridging therapy:

- The administration of therapeutic doses of low molecular weight heparin by subcutaneous injection before or after surgery to cover the period when the oral anticoagulant has been interrupted

7. Preoperative assessment

- At preoperative assessment it should be established what anticoagulants the patient is taking and the indication for anticoagulation
- The surgical procedure and the likelihood of bleeding during the procedure and postoperatively should be determined.
- For anticoagulants:
  - Assess patients using algorithm on page 3
  - Follow high risk or standard risk protocol (appendix 1 – 3) if on oral anticoagulants or appendix 4 if on LMWH
  - Issue patient with patient information sheet and LMWH syringes for self injection (if required)

8. Notes on indication for anticoagulation and perioperative thrombotic risk

8.1 Venous Thromboembolism (VTE)

- Interruption of anticoagulation during the first three months following VTE is associated with a high rate of recurrence. Where possible, surgery should be deferred until after 3 months. The risk of perioperative thrombosis is greatest in the first month following diagnosis of VTE. Patients who require surgery within one month of VTE should be considered for an IVC filter to prevent pulmonary embolism in addition to bridging anticoagulation with low molecular weight heparin if taking warfarin. After the third month the risk of a further thrombotic event if anticoagulation is interrupted is much lower.

8.2 Atrial fibrillation

- The risk of a cardioembolic stroke during perioperative interruption of anticoagulation for patients with atrial fibrillation is small. In the majority of patients who have atrial fibrillation, anticoagulation can be safely interrupted to allow surgery to occur. Bridging therapy is not required. Patients who have multiple risk factors for stroke and have a CHADS score of 5-6 and are taking warfarin should receive bridging with LMWH.

8.3 Mechanical Heart Valves

- The thrombotic risk to patients with mechanical heart valves is heavily influenced by the site and type of valve. Mechanical aortic valves are associated with a very small risk of thrombotic events during perioperative interruption of anticoagulation. Bridging therapy with LMWH is not required. The risk is higher for mechanical mitral valves. As a general rule mechanical mitral valves should be considered a high thrombotic risk and receive bridging therapy with LMWH. Because of the individual nature of thrombotic risk, perioperative management of patients with prosthetic cardiac valves should ideally be discussed with the patient's cardiologist prior to surgery.

8.4 Thrombophilias

- Patients on anticoagulation with a high risk thrombophilia (see below) should be discussed with a haematologist

    - Antiphospholipid syndrome
    - Antithrombin deficiency
    - Protein C or Protein S deficiency
    - Factor V Leiden **homozygosity** (i.e. both genes affected)
    - Prothrombin gene **homozygosity** (i.e. both genes affected)
    - Patients with more than one thrombophilia

- Patients with low risk thrombophilia (see below) should follow the pathways in this guideline

    - Factor V Leiden **heterozygosity** (one affected gene, one normal gene)
    - Prothrombin gene **heterozygosity** (one affected gene, one normal gene)

8.5 Other Indications

- Although the indications above cover the majority of patients taking anticoagulants a small number of patients may be on an anticoagulant for other reasons. The thrombotic risk to such patients is highly individualised and should therefore be discussed on an individual basis with the clinician who initiated anticoagulation or relevant specialist.

9. Procedure related bleeding risk and timing of stopping and restarting a DOAC

It is possible to optimise the timing of stopping and restarting a DOAC based on categorising surgical procedures as “high” or “low” bleeding risk. This is based on the PAUSE study protocol which has been added as an addendum to BCSH guidance (2022).

Given that not all procedures may be clearly categorised as “high” or “low” bleeding risk, the potential bleeding risks associated with incorrect risk stratification or unexpected surgical complications in low risk procedures and the very low risk of thrombotic complications associated with stopping anticoagulation peri-operatively this guideline has not incorporated procedure related bleeding risk stratification to determine timing of stopping and restarting DOACs.

The timing of stopping a DOAC preoperatively outlined in appendix 3 will result in minimal anticoagulant effect at the time of surgery and is suitable for high bleeding risk procedures.

If the surgical team advises a procedure has a low risk of bleeding and a shorter anticoagulant window is requested the last dose of apixaban, edoxaban or rivaroxaban should be taken on day -2 and restarted on day +1. For dabigatran the same timing applies if Cr Cl > 50 ml/min. For Cr Cl < 50 ml/min the last dose should be taken on day – 3.

10. General comments

10.1 Anticoagulants:

- The risk of thromboembolic events occurring during temporary interruption of anticoagulants is small, irrespective of the indication for anticoagulation.
- The incidence of bleeding problems is reported to be greater than the risk of thrombotic problems in published reports of perioperative anticoagulation.
- For major surgery it is usually safer to stop all anticoagulants prior to surgery and restart in the postoperative period (allowing a few days for wounds to heal if necessary) than to attempt bridging therapy close to the time of surgery.
- However, thrombotic problems can be devastating when they occur, hence the rationale for considering bridging therapy in ‘high risk groups’ to try and minimise this occurrence.
- For patients taking warfarin (or other coumarin) the INR should be <1.5 prior to major surgery and <2.0 for minor procedures. If the INR is outwith these limits and time allows give vitamin K to correct the coagulopathy prior to surgery.
- For patients taking a DOAC no preoperative coagulation testing is required, providing the drug is stopped within the recommended time (appendix 3)

- NB. For emergency surgery in patients taking a DOAC see advice sheet AS015.3 Management of emergency surgery in patients taking a DOAC on click for clots http://intranet/ClickforClots/index.htm

10.2 Regional anaesthesia

- **NB. Specific care must be taken if regional/epidural anaesthesia is planned**. The case must be discussed with the anaesthetist performing the anaesthetic and the trust guideline 'CA2031 Regional Anaesthesia Venous Thromboprophylaxis' should be consulted.

11. Clinical audit standards

1. Monitor rates of haemorrhagic or thrombotic complications and the number of surgical procedures cancelled because of high INR.

12. Summary of development and consultation process undertaken before registration and dissemination

This guideline has been agreed by the NNUH thrombosis and thromboprophylaxis committee. This version has been endorsed by the Clinical Guidelines Assessment Panel.

13. Distribution list / dissemination method

This guideline will be available on the trust intranet.

14. References / source documents

1. British Society Haematology guidelines 2016 Perioperative management of patients on anticoagulant and antiplatelet therapy http://www.b-s-h.org.uk/guidelines/guidelines/peri-operative-management-of-anticoagulation-and-antiplatelet-therapy/

2. Douketis JD et al. (2012) The perioperative management of antithrombotic therapy: American College of Chest Physicians Evidence-Based Clinical practice Guidelines (9th Edition) Chest 2012; 141 e326S-350S

3. Manufacturers summary of product characteristics: apixaban, dabigatran, edoxaban, rivaroxaban, clopidogrel

Appendix 1: Perioperative management of patients undergoing elective surgery who are taking warfarin

High Thrombotic Risk Patients

	Day -5	Day -4	Day -3	Day –2	Day-1	Day 0 Surgery	Day +1	Day +2	Day +3	Day +4	Day +5
Check INR					✓			✓		✓	
Dalteparin 200units/kg 18.00 hrs	OMIT	OMIT	OMIT	GIVE	OMIT	OMIT	GIVE (After assessing bleeding risk)**	Give daily until INR in therapeutic range** then stop			
Warfarin 18.00hrs (REFER PATIENT TO ANTICOAGULATION TEAM FOR DOSING)	GIVE USUAL DOSE	OMIT	OMIT	OMIT	OMIT	OMIT	Give patients USUAL daily dose* if: 1. Not likely to return to theatre 2. Patient is not actively bleeding/high risk of bleeding 3. Epidural catheter not present Otherwise OMIT until safe to restart				
Dalteparin 5000 units s/c 18.00 hrs	OMIT	OMIT	OMIT	OMIT	GIVE	GIVE	(Give daily if warfarin and dalteparin 200 Units/kg is being withheld)				
Mechanical thromboprophylaxis measures (stockings, pneumatic compression) should be used as per departmental thromboprophylaxis policy during hospital admission											

INR should be <1.5 for major surgery or <2.0 for minor surgery to proceed.

* Use dose of warfarin prior to admission (DO NOT give loading dose).

If actively bleeding or needs to return to theatre imminently **OMIT dose until bleeding risk falls.

If the procedure has a significant postoperative bleeding risk the therapeutic dalteparin dose (200 Units/kg) should be given in 2 divided doses (18.00 and 0600) starting no earlier than 18.00 on Day +1 (If epidural catheter present once daily dosing is preferable).
Refer all patients to anticoagulation nurses for warfarin dosing once warfarin restarted (bleep 0799)

Appendix 2: Perioperative management of patients undergoing elective surgery who are taking warfarin

Standard Thrombotic Risk Patients

	Day -5	Day -4	Day -3	Day –2	Day-1	Day 0 Surgery	Day +1	Day +2	Day + 3	Day +4	Day +5 +
Check INR					✓			✓			✓
Dalteparin 5000units s/c 18.00 hrs**	not required	not required	not required	not required	not required	GIVE (if needed for TP***)	GIVE (if needed for TP)	GIVE (if needed for TP))	GIVE (if needed for TP)	GIVE (if needed for TP)	GIVE (if needed for TP)
Warfarin 18.00hrs (REFER PATIENT TO ANTICOAGULATION TEAM FOR DOSING Bleep 0799)	GIVE USUAL DOSE	OMIT	OMIT	OMIT	OMIT	OMIT	Give patients USUAL daily dose* if: 1. No return to theatre likely 2. Patient is not actively bleeding 3. Epidural catheter not present Otherwise OMIT until safe to restart				
A thrombosis risk assessment (TRA) should be performed at pre-operative assessment. If LMWH indicated this should be offered post-operatively until INR < 2.											

Mechanical thromboprophylaxis measures (stockings, pneumatic compression) should be given if indicated by thromboprophylaxis policy

INR should be <1.5 for major surgery or <2.0 for minor surgery to proceed.

* Give patients the dose of warfarin they were on prior to admission (**DO NOT** give loading dose).
If actively bleeding or needs to return to theatre imminently **OMIT dose until bleeding risk falls.
*** TP = thromboprophylaxis

Refer all patients to anticoagulation nurses for warfarin dosing once warfarin restarted (bleep 0799)
Discharge does not need to be delayed for anticoagulation – discuss with anticoagulation nurses.

Appendix 3: Perioperative management of patients undergoing elective surgery who are taking one of the direct oral anticoagulants (DOACs) i.e. apixaban dabigatran, edoxaban or rivaroxaban (high or standard thrombotic risk)

	Day -4	Day -3	Day –2	Day-1	D$	Day +1	Day +2	Day + 3
Patient takes DOAC usual dose at usual time	Give	Give (Omit if on dabigatran and eGFR <50 ml/min/1.73m^2)	Omit	Omit	O	Omit	Omit	Restart DOAC at usual dose/time providing: • Haemostasis achieved • Can take oral drugs • Return to theatre unlikely • No epidural in situ • Stable renal function Otherwise continue with dalteparin prophylaxis and delay restarting
Dalteparin 5000 units s/c 18.00 hrs*	not required	not required	not required	not required	G	Give if indicated for TP	Give if indicated for TP	

								DOAC**
A thrombosis risk assessment (TRA) should be performed at pre-operative assessment. If LMWH indicated this should be given post operatively until DOAC restarted. Mechanical thromboprophylaxis measures (stockings, pneumatic compression) should be given if indicated by thromboprophylaxis policy								

*See trust low molecular weight heparin dosing chart for prescribing guidance and dose modifications (ClickforClots intranet site)

- DOAC can be restarted before Day +3 in procedures with low risk of post op bleeding at surgeon's discretion
- Check renal function preoperatively. If eGFR <30 ml/min/1.73m^2 seek advice. These drugs are renally excreted
  - Spinal anaesthesia is acceptable if >48 hours since last dose of dabigatran and eGFR >50 ml/min/1.73m^2 . Spinal anaesthesia is acceptable if >48 hours since last dose of apixaban, edoxaban or rivaroxaban and eGFR >30 ml/min/1.73m^2 . For other situations seek advice
- **If delaying restarting DOAC and patient is high thrombotic risk consider using therapeutic dose dalteparin instead of prophylactic dose from day +2

Appendix 4: Perioperative management of patients undergoing elective surgery who are on therapeutic LMWH

	Day –2	Day-1	Day 0 Surgery	Day +1	Day +2
dalteparin 200 units/kg s/c 18.00 hrs*	Give**	Omit	Omit	Give**	Give**
dalteparin 5000 units s/c 18.00 hrs*	Omit	Give	Give	Omit	Omit

Mechanical thromboprophylaxis (stockings, pneumatic compression) should be used as per departmental thromboprophylaxis policy

*see trust low molecular weight heparin dosing chart for prescribing guidance and dose modifications (ClickforClots intranet site)

** assess risk of bleeding. If high risk of post op bleeding omit dalteparin, or give dalteparin in 2 divided doses (100 units/kg b.d).

Appendix 5: Management of adult patients on therapeutic anticoagulants or antiplatelet therapy undergoing CT guided nerve root injection

or image-guided biopsy (soft tissue and bone)

If your patient is a high thrombotic risk (i.e. does not meet the criteria below) the following guidance does not apply and direct discussion with the relevant clinician is advised.

Standard thrombotic risk only* Can stop warfarin - does not need bridging LMWH
• VTE > 3 months previously • Single or recurrent VTE while not on anticoagulation • Atrial fibrillation with no previous stroke or TIA or systemic embolism of cardiac origin • Venous stent > one year

Medication	Day -4	Day -3	Day –2	Day-1	Day of procedure	Day +1	Day +2	Day + 3
Warfarin	Omit	Omit	Omit	Omit	Omit & check INR pre-procedure (<1.5)	Re-start at usual dose	Take usual dose	Arrange to have INR (warfarin check) at GP 3-5 days after re-starting warfarin
Aspirin 75 mg	Continue to take as normal							
Clopidogrel 75mg	Stop 7 days before procedure (including day of procedure); re-start day after procedure.							
DOAC: Dabigatran	Take as usual	Omit only if eGFR <50 ml/min/1.73m^2)	Omit	Omit	Omit	Omit	Omit	Restart DOAC at usual dose and time providing no complication or otherwise instructed. Otherwise
All other Direct Oral anticoagulant	Take as usual	Take as usual	Omit	Omit	Omit	Omit	Omit	

								continue with dalteparin prophylaxis and delay restarting DOAC**

This protocol does not replace the need for thrombosis risk assessment (TRA). All patients should have a TRA on admission.

* Trust Guideline for the Management of Adult Patients on Therapeutic Anticoagulation who Require Elective Surgery or an Invasive Procedure
**See trust low molecular weight heparin dosing chart for prescribing guidance and dose modifications (ClickforClots intranet site)