Periprocedural Management of Antithrombotic Therapy- Adults- Inpatient/Ambulatory Consensus Care Guideline Summary

Target Population: Adults with indication(s) for antithrombotic medications who require antithrombotic therapy to be held for a planned surgical procedure.

Full Guideline: https://uconnect.wisc.edu/clinical/cckm-tools/content/cpg/hematology-and-coagulation/related/name-148493-en.cckm

Guideline Overview

- Periprocedural interruption or continuation of long-term antithrombotic therapy requires a patient-specific assessment of thromboembolic and bleeding risks
  - Step 1. Identify the bleeding risk of the procedure
  - Step 2. Identify the usual recommendation for stopping the antithrombotic prior to the procedure
  - Step 3. Identify the usual recommendation for restarting the antithrombotic after the procedure
  - Step 4. Determine if bridging therapy is usually recommended
  - Step 5. Individualize recommendations
  - Step 6. Communicate and document plan
  - Step 7. Revisit the plan after the procedure and revise as necessary

Table 1. Surgical Procedure Bleeding Risk Categories

MINIMAL BLEED RISK 30 day risk of major bleeding: ~0%	LOW/MODERATE BLEED RISK 30 day risk of major bleeding: 0-2%	HIGH BLEED RISK 30 day risk of major bleeding: > 2%	PROCEDURES INVOLVING NEURAXIAL ANESTHESIA

• Minor dental procedures
  ○ Dental extractions
  ○ Restorations
  ○ Prosthetics
  ○ Endodontics (root canals)
  ○ Dental cleanings
  ○ Dental fillings
• Minor dermatologic procedures
  ○ Excision of basal or squamous cell skin cancer
  ○ Excision of actinic keratosis
  ○ Excision of premalignant or cancerous skin nevi
• Ophthalmologic procedures
  ○ Cataract surgery
• Pacemaker or cardioverter-defibrillator device implantation
	• Abdominal hernia repair
	• Abdominal hysterectomy
	• Arthroscopy
	• Bronchoscopy +/- biopsy
	• Colonoscopy +/- biopsy
	• Coronary angiography*
	• Cutaneous/lymph node biopsy
	• Epidural injections
	• Foot/hand surgery
	• Gastrointestinal endoscopy +/- biopsy
	• Hemorrhoidal surgery
	• Laparoscopic cholecystectomy
		• Any major operation (procedure duration > 45 min)
		• Bowel resection
		• Cancer surgery, especially solid tumor resection
		• Cardiac, intracranial, or spinal surgery
		• Colonic polyp resection
		• Endoscopic retrograde cholangiopancreatography (ERCP)
		• Major orthopedic surgery, including shoulder replacement surgery
		• Major surgery with extensive tissue injury
		• Nephrectomy, kidney biopsy
		• Percutaneous endoscopic gastrotomy (PEG) placement
		• Reconstructive plastic surgery
		• Surgery in highly vascularized organs (kidneys, liver, spleen)
		• Transurethral prostate resection, bladder resection, or tumor ablation
		• Urologic or gastrointestinal surgery, especially anastomosis surgery
			• Neuraxial anesthesia
			  ○ Spinal anesthesia
			  ○ Epidural anesthesia, including epidural pain procedures

*Radial approach may be considered Minimal Bleed Risk compared to femoral approach

For procedures with minimal bleed risk, may continue antithrombotic therapy uninterrupted; See Step #2 for more details

Table 2. Stopping Antithrombotics Prior to Surgical Procedures

1 day = all doses on the calendar day prior to the procedure
24 hours = any dose within 24 hours from the time of the procedure

Oral Anticoagulant	Patient-Specific Criteria	Low/ Moderate Bleed Risk Procedure	High Bleed Risk Procedure	Neuraxial Anesthesia[6]
Warfarin[4]	INR 2.0-3.5	Stop 5 days prior		Stop 5 or more days prior; check INR 1-2 days prior; if INR > 1.5, consider 1 to 2 mg oral vitamin K
	INR > 3.5	Stop 6 or more days prior		
Apixaban (Eliquis)[4]		Stop 1 day prior	Stop 2 days prior	Stop 72 hours prior
Dabigatran (Pradaxa)[4]	CrCl ≥ 80 ml/min	Stop 1 day prior	Stop 2 days prior	Stop 72 hours prior*
	CrCl 50-79 ml/min			Stop 96 hours prior*
	CrCl < 50 ml/min	Stop 2 days prior	Stop 4 days prior	Stop 120 hours prior
Edoxaban (Savaysa)[4]		Stop 1 day prior	Stop 2 days prior	Stop 72 hours prior
Rivaroxaban (Xarelto)[4]		Stop 1 day prior	Stop 2 days prior	Stop 72 hours prior
Parenteral Anticoagulant	**Patient-Specific Criteria**	**Low/Moderate Bleed Risk Procedure**	**High Bleed Risk Procedure**	**Neuraxial Anesthesia[6]**
Argatroban¥	Normal liver function	Stop 3 hours prior	Stop 5 hours prior	Neuraxial anesthesia is not recommended
	Child-Pugh > 6	Stop 9 hours prior	Stop 15 hours prior	
Bivalirudin¥	CrCl ≥ 30 ml/min	Stop 1.5 hours prior	Stop 2.5 hours prior	
	CrCl < 30 ml/min	Stop 3 hours prior	Stop 5 hours prior	
Enoxaparin (Lovenox)[4]	Prophylactic Dose	Stop 12 hours prior¥		Stop ≥ 12 hours prior
	Therapeutic Dose	Stop 24 hours prior		Stop ≥ 24 hours prior
Fondaparinux (Arixtra)¥	CrCl ≥ 50 ml/min	Stop 3 days prior	Stop 4 days prior	See ASRA Guidelines for details
	CrCl < 50 ml/min	Stop 5 days prior	Stop 6 days prior	
Unfractionated heparin (UFH)[4]	5000 units BID/TID	Stop at least 4 hours prior¥		Stop 4 to 6 hours prior
	UFH infusion	Stop at least 4 hours prior		Stop 4 to 6 hours prior
Antiplatelet Agent	**Patient-Specific Criteria**	**Low/Moderate Bleed Risk Procedure**	**High Bleed Risk Procedure**	**Neuraxial Anesthesia[6]**
Aspirin (ASA)[4]		Continue ASA uninterrupted (If ASA interruption is required, stop ASA 7 days prior**)		ASA may be continued
Cangrelor¥		Stop 1 to 3 hours prior		Stop 3 hours prior
Cilostazol (Pletal)¥		Stop 1 to 2 days prior		Stop 2 days prior
Clopidogrel (Plavix)[4]		Stop 5 days prior**		Stop 5 to 7 days prior
Prasugrel[4]		Stop 7 days prior**		Stop 7 to 10 days prior
Ticagrelor[4]		Stop 3 to 5 days prior**		Stop 5 to 7 days prior

* For patients with additional risk factors for bleeding (e.g., age > 65 years, hypertension, concurrent antiplatelet medication), consider holding dabigatran 120 hours prior to procedure

**For patients taking dual antiplatelet therapy (DAPT) with stents in place, ANY interruption in antiplatelets should be coordinated with surgeon, anesthesiologist, the prescribing provider (e.g., cardiologist, neurosurgeon, vascular surgeon); elective noncardiac surgery should be delayed at least 30 days after bare metal stent and at least 6 months after drug-eluting stent

¥ UW Health-specific recommendation based on institutional standards and/or opinion of guideline workgroup members

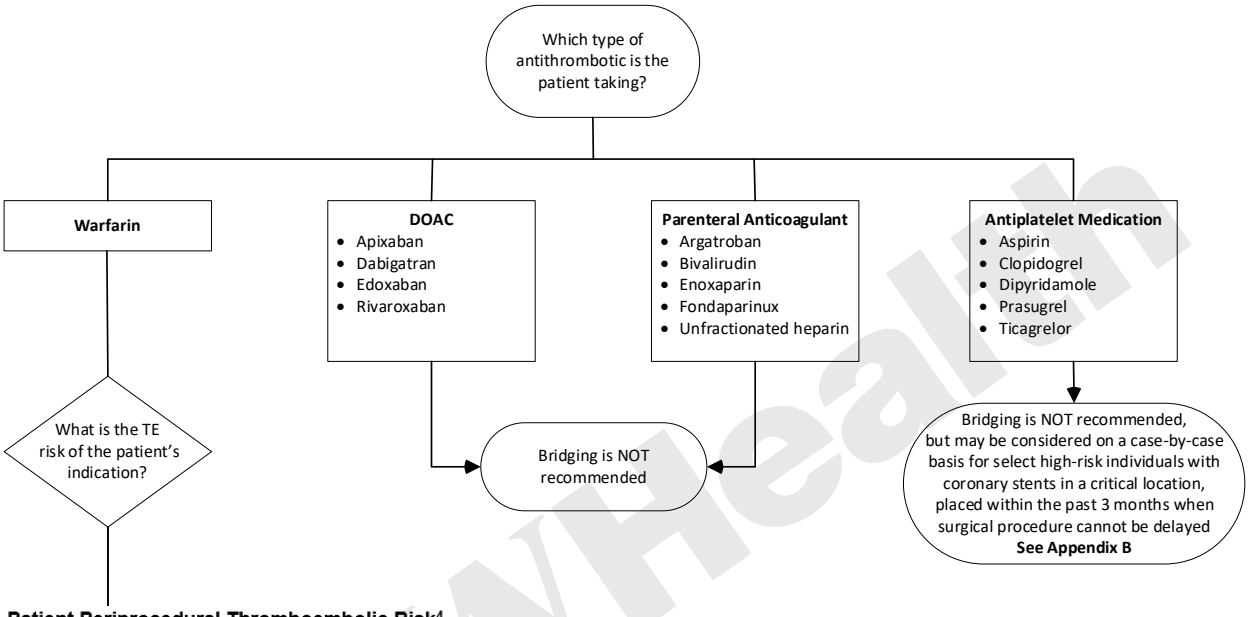
Table 3. Restarting Antithrombotics After Surgical Procedures

Oral Anticoagulant	Patient-Specific Criteria	Low or Moderate Bleed Risk Procedure	High Bleed Risk Procedure	Neuraxial Anesthesia[6]
Warfarin[4]		Restart within 24 hours post-op		Remove neuraxial catheter when INR < 1.5
Apixaban (Eliquis)[4]		Restart at least 24 hours post-op	Restart 48 to 72 hours post-op	Restart at least 6 hours after catheter removal
Dabigatran (Pradaxa)[4]				
Edoxaban (Savaysa)[4]				
Rivaroxaban (Xarelto)[4]				
Parenteral Anticoagulant	**Patient-Specific Criteria**	**Low or Moderate Bleed Risk Procedure**	**High Bleed Risk Procedure**	**Neuraxial Anesthesia[6]**
Argatroban¥		Restart at least 24 hours post-op	Restart 48 to 72 hours post-op	Neuraxial anesthesia not recommended
Bivalirudin¥		Restart at least 24 hours post-op	Restart 48 to 72 hours post-op	
Enoxaparin (Lovenox)[4]	Prophylactic Dose (once daily)	Restart at least 12 hours post-op¥	Restart at least 24 hours post-op¥	Restart once-daily prophylactic LMWH at least 12 hours after neuraxial catheter placement and at least 4 hours after catheter removal¥
	Prophylactic Dose (twice daily)	Restart at least 12 hours post-op¥	Restart at least 24 hours post-op¥	Restart twice-daily prophylactic LMWH no sooner than the day after the procedure, at least 4 hours after catheter was removed
	Therapeutic Dose	Restart at least 24 hours post-op	Restart 48 to 72 hours post-op	Restart at least 4 hours after neuraxial catheter was removed, and at least 24 hours after catheter was placed
Fondaparinux (Arixtra)¥		Restart at least 24 hours post-op	Restart 48 to 72 hours post-op	Restart at least 6 hours after catheter removal
Unfractionated heparin (UFH)[4]	5000 units BID/TID	Restart at least 12 hours post-op¥	Restart at least 24 hours post-op¥	OK to use with indwelling neuraxial catheter; remove indwelling neuraxial catheters 4 to 6 hours after last heparin dose; restart at least 1 hour after catheter removal
	UFH infusion	Restart at least 24 hours post-op; when therapeutic dose UFH is used for bridging therapy, omit bolus dose and start with a lower intensity infusion[4]		Delay restarting UFH at least 1 hour after needle placement; remove indwelling neuraxial catheters 4 to 6 hours after last UFH dose; restart at least 1 hour after catheter removal
Antiplatelet Medication	**Patient-Specific Criteria**	**Low or Moderate Bleed Risk Procedure**	**High Bleed Risk Procedure**	**Neuraxial Anesthesia[6]**
Aspirin[4]		Restart within 24 hours post-op		Restart 24 hours post-op; neuraxial catheter may be maintained and removed without regard to ASA
Cangrelor[4]		Restart within 4 to 6 hours post-op, continue for a minimum of 48 hours and maximum of 7 days total		Restart at least 8 hours after catheter removal
Cilostazol (Pletal)¥		Restart within 24 hours post-op		Restart at least 6 hours after catheter removal
Clopidogrel (Plavix)[4]		Restart within 24 hours post-op		Restart 24 hours post-op, neuraxial catheter may be maintained for 1 to 2 days provided no loading dose is given; if loading dose is planned, wait at least 6 hours after catheter removal

Prasugrel[4]		Restart within 24 hours post-op	Restart 24 hours post-op, after neuraxial catheter has been removed (if a loading dose is planned, wait at least 6 hours after catheter removal)
Ticagrelor[4]		Restart within 24 hours post-op	Restart 24 hours post-op, after neuraxial catheter has been removed (if a loading dose is planned, wait at least 6 hours after catheter removal)

¥ UW Health-specific recommendation, based on institutional standards and/or expert opinion of guideline workgroup members

Figure 1. Is Bridging Therapy Usually Recommended?



Patient Periprocedural Thromboembolic Risk[4]

Thromboembolic (TE) Risk[a]	Mechanical Heart Valve	Atrial Fibrillation	Venous Thromboembolism (VTE)	
Low	• Bileaflet mechanical aortic valve without major risk factors for stroke[b]	• $CHADS_2$ score of 0-2 and no prior stroke or TIA • CHA_2DS_2VASc score of 1-4	• VTE more than 12 months ago	Bridging is NOT recommended for low and moderate TE risk indications
Moderate	• Mechanical mitral valve without major risk factors for stroke[b] • Bileaflet mechanical aortic valve with major risk factors for stroke[b]	• $CHADS_2$ score of 3-4 • CHA_2DS_2VASc score of 5-6	• VTE in the past 3 to 12 months • Recurrent VTE • Non-severe thrombophilia (*heterozygous* factor V Leiden or prothrombin gene mutation) • Active cancer or recent history of cancer	
High	• Mechanical mitral valve with major risk factors for stroke[b] • Caged ball or tilting disc valve in mitral or aortic position • Stroke or TIA within past 3 months	• $CHADS_2$ score of 5-6 • CHA_2DS_2VASc score of 7 or higher • Stroke or TIA within past 3 months • Rheumatic valvular heart disease	• VTE within past 3 months (especially < 1 month) • Severe thrombophilia[c] • Antiphospholipid antibody syndrome • Active pancreatic cancer, myeloproliferative disorders, primary brain cancer, gastric cancer, or esophageal cancer	Bridging therapy is recommended for high TE risk indications **See Appendix A**

[a] Empiric risk stratification that is a starting point for assessing periprocedural thromboembolic risk and should be combined with clinical judgement that incorporates individual patient- and surgical procedure-related risk factors

[b] Atrial fibrillation; prior stroke or TIA during anticoagulant interruption or other prior stroke or TIA; prior valve thrombosis; rheumatic heart disease; hypertension; diabetes; congestive heart failure; age > 75 years

[c] Deficiency of protein C, protein S, or antithrombin; *homozygous* factor V Leiden or prothrombin gene mutation or *double heterozygous* for each mutation; multiple thrombophilias

References:

1. Douketis JD, Spyropoulos AC, Spencer FA, et al. Perioperative management of antithrombotic therapy: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. *Chest*. Feb 2012;141(2 Suppl):e326S-e350S. doi:10.1378/chest.11-2298
2. Douketis JD, Spyropoulos AC, Kaatz S, et al. Perioperative Bridging Anticoagulation in Patients with Atrial Fibrillation. *N Engl J Med*. Aug 27 2015;373(9):823-33. doi:10.1056/NEJMoa1501035
3. Kovacs MJ, Wells PS, Anderson DR, et al. Postoperative low molecular weight heparin bridging treatment for patients at high risk of arterial thromboembolism (PERIOP2): double blind randomised controlled trial. *BMJ*. 2021:n1205. doi:10.1136/bmj.n1205
4. Douketis JD, Spyropoulos AC, Murad MH, et al. Perioperative Management of Antithrombotic Therapy: An American College of Chest Physicians Clinical Practice Guideline. *Chest*. 2022;doi:10.1016/j.chest.2022.07.025
5. Spyropoulos AC, Brohi K, Caprini J, et al. Scientific and Standardization Committee Communication: Guidance document on the periprocedural management of patients on chronic oral anticoagulant therapy: Recommendations for standardized reporting of procedural/surgical bleed risk and patient-specific. *Journal of Thrombosis and Haemostasis*. 2019;17(11):1966-1972. doi:10.1111/jth.14598
6. Horlocker TT, Vandermeuelen E, Kopp SL, Gogarten W, Leffert LR, Benzon HT. 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*. Apr 2018;43(3):263-309. doi:10.1097/aap.0000000000000763
7. Levine GN, Bates ER, Bittl JA, et al. 2016 ACC/AHA Guideline Focused Update on Duration of Dual Antiplatelet Therapy in Patients With Coronary Artery Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Journal of the American College of Cardiology*. Sep 6 2016;68(10):1082-115. doi:10.1016/j.jacc.2016.03.513
8. Rossini R, Masiero G, Fruttero C, et al. Antiplatelet Therapy with Cangrelor in Patients Undergoing Surgery after Coronary Stent Implantation: A Real-World Bridging Protocol Experience. *TH Open*. 2020;04(04):e437-e445. doi:10.1055/s-0040-1721504
9. Angiolillo DJ, Rollini F, Storey RF, et al. International Expert Consensus on Switching Platelet P2Y ₁₂ Receptor–Inhibiting Therapies. *Circulation*. 2017;136(20):1955-1975. doi:10.1161/circulationaha.117.031164