LOS ANGELES COUNTY DEPARTMENT OF HEALTH SERVICES
HARBOR-UCLA MEDICAL CENTER

SUBJECT: PERIOPERATIVE MANAGEMENT OF PATIENTS ON ANTICOAGULANTS **POLICY NO.** 325U

CATEGORY: Provision of Care	**EFFECTIVE DATE:** 7/19
POLICY CONTACT: Julianne Joo, PharmD	**UPDATE/REVISION DATE:** 2/23
REVIEWED BY COMMITTEE(S): Pharmacy and Therapeutics, Medical Executive	

PURPOSE:
To establish standard guidelines for the perioperative management of anticoagulation therapy for adult patients.

POLICY:
Harbor-UCLA Medical Center providers will use this guideline to assist in determining the appropriateness in management of anticoagulation in the perioperative period for adult patients.

ABBREVIATIONS:
AF – atrial fibrillation
APLS – antiphospholipid syndrome
CrCl – creatinine clearance
DOAC – direct oral anticoagulant
EF – ejection fraction
IV – intravenous
LMWH – low molecular weight heparin
TIA – transient ischemic attack
UFH – unfractionated heparin
VKA – vitamin K antagonist
VTE – venous thromboembolism

GUIDELINES:
Introduction
The perioperative plan should be developed with input from the provider performing the procedure as well as the provider managing anticoagulation. These guidelines are intended to assist providers in managing anticoagulation in most clinical situations. They should not replace provider judgement or expert consultation.

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Perioperative management of anticoagulation involves determining:

1. Whether anticoagulation needs to be interrupted in order to perform the procedure
2. When to discontinue the anticoagulant prior to the procedure
3. When to resume the anticoagulant after the procedure, and
4. Whether the use of bridging therapy is indicated

Bridging therapy refers to the use of a parenteral anticoagulant (low molecular weight heparin or IV unfractionated heparin) to maintain therapeutic anticoagulation during interruption of an oral anticoagulant.

These practice guidelines are developed to assist the clinician in determining appropriate management of anticoagulation in the perioperative period.
***NOTE:* for patients on dual antiplatelet therapy, contact cardiology for recommendation.**

Decision to interrupt oral anticoagulation

- Most procedures require temporary interruption of oral anticoagulant therapy, whether with warfarin or a DOAC
- Some procedures have a minimal risk of bleeding and may be performed safely without interrupting anticoagulation. The suggested management for these procedures is summarized in the following table:

Table 1: Management of Oral Anticoagulants in Minimal Bleeding Risk Procedures*

Minimal Bleeding Risk Procedures	DOAC management	Warfarin management
Dental procedures (such as single and multiple extractions, minor oral surgery, and placement of dental implants)[1,2,3,4]	Options: • Continue DOAC without interruption • Postpone usual daily dose of DOAC until after procedure • Omit DOAC on the day of the procedure	Continue warfarin without interruption (consider checking an INR prior to procedure)
Cataract surgery[i]	Optimal management unknown	
Joint aspiration or injections[2,3]	Continue DOAC without interruption	
Cardiac device implantation[2,3]	• Last dose of DOAC in AM of the day prior to procedure • Resume DOAC the day after procedure	Consult cardiologist. Warfarin can usually be continued without interruption for pacemaker and defibrillator implantation.

*decision to continue anticoagulation during a procedure should be made jointly with provider managing anticoagulation and provider performing the procedure

<u>Perioperative Management of DOACs</u>

- Due to the rapid onset and offset of action of DOACs, bridging therapy is not recommended during their interruption [ACC nvAF 2017]
- Stop DOAC medications according to the tables below
- DOACs can be resumed at the patient's usual dose when hemostasis is achieved (usually 1 day after low bleeding risk procedures and 2-3 days after high bleeding risk procedures)

- These are general guidelines; the provider and surgeon should incorporate their clinical judgement to determine appropriate patient-specific care

Table 2: When to stop and restart Factor Xa Inhibitors (Rivaroxaban, Apixaban, and Edoxaban)

High Bleeding Risk Procedure			Low Bleeding Risk Procedure		
mL/min	**Stop**	**Restart**	**mL/min**	**Stop**	**Restart**
CrCl < 15	No data	Resume 48-72 hours after procedure (i.e., postoperative day 2-3)	**CrCl < 15**	No data	Resume 24 hours after procedure (i.e., postoperative day 1)
CrCl 15-29	Stop 72 hrs (i.e., last dose evening of preoperative day 4)		**CrCl 15-29**	Stop 36 hrs	
CrCl ≥ 30	Stop 48 hrs (i.e., last dose evening of preoperative day 3)		**CrCl ≥ 30**	Stop 24 hrs (i.e., last dose evening of preoperative day 2)	

[Adapted from ACC nvAF 2017, Up-to-date]

Table 3: When to stop and restart direct thrombin inhibitors (Dabigatran)

High Bleeding Risk Procedure			Low Bleeding Risk Procedure		
mL/min	**Stop**	**Restart**	**mL/min**	**Stop**	**Restart**
CrCl < 15	No data	Resume 48-72 hours after procedure (i.e., postoperative day 2-3)	**CrCl < 15**	No data	Resume 24 hours after procedure (i.e., postoperative day 1)
CrCl 15-29	Stop 120 hrs (i.e., last dose evening of preoperative day 6)		**CrCl 15-29**	Stop 72 hrs (i.e., last dose evening of preoperative day 4)	
CrCl 30-49	Stop 96 hrs (i.e., last dose evening of preoperative day 5)		**CrCl 30-49**	Stop 48 hrs (i.e., last dose evening of preoperative day 3)	
CrCl 50-79	Stop 72 hrs (i.e., last dose evening of preoperative day 4)		**CrCl 50-79**	Stop 36 hrs (i.e., last dose morning of preoperative day 2)	
CrCl ≥ 80	Stop 48 hrs (i.e., last dose evening of preoperative day 3)		**CrCl ≥ 80**	Stop 24 hrs (i.e., last dose evening of preoperative day 2)	

[Adapted from: ACC nvAF 2017, Up-to-date]

Perioperative Management of warfarin

- Given warfarin's long half-life, advanced planning for anticoagulation interruption is recommended for planned procedures.
- Stop and restart warfarin according to the table below
- Provider should consider patient's thrombotic risk to determine if bridging therapy is indicated during warfarin interruption.

Table 4: When to stop and restart warfarin

When to stop and restart warfarin:		
	Usual timing:	Considerations:
STOP	5 days prior to procedure	- Warfarin may be held for longer or shorter durations depending on current INR, the time to scheduled procedure, and the desired INR for procedure - A provider can consider checking an INR 24 hours prior to the procedure to ensure INR is at or close to desired level.
RESTART	Within 24 hours after procedure	- Due to its slow onset of action, warfarin can typically be resumed **within 24 hours** post-procedure at the patient's regular therapeutic dose. - In the setting of post-procedural bleeding complications or high post-procedural bleeding risk, provider may consider delaying warfarin resumption. This should be determined in consultation with the managing care team and the provider performing procedure.

Table 5: Thrombotic Risk Stratification for Patients on Warfarin

	Clinical indication for warfarin therapy			Bridging Recommendation
	Mechanical Heart Valve	**Atrial Fibrillation**	**VTE**	
High Risk	• Mechanical mitral valve • Caged-ball or tilting disc valve • Recent stroke/TIA (< 3 months)	• Recent stroke/TIA (< 3 months) • Presence of cardiac thrombus • Rheumatic heart disease • CHA2DS2-VASc score ≥ 7	• Recent (< 3 months) VTE • Presence of APLS • Strong genetic thrombophilia: -Protein C or S deficiency -Antithrombin deficiency -Homozygous factor V Leiden or PT gene mutations -Multiple abnormalities	Bridging therapy is **recommended** for patients with **high thrombotic risk conditions,** unless the risk of bleeding outweighs the benefit of bridging.
Moderate Risk	• Bileaflet aortic valve with additional risk factors: - Atrial fibrillation - Prior stroke/emboli - Low EF (<30%)	• Nonvalvular AF with: - CHA2DS2-VASc 5-6, or - History of stroke/emboli	• VTE within the past 3-12 mos • Nonsevere thrombophilia • History of recurrent VTE • Active cancer	**Individualized consideration** is needed for patients with **moderate thrombotic risk**. May consult with anticoagulation management service or other subspecialty if desired.
Low Risk	• Bileaflet aortic valve with: - No atrial fibrillation, and - No history of stroke/emboli	• Nonvalvular AF with: - CHA2DS2-VASc 1-4, and - No cardiac thrombus, and - No history of stroke/emboli	• VTE ≥ 12 months old, with: - No APLS, and - No genetic thrombophilia	Bridging therapy is **not recommended** for patients with **low thrombotic risk conditions**

Abbreviations:
AF=atrial fibrillation, APLS=antiphospholipid syndrome, EF=ejection fraction, TIA=transient ischemic attack, VTE=venous thromboembolism

Parenteral bridging

- Parenteral agents commonly used for perioperative bridging include low molecular weight heparin (LMWH) and IV unfractionated heparin (UFH)
- The decision to use UFH rather than LMWH as the bridging agent depends on renal function and the clinical setting (inpatient versus outpatient)

Table 6: Parenteral Bridging Selection

How to choose a parenteral bridging agent:	
LMWH	• Preferred agent for patients with CrCl > 30mL/min • Dose-adjusted LMWH can be considered for patients with CrCl between 15-30 mL/min
UFH	• Preferred agent for patients with CrCl < 30mL/min or when quick onset/offset of anticoagulation is desired • For UFH dose titration, please refer to the heparin policy and procedure
Other	For patients with active or remote history of heparin allergy or heparin-induced thrombocytopenia, an alternative non-heparin anticoagulant should be selected with specialist consultation

Table 7: When to stop and restart parenteral bridging agents (LMWH and UFH)

Pre-procedure:	
START	• Inpatient: start parenteral agent once INR is below therapeutic range • Outpatient: start parenteral agent once INR is below therapeutic range **or** after omitting 2-3 doses of warfarin if the INR is not measured
STOP	• Discontinue LMWH at least 24 hours prior to the procedure • Discontinue UFH at least 6 hours prior to the procedure
Post-procedure:	
RESUME	Restart LMWH or UFH when adequate hemostasis is achieved
STOP	Discontinue LMWH or UFH when INR is therapeutic

Reviewed and approved by:
Medical Executive Committee 2/2023

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