Antithrombotic Reversal & Surgical Management Recommendations* 02/19

Drug Class	*Non-Urgent*	*Urgent - Bleeding or immediate surgery necessary*	*Comments*
Anti-platelet Agents	Hold 5 days prior to procedure* o Plavix® (clopidogrel) o Brilinta® (ticagrelor) Hold 7 days prior to proc.* o Effient® (prasugrel) o Aggrenox® (ASA/dyprid.)	• Consider platelet transfusion	• Caution advised in patients with cardiac stents • Abrupt discontinuation can increase risk of acute stent thrombosis
Unfractionated Heparin	• Infusion: Stop infusion 2 – 6 hours prior to procedure • SQ doses: Hold the evening dose prior to the procedure	• Protamine sulfate: 1 mg for every 100 units of heparin given in previous 3 hrs (max dose: 50 mg single dose or 100 mg in 2 hr period)	• aPTT can be utilized to determine degree of anticoagulation
Low Molecular Weight Heparins	• The last dose should be given 24 hours before the procedure. i.*e., enoxaparin at a dose of 1 mg/kg ONCE 24 hrs prior to surgery if dose was 1 mg/kg BID.*	• Wait 24 hours if possible • Consider protamine sulfate if delay not possible for high bleed risk procedure (only partially reverses LMWH) • Protamine sulfate (based on last dose): LMWH administered ≤ 8 hrs: 1 mg protamine per 1 mg LMWH LMWH administered > 8 hrs: 0.5 mg protamine per 1 mg LMWH	• Elimination can be further delayed in patients with acute or chronic kidney disease • Anti Xa assay can be used to assess degree of anticoagulation
Indirect Factor Xa Inhibitor			
Arixtra® (fondaparinux)	• Hold 36-48 hours prior to procedure	• No specific antidote • rVIIa – limited data available *consider low dose (1-2 mg) and assess response*	• Elimination can be further delayed in patients with acute or chronic kidney disease
Vitamin K Antagonist			
Warfarin	• Stop 5 days prior to procedure • Check INR 1-2 days prior, and if INR greater than 1.5, give Vitamin K 1-2 mg PO • May consider bridge therapy with LMWH in high risk patients	• If procedure can be delayed 6-24 hours, Vitamin K 5-10 mg PO/IV • If procedure cannot be delayed or life threatening bleeding (ICH, etc.), give FFP or PCC prior to procedure. If PCC used give Vitamin K 5-10 mg IV to sustain anticoagulation reversal • NOTE: Memorial recommendations are now for fixed-dose PCC as noted below. Baseline INR not required; repeat dosing may be considered if INR remains elevated following initial dose • PCC Dosing for *life threatening* bleeding: - 1500 units unless indicated below - 2000 units for any patient with ▪ ICH diagnosis ▪ Body weight > 90 kg ▪ INR > 5 (if initial INR known)	• PCC should only be used for *life threatening bleeding (ICH, etc.)* or if urgent surgery needed and IV vitamin K or FFP not appropriate (surgery needed within 4-6 hours) *Caution: Risk of thrombosis when PCC used, particularly in patients with history of thrombosis.*

***This is intended to provide the clinician with possible strategies for patient management and does not establish a fixed set of guidelines that preempt physician judgment. Consider risk of thrombosis when reversal agents utilized.**

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Thrombin Inhibitor			
Pradaxa® (Dabigatran)	• Hold for 1-2 days prior to procedure for CrCl greater than 50 ml/min • Hold for 3-5 days prior to procedure for CrCl less than 50 ml/min	• Idarucizumab (Praxbind®): 5 grams IV x 1 dose Limited data to repeat 5gm dose 12-24 hrs after first dose IF bleeding persists in combination with elevated coagulation parameters • Hemodialysis	• Thrombin Time (preferred) or aPTT can be used to rule out substantial residual effect
Factor Xa Inhibitors			
Xarelto® (Rivaroxaban)	• Hold for at least 24 hours prior to procedure with normal renal function (>90 ml/min). Consider holding 2-3 days for patients with CrCl 30-90 ml/min.	• PCC – 50 units/kg for major bleeding. Max dose: 5000 units • Vitamin K not effective if given	• PT can be used to rule out substantial residual effect. Normal value may rule out clinically relevant residual anticoagulant effect. PT not intended to be used for dosage adjustment.
Eliquis® (Apixaban)	• Hold for at least 48 hrs prior to procedures with high risk of bleeding; 24 hrs prior to procedures with low risk of bleeding. Consider holding 2-3 days if CrCl < 60 ml/min regardless of procedure type or 3 or more days if CrCl < 50 ml/min.	• PCC – 50 units/kg for major bleeding. Max dose: 5000 units • Vitamin K not effective if given	• PT can be used to rule out substantial residual effect. Normal value may rule out clinically relevant residual anticoagulant effect. PT not intended to be used for dosage adjustment.
Savaysa® (Edoxaban)	• Hold for at least 48 hrs prior to procedures with high risk of bleeding; 24 hrs prior to procedures with low risk of bleeding. Consider holding 1-2 days for CrCl > 50 ml/min and 3 or more days if CrCl ≤ 50 ml/min.	• No specific antidote/ Not dialyzable • PCC – 50 units/kg for major bleeding. Max dose: 5000 units • Vitamin K not effective if given	• PT can be used to rule out substantial residual effect. Normal value may rule out clinically relevant residual anticoagulant effect. PT not intended to be used for dosage adjustment.
Coagulopathies Not Associated with Oral Anticoagulants			
Cardiopulmonary bypass associated coagulopathy (intra-op or post-op cardiac surgery)	• Vitamin K • FFP	• PCC – 1000 units and assess response - May repeat dose if clinically necessary • Vitamin K – consider in addition to PCC	PT can be used to rule out substantial residual effect. Normal value may rule out clinically relevant residual anticoagulant effect. PT not intended to be used for dosage adjustment.