

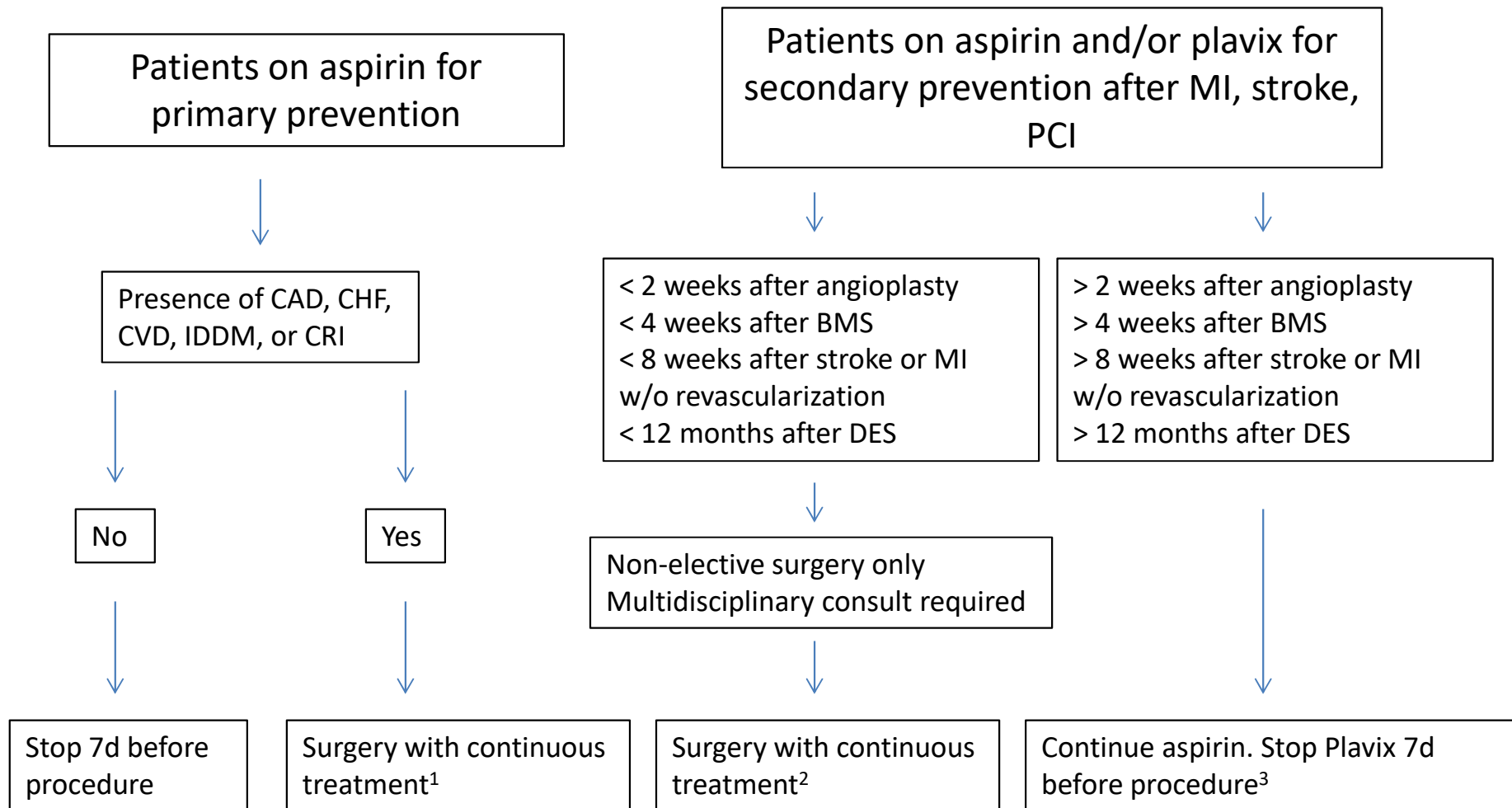
Good Samaritan Hospital
Department of Anesthesia
Perioperative Guidelines

NPO GUIDELINES*
Clear liquids: > 2 hours
Breast Milk: > 4 hours
Light meal (toast): > 6 hours
Heavy meal (meat, fried or fatty food): > 8 hours
* For healthy patients with normal gastric emptying

PREOPERATIVE TESTING: STEP 1*			
EXPECTED BLOOD LOSS	CBC	T&S	T&C
EBL <100			
EBL 100-500 mL	X	1	
EBL >500 mL	X	X	1
<i>*Studies valid for 6 months unless there has been a change in medical history</i>			
<i>1) Consider for patients with significant medical problems, anemia or previous blood transfusion</i>			

PREOPERATIVE TESTING: STEP 2*											
ALL SURGERIES	CBC	Glucose	Chem 7	LFTs	Coags	Preg Test	ECG	Echo	CXR	PFTs	Consults
Female with childbearing potential						OFFER					
Active cardiac condition (<i>No Elective Surgery. Emergency surgery only. Requires Anesthesia consult</i>)	X		X	X	X		X	X	X		X
LOW RISK SURGERY (<i>Endoscopic procedures, Ophthalmic surgery, Superficial procedures, Minor Procedures</i>)											
No Routine Testing Necessary											
INTERMEDIATE RISK SURGERY (<i>Nonambulatory Neuro, ENT, Thoracic, Intraoperative, Gynecologic, Urologic, Orthopedic surgery</i>) OR HIGH RISK SURGERY (<i>Vascular</i>)											
Cardiac disease											
Cardiac disease with exercise tolerance > 4 METs							3				
Cardiac disease with exercise tolerance < 4 METs	X						X	2			
Stable coronary artery disease or congestive heart failure							X				1
Left Ventricular Dysfunction or ≥ moderate valvular disease	X		X				X	X			
High risk murmur							X	2			
Pulmonary disease											
Stable respiratory disease with exercise tolerance > 4 METs							3				
Stable respiratory disease with exercise tolerance < 4 METs	X						X	2			
Unstable or severe, uncharacterized respiratory disease	X		X				X	X	X	+/-	X
Other disease											
Cerebrovascular disease							X				1
Diabetes		X	+/-				X				1
Renal insufficiency	X		X				X				1
Liver disease			X	X	X		3				
Hematologic disorders	X						3				
Coagulopathies	X				X		3				
Malignancy	+/-						3				
Current drug therapy											
Diuretics			X								
Coumadin					X						
Digoxin							X				
Chemotherapy (<i>Within last 3 months</i>)	X										
<i>*Studies valid for 6 months unless there has been a change in medical history</i>											
<i>1) If it will change management, consider consult and/or testing if patient has exercise tolerance < 4 METs and at least 1 of 5 risk factors including ischemic heart disease, CHF, cerebrovascular disease including TIA, IDDM, and renal insufficiency with Cr >2.0</i>											
<i>2) Consider echo if it will change management for patients with cardiac or pulmonary disease and exercise tolerance < 4 METs or patients with high risk murmurs including diastolic, continuous, holosystolic, late systolic, ≥ grade 3/6, murmurs with an ejection click or radiation to neck or back, murmurs of known valvular disease in a patient with a change in symptoms, or murmurs in a patient with cardiac disease or abnormal ECG or CXR</i>											
<i>3) ECG indicated for patients scheduled for high risk surgery but not intermediate risk surgery</i>											
<i>METs: Metabolic equivalent of tasks. 4 METs is roughly equivalent to climbing a flight of stairs, walking up a hill or walking on flat ground at 3-4 mph</i>											
<i>Emergency surgery: Surgery necessary given risk to life or limb</i>											
<i>Active cardiac condition: 1) Unstable coronary syndromes: Unstable or severe angina, myocardial infarction within last 30d; 2) Decompensated heart failure: NYHA class IV, worsening or new-onset heart failure;</i>											
<i>3) Significant arrhythmias: High-grade atrioventricular block, Mobitz II atrioventricular block, third-degree atrioventricular heart block, symptomatic ventricular arrhythmias including atrial fibrillation with uncontrolled ventricular rate (HR > 100 beats per minute at rest), symptomatic bradycardia, newly recognized ventricular tachycardia; 4) Severe valvular disease: Severe aortic stenosis (mean pressure gradient > 40 mmHg, aortic valve area < 1.0 cm², or symptomatic), symptomatic mitral stenosis (progressive dyspnea on exertion, exertional presyncope, or HF)</i>											

DAY OF SURGERY DRUG MANAGEMENT	CONTINUE	HOLD
Beta Blockers	X	
Statins	X	
Calcium channel blockers	X	
ACEi and ARBs		X
Alpha2 agonists (e.g.. Clonidine)	X	
Diuretics		X
Insulin	1	
Oral diabetes medications		2
PPIs and H2-blockers	X	
NSAIDs		X
Aspirin	2	
Clopidogrel (Plavix) and Effient (Prasugrel)		2
Anticoagulants (e.g.. Coumadin, Pradaxa, Xarelto, Eliquis)		2
Anti-Rejection medications	X	
Opiates	X	
Antidepressants (except MAOI)	X	
Dietary supplements		X
1) Generally patient should take 80% of their long acting basal insulin prior to surgery		
2) Consult anesthesiologist		



MI: myocardial infarction; PCI: percutaneous coronary intervention; BMS: bare metal stent; DES: drug eluting stent; CAD: coronary artery disease; CHF: congestive heart failure; CVD: cerebrovascular disease; IDDM: insulin-dependent diabetes mellitus; CRI: chronic renal insufficiency with creatinine > 2.0

1) Risk of thrombosis is generally greater than risk of surgical bleeding and aspirin therapy should be continued. Consider stopping aspirin if multidisciplinary discussion deems risk of surgical bleeding to be greater than risk of thrombosis (e.g. select neurosurgery procedures)

2) Risk of thrombosis is generally much greater than risk of surgical bleeding and antiplatelet therapy should be continued. If multidisciplinary discussion deems risk of surgical bleeding to be greater than risk of thrombosis (e.g. select neurosurgery procedures) continue aspirin and stop plavix.

3) Ideally delay surgery until dual antiplatelet therapy is complete in patients with cardiac stents (12 months following any DES; 12 months following BMS with STEMI). After this time and in all others, continue aspirin and stop plavix. If high risk for atherosclerotic event (previous thrombosis, L main stent, multivessel stenting, stent in only remaining coronary artery or graft conduit) undergoing low bleeding risk procedure, consider continuing both aspirin and plavix.

Anticoagulant	Mechanism of Action	Last Dose Prior to Surgery	Comments
Warfarin (Coumadin)	Vitamin K antagonist (inhibition of II, VII, IX, X)	Generally 5 days	Monitor INR; Reversal with Vitamin K, FFP or 4 factor PCCs
Unfractionated heparin	Antithrombin activation (inhibition of IIa, IXa, Xa, XIa, XIIa)	IV 2-6 hours	Monitor PTT; Reversal with protamine
LMWH (Lovenox)	Antithrombin activation (inhibition of Xa>>IIa)	24 hours	Possible to monitor anti-Xa level; Partial reversal with protamine
Fondaparinux (Arixtra)	Antithrombin activation (inhibition of Xa)	36-48 hours	No reversal agent, consider factor VIIa in cases of major bleeding
Dabigatran (Pradaxa)	Direct thrombin inhibitor	1-2 days with CrCl >50, 3-5 days with CrCl <50	PTT to rule out residual effect; Praxbind for reversal. Can be removed with dialysis
Rivaroxaban (Xarelto)	Direct Xa inhibitor	1 day with normal CrCl, 2 days with CrCl 60-90, 3 days with CrCl 30-59, 4 days with CrCl 15-29	PT or anti-Xa to rule out residual effect; No reversal agent, consider PCCs for major bleeding
Apixaban (Eliquis)	Direct Xa inhibitor	2 days with CrCl >60, 3 days with CrCl 50-59, 5 days with CrCl 20-49	Anti-Xa to rule out residual effect; No reversal agent, consider 4 factor PCCs for major bleeding

Perioperative Diabetic Medication Management

Oral hypoglycemic agents

Agent0000	Day before admission	Surgery in morning	Surgery in afternoon	If an insulin infusion is started
Meglitinides	Take as normal	Omit morning dose	Give morning dose if eating	Stop until eating and drinking normally
Sulphonylurea	Take as normal	Omit morning dose	Omit morning dose	Stop until eating and drinking normally
SGLT-2 inhibitors	No dose change	Reduce morning dose by 50% Check BG on admission Retake evening dose if eating	Reduce morning dose by 50% Check BG on admission Retake evening dose if eating	Stop until eating and drinking normally
Acarbose	Take as normal	Omit morning dose	Give morning dose if eating	Stop until eating and drinking normally
DPP-IV inhibitors	Take as normal	Take as normal	Take as normal	Take as normal
GLP-1 analogues	Take as normal	Take as normal	Take as normal	Stop until eating and drinking normally
Metformin	Take as normal	Take as normal	Take as normal	Stop until eating and drinking normally
Pioglitazone	Take as normal	Take as normal	Take as normal	Stop until eating and drinking normally

Metformin should be stopped if patient is receiving contrast medium or estimated GFR > 60cc/min

Ref: Membership of the Working Party, Barker, P., Creasey, P. E., Dhatariya, K., Levy, N., Lipp, A., Nathanson, M. H., Penfold, N., Watson, B. and Woodcock, T. (2015), Peri-operative management of the surgical patient with diabetes 2015. *Anaesthesia*, 70: 1427–1440. doi: 10.1111/anae.13233

Perioperative Diabetic Medication Management

Long acting insulin (Lantus (glargine), levemir (detemir), tresiba, insulatard, Insuman)

Taken	Day before admission	Surgery in the morning	Surgery in the afternoon	If an insulin infusion is started
QD evening	Reduce dose by 20%	Check BG on admission	Check blood glucose on admission	Continue at 80% of usual dose
QD morning	Reduce dose by 20%	Reduce dose check BG on admission	Reduce dose check BG on admission	Continue at 80% of usual dose.

Biphasic or mixed insulin (Novomix30, humulin (NPH), Humalog mix, insuman comb, levemir, Lantus)

Taken	Day before admission	Surgery in the morning	Surgery in the afternoon	If an insulin infusion is started
BID	No change in dose	Reduce morning dose by 50% Check BG on admission Restart normal dose at night if eating.	Reduce morning dose by 50% Check BG on admission Restart normal dose at night if eating.	Hold subcutaneous insulin Restart when patient is eating.

Short and intermediate acting insulin (Novorapid (aspart), humulin S, apidra, humulin)

Taken	Day before admission	Surgery in the morning	Surgery in the afternoon	If an insulin infusion is started
BID	No change in dose	Calculate total morning dose and give 50% of intermediate-acting insulin Check BG on admission Restart normal dose at night if eating.	Calculate total morning dose and give 50% of intermediate-acting insulin Check BG on admission Restart normal dose at night if eating.	Hold subcutaneous insulin Restart when patient is eating.

Basal/bolus regimens (long-acting insulin with short acting insulin for meals)

Taken	Day before admission	Surgery in the morning	Surgery in the afternoon	If an insulin infusion is started
3-5 injections per day	No change in dose	Normal basal injection Omit morning and lunch short-acting dose Keep basal rate Check BG on admission For premixed insulin- halve morning dose, and omit lunchtime dose	Give normal morning insulin dose Omit lunchtime dose Check BG on admission	Stop short acting insulin Continue long acting insulin dose at 80%