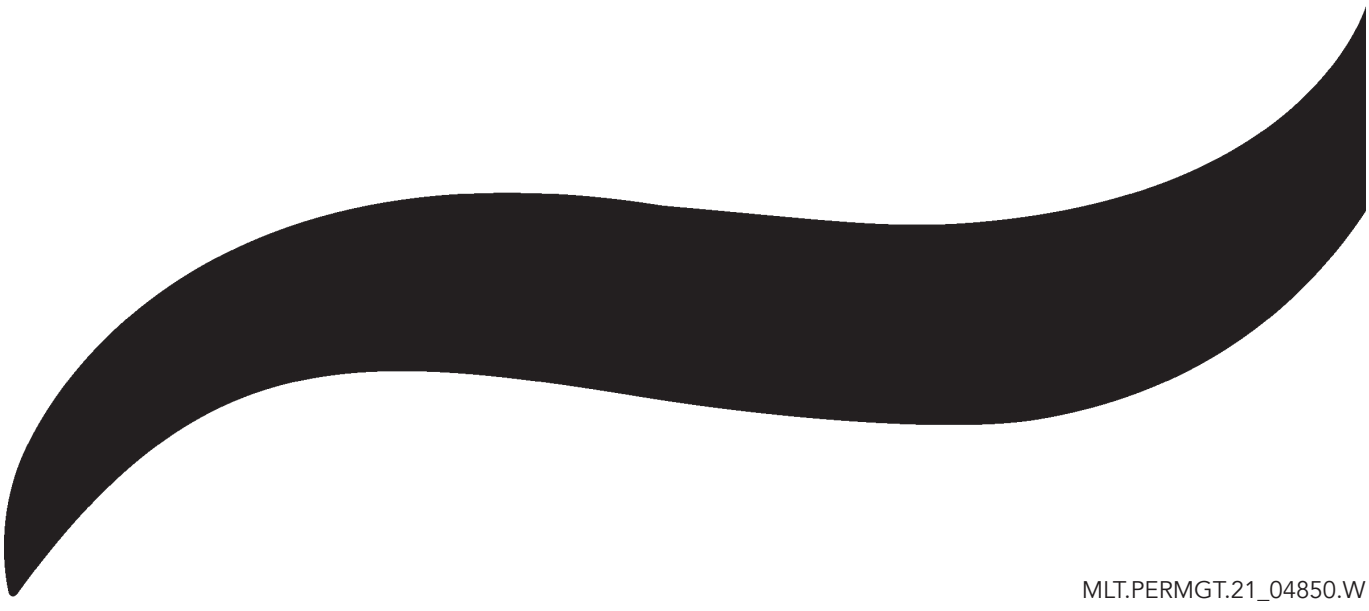
NHS Lanarkshire

Peri-procedure Management of patients on Anticoagulation



MLT.PERMGT.21_04850.W

Lead Author: Drs A Hung/H MacKay | Date approved: 20/07/2022 | Review date: 20/07/2025 | Uncontrolled when printed: access the most up-to-date version on: www.nhslguidelines.scot.nhs.uk

Index

References

1. Perioperative bridging anticoagulation in patients with atrial fibrillation. Douketis et al. N Engl J Med 2015; 373:823-33.
2. Perioperative Management of Antithrombotic Therapy. Douketis et al. Chest 2012;141(2_suppl):e326S-e350S.
3. British committee for standards in Haematology guideline on Perioperative management anticoagulant and antiplatelets 2016

General information

This updated guideline aims to standardise periprocedure management of patients on anticoagulant therapy in NHSL.

Management is guided by assessment of bleeding risk associated with procedure and patient's thrombotic risk.

It does not surpass clinical judgement by surgeon or anaesthetist. If needed, consult with relevant specialties eg cardiology, haematology.

All patients must be given written advice including risks, schedule when to stop anticoagulation and start bridging therapy if this is needed.

It is the responsibility of surgeon and anaesthetist on day to ensure patient is restarted on appropriate therapy, including in the event of cancellation.

Patients on warfarin should be advised to inform the Anticoagulant clinic of procedure date so that INR monitoring can be coordinated.

Do not restart anticoagulation postoperatively unless haemostasis is achieved. If in doubt, discuss with senior staff.

Do not start warfarin, treatment dose LMWH or DOAC while an epidural catheter is still in-situ.

This guideline does not cover patients with chronic kidney disease and eGFR <30 or dialysis. These patients should be discussed individually with relevant senior medical staff in your department. Similarly, patients with complex thrombotic history or recent thrombotic events within last 3 months may need to be discussed with the relevant team for an individualised care plan.

Patients with mechanical heart valves

This group of patients is particularly at high risk of thrombosis when anticoagulation is stopped. Their management should be discussed individually with the relevant cardiology team for advice on most appropriate bridging anticoagulant therapy.

Cancellation procedure for patients in whom anticoagulation has been stopped

Cancellation should be avoided in patient with **high thrombotic risk** such as those with mechanical heart valves as interruption of anticoagulant therapy increases their risk of thrombosis.

However, if this cannot be avoided, it will be the responsibility of theatre team to instruct patient to resume their anticoagulation and inform appropriate department, in particular Preassessment so that procedure is rescheduled in a timely manner.

Patients with mechanical heart valves should be issued with one week's supply of bridging treatment dose LMWH (tinzaparin) until INR is within range.

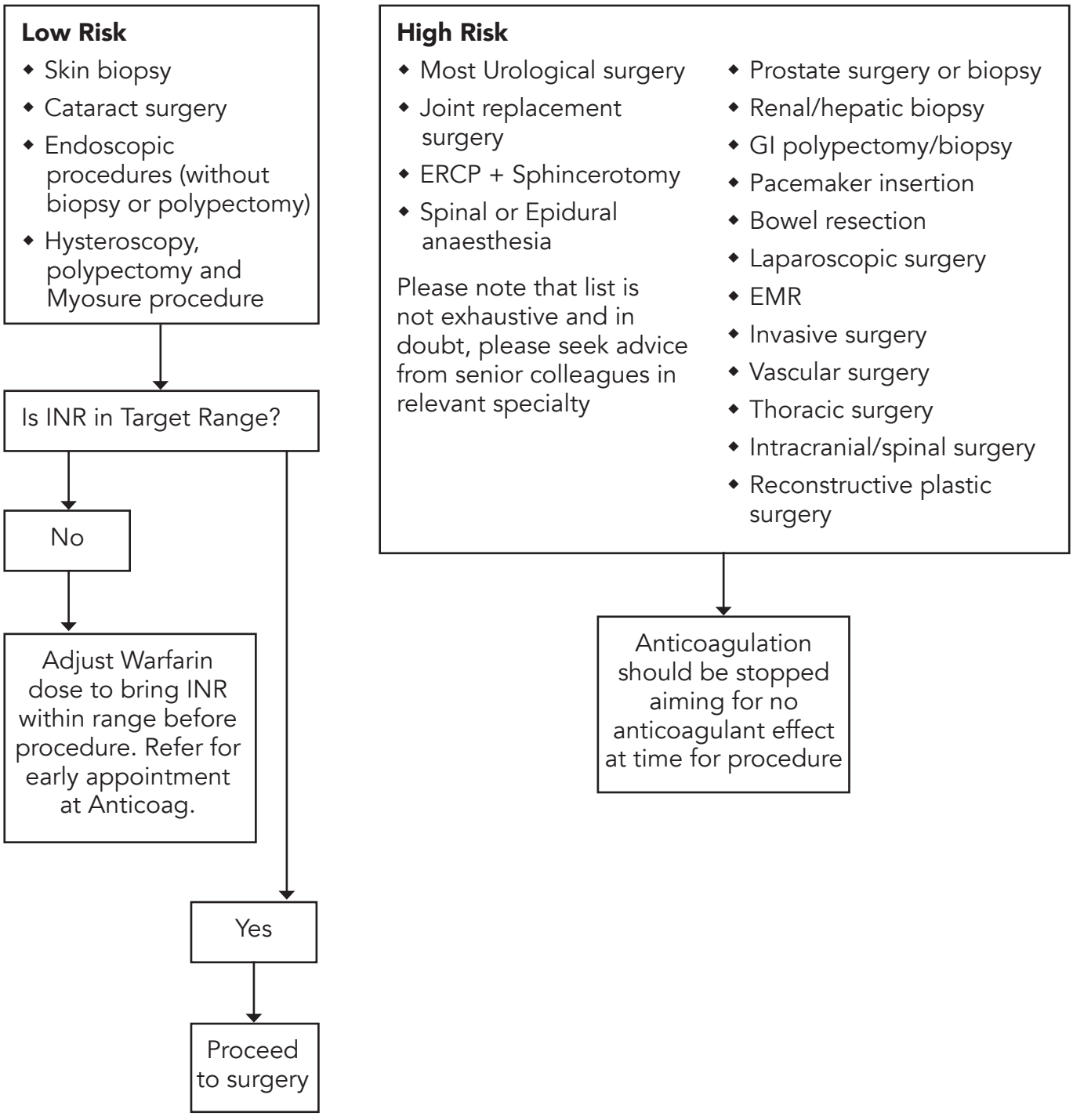
For patients on warfarin, the Anticoagulant clinic should be informed of cancellation asap so an early clinic appointment for INR monitoring will be arranged. They will be able to advise when to restart warfarin and stop bridging heparin therapy.

Lead Author: Drs A Hung/H MacKay | Date approved: 20/07/2022 | Review date: 20/07/2025 | Uncontrolled when printed: access the most up-to-date version on: www.nhslguidelines.scot.nhs.uk

NHS Lanarkshire Periprocedure Management of patients on Anti-coagulation

Optimal periprocedure management of anticoagulation depends on balancing **BLEEDING RISK** associated with procedure against individual patient's **THROMBOTIC RISK**.

Step 1: Bleeding Risk assessment



Lead Author: Drs A Hung/H MacKay | Date approved: 20/07/2022 | Review date: 20/07/2025 | Uncontrolled when printed: access the most up-to-date version on: www.nhslguidelines.scot.nhs.uk

Step 2:
Assess Thrombotic Risk of patient

	LOW	MODERATE	HIGH
Mechanical heart valve	Bileaflet aortic valve prosthesis without AF and no other risk factors for stroke (Ascertain type of valve and check with Cardiology to ensure that it is of low thrombotic risk)	Bileaflet aortic valve prosthesis and one or more of the following risk factors ◆ AF prior stroke or TIA ◆ Hypertension ◆ Diabetes ◆ Congestive heart failure ◆ Age >75 years	◆ Any mitral valve prosthesis ◆ Any caged-ball or tilting disc aortic valve prosthesis ◆ Recent (within 6 months) stroke or TIA
Atrial fibrillation (AF)	CHA2DS2Vas score of 0-2 (assuming no prior stroke or TIA) (Stroke risk 1.3% - 2.2% per annum)	CHA2DS2Vas score of 3-4 (Stroke risk 3.2% - 4% per annum)	CHA2DS2Vas score of 5-9 ◆ Recent (within 3 months) stroke or TIA ◆ Rheumatic valvular heart disease (Stroke risk 6.7% - 15.2% per annum)
Venous thombo-embolism (VTE)	VTE greater than 12 months previous and no other risk factors	◆ VTE that occurred 3-12 months ago ◆ Non-severe thrombophilia (e.g. heterozygous factor V Leiden or prothrombin gene mutation) ◆ Recurrent VTE (if on warfarin, target INR 2.5) ◆ Active cancer (treated within 6 months or palliative)	◆ Recent (within 3 months) VTE ◆ Severe thrombophilia (e.g. Protein C, Protein S or Antithrombin deficiency; Antiphospholipid syndrome; multiple thrombophilic defects) Recurrent VTEs with target INR 3.5

CHA2DS2Vas score (maximum of 9) based on:

Congestive Heart failure; Hypertension; Age 65-74 (1) and >75 (2); Diabetes; Previous Stroke or TIA (2); Vascular disease (prior MI, PAD or aortic plaque); Sex (1 for female).

Is bridging with treatment dose Heparin indicated?

For patients undergoing high bleeding risk procedures and in whom **warfarin** needs to be stopped:

THROMBOTIC RISK	MANAGEMENT OF PATIENTS ON WARFARIN
LOW (Applies to AF, VTE and mechanical heart valves)	Stop warfarin on Day -5 (day minus 5 with Day 0 being day of procedure) NO BRIDGING INDICATED
MODERATE (For VTE patients only)	Stop warfarin on Day -5 *Consider prophylactic LMWH (enoxaparin) from Day -3 Check INR on or day before procedure aiming for INR <1.5
HIGH (Applies to AF, VTE and mechanical heart valves)	Stop warfarin on Day -5 Ideally check INR on Day -3 If <2.5, start treatment dose LMWH (tinzaparin) at 08.00 - 10.00 Patient to be taught self-injections Assuming normal renal function, last dose to be administered at least 24 hours prior to procedure Check INR on or day before procedure aiming for INR <1.5

*Dose of prophylactic LMWH should be adjusted according to renal function and weight

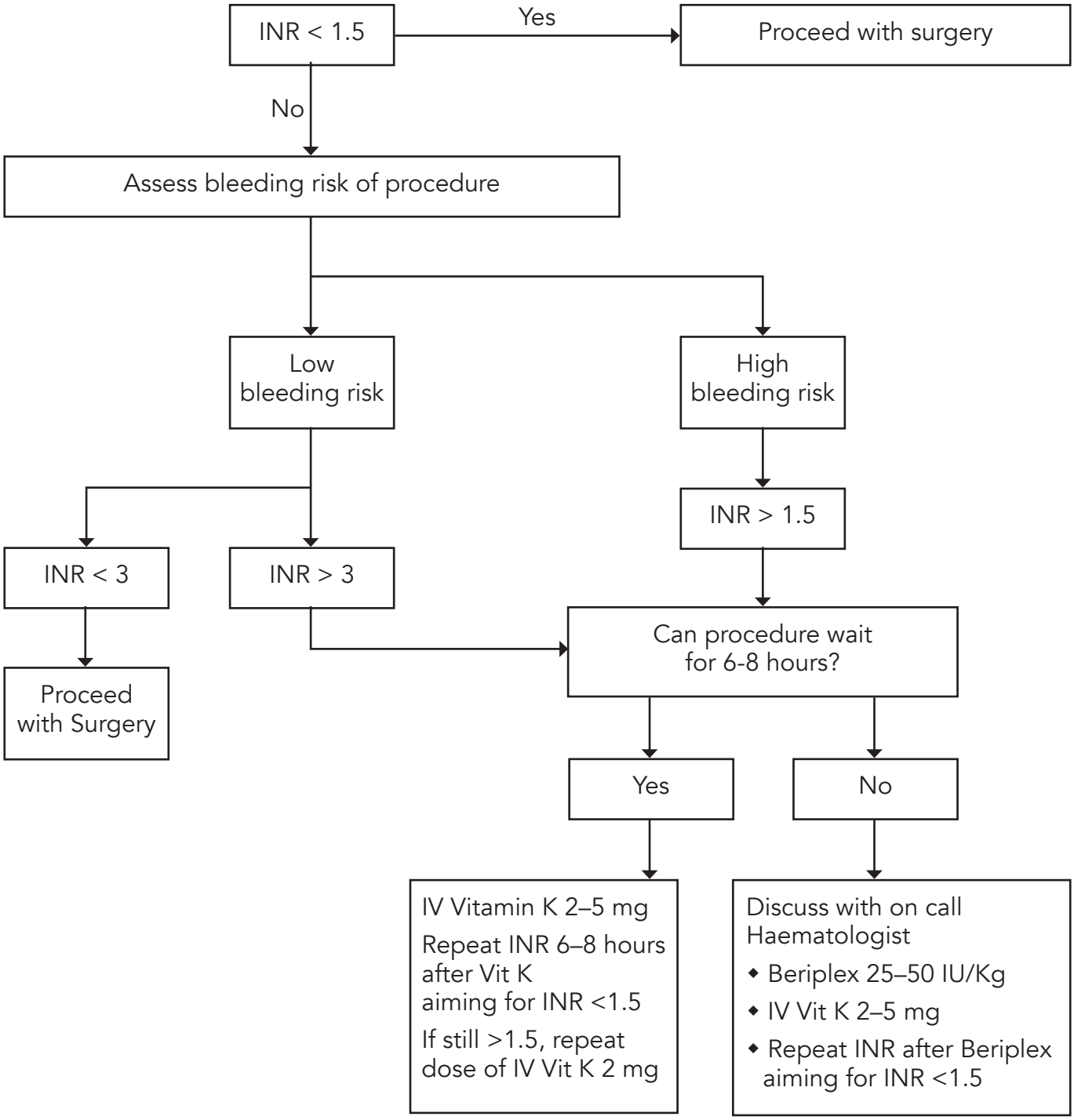
Patient/carer should be encouraged to learn self-injection if LMWH injection is indicated.

ALL METALLIC HEART VALVES patients should be discussed with cardiology for an individual management plan.

Patients with Atrial Fibrillation
Please note that bridging therapy with treatment dose LMWH is only indicated in those with high thrombotic risk as assessed using criteria on page 5 in this document. If in doubt, consider discussing with relevant specialty.

Lead Author: Drs A Hung/H MacKay | Date approved: 20/07/2022 | Review date: 20/07/2025 | Uncontrolled when printed: access the most up-to-date version on: www.nhslguidelines.scot.nhs.uk

Emergency Surgery in patients on Warfarin



Lead Author: Drs A Hung/H MacKay | Date approved: 20/07/2022 | Review date: 20/07/2025 | Uncontrolled when printed: access the most up-to-date version on: www.nhslguidelines.scot.nhs.uk

Resumption of Anticoagulation Post-Procedure

For patients with high thrombotic risk

- Assuming haemostasis achieved and no bleeding
- Prophylactic LMWH to start on night of surgery and for 24 hour (usually Enoxaparin 40 mg/day but dose-adjust according to weight and renal function)
- Escalate to treatment dose LMWH (Tinzaparin) after 48 - 72 hours if patient stable

- **Resumption of Warfarin**:

  For uncomplicated surgery, restart on night of surgery

  Otherwise, defer until patient stabilises

  If on antibiotics, it will be prudent to defer Warfarin because of potential drug interactions and patient maintained on LMWH, either prophylactic or treatment dose guided by clinical features.

  Reintroduce Warfarin when patient is stable

  Continue LMWH until INR is within target range

  Inform anticoagulant clinic of discharge so that an early appointment is arranged

  If patient is otherwise stable, do not delay discharge just to allow INR monitoring as this can be resumed early at the Anticoag clinic.

For patients with low thrombotic risk:

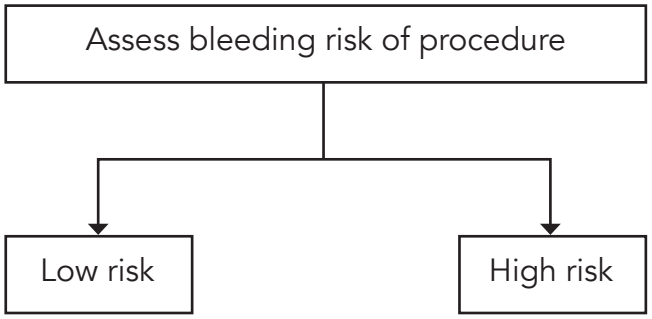
- Give and stop thromboprophylaxis with LMWH (enoxaparin) as for any perioperative patient
- Restart warfarin as above

Lead Author: Drs A Hung/H MacKay | Date approved: 20/07/2022 | Review date: 20/07/2025 | Uncontrolled when printed: access the most up-to-date version on: www.nhslguidelines.scot.nhs.uk

Peri-procedure management of patients on DOACs (direct oral anticoagulants)

(Apixaban, Edoxaban, Rivaroxaban, Dabigatran)

Elective procedure



The following table gives guidance when to stop DOACs before planned procedure based on procedure bleeding risk and renal function.

Please note that renal function is based on clearance clearance rather than eGFR

Creatinine clearance (ml/min)	FXa Inhibitors Apixaban, Edoxaban, Rivaroxaban		FIIa Inhibitor Dabigatran	
	Low Risk	High Risk	Low Risk	High Risk
>80	>24 hr	>48 hr	>24 hr	>48 hr
50 - 80	>24 hr	>48 hr	>36 hr	>72 hr
30 - 50	>24 hr	>48 hr	>48 hr	>72 hr
15 - 30	>48 hr	>72 hr	CONTRAINDICATED	
<15	CONTRAINDICATED		CONTRAINDICATED	

Lead Author: Drs A Hung/H MacKay | Date approved: 20/07/2022 | Review date: 20/07/2025 | Uncontrolled when printed: access the most up-to-date version on: www.nhslguidelines.scot.nhs.uk

Peri-procedure management of patients on DOACs

Emergency procedure

- Ascertain **type of DOAC** (Apixaban, Edoxaban, Rivaroxaban, Dabigatran)
- Time last dose taken
- Assess renal function as all DOACs have a degree of renal excretion
- If feasible, consider deferring surgery for 18 - 24 hrs to achieve trough level and minimise bleeding risk
- If immediate surgery required, to proceed with low threshold to request Beriplex 25-50 IU/Kg perioperatively for any excessive bleeding. Discuss with on call Haematologist
- Tranexamic acid to be considered perioperatively if excessive bleeding
- Andexanet alpha (reversal agent for FXa inhibitors i.e. apixaban, rivoraxaban and edoxaban) is not licensed for reversal of anticoagulation prior to urgent surgery. It should only be considered in exceptional circumstances after discussion with consultant haematologist.

Resumption of DOACs post procedure

Low bleeding procedure:	Restart at 24 hrs
High bleeding risk:	Defer for at least 48 - 72 hrs, or until patient stabilises because of rapid onset of anticoagulant effect and risk of bleeding. Assess renal function to ensure it is safe to restart DOAC. A LMWH (either prophylactic or treatment dose) or IV Heparin can be considered if clinically indicated.

Lead Author: Drs A Hung/H MacKay | Date approved: 20/07/2022 | Review date: 20/07/2025 | Uncontrolled when printed: access the most up-to-date version on: www.nhslguidelines.scot.nhs.uk

Peri-procedure management of patients on Heparins

LOW MOLECULAR WEIGHT HEPARINS (LMWH) ie enoxaparin, tinzaparin, dalteparin

Prophylactic dose LMWH

- Assuming normal renal function, last dose to be given at least 12 hours prior to procedure

Treatment dose LMWH

- Assuming normal renal function, last dose to be administered at least 24 hours prior to procedure
- To facilitate this prior to any procedure, it is good practice for patients to receive their daily treatment dose LMWH at 8-9 am. Evening dose can gradually be moved to morning eg 1-2 hrs backward for a few days.
- For patients with abnormal renal function, consider stopping treatment dose 48 hours before

INTRAVENOUS UNFRACTIONATED HEPARIN (UFH)

- Use **NHSL IV HEPARIN CHART** and follow dosing instructions accordingly.
- IV unfractionated heparin has a relatively short half-life of about 90 mins. Infusion should be stopped 6 hours before scheduled time of procedure. Coagulation screen should be repeated after IV heparin infusion has been stopped for 6 hours aiming for a normal APTT ratio.
- Peri-procedure use of IV heparin is not commonly recommended, except for patients with very high thrombotic risk. Management of such patients should be individualised after discussion with appropriate specialties and a clear plan should be in place.

RESUMPTION OF HEPARIN POST PROCEDURE

- Assuming haemostasis achieved and no bleeding, prophylactic LMWH (usually enoxaparin 40 mg/dy) can be restarted on evening of procedure. This can be escalated to treatment dose LMWH (Tinzaparin) after 48-72 hours if indicated.
- Similarly IV heparin infusion can be re-established day after surgery assuming haemostasis achieved. No bolus dose is required.

Lead Author: Drs A Hung/H MacKay | Date approved: 20/07/2022 | Review date: 20/07/2025 | Uncontrolled when printed: access the most up-to-date version on: www.nhslguidelines.scot.nhs.uk

Information for patients

You are currently on an anticoagulant drug to thin your blood and prevent blood clots. This drug can be warfarin, apixaban, edoxaban, rivoraxaban, dabigatran or heparin.

Prior to a procedure, a decision must be made whether to stop your anticoagulant treatment as this medication can cause excessive bleeding complications during your operation. However stopping your anticoagulation can also increase your risk of a blood clot. This decision therefore needs to be balanced taking into account your history of blood clots against the bleeding risk of the intervention required.

If the decision is to stop your anticoagulant drug to reduce your risk of bleeding during your operation, we may recommend 'bridging' anticoagulant treatment with a heparin injection or infusion This is now advised for only a minority of patients who may be at high risk of blood clots. Recent evidence in the medical literature support that in the majority of patients, this is not required because it increases the risk of bleeding compared to the risk of a blood clot. The risk of stroke after stopping warfarin in people with atrial fibrillation is thought to be in the region of 0.4% versus 0.3% whilst on bridging therapy with heparin. However, risk of bleeding is significantly higher at 3.2% whilst on bridging therapy (compared to 1.3% while not on bridging anticoagulant therapy).

When you attend the Preassessment Clinic, your risk of clotting will be assessed. This will guide us whether you may require bridging therapy with heparin if your anticoagulant drug needs to be stopped prior your procedure, you will receive appropriate instructions what to do. If a heparin(usually enoxaparin but it can be tinzaparin) injection is advised, either one of your carers or you will be taught how to administer this.

Importantly you will be involved in making this decision. If you are concerned with the proposed management plan regarding your anticoagulant treatment, please ask to discuss with either the Pre-assessment anaesthetist or consultant surgeon prior to your operation. Likewise, we advise that you pay attention to the following:

- Don't stop your anticoagulant drug unless you are instructed to do so by the hospital or your GP.
- If you are on warfarin and attend the Anticoagulant clinic in Lanarkshire, please inform them of your forthcoming operation and scheduled date.
- If your operation is cancelled, you must either restart your warfarin or be maintained on bridging heparin therapy. If unsure, contact Preassessment for guidance or the Anticoagulant clinic for patients on warfarin.
- If you are on a heparin injection (either enoxaparin or tinzaparin) before or after the operation and develop any bleeding or a skin rash at the injections site or other parts of the body, phone the hospital ward for advice.

Lead Author: Drs A Hung/H MacKay | Date approved: 20/07/2022 | Review date: 20/07/2025 | Uncontrolled when printed: access the most up-to-date version on: www.nhslguidelines.scot.nhs.uk

Instructions for patients on Warfarin with **Low Thrombotic Risk** for high bleeding risk procedure

Addressogram

Current warfarin dose:

Please inform the Anticoagulant clinic of your forthcoming procedure and scheduled date as soon as possible so that your clinic appointment is arranged both before and after your procedure.

Date DD/MM/YY	Days before surgery	Instruction on warfarin
	-6	Last dose of warfarin before procedure
	-5	STOP warfarin. Do not take any more warfarin before surgery.
	-4	No warfarin.
	-3	No warfarin.
	-2	No warfarin.
	-1	No warfarin.
	Day of surgery	Warfarin .....mg in the evening (if no bleeding) If your warfarin needs to be withheld again on this day, the team in charge of your care will advise you when to restart.
	1 day after surgery	If warfarin is restarted, take your usual Warfarin dose in the evening
	+2	Usual Warfarin dose in the evening Thereafter, continue on same dose of warfarin unless instructed otherwise. On discharge, make sure you have an early appointment at the Anticoagulant clinic

Lead Author: Drs A Hung/H MacKay | Date approved: 20/07/2022 | Review date: 20/07/2025 | Uncontrolled when printed: access the most up-to-date version on: www.nhslguidelines.scot.nhs.uk

Instruction for **VTE** patients on Warfarin with **Moderate Thrombotic Risk** for high bleeding risk procedure

Addressogram

Current warfarin dose:

Please inform the Anticoagulant clinic of your forthcoming procedure and scheduled date as soon as possible so that your clinic appointment is arranged both before and after your procedure.

Date DD/MM/YY	Days before surgery	Instruction on warfarin
	-6	Last dose of warfarin before procedure
	-5	STOP warfarin. Do not take any more warfarin before surgery.
	-4	No LMWH. No warfarin.
	-3	Start LMWH Enoxaparin 40 mg, once daily. No warfarin.
	-2	LMWH Enoxaparin 40 mg once daily. No warfarin.
	-1	LMWH Enoxaparin 40 mg, once daily - last dose should be at least 12 hrs before your procedure No warfarin.
	Day of surgery	LMWH Enoxaparin 40 mg 6 hours post procedure if your team is happy there is no excessive bleeding and you do not still have an epidural catheter in Restart usual Warfarin dose in the evening if no bleeding
	1 day after surgery	LMWH Enoxaparin 40 mg once daily. Continue usual Warfarin dose in the evening if no bleeding
	+2	LMWH Enoxaparin 40mg, once daily. Usual Warfarin dose in the evening Thereafter your dose will be instructed by the ward if you are still an inpatient On discharge, make sure you have an early appointment at the Anticoagulant clinic

Lead Author: Drs A Hung/H MacKay | Date approved: 20/07/2022 | Review date: 20/07/2025 | Uncontrolled when printed: access the most up-to-date version on: www.nhslguidelines.scot.nhs.uk

Instructions for patients on Warfarin with **High Thrombotic Risk** for high bleeding risk procedure

Addressogram

Current warfarin dose:

Please inform the Anticoagulant clinic of your forthcoming procedure and scheduled date as soon as possible so that your clinic appointment is arranged both before and after your procedure.

Date DD/MM/YY	Days before surgery	Please take your warfarin and LMWH injections as instructed below:
	-6	Last dose of warfarin before procedure.
	-5	STOP warfarin. Do not take any more warfarin before surgery.
	-4	No LMWH. No warfarin.
	-3	LMWH Tinzaparin 175 units/kg 8am = ... units No warfarin.
	-2	LMWH Tinzaparin 175 units/kg 8am = ... units No warfarin.
	-1	LMWH Enoxaparin 40 mg 1800hrs No warfarin.
	Day of surgery	LMWH Enoxaparin 40mg 6 hours post procedure if your team is happy there is no excessive bleeding and you do not still have an epidural catheter in Restart usual warfarin if not bleeding and stable
	+1	**LMWH either prophylactic dose of enoxaparin or treatment dose of tinzaparin as advised by ward** **If warfarin is restarted, continue same dose unless advised otherwise**
	Post operative	**Your anticoagulation thereafter will be advised by the ward staff. Your heparin injection should be continued until your INR is satisfactory.** On discharge, make sure you have an early appointment at the Anticoagulant clinic and they will be able to advise when to stop your injection.

Lead Author: Drs A Hung/H MacKay | Date approved: 20/07/2022 | Review date: 20/07/2025 | Uncontrolled when printed: access the most up-to-date version on: www.nhslguidelines.scot.nhs.uk

Instruction for patients on **DOAC for Low Bleeding** risk procedure

Addressogram

Type and dose of DOAC (Direct oral anticoagulant):

Date DD/MM/YY	Days before surgery	Instruction on warfarin
	-2	Last dose of DOAC before surgery
	-1	STOP DOAC. Do not take any more DOAC before surgery.
	Day of surgery	No DOAC LMWH enoxaparin 40 mg if indicated for thromboprophylaxis
	1 day after surgery	Restart your anticoagulant tablet if your team is happy that there is no bleeding
	+2	Continue with your anticoagulant tablet. If there is any excessive bleeding after discharge, please discuss with the team who did your procedure

Lead Author: Drs A Hung/H MacKay | Date approved: 20/07/2022 | Review date: 20/07/2025 | Uncontrolled when printed: access the most up-to-date version on: www.nhslguidelines.scot.nhs.uk

Instructions for patients on **DOAC for high bleeding** risk procedure

Addressogram

Type and dose of DOAC (Direct oral anticoagulant):

Date DD/MM/YY	Days before surgery	Instruction on warfarin
	-3	Last dose of DOAC before surgery
	-2	STOP DOAC. Do not take any more DOAC before surgery.
	-1	No DOAC.
	Day of surgery	No DOAC LMWH enoxaparin 40 mg if indicated for thromboprophylaxis
	1 day after surgery	No DOAC LMWH enoxaparin 40 mg if indicated for thromboprophylaxis
	+2	Restart your anticoagulant tablet if your team is happy that there is no bleeding
	+3	Continue with your anticoagulant tablet. If there is any excessive bleeding after discharge, please discuss with the team who did your procedure

Lead Author: Drs A Hung/H MacKay | Date approved: 20/07/2022 | Review date: 20/07/2025 | Uncontrolled when printed: access the most up-to-date version on: www.nhslguidelines.scot.nhs.uk