CLINICAL GUIDELINES ID TAG	
Title:	Perioperative management of patients on warfarin requiring elective surgery
Author:	Dr K Boyd, Mrs S Doyle
Speciality / Division:	Haematology
Directorate:	Acute
Date Uploaded:	08/11/2023
Review Date	30/11/2025
Clinical Guideline ID	**CG0503[2]**

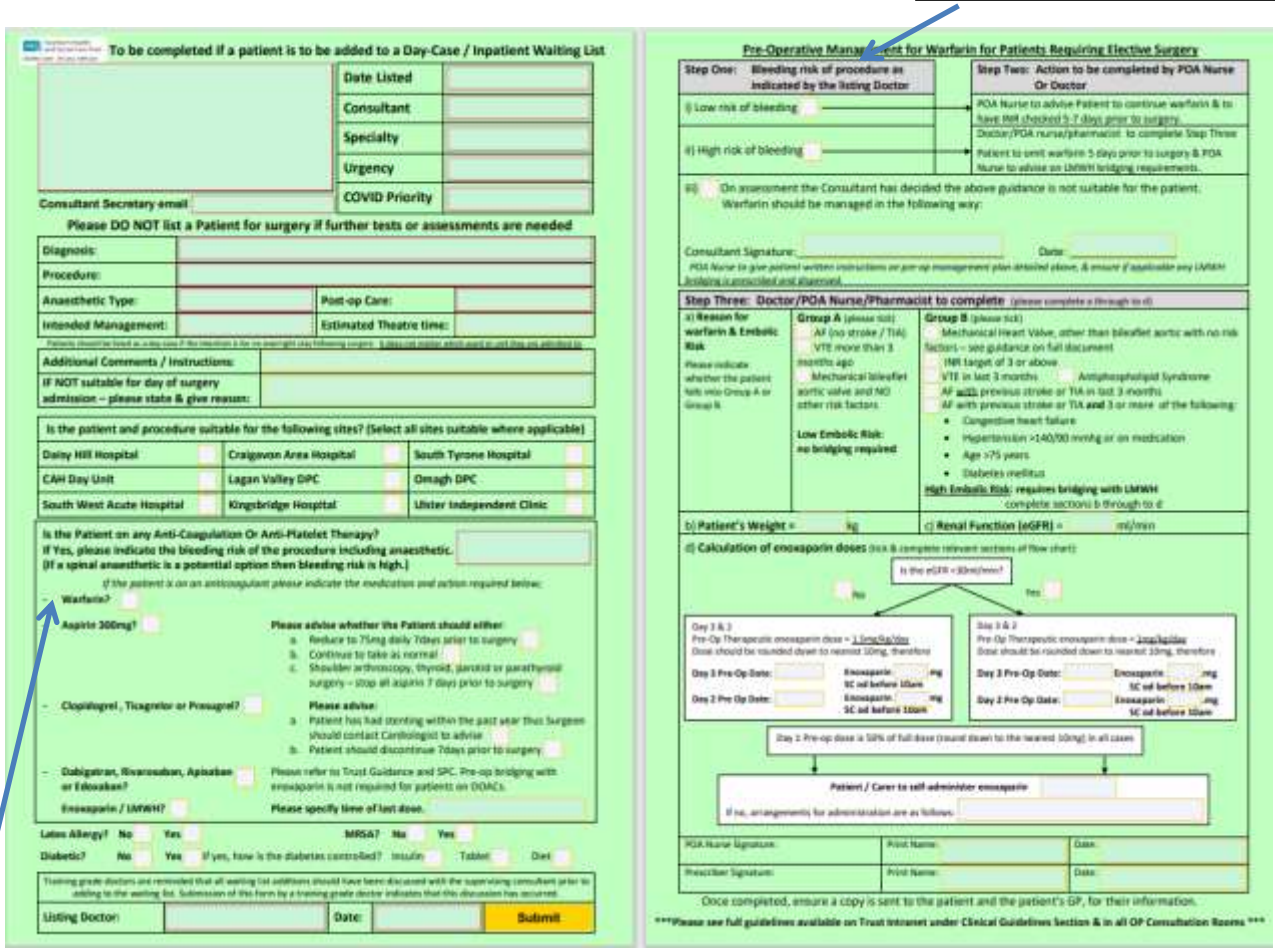
Guideline for the Management of Warfarin for Patients Requiring an Elective Procedure

1.0 Establish if Patient is taking warfarin & assess bleeding risk of procedure

It is the responsibility of the Doctor to establish whether the patient being listed for an elective procedure is taking warfarin.

At the time of listing, the "Green Additions to the Day-Case / Inpatient Waiting List Form" (either paper copy or electronic version) and the "Yellow Elective ENDOSCOPY Waiting list" form should be completed. If the patient is taking warfarin the Doctor should indicate so by ticking the relevant section on the form. The Doctor should then indicate the bleeding risk of the procedure i.e. high risk of bleeding, or low risk of bleeding.

Indicate procedure bleeding risk here



If patient is on warfarin tick here

Please see tables below for example of procedures and bleeding risk.

Examples of Procedures (including radiological) with a high risk of bleeding	
• Most formal surgical procedures • Anaesthesia involving spinal or epidural anaesthetic • Polypectomy • Endoscopic treatment of varices • Endoscopic ultrasound with fine needle aspiration • ERCP	• Ultrasound and CT guided aspiration and biopsy • PTC and biliary stenting • Nephrostomy +/- ureteric stenting • Catheter angiography and all vascular intervention • Tunneled central line insertion • RIG (radiological insertion of gastrostomy tube)

Examples of Procedures with a low risk of bleeding	
• Dental procedures including simple extractions • OGD +/- biopsy • Cataract surgery • Colonoscopy without polypectomy	• Diagnostic endoscopic ultrasound • Skin biopsy • Joint or soft tissue aspiration

Once the Doctor has indicated the bleeding risk of the procedure, the Pre-Operative Assessment (POA) Nurse and Pharmacist will ensure the Patient and their GP are informed regarding the pre-operative management of warfarin. POA nurses only deal with patients who are for elective endoscopy and elective surgery in general surgery, oral, gynae, ENT, urology and orthopaedic specialities. (They do not deal with cardiology, dermatology, dental patients and patient who are having a radiology procedure.)

If bridging with low molecular weight heparin (LMWH) is required, the POA Nurse and Pharmacist will ensure the prescription is written and the LMWH is dispensed by the hospital pharmacy. Note, the patient must have had a recent U&E (within the last 3 months) and body weight should be confirmed to determine what dose of enoxaparin the patient requires.

It should be remembered that bridging with a LMWH carries a significant risk of major bleeding. Only those patients with a high embolic risk should be bridged.

2.0 Peri-operative management of patients once bleeding risk is known

Procedures with a low risk of bleeding (bleeding risk is minimal & potential bleeding site is accessible)

Pre-operative management:

- Patient should be advised to continue warfarin
- Patient should be advised to attend the Health Professional who manages their warfarin 5 to 7 days prior to the date for surgery to have their INR checked, and if necessary the dose adjusted to have INR in therapeutic range for the procedure.

On the day of the procedure:

- Check INR on morning of procedure
    - For dental surgery, including simple extractions, INR should be ≤ 4.0 (see Trust guideline on dental procedures)
    - For all other minor procedures, INR should be ≤ 2.5.

Post-operative management:

In all cases, once haemostasis is achieved, warfarin is prescribed at the previous maintenance dose on evening of surgery (no loading dose).

<u>Procedures with a high risk of bleeding (significant risk of surgical bleeding)</u>

Pre-operative management:

- Patient should be advised to stop warfarin 5 days prior to surgery
- Doctor/POA Nurse/Pharmacist to establish and document reason why patient is taking warfarin, by doing this patient will fall into either:

Group A: Patients with LOW embolic risk, e.g.	**Group B: Patients with HIGH embolic risk, e.g.**

• AF with no prior stroke or TIA
• VTE more than 3 months ago
• Mechanical bileaflet* aortic valve and **NO OTHER RISK FACTORS** (see list in Group B for additional risk factors). In the absence of an additional risk factor, bridging with LMWH may still be considered at the discretion of the treating consultant.
 	
Bridging with LMWH is NOT required.
	• Mechanical heart valve: mitral position
	• Mechanical Aortic valve: caged ball or tilting disc valve.
	• Mechanical bileaflet* aortic valve **and ANY of these risk factors:**
	  • AF
	  • Previous stroke or TIA
	  • Hypertension
	  • Diabetes
	  • Congestive heart failure
	  • Age >75
	  NB. In the absence of an additional risk factor, bridging with LMWH may still be considered at the discretion of the treating consultant
	• AF with previous stroke or TIA in last 3 months
	• AF with previous stroke or TIA **and** three or more of the following
	  • Congestive heart failure
	  • Hypertension >140/90 mmhg or on medication
	  • Age >75 years
	  • Diabetes mellitus
	• AF with CHA_2DS_2VASc of more than 6
	• VTE in the last 3 months – aim to defer surgery
	• Antiphospholipid Syndrome
	• INR target of 3.0 or above
	Bridging with LMWH is required for 3 days prior to surgery:
	• <u>Days 3 and 2 pre-op</u> – Full therapeutic dose of LMWH, i.e. enoxaparin 1.5mg/kg/day before 10am (or 1mg/kg/day if eGFR <30ml/min). Dose should be rounded down to the nearest 10mg.
	• <u>Day 1 pre-op</u> - patient should receive 50% of the full therapeutic dose of LMWH. Dose should be rounded down to the nearest 10mg.
	• **NB: if patient's weight >100kg then 1mg/kg twice daily dosing of enoxaparin should be given on days 3 and 2 pre-op, and 1mg/kg once daily before 10AM on day 1 pre-op. The day 1 pre-op dose must be given at least 24 hours before planned surgery.**

If bridging with LMWH is required, the doctor or pharmacist should calculate the dose of enoxaparin and complete a prescription for the three doses of enoxaparin, which will be dispensed by the hospital pharmacy. The POA nurse will inform the patient in writing of the dates of administration of enoxaparin and inform their GP about the pre-operative management of warfarin by sending them a copy of the pre-op plan. Where possible, the patient / carer should be instructed on self-administration of LMWH by the POA nurse.

Please note: This guideline has been written to aid the Consultant in their decision regarding the most appropriate way to manage the patient's warfarin prior to elective surgery. It is not possible to provide guidance that will cover all circumstances; as such patients should always be assessed on an individual basis. The Consultant may decide that the "standard" guidance is not appropriate for a patient, in these instances the Consultant should consider discussing the alternative plan with a Consultant Haematologist and document in the patient's medical notes and in the space provided in "Step One of the Pre-op Management of Warfarin Form" the appropriate prescribed management and the reason for this. The POA nurse will ensure the patient and their GP are informed of the patient-specific prescribed management.
Pre-operatively, the post-op management of day cases must be considered so that if LMWH is needed this can be prescribed and dispensed in preparation for discharge.

On day of Surgery:

- INR should be checked to ensure it is $\leq$1.4. If INR is above this target, the senior doctor must decide if the surgery should proceed or be delayed.
- If regional anaesthesia is required the INR must be $\leq$1.4.

If Surgery is cancelled:

If a patient's procedure is cancelled, the clinician must contact the patient with advice on restarting warfarin.

Post-operative management:

In all cases, once haemostasis is achieved, warfarin is prescribed at the previous maintenance dose on evening of surgery (no loading dose). The aim is to achieve a gradual rise to therapeutic levels by one week; therefore the INR should be checked in 5-7 days.
In addition, when warfarin has been stopped, patients should be prescribed LMWH as follows:

Group A: Patients with Low embolic risk

If the surgery carries a significant risk of VTE, use the Trust VTE risk assessment tool and if required give prophylactic enoxaparin until the INR is in therapeutic range (supply 7 days) and arrange an appointment at the patient's usual INR monitoring clinic in 5-7 days.

Group B: Patients with High embolic risk

1. Continue enoxaparin at prophylactic dose until the bleeding risk has diminished and / or epidural catheter is removed. This should be for at least 48 hours after high bleeding risk surgery.

2. Then increase the enoxaparin to 1.5mg/kg/day in two divided doses (1mg/kg/day in two divided doses if eGFR<30ml/min).
3. When bleeding risk is minimal, change to 1.5mg/kg once daily or 1mg/kg twice daily if weight >100kg. (1mg/kg/day if eGFR<30ml/min).
4. Continue enoxaparin until INR is therapeutic, which may necessitate enoxaparin post-discharge, which should be dispensed by the hospital pharmacy
5. Arrange appointment at patient's usual INR monitoring clinic in 5 - 7 days.

3.0 Precautions in patients with spinal or epidural anaesthetics

- Epidural or spinal anaesthesia should not be initiated or removed unless the INR is ≤1.4 and there is no appreciable heparin effect (see below).
- Insertion or removal of an epidural catheter should be a minimum of 10-12 hours after the last dose of LMWH (thromboprophylaxis dose). The next dose after placement should be delayed for at least 6-8 hours.
- If therapeutic doses of LMWH used (e.g. enoxaparin 1.5mg/kg/day) a delay of at least 24 hours after last dose is recommended.
- Avoid LMWH or UFH administration for 4 hours after removal of an epidural catheter.
- Consider medications that affect other components of the haemostatic mechanism (e.g. antiplatelet drugs) that may increase the risk of bleeding.

4.0 Precautions in Patients with history of Venous Thromboembolism

- Aim to defer surgery until at least 3 months after the last event.
- Insertion of an IVC filter should be discussed with Consultant Haematologist, Vascular Surgeon and Radiologist in, for example, the following cases:
    - surgery must be performed within 4 weeks of a proximal DVT or PE
    - major surgery with high bleeding potential is required in a patient with a new VTE and an on-going major venous thrombotic risk factor, e.g. adenocarcinoma.

Discuss with haematologist any patient with protein C, protein S or antithrombin deficiency.

5.0 Bridging with IV unfractionated Heparin (UFH)

When the ability to ensure rapid, full and complete reversal of heparin is required or where significant renal impairment exists and straightforward monitoring of heparin effect is needed, then UFH may be used. Please follow the Trust protocol.

6.0 References

Veitch AM et al. Guidelines for the management of anticoagulant and antiplatelet therapy in patients undergoing endoscopic procedures. Gut 2008; 57:1322-1329

BCSH guideline 2011: guidelines on oral anticoagulation with warfarin; fourth edition. Br J Haematol 2011

BCSH guideline 2016: peri-operative management of anticoagulation and antiplatelet therapy.

Douketis JD, et al. Perioperative Management of Antithrombotic Therapy. An American College of Chest Physicians Clinical Practice Guideline. Chest 2022 Education and Clinical Practice: Guidelines and Consensus Statements, Volume 162, Issue 5, E207-E243, November 2022

Perry DJ et al. Guidelines for management of patients on oral anticoagulants requiring dental surgery. British Dental Journal 2007; 203, 389-393, doi:1038/bdj.2007,892

Horlocker TT et al. Executive summary: Regional Anesthesia in the patient receiving antithrombotic or thrombolytic therapy. American Society of regional anesthesia and pain medicine evidence-based guidelines (third edition). Reg Anesth Pain Med 2010; 35(1) Jan-Feb: 102-105

Halvorsen S et al.2022 ESC Guidelines on cardiovascular assessment and management of patients undergoing non-cardiac surgery. European Heart Journal, Volume 43, Issue 39, 14 Oct 2022 pages 3826-3924

Thanks to the Surgeons, Physicians, Pharmacists, Radiologists and Anaesthetists of the Southern Trust who have contributed to the preparation of this guideline.

Date of first preparation: March 2010
Reviewed: October 2012, November 2017, November 2019, November 2023
Next Review: November 2025