Blood Thinner Safety Plan: Which zone are you in?

Check your "zone" often to stay healthy and safe

The name of my "blood thinner" is: (CIRCLE the medications you take):

Coumadin® (warfarin) Pradaxa® (dabigatran) Xarelto® (rivaroxaban) Eliquis® (apixaban) Lixiana® (edoxaban)
Lovenox® (enoxaparin) Arixtra® (fondaparinux) Fragmin® (dalteparin) Heparin

I take my blood thinner because: _____

• I can afford and can get my blood thinner with no problems • I take my blood thinner on a regular basis (exactly as prescribed) • I have no new changes or symptoms **For Warfarin Users Only:** • I get my INR blood test regularly and my results are fine	**GREEN ZONE** • No action needed. You are doing great
Changes/Symptoms • I have trouble affording my blood thinner or my insurance won't cover it • I have trouble getting my blood thinner from the pharmacy • I miss doses or sometimes go without taking my blood thinner • I have symptoms such as: Bruising easily Bleeding easily Can't eat Vomiting Upset stomach Cold/Virus/Flu Diarrhea (24+ hours) Other • I have a medical procedure, surgery, or major dental work scheduled Date:_____ What I'm having done:_____ • I am pregnant or plan on becoming pregnant **For Warfarin Users Only:** • I have started, stopped, or changed the dose of another medication I take (prescription or over-the-counter) • My diet has changed a lot	**YELLOW ZONE! Time to take action!** These changes or symptoms may put your at risk of bleeding or clotting! • Call doctor's office Doctor's name: _____ Doctor's phone number: _____ • State your name & the name of your doctor • Describe changes or symptoms in left column • Write any new instructions the doctor has provided in space below: _____ _____ _____
Changes/Symptoms • I am bleeding (from any area of the body) and it will not stop • I have severe stomach or back pain, headache, dizziness, fainting, or body weakness that will not stop, or unusual bruising • I have dark, black tarry (sticky like tar) stool, any color blood in stool, any color blood in vomit, vomit that looks like coffee grounds, or any shade of red (even pink) in urine • I had a major accident, serious fall, or hit my head (even if I don't look hurt)	**RED ZONE!!** • SEEK EMERGENCY MEDICAL ATTENTION or • DIAL 911

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Table 3: WARFARIN INTERRUPTION AND BRIDGING SUGGESTIONS[1,2]

Day	Warfarin Dose	Bridging with Low Molecular Weight Heparin (LMWH)	International Normalized Ratio (INR) Monitoring
-7 to -10	Maintenance dose	Assess for perioperative bridging anticoagulation; classify patients as undergoing high or low bleeding risk procedures	Check baseline labs (hemoglobin, platelet count, serum creatinine, INR)
-6- or -5	Begin to hold warfarin day -5 or day -6	No LMWH	None
-4	No Warfarin	No LMWH	None
-3	No Warfarin	Start LMWH at therapeutic or intermediate dose†	None
-2	No Warfarin	LMWH at therapeutic or intermediate dose†	None
-1	No Warfarin	Last preprocedural dose of LMWH administered no less than 24 h before start of surgery at half the total daily dose	Assess INR before the procedure; proceed with surgery if INR <1.5; If INR > 1.5 and <1.8, consider low-dose oral vitamin K reversal (1-2.5 mg)
0 or +1	Resume maintenance dose of warfarin on evening of or morning after procedure	None	None
+ 1	Maintenance dose	Low-bleeding risk: restart LMWH at previous dose; High-bleeding risk: no LMWH administration;	Per clinician judgment
+2 or +3	Maintenance dose	Low-bleeding risk: LMWH administration continued High-bleeding risk: restart LMWH at previous dose	Per clinician judgment
+4	Maintenance dose	Low-bleeding risk: INR testing (discontinue LMWH if INR > 1.9) High-bleeding risk: INR testing (discontinue LMWH if INR > 1.9)	INR
+7 to +10	Maintenance dose		INR

Decisions to interrupt, bridge, and resume anticoagulants MUST be clearly communicated among providers and to patient.

Table 4: PERI-PROCEDURAL USE OF ANTIPLATELETS[3]

Patient Population on Antiplatelet	Action
On aspirin for secondary prevention of cerebrovascular disease (CVD) and is having minor dental or dermatologic procedure, or cataract surgery	Continue aspirin
On aspirin with moderate to high risk for cardiovascular events and requires non-cardiac surgery	Continue aspirin
On aspirin with low risk for cardiovascular events and requires non-cardiac surgery	Stop aspirin 7-10 days before procedure
On aspirin and requires coronary artery bypass grafting (CABG) surgery	Continue aspirin
On dual antiplatelet drug therapy and requires CABG surgery	Continue aspirin; Stop clopidogrel or ticagrelor 5 days before sugery; Stop prasugrel 7 days before surgery
On dual antiplatelet drug therapy and requires surgery within 6 weeks of bare-metal stent or within 6 months of drug-eluting stent and cannot wait the suggested time periods before surgery.	Continue dual antiplatelet drug therapy if surgery cannot be deferred until after those time periods (6 weeks for bare-metal stent/6 months for drug-eluting stent).

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Management of Anticoagulation in the Peri-Procedural Period

A TOOL FOR CLINICIANS

Despite the considerable efficacy of antithrombotics and the increased number of oral anticoagulants now available, preventable bleeding and thrombotic events are still unacceptably common. While recently marketed agents require less laboratory monitoring, problems with the clinical management of anticoagulated patients persist, particularly in the peri-procedural period.

Surgery and invasive medical interventions increase the risk of bleeding, while withholding anticoagulants increases the risk of thrombosis due to the underlying condition(s) for which anticoagulation was originally prescribed. The clinical team must therefore balance these competing risks and make educated decisions regarding the decision to interrupt oral anticoagulation for a medical procedure and, if interrupted, whether to "bridge" anticoagulation with injectable anticoagulants, such as low molecular weight heparin (LMWH) in warfarin treated patients.

This guide is intended to:

- Assist clinicians in the simultaneous evaluation of procedure-related bleeding risk and underlying risk of thrombosis
- Guide decisions regarding the interruption of anticoagulation and the use of anticoagulant "bridging"
- Provide detailed guidance for drug dosing and laboratory monitoring in the peri-procedural period
- Encourage clear communication between clinicians involved in prescribing anticoagulants and performing invasive procedures

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4/03/2014

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Table 1: RISK ASSESSMENT[1,2]

INSTRUCTIONS

1. Perform patient anticoagulation assessment 7+ days prior to procedures.
2. Categorize procedure-related bleeding risk using columns to right.
3. Categorize underlying thrombosis risk using rows below.
4. View suggestions for anticoagulant interruption and bridging in cell where row and column intersect.
5. View specific guidance for novel oral anticoagulant (NOAC) users in Table 2.
6. View specific guidance for warfarin users in Table 3.
7. View specific guidance for antiplatelet users in Table 4.

DISCLAIMER: Anticoagulation prescribing is highly complex, and should be conducted with the greatest care on a case by case basis, considering the complete patient medical profile. The information presented is for general guidance only. Prescribers are encouraged to consult the most current medical evidence and organizational policies and procedures.

HIGH BLEEDING RISK PROCEDURES (2 day risk of major bleed ≥ 2%)	LOW BLEEDING RISK PROCEDURES (2 day risk of major bleed <2%)	MINIMAL BLEEDING RISK PROCEDURES
Major surgery with extensive tissue injury ■ Cancer surgery ■ Major orthopedic surgery ■ Reconstructive plastic surgery ***Urologic or Gastrointestinal surgery*** ■ Transurethral prostate resection, bladder resection or tumor ablation ■ Nephrectomy, kidney biopsy ■ Colonic polyp resection ■ Bowel resection ■ Percutaneous endoscopic gastrotomy (PEG) placement, endoscopic retrograde cholangiopancreatography (ERCP) ***Other*** ■ Cardiac, intracranial, or spinal surgery ■ Surgery in highly vascular organs (kidneys, liver, spleen) ■ Multiple tooth extractions ■ Any major operation (procedure duration >45 minutes) ■ Pacemaker or cardioverter-defibrillator device implantation*	■ Minor dental procedures (simple dental extractions, restorations, prosthetics, endodontics) ■ Cutaneous/lymph node biopsies ■ Shoulder/foot/hand surgery ■ Coronary angiography ■ Gastrointestinal endoscopy +/- biopsy ■ Colonoscopy +/- biopsy ■ Abdominal hysterectomy ■ Laparoscopic cholecystectomy ■ Abdominal hernia repair ■ Hemorrhoidal surgery ■ Bronchoscopy +/- biopsy ■ Epidural injections with INR <1.2 ■ Pacemaker battery change ■ Arthroscopy	■ Minor dermatologic procedures (excision of basal and squamous cell skin cancers, actinic keratoses, and premalignant or cancerous skin nevi) ■ Cataract procedures ■ Dental cleanings, fillings

UNDERLYING THROMBOEMBOLIC RISK	A	B	C
(>10%/yr. risk of arterial thromboembolism [ATE] or >10%/month risk of venous thromboembolism [VTE]) • Any mechanical mitral valve • Caged ball or tilting disc valve in mitral/aortic position • Stroke or transient ischemic attack (TIA) within last 6 months in patients with a mechanical valve • Atrial fibrilliation (AF) with $CHADS_2$ score of 5 or 6 • Stroke or TIA within past 3 months in patients with AF • Rheumatic valvular heart disease • VTE within past 3 months • Severe thrombophilia • Deficiency of protein C, protein S or antithrombin • Antiphospholipid antibodies • Multiple thrombophilias **1 HIGH**	**NOAC users:** Interrupt NOAC. Bridging with low molecular weight heparin (LMWH) not suggested for NOACs (See Table 2); **Warfarin users:** Interrupt warfarin and bridge with LMWH suggested (See Table 3)† A1	**NOAC users:** Consider interrupting NOAC using clinical judgment. Bridging with LMWH not suggested for NOACs (See table 2); **Warfarin users:** Consider interrupting warfarin using clinical judgment. Bridging with LMWH suggested if warfarin interrupted (See table 3) B1	Do not interrupt anticoagulants. C1
(4–10%/yr. risk of ATE or 4–10%/month risk of VTE) • Bileaflet aortic valve replacement (AVR) WITH major risk factors for stroke • AF with $CHADS_2$ score of 3 or 4 • VTE within past 3-12 months • Recurrent VTE • Non-severe thrombophilia • Active cancer **2 MEDIUM**	**NOAC users:** Interrupt NOAC. Bridging with LMWH not suggested for NOACs (See Table 2); **Warfarin users:** Interrupt warfarin and consider bridging with LMWH (See Table 3) A2	**NOAC users:** Consider interrupting NOAC using clinical judgment. Bridging with LMWH not suggested for NOACs (See table 2); **Warfarin users:** Consider interrupting warfarin with or without LMWH bridging based on clinician judgment (See Table 3) B2	Do not interrupt anticoagulants. C2
(<4%/yr. risk of ATE or <2%/mos. risk of VTE) • Bileaflet AVR WITHOUT major risk factors for stroke • AF with $CHADS_2$ score of 0–2 (and no prior stroke or TIA) • VTE more than 12 months ago **3 LOW**	**NOAC users:** Interrupt NOAC. Bridging with LMWH not suggested for NOACs (See Table 2); **Warfarin users:** Interrupt warfarin. Bridging with LMWH not necessary (See Table 3) A3	**NOAC users:** Interrupt NOAC, Bridging with LMWH not suggested for NOACS (See Table 2); **Warfarin users:** Interrupt warfarin. Bridging with LMWH not necessary (See Table 3) B3	Do not interrupt anticoagulants. C3

Table 2: NOVEL ORAL ANTICOAGULANT (NOAC) INTERRUPTION SUGGESTIONS[1,4]

Drug‡	Patient§ Renal Function	Low Bleeding Risk Surgery** (2 or 3 drug half-lives between last dose and surgery)	High Bleeding Risk Surgery†† (4 or 5 drug half-lives between last dose and surgery)	Resumption of Therapy: Low Bleeding Risk Surgery	Resumption of Therapy: High Bleeding Risk Surgery
Dabigatran					
t ½ = 14–17 hrs	CrCl > 50 mL/min	Last dose: 2 days before procedure	Last dose: 3 days before procedure	Resume on day after procedure (24 h postoperative)	Resume 2-3 days after procedure (48-72 h postoperative)‡‡
t ½ = 16–18 hrs	CrCl 30–50 mL/min	Last dose: 3 days before procedure	Last dose: 4–5 days before procedure		
Rivaroxaban					
t ½ = 8–9 hrs	CrCl > 50 mL/min	Last dose: 2 days before procedure	Last dose: 3 days before procedure	Resume on day after procedure (24 h postoperative)	Resume 2-3 days after procedure (48-72 h postoperative)‡‡
t ½ = 9 hrs	CrCl 30–50 mL/min	Last dose: 2 days before procedure	Last dose: 3 days before procedure		
t ½ = 9–10 hrs	CrCl 15–29.9 mL/min§§	Last dose: 3 days before procedure	Last dose: 4 days before procedure		
Apixaban					
t ½ = 7–8hrs	CrCl >50 mL/min	Last dose: 2 days before procedure	Last dose: 3 days before procedure	Resume on day after procedure (24 h postoperative)	Resume 2-3 days after procedure (48–72 h postoperative)‡‡
t ½ = 17–18 hrs	CrCl 30–50 mL/min	Last dose: 3 days before procedure	Last dose: 4 days before procedure		
Edoxaban t ½ = 6–11 hrs	CrCl >50mL/min	Last dose: 2 days before procedure	Last dose: 3 days before procedure	Resume on day after procedure (24 h postoperative)	Resume 2-3 days after procedure (48–72 h postoperative)

The table above consists of the three NOACs currently available in the US and edoxaban (available in the UK, currently under FDA review in the US). As new medications become available, this list will be modified to include the latest available medications. In the patient with decreased renal clearance, allowance should be made for lower dosing and/or increased time between cessation of medication prior to the procedure to minimize increased bleeding risk.

* Recent evidence suggests that interruption of anticoagulation for ICD and pacemaker-related procedures is not necessary. See Birnie DH et al. *NEJM* 368(22):2084-2093.

† Therapeutic LMWH regimens include enoxaparin 1.5 mg/kg once daily or 1.0 mg/kg twice daily subcutaneously; dalteparin 200 IU/kg once daily or 100 IU/kg twice daily subcutaneously. Intermediate dose LMWH (i.e., enoxaparin 40 mg twice daily subcutaneously) has been less studied in this setting.

‡ Estimated t1/2 based on renal clearance.

§ CrCl calculated using Cockcroft-Gault method.

** Aiming for mild to moderate residual anticoagulant effect at surgery (12%–25%).

†† Aiming for no or minimal residual anticoagulant effect (3%–6%) at surgery.

‡‡ For patients at high risk for thromboembolism and high bleeding risk after surgery, consider administering a reduced dose of dabigatran (75 mg twice daily), rivaroxaban (10 mg once daily), or apixaban (2.5 mg twice daily) on the evening after surgery and on the following day (first postoperative day) after surgery.

§§ Value for patients receiving rivaroxaban, 15 mg once daily.

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Switching Oral Anticoagulant Regimens

FROM: Warfarin **TO:** Eliquis®	Discontinue warfarin and initiate Eliquis® when INR <2.
FROM: Warfarin **TO:** Pradaxa®	Discontinue warfarin and initiate Pradaxa® when INR <2.
FROM: Warfarin **TO:** Xarelto®	Discontinue warfarin and initiate Xarelto® when INR <3.
FROM: Eliquis® **TO:** Warfarin **FROM:** Xarelto® **TO:** Warfarin	Discontinue Eliquis® or Xarelto®. Initiate warfarin and treatment doses of LMWH OR UFH when the next dose of Eliquis® or Xarelto® is due. Discontinue LMWH OR UFH after 5 days if INR is in target range. If INR is not in range, continue LMWH OR UFH until INR is in range.
FROM: Pradaxa® **TO:** Warfarin	**IF CrCl>50ml/min** Start warfarin *3 days* before discontinuing Pradaxa®. **IF CrCl 31-50ml/min** Start warfarin *2 days* before discontinuing Pradaxa®. **IF CrCl 15-30 ml/min** Start warfarin *1 day* before discontinuing Pradaxa®.
FROM: Eliquis® **TO:** Pradaxa®	Discontinue Eliquis® and begin Pradaxa® at the next scheduled dose.
FROM: Pradaxa® **TO:** Eliquis®	Discontinue Pradaxa® and begin Eliquis® at the next scheduled dose.
FROM: Pradaxa® OR Eliquis® **TO:** Xarelto®	Discontinue Pradaxa® OR Eliquis® & start Xarelto® *≤2 hours* prior to next regularly scheduled *evening dose* of discontinued anticoagulant.
FROM: Xarelto® **TO:** Pradaxa® OR Eliquis®	Discontinue Xarelto® & begin Pradaxa® OR Eliquis® at the time of the next scheduled Xarelto® dose.

Eliquis® (apixaban), Pradaxa® (dabigatran), Xarelto® (rivaroxaban), LMWH (low molecular weight heparin), UFH (unfractionated heparin)
Updated 03/2014

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Oral Anticoagulant Dosing Guidelines

	Warfarin	Pradaxa® (dabigatran)	Xarelto® (rivaroxaban)	Eliquis® (apixaban)
FDA approved Indications	**Thromboembolism prophylaxis of:** Atrial Fibrillation Myocardial infarction Prosthetic heart valve **Treatment of:** Pulmonary embolism Venous thromboembolism	**Thromboembolism prophylaxis of:** Non-valvular atrial fibrillation **Treatment of:** Deep vein thrombosis Pulmonary embolism	**Thromboembolism prophylaxis for:** Non-valvular atrial fibrillation Deep vein thrombosis Pulmonary embolism Hip or Knee Replacement **Treatment of:** Deep vein thrombosis Pulmonary embolism	**Thromboembolism prophylaxis for:** Non-valvular atrial fibrillation Hip or Knee Replacement
Usual Dosing	Usual initiation dose of 5-10mg daily Adjust dose based on INR	**Non-valvular Atrial Fibrillation** 150mg twice daily **DVT/PE Treatment** 150mg twice daily following 5-10 days of parenteral anticoagulation	**Non-valvular Atrial Fibrillation** 20 mg once daily **Post-Op DVT prophylaxis** Knee: 10mg once daily for 12 days Hip: 10 mg once daily for 35 days **DVT/PE treatment & secondary prophylaxis** 15 mg twice daily for 21 days, then 20mg once daily	**Non-valvular atrial fibrillation** 5mg twice daily **Post-Op DVT Prophylaxis** Knee: 2.5mg twice daily for 12 days Hip: 2.5mg twice daily for 35 days
Dose Adjustments	Adjust dose based on INR	**Non-valvular Atrial Fibrillation** CrCl >30 ml/min: 150mg twice daily CrCl 15-30 ml/min: 75mg twice daily CrCl<15ml/min or dialysis: Avoid Use **DVT/PE Treatment** Avoid if CrCl ≤30ml/min	**DVT/PE treatment or Post-Op prophylaxis*** CrCl ≥30ml/min: no adjustment needed CrCl<30ml/min: Avoid Use **Non-valvular Atrial Fibrillation*** CrCl>50ml/min: no adjustment needed CrCl 15-50ml/min: 15mg once daily CrCl<15ml/min: Avoid Use	**If patient has *ANY 2* of the following:** Age ≥80 years Weight ≤60kg SrCr≥1.5mg/dL **THEN** 2.5mg twice daily **Non-valvular Atrial Fibrilation** ESRD on hemo-dialysis: 5mg twice daily
Monitoring	INR	None	None	None
Clinical Pearls	INR goal range: 2-3.5 (goal depends on diagnosis) Bridging, if appropriate, should occur for ~5 days and until patient is therapeutic Vitamin K & other clotting factors can be used for reversal	Swallow capsules whole, with a full glass of water, without regard to meals Store in original container, tightly capped, use within 4 months after opening No specific reversal agent	15 and 20mg doses *need* to be administered with food 10mg doses can be administered with or without food AFib dose given with evening meal No specific reversal agent	Take without regard to meals No specific reversal agent

*Creatinine Clearance estimate was calculated using Cockcroft-Gault in clinical trials

Updated 04/21/2014