

Elective Surgery in Adults on DOACs (Direct Oral Anticoagulants)

Peri-operative DOAC decision making should consider the patient’s underlying thrombotic risk (Appendix 1), and the bleeding risk associated with the surgery/procedure (Appendix 2). This should be discussed with the patient prior to the procedure, and the outcome of the discussion clearly documented. The form at the end of the document provides a template for the plan to be documented by a senior member of the clinical team.

Whilst the guidance that follows provides recommendations, they do not replace clinical judgement. Alternative plans can be made and documented by a senior clinician, including the decision as to which ‘bleeding risk’ recommendation to follow for a specific procedure.

Issues for surgery

- Risk of venous thromboembolism if omitted.
- Risk of cerebrovascular event (CVA) if omitted.
- Risk of bleeding and / or complications of bleeding if continued.
- Risk of epidural or spinal haematoma if continued prior to neuraxial anaesthesia.

Timing of last DOAC intake before an elective intervention

Confirm the dose, timings and frequency of administration with patient / carer (this will affect pre-operative cessation advice). Dosing of DOACs can be based on several factors, which includes renal function.

DOACs have a predictable elimination half-life. If the decision is made to interrupt DOAC therapy, the patient’s current renal function should be used to guide when to stop DOAC therapy. When estimating renal function use the Cockcroft-Gault formula rather than estimated glomerular filtration rate (GFR), to avoid overestimating renal function. See below or www.mdcalc.com†

Estimated Creatinine Clearance (CrCl) (mL/min) = $\frac{[140-\text{Age}] \times \text{Weight} \times \text{Constant}}{\text{Serum creatinine}}$

- Age in years
- Weight in kilograms (Use ideal body weight. Where the patient’s actual body weight is less than their ideal body weight, actual body weight should be used instead)
- Serum creatinine in micromol/L
- Constant = 1.23 for men; 1.04 for women

Ideal body weight (kilograms) for *men* = $50 + 0.91(\text{Height in centimetres} - 152.4)$

Ideal body weight (kilograms) for *women* = $45.5 + 0.91(\text{Height in centimetres} - 152.4)$

It would be prudent to confirm that the patient is on the appropriate dose of DOAC (1). For example, rivaroxaban is not recommended in CrCl less than 15ml/min and dabigatran is not recommended in CrCl less than 30 ml/min. See current product literature or seek advice if necessary.

Bridging with therapeutic dose LMWH (Low Molecular Weight Heparin) is not usually required for patients on a DOAC (1,3) since the predictable waning of the anticoagulation effect allows for properly timed short-term cessation of DOAC therapy before surgery (3). However, there are high-risk situations in which the multi-disciplinary team should consider bridging, e.g. urgent surgery in patients with a recent (within last 3 months) thromboembolic event, or for patients who suffered an event during previous interruption of DOAC therapy.

Minor bleeding risk procedures can often be safely undertaken without DOAC interruption. A pragmatic approach would be to conduct the intervention 18-24 hours after the last DOAC intake (1).

For management of Low- or High-risk procedures see following advice:

<https://www.ukcpa-periophandbook.co.uk/medicine-monographs/direct-oral-anticoagulants-doacs>

Post-operative Advice (1)

All DOACs are rapidly absorbed and have a rapid onset of action, with peak anticoagulant activity at approximately 2-3 hours after oral ingestion. Attention to post-operative haemostasis is clinically important since too early resumption of DOACs, especially within 24 hours of surgery, is associated with a two- to fourfold increased risk of major bleeding.

Minor / Low Risk Procedures

Recommence 6 – 12 hours post-procedure if haemostasis has been fully secured.

High Risk Procedures / Increased Bleeding Risk

Do not recommence at full-dose until at least 48 hours post-procedure.

Prophylactic dose LMWH may be considered in the post-operative period prior to DOAC resumption. Prophylactic LMWH can be commenced 6-12 hours post-op based on patient's thromboembolic risk and bleeding risk.

Note: if patient has an epidural in situ, refer to GHNHSFT Policy [A2165](#) ('Anticoagulants, Antiplatelets and spinal/epidural Anaesthesia) and [VTE Prophylaxis Dosing Guideline](#).

LMWH should be discontinued immediately upon recommencing DOAC.

Appendix 1- Assessing Thrombotic risk

	Very High	High	Moderate
<p>Chronic Atrial Fibrillation</p> <hr/> <p>CHADS₂ score</p> <hr/> <p>CHF 1 point Hypertension 1 point Age 75 and over 1 point Diabetes mellitus 1 point Prior Stroke or TIA 2 points</p>	<p>stroke or TIA within 3 months</p> <p>rheumatic valvular heart disease</p> <p>CHADS₂ score greater than 4</p>	<p>CHADS₂ score 3 or 4</p> <p>Stroke or TIA more than 3 months ago</p>	<p>CHADS₂ score 2 or less and no prior stroke or TIA</p>
<p>Venous Thromboembolism</p> <p>(if VTE within 3 months consider postponing surgery or placing an IVCfilter)</p>	<p>VTE within 3 months</p> <p>Severe thrombophilia (active cancer, antiphospholipid syndrome, deficiency of protein C, protein S or Antithrombin, multiple thrombophilia) (antithrombin deficiency should be referred to hematology)</p> <p>Recurrence of VTE on anticoagulation</p>	<p>VTE within last 3 to 12 months</p> <p>VTE on long-term anticoagulant therapy</p> <p>Cancer therapy within 6 months or active disease (patients usually on LMWH)</p> <p>Non-severe thrombophilia (heterozygous for Factor V Leiden or prothrombin gene mutation)</p>	<p>VTE greater than 12 months prior and no other risk factors</p> <p>(patients with previous VTE not on anticoagulation should follow the thromboprophylaxis protocol)</p>

Appendix 2- Assessing bleeding risk

This is often a very individual statistic: the risk of performing this particular procedure in this patient. For each patient, individual factors relating to bleeding and thrombotic risk (e.g. age, stroke risk, renal function, co-medications (e.g. anti-platelets, NSAIDs) need to be taken into account and be discussed with the surgeon and the patient.

Dosing of DOACs can be based on a number of factors, which includes renal function. It would be prudent to confirm that the patient is on the appropriate dose of DOAC (1). See current product literature or seek advice if necessary.

The table below provides some broad guidance as to the bleeding risk described in large studies (2,3). See also endoscopy specific guidance.

Minor bleeding risk *	Low procedural bleeding risk (bleeding infrequent or of low clinical impact) *	High procedural bleeding risk (bleeding frequent and/or of high impact)
Cataract or glaucoma intervention	Carpal tunnel repair	Spinal or epidural anaesthesia** ; lumbar diagnostic puncture
Superficial surgery e.g. abscess incision; small dermatologic excision, skin biopsy	Pacemaker or ICD implantation (except complex procedures)	Cardiac surgery; complex invasive cardiological interventions, including lead extraction, VT ablation, chronic total occlusion PCI
Simple dental surgery (simple 1-3 extractions, abscess incision)	Paradontal surgery, implant positioning	Neurosurgery
Low bleeding risk endoscopic procedure e.g. without resection or biopsy	GI endoscopy (with simple biopsy), enteroscopy, biliary/pancreatic stent (without sphincterotomy)	Certain GI procedures (e.g. polypectomy, variceal treatment, biliary sphincterotomy, PEG placement)
	Many biopsies (bladder, thyroid, breast or lymph node)	Major urologic surgery e.g. TURP/ biopsy (including kidney)
	Central line removal	Surgery not specified in minor or low procedural risk (vascular, general, major orthopaedic surgery, thoracic surgery)
	Abdominal hernia repair	Multiple tooth extractions
	Shoulder/Foot/Hand surgery Knee/Hip replacement Arthroscopy	

*Minor bleeding risk e.g. low bleeding risk endoscopic procedures- see UKCPA peri-operative handbook

Where **spinal or epidural anaesthesia is planned the 'High procedural bleeding risk' advice should be followed, irrespective of the bleeding risk of the procedure itself.

Continuation of DOACs in patients who receive neuraxial anaesthesia is not recommended due to the risk of spinal haematoma:

Patients who have epidural or paravertebral catheters in place should not be started on long-acting anticoagulants until the catheter has been safely removed and an acceptable time has elapsed.

Appendix 3: Perioperative DOAC patient information leaflet. Note plan should also be printed and signed by Consultant Anaesthetist for inclusion in POAC plan

Instructions for taking apixaban, dabigatran, edoxaban or rivaroxaban before and after your operation

Procedure	
Consultant	
Patient Weight	
Renal function (Creatinine clearance)	mL/min

Patient Name Label

Name of Anticoagulant Medication	
Dose and time/s normally taken Before your procedure	Miss _____ doses of your anticoagulant
After your procedure	The surgical team will tell you when your anticoagulant should be restarted

Consultant Anaesthetist to complete as appropriate									
Date the last dose of oral anticoagulant should be taken on						____ / ____ / ____			
	Day -4	Day -3	Day -2	Day -1	Day of Procedure	Day +1	Day +2	Day +3	
AM					NO ANTICOAGULANT				
PM					Prophylactic LMWH				

Consultant Anaesthetist Signature:

Print Name:

Date:

POAC nurse to complete: I confirm that the patient has been informed of the above plan

Nurse signature :

Date:

If your operation is cancelled or the date is changed please contact us for advice on-

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Figure 1: Number of doses of DOAC to be omitted prior to surgery or invasive procedures for which anticoagulation needs to be stopped (1,3)

See Appendix 2 for bleeding risk. Note -Where **spinal or epidural anaesthesia** is planned the ‘**High procedural bleeding risk**’ advice should be followed, irrespective of the bleeding risk of the procedure itself.

DOAC	Renal Function (CrCl, ml/min)	Estimated half-life (h)	Bleeding Risk of Procedure	Number of doses to be omitted prior to procedure (including any doses due on the morning of surgery – Day 0)					
				Day -5	Day -4	Day -3	Day -2	Day -1	Day 0
Apixaban	≥30	8	HIGH						Omit 5 doses
			LOW					Omit 3 doses	
	<30		HIGH						Omit 7 doses
			LOW					Omit 5 doses	
Dabigatran	≥50	15	HIGH						Omit 5 doses
			LOW					Omit 3 doses	
	<50	18	HIGH						Omit 9 doses
			LOW					Omit 5 doses	
Edoxaban	≥30	10-14	HIGH						MORNING dose- omit 3 doses EVENING dose – omit 2 doses
			LOW					MORNING dose- omit 2 doses EVENING dose – omit 1 dose	
	<30		HIGH						MORNING dose- omit 4 doses EVENING dose – omit 3 doses
			LOW					MORNING dose- omit 3 doses EVENING dose – omit 2 doses	
Rivaroxaban*	≥30	9	HIGH						MORNING dose- omit 3 doses EVENING dose – omit 2 doses
			LOW					MORNING dose- omit 2 doses EVENING dose – omit 1 dose	
	<30		HIGH						MORNING dose- omit 4 doses EVENING dose – omit 3 doses
			LOW					MORNING dose- omit 3 doses EVENING dose – omit 2 doses	

* Low dose Rivaroxaban (2.5mg Twice Daily) is licensed for use in conjunction with aspirin +/- clopidogrel for PAD/CAD. Pre-operative cessation of 2.5mg rivaroxaban should be managed on a case-by-case basis- see UKCPA peri-operative handbook.

† MDCalc is not a registered medical device. Healthcare professionals must exercise their own clinical judgement when using this tool to calculate creatinine clearance.

References

- 1) The Handbook of Perioperative Medicines. UKCPA. <https://www.ukcpa-periophandbook.co.uk/>
 - 2) Spyropoulos C., Douketis, J. How I treat anticoagulated patients undergoing elective procedure or surgery. *Blood* October 2012 Vol 120 (15)
 - 3) 2021 European Heart Rhythm Association Practical Guide on the Use of Non-Vitamin K Antagonist oral anticoagulants in patients with Atrial Fibrillation. *European Society of Cardiology. Europace* (2021) 00, 1-65
 - 4) Douketis JD, Spyropoulos AC, Carrier M *et al.* Perioperative Management of Patients with Atrial Fibrillation Receiving a Direct Oral Anticoagulant. *JAMA Internal Medicine*. 2019. PAUSE study
 - 5) Peri-operative management of anticoagulant and antiplatelet therapy. Keeling et al. *British Journal of Haematology* 2016 175: 602-613
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