East and North Hertfordshire NHS
NHS Trust

Trust-wide Guideline

For

Managing Oral Anticoagulation for Invasive Procedures in Adult* Patients on Warfarin

A document recommended for use

In: A&E Departments, All Wards & Clinics, Anticoagulation clinics, Pre-Operative Assessment Clinics, theatres

By: Doctors & nurses

For: Adult* patients (aged 16 yrs. & above) on anticoagulants due for surgery or other invasive procedures.

NB These guidelines apply to adult patients on full dose oral anticoagulation, and not to the routine low-dose anticoagulation given to prevent venous thromboembolism (VTE) after moderate & high risk surgery.

Key Words: Anticoagulation; warfarin; heparin; low molecular weight heparin (LMWH); dalteparin; haemorrhage; thrombosis

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20th June 2019

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9th July 2019

Document issued: July 2019

To be reviewed before: July 2022

To be reviewed by: Consultant Haematologist, Lead for Haemostasis & Anticoagulation

Registration No. CGSG 026 **Version No.** 6

Version	Date	Comment
1	September 2006	New guideline
2	October 2008	Scheduled Review
3	April 2013	Scheduled Review
4	July 2015	Scheduled Review
5	August 2018	Scheduled Review
6	July 2019	Guideline updated

Equality Impact Assessment
This document has been reviewed in line with the Trust's Equality Impact Assessment guidance and no detriment was identified. This policy applies to all regardless of protected characteristic - age, sex, disability, gender-re-assignment, race, religion/belief, sexual orientation, marriage/civil partnership and pregnancy and maternity.

Dissemination and Access
This document can only be considered valid when viewed via the East & North Hertfordshire NHS Trust Knowledge Centre. If this document is printed in hard copy, or saved at another location, you must check that it matches the version on the Knowledge Centre.

Associated Documentation

- Trust Guideline: 'The use of Octaplex for the rapid reversal of anticoagulation with Vitamin K antangonists'
- Trust Guideline: 'Reversal of anticoagulation and management of bleeding in adult anticoagulated patients'.
- Trust Guideline: 'Peri-procedure management of patients on Non-Vitamin K antagonist Oral Anticoagulants (NOACs)'

Review
This document will be reviewed within three years of issue, or sooner in light of new evidence.

Key Messages

1. These guidelines apply to adult patients on full dose oral anticoagulation, and not routine low-dose anticoagulation given to prevent venous thromboembolism (VTE) after moderate & high risk surgery.
2. These guidelines apply to warfarin. Occasionally patients are on other oral anticoagulants, e.g. phenindione, nicoumalone or similar drugs prescribed abroad. Reversal of anticoagulation for these should be discussed with a Consultant Haematologist.
3. These guidelines do not apply to Non-Vitamin K antagonist Oral Anticoagulants (NOACs) – the relevant Trust guideline (CGSG 161) should be reviewed for guidance.
4. Ideally any elective procedure should be **postponed**, when safe to do so, until full-dose anticoagulation has been stopped, e.g. in patients anticoagulated for 3-6 months following a first episode of thromboembolism.
5. The risk of thromboembolism needs to be balanced against risk of surgical haemorrhage for each individual patient.
6. The best available evidence, on which these guidelines are based, is generally scientifically weak, therefore clinical judgement remains very important.

1 INTRODUCTION

Despite the introduction of Non-Vitamin K antagonist oral anticoagulants (NOACs), warfarin remains a commonly used oral anticoagulant. Many patients attend for elective surgery whilst taking warfarin and at these times the risks and benefits of stopping or continuing anticoagulation must be considered. Clear instructions are required so that both the patient and all health care professions interacting with the patient are aware of how each patient's anticoagulation is being managed during the perioperative period.

Bridging anticoagulation therapy refers to the use of a shorter acting anticoagulation agent, such as low molecular weight heparin (LMWH), during a period of interruption of warfarin therapy in the perioperative period. Thereby aiming to minimise the thromboembolic risk for the higher risk group. To justify bridging anticoagulation, the risk of VTE whilst off of anticoagulation should be great enough to justify the bleeding risk of bridging.

2 SCOPE

This document describes the process for identifying an individual patient's thromboembolic risk and surgical bleeding risk. After which, they can be risk stratified into an appropriate risk group and their individual perioperative anticoagulant management plan can be identified through completion of the enclosed 'perioperative anticoagulation instruction proforma (for patients taking warfarin)' – Appendix 1. The proforma can then be referred to by the patient and all health care professionals with whom they have contact during the perioperative period as a record of their anticoagulation management plan during the perioperative period.

3 PURPOSE

This document aims to aid identification of those patients which require bridging of anticoagulation around the time of surgery and provide clear instructions for all regarding management of anticoagulation during the perioperative period.

4 DEFINITIONS

- **AF** – atrial fibrillation
- **Bridging** – a term used to describe the process of replacing oral anticoagulation with a treatment dose of subcutaneous or intravenous heparin in order to maintain anticoagulation.
- **CHA(2)DS(2)-VASC** – tool to aid estimation of the risk of thromboembolic stroke in patients with AF
- **INR** – International Normalised Ratio
- **FBC** – Full Blood Count
- **LMWH** – low molecular weight heparin
- **UFH** – unfractionated heparin
- **DVT** – Deep vein thrombosis
- **PE** – pulmonary embolus
- **TIA** – transient ischaemic attack
- **VTE** – venous thromboembolism

5 DUTIES

The pre-operative assessment nurse or doctor will be responsible for completion of the 'perioperative anticoagulation instruction proforma (for patients taking warfarin)' – see appendix 1. Thereby giving the patient clear instruction for their perioperative anticoagulation management plan

It is the responsibility of the surgical team responsible for the patient's clinical care to liaise with the pre-assessment clinic or the patient's anticoagulation clinic to ensure an appropriate anticoagulation / bridging plan is considered and instituted as appropriate.

6 GUIDANCE

6.1 General guidance:

Warfarin has a half-life of approximately 36 hours, for its effect to subside vitamin K dependent procoagulant factors need to be re-synthesised. Therefore, if the anticoagulant effect of warfarin needs to be stopped pre-operatively, the drug should be stopped 5 days before the elective surgery.

Studies suggest that the risk of haemorrhage is far more common than VTE when bridging is performed[1,2], and the benefits of bridging have even been questioned [1]. Consequently, only the highest risk groups should be bridged with heparin. It is the purpose of this document to aid identification of such higher risk individuals in order to reduce the risk of inappropriate bridging of lower risk groups.

To aid in discussion with patients and help quantify the average daily risk of stroke or TIA for a patient in AF, the annual risk for each CHA(2)DS(2)-VASC score [3,4]can be divided by 365 to obtain an approximate daily risk score.

Atrial Fibrillation – Annual Stroke Risk		
CHA(2)DS(2)-VASC score	Annual stroke risk (%)	Risk of stroke / TIA / systemic emboli (%)
0	0.2	0.3
1	0.6	0.9
2	2.2	2.9
3	3.2	4.6
4	4.8	6.7
5	7.2	10.0
6	9.7	13.6
7	11.2	15.7
8	10.8	15.2
9	12.2	17.4

Acknowledging the fact that the CHADS2 scoring system was used in some major studies, such as the BRIDGE trial [5], and is the scoring system quoted in several perioperative anticoagulation reviews / guidelines [1,2] ; the Trust's Cardiology department collectively felt that the CHA(2)DS(2)-VASC scoring system should be utilised to estimate the risk of a thromboembolic event for a patient in AF, and as such whether perioperative bridging is required. Consequently, the assigned perioperative thromboembolic risk groups for AF patients, listed in this document, based on the CHA(2)DS(2)-VASC scoring system, are not evidence based but considered expert local opinion.

6.2 Perioperative Management of Warfarin Anticoagulation:

6.2a Surgery which can be undertaken whilst warfarin is continued

Pre-operatively:

- Confirm that there is a low surgical bleeding risk and that warfarin does not need to be discontinued.
- If a recent INR has been >2.5, warfarin may need to be reduced for 5 days prior to surgery.
- Check INR on the day of the procedure. INR <2.5 is usually acceptable.

Post-operatively:

- Restart the patient's usual dose of warfarin the day of the procedure, unless there is an instruction to the contrary by the surgeon.

- Heparin injections will not be required if INR is >1.5
- If a dental / oral procedure, tranexamic mouthwash can be used to aid haemostasis.

6.2b Surgery which requires warfarin to be stopped pre-operatively

- For each patient a 'Perioperative anticoagulation instruction proforma (for patients taking warfarin)' should be completed – see appendix 1.

1. The patient's demographics should be filled in on the front of the proforma or an addressograph sticker applied.
2. Pre-op assessment date, professional completing the assessment should be entered onto the front sheet along with the patient's weight and eGFR.
3. The reverse side of the proforma should then be completed.

- The patient's reason(s) for anticoagulation with warfarin should be circled in the table at the top of the page. This will place the patient in a high, moderate or low risk group.
- The post-operative bleeding risk should then be established by circling the 'type' of surgical procedure in the table at the bottom of the page.

4. The indication for anticoagulation and post-operative bleeding risk category can then be circled in the box at the top of the front sheet. The name of the surgical procedure and Surgical Consultant should also for written in this box.
5. Having established the patient's indication for anticoagulation / thrombotic risk group, the relevant management table for the patient should be completed and the remaining two irrelevant management tables should be crossed though.

- For example, if the patient takes warfarin as they have AF and their CHA(2)DS(2)-VASC score is calculated as 5. They are therefore in a high thrombotic risk group, as per the table on the reverse of the proforma. The high thrombotic risk management table should therefore be completed for this patient by writing in the date of surgery and then filling in the dates back to day -6 prior to surgery and forward up to day +5 after surgery. The relevant treatment and prophylactic doses of dalteparin should be written for this patient after considering their weight and renal function. The two irrelevant management tables for moderate and low thrombotic risk should be crossed through.
- Please note that the Trust's instructions for prophylactic and therapeutic dalteparin administration are available inside the Trust drug charts. The patient's weight and eGFR must be known in order to prescribe the correct dose. Please refer to CGSG 094 (Risk assessement and prevention of VTE in adults) for patients with renal impairment (creatinine >150mmol/l or eGFR <30ml/min), or extremes of weight.
- For surgery associated with a risk of internal bleeding (those surgeries listed in the high or very high risk post-operative bleeding table on the reverse of the proforma), when checked prior to surgery, the target for INR is <1.5. For those procedures with a low post-operative bleeding risk, an INR of <2.5 may be acceptable.

6.3 Restarting anticoagulation post-operatively

- In line with the instructions on the proforma:

  - Dalteparin should be administered 6 hours post-surgery, but only if haemostasis secured and surgical bleeding risk falls in high or low risk group.
  - For very high bleeding risk group: Follow surgeon's instructions for anticoagulation post operatively; in the absence of specific instructions, consider waiting till 24 hours post operatively before starting LMWH.
  - Restart warfarin (at usual maintenance dose) 24hrs post procedure. Stop Dalteparin when INR in therapeutic range post operatively.

6.4 Reversal of warfarin for emergency surgical procedures

- Obtain blood samples for INR, FBC and crossmatch, with any other required blood tests at time of admission
- Administer Vitamin K (phytomenadione) 5-10 mg IV over 2-3 minutes. With the aim of lowering the INR within 6-12 hours. Note: the patient will be refractory to warfarin anticoagulation for several days after receiving this dose of vitamin K. An alternative Vitamin K dose of 1-2 mg should be considered if warfarin is to be restarted immediately post operatively.
- If the clinical situation dictates that surgery cannot be deferred for 6-12hours, whilst the INR reduces post vitamin K, and the INR is >2.0, then the patient should be discussed with the on-call Consultant Haematologist and administration of Octaplex 30 units/kg considered.
- If the patient is bleeding then reference should be made to the Trust Guideline, 'Reversal of anticoagulation and management of bleeding in adult anticoagulated patients'.
- For additional guidance in the case of life-threatening bleeding the on-call Consultant Haematologist should be contacted.
- INR should be *rechecked* 6-12 hours after Vitamin K administration or immediately after administration of Octaplex. If surgery involves a high risk of bleeding, an INR<1.5 is recommended.
- Consider prescribing post-operative LMWH or UFH as appropriate.

6.5 Further General points

- For major & moderate surgery, once warfarin has been stopped, in addition to prescription of LMWH outlined on the proforma (appendix 1), follow surgical guidelines regarding the use of graduated compression TED stockings and intermittent pneumatic compression stockings as appropriate.
- Twice daily coagulation testing will be required for 24-48 hours post operatively for patients on full dose UFH infusion.
- Consider the use of an IV UFH infusion if post-operative anticoagulation is required but the risk of post-operative complications is increased, as this allows for faster adjustment of anticoagulation.

NB: If uncertain, consider discussion with Consultant Haematologist.

7 MONITORING COMPLIANCE

This guideline will be monitored on a 3 yearly basis by the Haematology lead for Haemostasis and Anticoagulation.

Measurable standards:

- Number of patients that have their surgery cancelled due to inappropriate INR.
- Number of patients who are on pre-operative warfarin that develop VTE one month post operatively.
- Number of patients who are on pre-operative anticoagulation for AF that develop a TIA or Stroke one month post operatively.

8 REFERENCES

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9 ACKNOWLEDGEMENTS

Appendix 1

Perioperative anticoagulation instruction proforma (for patients taking warfarin)

East and North Hertfordshire NHS Trust

Perioperative anticoagulation instruction proforma

(For patients taking warfarin)

Name
Hospital Number
Date of birth

Indication for anticoagulation:

Thromboembolic risk group: High Moderate Low (circle)

Surgical procedure: .....

Surgical bleeding risk group: Very High High Low (circle)

Surgical Consultant: .....

Pre-operative assessment date:	Patient's weight (kg):
Pre-operative assessment nurse:	Patient's eGFR (ml/min):

High thrombotic risk group:

	Day -6	Day -5	Day -4	Day -3	Day -2	Day -1	Surgery	Day +1	Day +2 to 5
Date									
Warfarin dose	Yes	**No warfarin to be taken**					No	Yes	Yes
INR check	Yes	No	No	No	No	**Either day**		No	After day 3
Treatment dose Dalteparin at 08.00 (..... mg)	No	No	**Yes**	**Yes**	**Yes**	No	No	No	Yes
Prophylactic dose Dalteparin At 08.00 (..... mg)	No	No	No	No	No	Yes	*	Yes	No

Moderate thrombotic risk group:

	Day -6	Day -5	Day -4	Day -3	Day -2	Day -1	Surgery	Day +1	Day +2 to 5
Date									
Warfarin dose	Yes	**No warfarin to be taken**					No	Yes	Yes
INR check	Yes	No	No	No	No	**Either day**		No	After day 3
Prophylactic dose Dalteparin At 08.00 (..... mg)	No	No	Yes	Yes	Yes	Yes	*	Yes	Yes

Low thrombotic risk group:

	Day -6	Day -5	Day -4	Day -3	Day -2	Day -1	Surgery	Day +1	Day +2 to 5
Date									
Warfarin dose	Yes	**No warfarin to be taken**					No	Yes	Yes

* Dalteparin (at least 6 hours post-surgery), but only if haemostasis secured and surgical bleeding risk falls in high or low risk group. For very high bleeding risk group: Follow surgeon's instructions for anticoagulation post operatively; in the absence of specific instructions, consider waiting till 24 hours post operatively before starting LMWH. Restart warfarin (at usual maintenance dose) 24hrs post procedure. Stop Dalteparin when INR in therapeutic range post operatively.

Indication for anticoagulation			
Risk group	**Mechanical heart valves**	**Atrial fibrillation**	**Thromboembolism**
High	• Mitral valve prosthesis • Cage-ball or tilting disc aortic valve • & CVA/TIA <6months prior ***Please ensure the perioperative anticoagulation plan for all members of this group is always discussed with the patient's cardiologist***	• CHA_2DS_2-VASC score of >5 • AF &: ○ CVA/TIA <3/12 ago ○ Recurrent CVA ○ Mechanical heart valve ○ Rheumatic mitral stenosis	• VTE <3/12 ago • Severe thrombophilia, i.e. ○ Protein C or S deficiency ○ Anti-thrombin deficiency ○ Antiphospholipid antibodies ○ Homozygous Factor V Leiden deficiency
Moderate	• Bileaflet aortic valve & other risk factors inc: ○ AF ○ Prior CVA/TIA ○ HTN ○ DM ○ CCF ○ >75yrs	• CHA_2DS_2-VASC score of 3 or 4	• VTE 3-12 ago • Recurrent VTE • Nonsevere thrombophilia, i.e. ○ Heterogenous Factor V Leiden deficiency ○ Prothrombin gene mutation • Active cancer
Low	• Bileaflet aortic valve without other risk factors	• CHA_2DS_2-VASC score of ≤2 without prior CVA/TIA	• Single VTE >12 months ago, without other risk factors

CHA_2DS_2-VASC **score**		
C	Congestive heart failure	1
H	Hypertension	1
A	Age:	
	65-74 yrs	1
	>75 yrs	2
D	Diabetes	1
S	Previous stroke / TIA or thromboembolism	2
	Female	1
VASC	Vascular disease history	1
	CHA_2DS_2-VASC score:	(out of 9)

		Definition
C	Congestive heart failure	Evidence of either right or left ventricular failure or both, e.g. LVEF < 40%.
H	Hypertension	A resting blood pressure >140mmHg systolic and/or >90mmHg diastolic on at least 2 occasions or current antihypertensive treatment.
D	Diabetes	Fasting glucose >7.0 mmol/l or receiving treatment for diabetes
VASC	Vascular disease	Previous or current evidence of (or treatment for) ischaemic heart disease, peripheral vascular disease or aortic plaques.

Post-operative bleeding risk:		
Very high risk	High risk	Low risk
Spinal surgery Prostatectomy	Urological / gynaecological surgery Colonic polyp resection Surgery in highly vascular organs Bowel resection Cancer surgery Joint / bone surgery	Diagnostic endoscopy +/- biopsy Minor dermatological surgery Minor dental surgery Minor ophthalmology surgery