Guideline for the Peri-Procedural Management of Adults Taking Direct Oral Anticoagulants (DOACs): dabigatran, rivaroxaban, apixaban, edoxaban

Drug	Renal Function	LOW Procedural Bleed Risk (~3 half-lives between last dose & procedure) Interval between last dose and procedure:	HIGH Procedural Bleed Risk (~5 half-lives between last dose & procedure) Interval between last dose and procedure:	VERY HIGH Procedural Bleed Risk (e.g. cardiothoracic, intracranial; neuraxial) Interval between last dose and procedure:	Resumption of DOAC Low bleed risk procedures	Resumption of DOAC High / Very High bleed risk procedures
Dabigatran (Pradaxa®) 75mg, 150mg BID	CrCl > 50 mL/min t½=14-17h	24 hours Last dose: In PM 2 days prior	60 hours Last dose: In AM 3 days prior	96 hours Last dose: 5 days prior Confirm that pre-op PTT or thrombin time is normal	Consider resuming no sooner than 1 day postop AND Discuss timing with proceduralist	Consider resuming no sooner than 2-3 days postop AND Discuss timing with proceduralist
	CrCl 30-50 mL/min t½=18-19h	48 hours Last dose: In PM 3 days prior	108 hours Last dose: In AM 5 days prior Confirm that pre-op PTT or thrombin time is normal	120 hours Last dose: 6 days prior		
Rivaroxaban (Xarelto®) 15mg daily-BID, 20mg daily	CrCl ≥ 30 mL/min t½=8-9h	24 hours Last dose: 2 days prior	48 hours Last dose: 3 days prior	72 hours Last dose: 4 days prior		
	CrCl 15-29 mL/min t½=9-10 h	48 hours Last dose: 3 days prior	72 hours Last dose: 4 days prior	120 hours Last dose: 6 days prior		
	CrCl <15 or on HD t½=unknown	> 96 hours[1] Last dose: > 5 days prior	> 96 hours[1] Last dose: > 5 days prior	> 120 hours[1] Last dose: > 6 days prior		
Apixaban (Eliquis®) 2.5mg, 5mg, 10mg BID	CrCl > 50 mL/min t½=12-15h	24 hours Last dose: 2 days prior	48 hours Last dose: 3 days prior	72 hours Last dose: 4 days prior		
	CrCl 30-50 mL/min t½=17-18h	48 hours Last dose: 3 days prior	84 hours Last dose: In AM 4 days prior	108 hours Last dose: In AM 5 days prior		
	CrCl 15-29 mL/min t½=17-18h	≥ 72 hours[1] Last dose: ≥ 4 days prior	≥ 96 hours[1] Last dose: ≥ 5 days prior	≥ 120 hours[1] Last dose: ≥ 6 days prior		
	CrCl <15 or on HD t½=unknown	> 96 hours[1] Last dose: > 5 days prior	> 96 hours[1] Last dose: > 5 days prior	> 120 hours[1] Last dose: > 6 days prior		
Edoxaban (Savaysa®) 30mg, 60mg daily	CrCl > 50 mL/min t½=10-14h	24 hours Last dose: 2 days prior	48 hours Last dose: 3 days prior	72 hours Last dose: 4 days prior		
	CrCl ≤50 mL/min t½=10-17h	≥ 96 hours[1] Last dose: ≥ 5 days prior	≥ 96 hours[1] Last dose: ≥ 5 days prior	≥ 120 hours[1] Last dose: ≥ 6 days prior		

[1] No Data. It is not known how long it takes for anticoagulant effect to wear off in ESRD. **Consider:** obtaining drug-specific antiXa level (UCSF only) or LMWH antiXa level (VASF), and consulting with institutional hematology or anticoagulation service

NOTE: This guideline provides general recommendations that are not intended to replace clinician judgment.

- Individual patient risk profiles, procedure risk, and provider/patient preference may influence recommendations.
- Suggested hold times correspond with low residual anticoagulant effect in low procedural bleed risk, minimal to no residual anticoagulant effect in high procedural bleed risk, and no significant residual anticoagulant effect in very high procedural bleed risk.
- Interval between last dose and procedure derived from recommendations from Pause Trial[1] (3-5 DOAC half-lives), accounts for renal dependence of each DOAC, and assumes PM administration of daily use DOACs.
- See "*UCSF Guidelines for the use of antithrombotic agents in the setting of neuraxial procedures*" for additional information on neuraxial anesthesia
- Clearance of anticoagulant effect depends on renal function. Consider reassessing renal function within one month of pre-op planning.
- Full anticoagulant effect occurs within hours of resuming DOAC therapy. Patient must be tolerating orals and have good absorption. Post-procedure resumption of anticoagulation should be done with the approval of the proceduralist.
- DOAC specific antiXa levels not available as STAT at all institutions, please contact Clinical Labs for more info.
- **Bridging with heparin or LMWH is NOT usually recommended for patients on DOACs**. However, bridging may be considered in patients at VERY high risk of thrombosis or with prolonged DOAC hold times (e.g. Afib with TIA/CVA<3 mos, or VTE in past 3 mos). Consultation with a specialist is recommended in complex situations. UCSF: Hematology Consult (415-443-4276) or Anticoagulation Clinic. SFGH: Anticoagulation Pharmacist (415-327-0339). VA Inpatient Anticoagulation Service (415-223-7824).

Examples of Procedures performed off anticoagulants (Hold/Restart DOAC per Guideline above)

Cardiothoracic surgery (such as heart valve replacement, coronary artery bypass graft)
Neurosurgical /neuraxial procedures
Major surgery with significant tissue injury (such as orthopedic, abdominal)
Certain interventional radiologic or endoscopic procedures with biopsy
Higher risk urologic procedures: TURP, prostate biopsy, lithotripsy, prostatectomy, bladder surgery

Examples of Procedures performed on anticoagulants (no interruption of DOAC)

Endoscopic or urologic procedures **without** biopsy
Skin biopsy
Potentially bloodless surgery (e.g, cataract). Consider risk of anesthesia administration (e.g., retrobulbar administration)
Simple dental procedures such as cleaning, extractions, endodontics

References

1. Douketis JD, et al. Periop Management of Patients With Atrial Fibrillation Receiving a Direct Oral Anticoagulant . *JAMA Intern Med*. 2019;179(11):1469-1478. **PAUSE**
2. Horlocker TT et al. Regional anesthesia in the patient receiving antithrombotic or thrombolytic therapy. American Society of Regional Anesthesia and Pain Medicine Evidence-Based Guidelines (fourth edition). Reg Anesth Pain Med 2018 43:263-309. **ASRA**
3. Doherty JU, et al. 2017 ACC Expert Consensus Decision Pathway for Periprocedural Management of Anticoagulation in Patients with Nonvalvular Atrial Fibrillation. JACC 2017 69:871-898.

Version 2.0 developed by Margaret Fang, MD, Tracy Minichiello, MD, Christina S. Wang, PharmD, Noelle de Leon, PharmD, Cynthia Fenton, MD, Erika Price, MD, Ashley Thompson, PharmD Version 1.0 Approved by UCSF P&T July 8, 2015; Version 2.0 in development.