

Bridging Warfarin with Parenteral Anticoagulants: Peri-Procedural Management of Anticoagulation and Subtherapeutic INR Bridging

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|----------------|-------------------|
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Interdisciplinary Review:

ABBREVIATIONS:

- **LMWH**: Low molecular weight heparin, including enoxaparin (Lovenox) or dalteparin (Fragmin)
- **MMC**: Medication Management Clinic
- **CCA**: Collaborative care agreement
- **VTE**: Venous thromboembolism
- **EMR**: Electronic medical record

DEFINITIONS:

- **Bridging**: The use of a(n) subcutaneous or intravenous anticoagulant for a period of time during interruption of warfarin therapy and/or when the INR is not within a therapeutic range.
- **Temporary interruption**: The process whereby an anticoagulant is stopped for ≥ 1 doses, resulting in full or partial dissipation of anticoagulant effect prior to the invasive procedure.
- **Nonvalvular Atrial Fibrillation**: Atrial Fibrillation (AF) in the absence of rheumatic mitral stenosis, a mechanical or bioprosthetic heart valve, or mitral valve repair.
- **Periprocedural**: The period of time prior to, during, and shortly after an invasive procedure.
- **Blanket bridge**: The process whereby a patient is to use parenteral anticoagulant when INR drops below a set threshold such as when a referring practitioner indicates on the CCA that they would like the MMC to bridge patient with LMWH if INR < 1.5

1. Peri-Procedural Management of Anticoagulation
PROCEDURE:

In the event a patient will have an invasive procedure requiring temporary discontinuation of anticoagulation, a physician may request the anticoagulation clinic pharmacist to coordinate periprocedural anticoagulation with or without bridging by indicating ‘yes’ on the collaborative care agreement to authorize the Medication Management Clinic to manage all parenteral bridge therapy dosing.

Fondaparinux is not recommended for bridging in mechanical heart valve patients or periprocedural anticoagulation. Fondaparinux may be used in this setting if required per pharmacist’s clinical judgment.

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- A. If a patient will have an invasive procedure which will require temporary interruption of **warfarin**:
- i. Pharmacist or front desk staff to contact practitioner performing procedure to determine appropriate length of holding warfarin therapy and when to resume warfarin post-procedure and document in EMR.
- B. If authorization granted in CCA for MMC to manage all parenteral bridge therapy, the pharmacist will then determine need for bridging based on VTE/stroke risk in Appendix A.
- i. Pharmacist will document “MMC to manage parental bridging” in the anticoagulation episode and anticoagulation tracker.
- C. If provider has **NOT** granted authorization in CCA for MMC to manage all parenteral bridge therapy, the pharmacist will contact referring practitioner to determine need for bridging and document communication in EMR. Pharmacist will provide a recommendation based on VTE/stroke risk in Appendix A.
- D. If bridging has been deemed appropriate, pharmacist to create bridging calendar (using template in Appendix B).
- Patient will be contacted by front desk staff to schedule bridge appointment, obtain patient’s current weight, inform patient of need to visit lab prior to appointment (if needed), and update preferred pharmacy.
 - Prior to visit, pharmacist will enter order for H/H, SCr and PLT if most recent results in EMR are >30 days (unless otherwise stated/documented) if stable or > 7 days if not. Pharmacist will also create the bridge calendar prior to the patient visit.
 - The following will occur at the visit:
 - a. Updated weight taken
 - b. INR checked, adjustment of calendar if needed
 - c. Discuss bridge plan – bridge calendar will be provided to patient and documented in the EMR
 - d. Schedule return appointment with MMC for 3 to 7 days after procedure, as appropriate
 - e. Send in prescription for enoxaparin
 - f. Assist patient with medication access
 - ii. If bridging is not necessary and patient has been seen at MMC within 2 months, pharmacist to call patient and discuss periprocedural anticoagulation dosing via telephone.
- E. If bridging is not necessary and patient has NOT been seen at MMC within 2 months, follow up appointment will be scheduled with patient. If a patient will be having an invasive procedure which will require temporary interruption of **warfarin** and **provider has NOT requested MMC to manage parental bridge therapy** in the CCA:
- i. Pharmacist or front desk staff to contact practitioner performing procedure to determine appropriate length of holding warfarin therapy and document in EMR.
 - ii. Pharmacist to contact referring provider to determine need for bridging and document communication in EMR. Pharmacist will provide a recommendation based on VTE/stroke risk in Appendix A.

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- iii. If bridging has been deemed appropriate, pharmacist to create bridging calendar (using template in Appendix B) and follow steps under Section D above.
- F. Pre-procedure considerations:
 - i. A 5-day warfarin hold prior to surgery is recommended in most cases unless otherwise stated by surgeon
 - ii. Administer the last dose of LMWH approximately 24 hours before procedure. If bridging with Fondaparinux, administer the last dose approximately 48 hours before procedure.
- G. Post-procedure considerations:
 - i. Resume warfarin within 24 hours (the evening of or the following day) after procedure and when there is adequate hemostasis
 - ii. Resume parenteral anticoagulation 24 hours after procedure for low bleed risk procedures (i.e. GI endoscopy, cardiac catheterization). Resume parenteral anticoagulation 48-72 hours after procedure for high bleed risk procedures (cardiac surgery, intracranial or spinal surgery, major orthopaedic surgery, prostate and bladder surgery).
 - iii. Always advise patient to clarify with surgeon regarding when to resume anticoagulation post-procedure and communicate any changes with the anticoagulation clinic
- H. If a patient will be having an invasive procedure which will require temporary interruption of **direct oral anticoagulant (DOAC)**, the MMC encourages the provider to follow the ACC Expert Consensus Decision Pathway for Periprocedural Management of Anticoagulation⁴ recommendation for procedures. If the provider decides a procedure warrants parenteral anticoagulation, the MMC may assist with bridge management if appropriate.
 - i. Pharmacist will provide recommendation for duration of hold per ACC Expert Consensus Decision Pathway for Periprocedural Management of Anticoagulation. Provider will need to indicate if procedure is considered low, moderate, or high risk of bleeding for pharmacist to provide accurate recommendation.

2. Sub-Therapeutic INR Bridging with Parenteral Anticoagulants**PROCEDURE:**

In the event that a thrombotic event is suspected, the patient will be referred to the Emergency Department for evaluation regardless of INR value.

In the event that we receive an INR value of ≤ 0.5 below the patient's therapeutic INR range in a patient with a previously stable therapeutic INR, continuing current dose or a warfarin boost dose according to the pharmacist's clinical judgement is recommended with subsequent INR check in 1-2 weeks. If repeat INR is not in the patient's therapeutic INR range a dosage adjustment should be made. Bridging with parenteral anticoagulation is not recommended for single out-of-range INRs (≤ 0.5 below range) in patients with a previously stable INR.

If a critical INR value of <1.5 is obtained for a patient not new to warfarin therapy, the subsequent procedures listed below will be followed. These procedures are guided by the patient-specific risk of VTE/stroke as reflected in Appendix A (stratified as low, moderate or high risk).

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- A. If the anticoagulation CCA signed by the practitioner indicates blanket bridging is requested, the pharmacist will proceed with ordering the appropriate bridge therapy. The pharmacist will send their note to the referring provider, including the following information:
 - i. Patient's sub-therapeutic INR value and etiology, if known
 - ii. Current indication for warfarin, INR goal, warfarin dosing and any planned warfarin boost doses
 - iii. Pharmacist's recommendation or clarification if bridge is appropriate for the individual patient based upon Appendix A.
 - iv. Pharmacist's plan regarding bridging
 - v. Date of next planned INR check
- B. If the referring practitioner has NOT requested blanket bridging and indicated that the pharmacist should manage bridging on the anticoagulation CCA, pharmacist will proceed with ordering the appropriate bridge therapy based on the clot risk as indicated in Appendix A. The pharmacist may consider clarifying bridge recommendation with referring practitioner if he/she deems appropriate. The pharmacist will send their note to the referring provider, including the following information:
 - i. Patient's sub-therapeutic INR value and etiology, if known
 - ii. Current indication for warfarin, INR goal, warfarin dosing and any planned warfarin boost doses
 - iii. Pharmacist's plan regarding bridging
 - iv. Date of next planned INR check
- C. If the referring practitioner has NOT requested blanket bridging and has NOT indicated that the pharmacist should manage bridging on the anticoagulation CCA, pharmacist will contact referring provider with the following information to coordinate bridge plan:
 - i. Patient's sub-therapeutic INR value and etiology, if known
 - ii. Current indication for warfarin, INR goal, warfarin dosing and any planned warfarin boost doses
 - iii. Pharmacist's recommendation regarding bridging based on Appendix A
 - iv. Date of next planned INR check
- D. If bridging is initiated by the clinic, therapeutic-dosing of parenteral anticoagulants will be used (in lieu of prophylactic doses) unless otherwise documented / stated in chart.
- E. Documentation of parenteral anticoagulation plan will be placed in the patient's Epic profile.
- F. Bridging with parenteral agent will continue until the patient's INR has reached at least the lower limit of therapeutic range.

NOTE: This guideline is not applicable to patients with contraindications to heparin products (e.g. heparin allergy, heparin-induced thrombocytopenia (HIT), etc.). For patients with contraindications to heparin products, may consider if Fondaparinux is appropriate with referring practitioner. For more information of the management of patients with HIT, please reference the Medication Management Clinic's Management of Patients with Heparin-Induced Thrombocytopenia (HIT). For more information regarding bridging with unfractionated heparin (UFH), refer to procedure PH MMC-15 Bridging Warfarin with Unfractionated Heparin.

Appendix A: Risk Stratification for VTE/stroke

Atrial Fibrillation

| Annual Thrombotic Risk | Characteristics | 2012 CHEST Perioperative Management¹ 2017 ACC Expert Consensus for Periprocedural Management² |
|-------------------------------|---|--|
| High (>10%) | <ul style="list-style-type: none"> • CHADS₂VASc score of ≥ 7 • Recent stroke, TIA or systemic embolism (within 3 months) • Rheumatic valvular heart disease | <ul style="list-style-type: none"> • Bridge therapeutic-dose <ul style="list-style-type: none"> ○ SC LMWH ○ IV UFH • Additional Considerations: <ul style="list-style-type: none"> ○ Recent intracranial hemorrhage (within 3 months): <ul style="list-style-type: none"> ▪ Attempt to delay procedure. If procedure is required, no bridge or post-procedural bridging only. ○ Recent stroke, TIA or systemic embolism (within 3 months): Attempt to delay procedure. |
| Moderate (5-10%) | <ul style="list-style-type: none"> • CHADS₂VASc score of 5 -6 | <ul style="list-style-type: none"> • Bridging generally not recommended; May consider bridging if prior stroke or TIA and no increase bleed risk. • Factors that increase patient bleed risk: <ul style="list-style-type: none"> ○ Major bleed or ICH <3 months, quantitative or qualitative platelet abnormality including aspirin use, INR above therapeutic range, prior bleed from previous bridging • If bridging desired: Utilize therapeutic-dose SC LMWH or IV UFH |
| Low (<5%) | <ul style="list-style-type: none"> • CHADS₂VASc score of ≤ 4 and no history of stroke, TIA, or systemic embolism | <ul style="list-style-type: none"> • Do not bridge |

Atrial Fibrillation Stroke Risk Scoring Systems

| CHADS₂VASc | Point Value |
|---------------------------------------|--------------------|
| Congestive heart failure | 1 |
| Hypertension | 1 |
| Age ≥ 75 years | 2 |
| Diabetes | 1 |
| Prior stroke or TIA | 2 |
| Vascular disease history | 1 |
| Age 65-74 years | 1 |
| Sex (female) | 1 |

Prosthetic Heart Valves

| Annual Thrombotic Risk | Characteristics | 2017 AHA/ACC Focused Update-Valvular Heart Disease ³ |
|------------------------|---|--|
| High | <ul style="list-style-type: none"> • Any mitral valve prosthesis • Older generation (caged-ball or tilting disk) aortic valve prosthesis • Recent stroke/TIA within 6 months • Bileaflet aortic valve prosthesis AND one of the following thromboembolic risk factors: <ul style="list-style-type: none"> ○ atrial fibrillation, previous thromboembolism, hypercoagulable condition, LV systolic dysfunction, >1 mechanical valve | <ul style="list-style-type: none"> • Reasonable to bridge preoperatively on individual basis; weigh risks of bleeding and thromboembolism • Bridge therapeutic-dose <ul style="list-style-type: none"> ○ SC LMWH ○ IV UFH (Grade IIC) |
| Moderate | <ul style="list-style-type: none"> • Bileaflet aortic valve prosthesis without atrial fibrillation AND no other risk factors for stroke | <ul style="list-style-type: none"> • Do not bridge (Grade IC) |

Venous Thromboembolism

| Annual Thrombotic Risk | Characteristics | 2012 CHEST Perioperative Management ¹ |
|------------------------|--|--|
| High | <ul style="list-style-type: none"> • Recent VTE (within 3 months) • Severe thrombophilia (eg. deficiency of protein C, protein S, or antithrombin, antiphospholipid antibodies, or multiple abnormalities) | <ul style="list-style-type: none"> • Bridge with therapeutic-dose <ul style="list-style-type: none"> ○ SC LMWH ○ IV UFH (Grade 1C) |
| Moderate | <ul style="list-style-type: none"> • Recent VTE (within the past 3 to 12 months) • Non-severe thrombophilic conditions (eg. heterozygous factor V Leiden mutation) • Recurrent VTE • Active cancer (treated within 6 months or palliative) | <ul style="list-style-type: none"> • Bridging or no bridging to be determined based on an assessment of individual patient and surgery-related factors. • If bridging desired: Therapeutic-dose SC LMWH or IV UFH (Grade 2C) |
| Low | <ul style="list-style-type: none"> • Single VTE occurred > 12 months ago and no other risk factors | <ul style="list-style-type: none"> • No bridging (Grade 2C) |

Appendix B: Standardized Bridge Calendar

| | | | | | | |
|---|--------|---------|-----------|--|--------|----------|
| Patient: Indication for Warfarin: Weight: SCr: PLT: | | | | Procedure: Lovenox syringe size: Days to hold Warfarin: Sent to Pharmacy: | | |
| Month Year | | | | | | |
| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
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Definition of Guideline Grading Recommendation:

- 2012 CHEST Perioperative Management Grade 1C Strong recommendation, low-or very low-quality evidence
 - Grade 2C Weak recommendation, low or very low-quality evidence
- 2017 AHA/ACC Focused Update-Valvular Heart Disease Class 1, Level C Strong recommendation, limited evidence or expert opinion
 - Class 2a, Level C Moderate (strength) recommendation, limited evidence or expert opinion

References:

1. Douketis JD, Spyropoulos, AC, Spencer, FA, et al. Perioperative management of antithrombotic therapy: CHEST evidence-based clinical practice guidelines (9th edition). *Chest*. 2012;141(2_suppl): e326S-e350S.
2. Doherty JU, et al. 2017 ACC Expert Consensus Decision Pathway for Periprocedural Management of Anticoagulation in Patients with Nonvalvular Atrial Fibrillation. *J Am Coll Cardiol*. 2017.69(7):871-898.
3. Nishimura RA, Otto CM, Bonow RO, et al. 2017 AHA/ACC Focused Update of the 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: A Report of the ACC/AHA Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol*. 2017. 70(2): 252-89.
4. Tomeselli GF, et al. 2017 ACC Expert Consensus Decision Pathway on Management of Bleeding in Patients on Oral Anticoagulants: A Report of the American College of Cardiology Task Force on Expert Consensus Decision Pathways. *J Am Coll Cardiol*. 2017 Dec, 70 (24) 3042–3067.

