



Preoperative Medication Directive

A Clinical Practice Protocol Practitioner Information

*Please note: this is a living document
subject to change. We recommend that this
not be printed but rather accessed on line for
the most current information.*

EVIDENCE INFORMED PRACTICE TOOLS

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PURPOSE AND INTENT

Who this document is for: These sectioned documents are a resource and an information source for Preoperative Assessment/Anaesthesia Clinic Staff, Surgeons and Anaesthesiologists. Each Section (A, B, etc...) was created for a primary user group. Users of this document shall always employ critical thinking and seek additional guidance from the appropriate colleagues (ie: anaesthesiologist and/or surgeon/prescribing physician) when concerns or variances arise.

1. Practice Outcomes

How to use this document:

This tool is to supplement the practice at each site. Implementation of this document will be at the discretion of the site leaders, however the directions provided to patients regarding preoperative medications should be consistent with this document (under the consideration of critical thinking). Clinical judgment, critical thinking and patient specific needs & concerns should always be employed, considered and addressed for all parts of the document.

Any care provider with a Preoperative Medication Directive medication question is asked to submit *in writing* the medication in question (along with any supporting evidence if available) to the PAC Working Group (chair) emalkoske@wrha.mb.ca for consideration.

Considerations for use:

A best possible medication history shall be obtained, including prescription and non-prescription medications. All medications should be asked about, reported and verified as accurately as possible, at transition points, and by all care providers. Recreational drug and alcohol use should also be documented and its implications to care considered. Further, as patients present to the hospital for surgery, information regarding changes in condition, newly prescribed or discontinued medication and current medications

(whether taken or held) should be reviewed. All responsible clinical care providers should be familiar with the medication history.

Patients voicing concerns in opposition to directions given require additional consideration and possibly further consultation with the Anaesthesia team, or other care providers as required. Off label usage, undocumented comorbidities, and multimodal therapy- requires the team to consider patients individually, and involve the patient as a member of the team, and when possible and able to, participate in the decision making process regarding medication administration.

2. Background

This document was created:

- To facilitate a safe surgical experience.
- To streamline and standardize the process as much as safely possible.

This tool has been created using current resources to support the team in the assessment and provision of preoperative instructions to patients regarding medication maintenance. It is fully recognized that there may be circumstances where a consultation with an anaesthesiologist and/or surgeon/prescribing physician is required for certain patients with respect to their history or surgical intervention. Every patient is recognized as unique, and therefore each requires individual consideration and guidance. Special circumstances may appropriately dictate a direction in discordance with this guideline. Clinical judgment, critical thinking as well as patient specific needs and concerns should always be employed, considered and addressed.

Clinical documentation of information shared is important, and should occur in accordance with site practice.

3. Components

The document is divided into sections, allowing a quick reference to the appropriate resource.

Appreciating that the evidence on best practice changes, it is our intent to provide a current document to support practice for care providers. The document will remain online, accessed through the WRHA Insite Surgery page, as a 'living document' with revisions as necessary. Each section of the document will clearly identify the target care provider.

Section A - Pre-Operative Management of Common Medications: For *Designated Preoperative Anaesthesia Clinic Nurses*. This is the main document- for *select Nurses as identified at each site, by the Chief Nursing Officer in collaboration with the Preoperative Anaesthesia Clinic Medical Director*. As all Registered Nurses are responsible for medication knowledge, nurses selected to use this section, and thereby identifying the appropriateness of communicating this information to individual patients, must demonstrate a solid knowledge base, appreciate a multitude of complexities inherent with multiple comorbidities, within in a variety of clinical situations in the perioperative environment. This section deals with common medications.

Section B- Vitamins, Birth Control, DMARDs: For Surgeons. These are medications that may impact surgical outcomes and current disease exacerbations if continued or stopped (such as increased risk of infection, disease symptoms worsening, etc.).

If instructions on these listed medications are NOT provided to the patient and the patient requests guidance, the patient will be directed to the surgeon or prescriber for direction. If both of these care providers are unavailable, the directions under “Preoperative Directions” will be provided and further consultation with anaesthesia leadership will be considered. Additionally, surgeons may refer to the guidelines for directions about continuing a certain medication. Please communicate by documenting on the patient’s chart or call the Preoperative Clinic Nurse. If there is concern or to request a change in the directive for that particular patient (or in general for a surgical procedure), clear and consistent communication is imperative to safe practice.

Section C- Anticoagulant Drugs: For Anaesthesiologists. This is a resource section for anaesthesiologists to use as a quick reference tool. (*pending*)

4. References

1. UpToDate. http://www.uptodate.com/contents/perioperative-medication-management?source=search_result&search=perioperative+medication+management&selectedTitle=1%7E18 Accessed August 26, 2014.
2. 2014 ACC/AHA Guideline on Perioperative Cardiovascular Evaluation and Management of Patients Undergoing Noncardiac Surgery. Fleisher, L.A., Auerbach, A. D., Barnason, S. A., et. al. To appear in Journal of the American College of Cardiology.
3. Micromedex Solutions. Web application. http://www.micromedexsolutions.com/micromedex2/librarian/ND_T/evidencexpert/ND_PR/evidencexpert/CS/105B13/ND_AppProduct/evidencexpert/DUPLICATIONSHIELDSYNC/23DA4C/ND_PG/evidencexpert/ND_B/evidencexpert/ND_P/evidencexpert/PFActionId/pf.HomePage
4. Dr. David Robinson and Rheumatology Department HSC. Expert opinion.
5. Up to Date http://www.uptodate.com/contents/surgical-and-endovascular-repair-of-popliteal-artery-aneurysm?source=see_link&anchor=H1231031607#H1231031607. Surgical and endovascular repair of popliteal artery aneurysm. Accessed December 2014.
6. Fisher B, Costantino JP, Wickerham DL, et. al. Tamoxifen for prevention of breast cancer: report of the National Surgical Adjuvant Breast and Bowel Project P-1 Study. J Natl Cancer Inst. 1998;90(18):1371.
7. Cummings SR, Eckert S, Krueger KA, et. al. The effect of raloxifene on risk of breast cancer in postmenopausal women: results from the MORE randomized trial. Multiple Outcomes of Raloxifene Evaluation. JAMA. 1999;281(23):2189.
8. Miller J, Chan BK, Nelson HD. Postmenopausal estrogen replacement and risk for venous thromboembolism: a systematic review and meta-analysis for the U.S. Preventive Services Task Force. Ann Intern Med. 2002;136(9):680.
9. Lidegaard Ø, Løkkegaard E, Svendsen AL, Agger C. Hormonal contraception and risk of venous thromboembolism: national follow-up study. BMJ. 2009;339:b2890.
10. Gonzalez, J.P. and Brogden, R.N. Naltrexone: a review of its pharmacodynamic and pharmacokinetic properties and therapeutic efficacy in the management of opioid dependence. Drugs. 1988; 35: 192–213.

11. Interactions Between Sedatives/Hypnotics/Anxiolytics and Antiretrovirals. http://hivclinic.ca/main/drugs_interact_files/benzo-int.pdf Accessed January 7, 2015.
12. Goldenberg RM, Berard LD, Cheng AYY, Gilbert JD, Verma S, Woo VC, Yale JF. SGLT2 Inhibitor-associated Diabetic Ketoacidosis: Clinical Review and Recommendations for Prevention and Diagnosis. *Clinical Therapeutics*. 2016; 38(12): 2654.
13. Royal Cornwall Hospitals/ NHS Trust. Pre-Operative Assessment Guidelines V 4.1 14 Nov 14. <https://doclibrary-richt.cornwall.nhs.uk/DocumentsLibrary/RoyalCornwallHospitalsTrust/Clinical/Anaesthetics/PreOperativeAssessmentGuidelines.pdf>. Accessed September 2017.
14. Seitz DP, Gill SS, Gruneir A, Austin PC, Anderson G, Reimer CL, Rochon PA. Effects of cholinesterase inhibitors on postoperative outcomes of older adults with dementia undergoing hip fracture surgery. *Am J Geriatr Psychiatry*. 2011 Sep;19(9):803-13.
15. Alcorn S, Foo I. Perioperative management of patients with dementia. *BJA Education* 2017; 17(3): 94-98.

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6. Guidelines

SECTION A- FOR *DESIGNATED NURSES PERI-OPERATIVE* MEDICATION DIRECTIVE

*** Clinical judgment and critical thinking must always be employed***

This document does not identify all medications (and potential drug interactions) that prolong the QT interval. Individual assessment of medications and patient risk factors is required.

When acetylsalicylic acid (ASA) is being used for the prevention or treatment of cardiovascular disease, management depends on the *scheduled surgery* and *preexisting patient conditions*.

Guidelines below refer to ASA 81mg, higher doses should be discussed with an anaesthesiologist and/or surgeon.

The typical management of ASA is given below. Because ASA's effects last for 7 days, the decision to continue or discontinue ASA should be made at least 7 days prior to surgery. As specific surgeons and sites may have preferences that differ from those listed here, consider discussing the preoperative management of ASA with the surgeon.

Indications for continuing ASA preoperatively, based on the <i>scheduled surgery</i>	
Carotid endarterectomy	Continue
Peripheral arterial bypass surgery	Continue
Cardiac surgery (includes pacemaker insertion, testing or revision of an implanted cardiac defibrillator)*	Continue
Cataract surgery	Continue
Indications for discontinuing ASA preoperatively, based on the <i>scheduled surgery</i>	
Spine surgery, Intracranial surgery	Discontinue 7 days preoperatively*
Ophthalmologic surgery (except cataract extraction)	Review with an anesthesiologist at least 7 days before surgery.
<i>Preexisting patient conditions</i> that may affect the decision to continue or discontinue ASA preoperatively	
Vascular stent insertion within the past 12 months	Review with an anesthesiologist at least 7 days before surgery and consider reviewing the case with the interventional radiologist or vascular surgeon who inserted the stent
Balloon angioplasty < 2 weeks prior to surgery	Continue and review with an anesthesiologist at least 7 days before surgery
Known or suspected high-risk coronary artery disease	Consider continuing based on the risk of cardiovascular events versus the risk of bleeding, and review with an anesthesiologist at least 7 days before surgery
Known cerebrovascular	Consider continuing based on the risk of cardiovascular events versus

disease	the risk of bleeding, and review with an anesthesiologist at least 7 days before surgery
<i>Preexisting patient conditions</i> that may affect the decision to continue or discontinue ASA preoperatively (<i>continued</i>)	
Recent <u>Coronary Stent</u> Insertion (<1 year)*	These patients should be referred to an anaesthesiologist at least 7 days before surgery for further consideration (see attached Figure 1 for guidance).
No surgical indication to continue ASA as listed above, and no preexisting patient condition, as listed above, to support continuing ASA preoperatively (i.e. ASA for primary prevention)	Discontinue 7 days preoperatively

*if the patient also has one of the preexisting patient conditions to support continuing ASA, as listed in the table, then review the case with an anesthesiologist at least 7 days prior to surgery.

These recommendations are based on the 2014 ACC/AHA guideline on preoperative cardiovascular evaluation and management of patients undergoing non-cardiac surgery², with the suggestion regarding peripheral arterial bypass surgery from the Up to Date⁵.

Anticoagulant/Antiplatelet Drugs	Preoperative Management
Clopidogrel (Plavix), ticlodipine, prasugrel, ticagrelor, ASA/dipyridamole (Aggrenox), dabigatran etexilate, rivaroxaban, apixiban, warfarin, dalteparin, enoxaparin, fondaparinux,	Consult with anaesthesiologist.

Cardiovascular Drugs	
Beta-Blockers (metoprolol, atenolol, bisoprolol, etc.)	Continue
Alpha-1-antagonists (for hypertension) (terazosin, doxazosin, prazosin)	Continue- however, if cataract surgery- discuss with surgeon
Alpha 2 Agonists (clonidine)	Continue
Calcium Channel Blockers (amlodipine, nifedipine, diltiazem, verapamil, etc.)	Continue
Angiotensin Converting Enzyme Inhibitors (ACE) (ramipril, enalapril, lisinopril, etc.)	HOLD on morning of surgery <i>and ask the patient to bring these medications to the hospital. Exception: Ophthalmic local/standby anaesthesia- Continue.</i>
Angiotensin Receptor Blockers (ARB) (losartan, irbesartan, valsartan, etc.)	HOLD on morning of surgery <i>and ask the patient to bring these medications to the hospital. Exception: Ophthalmic local/standby anaesthesia- Continue.</i>
Digoxin	Continue
Nitrates (nitroglycerin patch, isosorbide dinitrate, etc.)	Continue
Diuretics	
Diuretics for Hypertension, Combination Diuretic/Anti Hypertension medications	Hold on morning of surgery <i>and ask the patient to bring these medications to the hospital.</i>

(hydrochlorothiazide, etc.)	
Diuretics for Heart Failure (furosemide, metolazone)	Discuss with anaesthesiologist
Cholesterol Lowering Agents	
Non-statin Antihyperlipidemic Agents <ul style="list-style-type: none"> • niacin, Fibric Acid derivatives- (gemfibrozil, fenofibrate) • Bile Acid sequestrants (cholestyramine) • ezetimibe 	Hold on morning of surgery
Statins (atorvastatin, rosuvastatin, etc.)	Continue
GI agents	
H2 blockers (ranitidine, famotidine, etc)	Continue
Proton Pump Inhibitors (pantoprazole, omeprazole, etc.)	Continue
misoprostol, sucralfate,	Continue
metoclopramide, domperidone	Continue
Antacids	Hold on morning of surgery
Pulmonary Agents	
Beta agonists- salbutamol (Ventolin), terbutaline (Bricanyl), salmeterol (Serevent) formoterol (Oxeze), etc	Continue
Anticholinergics - ipratropium (Atrovent), tiotropium (Spiriva), etc	Continue
theophylline	Discontinue the evening before surgery
Glucocorticoids -Inhaled (fluticasone, budesonide etc) and systemic (prednisone, dexamethasone, etc)	Continue
Leukotriene inhibitors (zafirlukast, montelukast)	Continue
Combination long acting beta agonists/inhaled glucocorticoid agents (Advair, Symbicort)	Continue
Endocrine Agents	
Glucocorticoids - Systemic (prednisone, dexamethasone, etc)	Continue
Diabetic - SGLT2 inhibitors (canagliflozin (Invokana™), dapagliflozin and metformin (Invokamet™), dapagliflozin (Forxiga™), dapagliflozin and metformin extended-release (Xigduo™), empagliflozin (Jardiance™), empagliflozin and linagliptin (Glyxambi™))	<p>Major (inpatient) surgery: Hold these medications 3 days before surgery (See footnote *)</p> <p>Minor surgery: Hold on the morning of surgery*</p> <p>Bariatric surgery: Discontinue while on preoperative low carbohydrate (Boost) diet and do not resume postoperatively</p>
Diabetic -Other Oral Agents (glyburide, gliclazide, repaglinide, metformin, sitagliptin, saxagliptin, linagliptin, pioglitazone, acarbose , etc)	Hold on morning of surgery

Glucagon Like Peptide-1 (GLP) analogs (exenatide, liraglutide)	Hold on morning of surgery
insulin	Address with anaesthesiologist
anastrozole, letrozole	Continue
Thyroid treatment drugs, (levothyroxine, methimazole, propylthiouracil, etc.)	Continue
Bisphosphonates (alendronate, risedronate etc)	Continue perioperatively (Hold the morning of surgery if due on that day). <i>Note: Oral and Maxillofacial Surgeons may provide alternate cessation directions to patients if concerned re: osteonecrosis of the jaw. See Section B.</i>
Analgesics	
NSAIDs (including COX II inhibitors**)	Discontinue preoperatively. Ibuprofen- stop 24 hours prior to surgery. Others- stop at least 3 days prior to surgery.
Nonacetylated NSAIDs (diflunisal)	Continue
Opioid Analgesics- (short and long acting)	Continue
tramadol	Continue
buprenorphine	Continue
naltrexone	See footnote*** and consult with anaesthesiologist.
nabilone (Cesamet)	Continue
methadone	Continue
gabapentin, pregabalin	Continue
baclofen	Continue
Skeletal muscle relaxants (cyclobenzaprine, methocarbamol etc.)	Continue
Medical Marijuana (prescribed)	See footnote ^o

*The absolute risk of DKA is small, so if the SGLT2 is not stopped as recommended before surgery, it would be reasonable to proceed with surgery, but with increased vigilance for DKA in the postoperative period. The drug should only be resumed postoperatively once the patient is eating and/or drinking well.¹²

** Continuation of selective COX-II inhibitors (i.e. celecoxib) may be considered for patients who can't achieve adequate pain control using other analgesics (i.e. acetaminophen). The analgesic benefits of continuing the selective COX-II inhibitor should be balanced against the risks of renal toxicity and adverse cardiovascular effects. However, nonselective NSAIDs should almost always be discontinued preoperatively as recommended because of their anti-platelet and other adverse effects.

***Naltrexone is an opioid receptor antagonist typically taken orally once daily or by once monthly intramuscular depot. It is used in the treatment of opioid addiction and alcohol addiction. A single oral dose can antagonize the effects of opioids for 24-72h.¹⁰ The decision to continue or discontinue naltrexone must be individualized and if necessary, the medication should be stopped 24-72 hours preoperatively. The decision should be based on whether the patient can manage their addiction while naltrexone is discontinued and whether analgesia without opioids will be sufficient for the scheduled

surgery. The case should be reviewed with the anesthesiologist at least several days before surgery and discussion with the patient and the prescribing physician should be considered in deciding if and when naltrexone should be discontinued. Patients in whom naltrexone is discontinued may be very sensitive to opioid agonists due to opioid receptor upregulation. They must be monitored carefully in the postoperative period if opioids will be used.

∞ Reducing or stopping medical marijuana use preoperatively would likely reduce the risk of postoperative respiratory complications, similar to tobacco smoking cessation. However, cannabis withdrawal symptoms and exacerbation of chronic pain conditions are undesirable. These risks and benefits should be balanced in an individualized approach, and within the guidelines of WRHA policy.

Psychotropic Agents	
<ul style="list-style-type: none"> • Tricyclic and Tetracyclic Antidepressants (TCAs) (amitriptyline, nortriptyline, imipramine etc) 	Continue*
<ul style="list-style-type: none"> • Selective Serotonin Reuptake Inhibitors (SSRIs) (citalopram*, escitalopram*, sertraline, fluoxetine, etc) • Selective norepinephrine reuptake inhibitors (SNRIs) – venlafaxine* (Effexor), duloxetine (Cymbalta) • Noradrenergic Specific Serotonin Antidepressants (NaSSAs) - mirtazapine (Remeron) • Norepinephrine - Dopamine Reuptake Inhibitors (NDRIs) -bupropion (Wellbutrin) 	Continue**
MAOIs <ul style="list-style-type: none"> • phenylzine (Nardil) • tranylcypromine (Parnate) • moclobemide (Manerix) • selegeline (Eldepryl) (bold indicates potent non-selective MAOIs.)	Address with anaesthesiologist (ASAP) and psychiatrist and flag chart/notify anaesthesia team.
Other Drugs with MAOI properties <ul style="list-style-type: none"> • rasagiline (Azilect) (parkinson’s disease) • linezolid (Zyvoxam) (antibiotic) • procarbazine (Matulane) (antineoplastic) 	Address with anaesthesiologist (ASAP) and psychiatrist and flag chart/notify anaesthesia team.
Mood Stabilizers (not all inclusive) <ul style="list-style-type: none"> • lithium, valproic acid, carbamazepine, lamotrigine 	Continue
Antianxiety agents: <ul style="list-style-type: none"> □ Benzodiazepines (lorazepam, clonazepam, etc) 	Continue

□ buspirone	
Antipsychotic Medications <i>First Generation</i> • haloperidol, flupenthixol, chlorpromazine <i>Second Generation</i> • olanzapine, quetiapine, risperidone <i>Third Generation</i> • aripiprazole	Continue*
CNS stimulants • dextroamphetamine • methylphenidate, • modafinil (Alertec)	Hold on day of surgery
Cholinesterase inhibitors used in Alzheimer's disease (galantamine, rivastigmine, donepezil)	Continue*** (alert anesthesiologist)

*TCAs and antipsychotics, venlafaxine (**high dose**), citalopram (**high dose**), escitalopram (**high dose**) prolong the QTc interval on the ECG, increasing the risk of arrhythmias. Preoperative discontinuation is complicated by the need to taper the medication (over 7-14 days for TCAs) and the potential for exacerbation of an underlying psychiatric disorder or increased risk of postoperative delirium (antipsychotics). For most patients, the benefits of continuing TCAs and antipsychotics will outweigh the risks. Consider reviewing the case with an anesthesiologist and the prescribing physician if the QTc is markedly prolonged.

**SSRIs may increase bleeding risk through antiplatelet effects, particularly in patients on other antiplatelet medication. There is limited data for SNRIs, NaSSAs and NDRIs. (Considerations regarding cessation versus continuation in the perioperative period should be similar as with SSRIs). Preoperative discontinuation is complicated by long washout periods, the need to taper doses slowly when discontinuing the drug and potential exacerbation of the underlying psychiatric disorder during this period. For most patients, the benefits of continuing SSRIs will outweigh the risks. Consider reviewing the case with an anesthesiologist and the prescribing physician if the scheduled surgery is particularly high risk for bleeding or the patient is taking other antiplatelet medication.

*** These drugs may alter responses to succinylcholine (prolongation), non-depolarizing neuromuscular blockers (either resistance or reduced effect), and the cholinesterase inhibitors (i.e. neostigmine) used to reverse them (reduced effect). These drug interactions, based on pharmacology, have been substantiated in case reports but no increase in postoperative morbidity was found in one observational study. The altered responses are prolongation of effect for succinylcholine, reduced effect with nondepolarizing agents and reduced effect of neostigmine. In case reports the latter two effects have resulted in relatively high doses being given in an attempt to achieve adequate relaxation, followed by prolonged partial effect resistant to reversal by neostigmine. The benefits of continuing these drugs will almost always outweigh risks. If discontinued, galantamine and rivastigmine should be discontinued for 24 hours, while donepezil must be discontinued for 2 or 3 weeks because of its long half life. They should be restarted as soon as possible in the postoperative period. Prolonged stoppage may require restarting at a lower dose.^{13, 14, 15}

Anti-Gout Agents	
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allopurinol	Hold on the morning of surgery
colchicine	Hold on the morning of surgery
Anti-Parkinson Agents	
levodopa/carbidopa (Sinemet)	Continue
Dopamine Agonists (bromocriptine, pergolide, pramipexole, ropinirole, etc.)	Continue
selegiline (Eldepryl) (MAOB)	Address with anaesthesiologist (ASAP) and psychiatrist. Flag chart/notify anaesthesia team.
benztropine (Cogentin) (anticholinergic)	Continue
Myasthenia Gravis Agents	
pyridostigmine	Continue
neostigmine	Continue
Over The Counter Medications	
Antihistamines	Continue Do not use for 24hrs before surgery if combination containing pseudoephedrine or decongestants (Cough and Cold Remedies)
Cough & Cold Preparations	Do not use for 24hrs before surgery
Neurologic Agents	
Antiepileptic medications (phenytoin, carbamazepine, valproic acid, phenobarbital, etc.)	Continue
Bladder medications	
tolterodine (Detrol), oxybutynin (Ditropan), solifenacin (Vesicare)	Continue
pentosan (Elmiron)	Discuss with anaesthesia*** Consider INR, PTT and platelet count prior to neuraxial analgesia

***(Caution due to small increase in bleeding risk) Evaluate use in regards to invasive procedures and consider holding 3 days pre-op if high bleeding risk

Prostate Medications	
Alpha-1-antagonists (terazosin, doxazosin, tamsulosin, alfuzosin)	Continue- however, if cataract surgery- discuss with surgeon
Miscellaneous Medications	
testosterone	Continue
betahistine (Serc)	Continue
anagrelide (Agrylin)	Continue
sildenafil (Viagara), tadalafil (Cialis), vardenafil (Levitra) - FOR erectile dysfunction	Do not use 3 days preoperatively
sildenafil (Viagra) -FOR pulmonary hypertension	To be reviewed by anaesthesia. - FLAG CHART****
tranexamic Acid (Cyklokapron)	Assess benefit vs. risk with anaesthesia
gilenya (Fingolimod),	Must discuss with prescriber for directions, and anaesthesiologist for management. Do not advise without consultation with prescriber (MS Clinic Physician). Multiple significant drug interactions.

****some patients may take sildenafil to treat pulmonary hypertension and should continue this medication preoperatively. Discuss with anesthesiologist if the patient is unclear as to why they take this medication.

HIV Medications*	
Antiretroviral/HIV medications (lamivudine/zidovudine (Combivir), abacavir/lamivudine (Kivexa), efavirenz/emtricitabine/tenofovir (Atripla), emtricitabine/tenofovir disoproxil fumarate (Truvada), dolutegravir (Tivicay), raltegravir (Isentress), efavirenz (Sustiva), rilpivirine/tenofovir/emtricitabine (Complera) etc.) <i>This list is non-exhaustive.</i>	*Continue
Protease Inhibitors: atazanavir (Reyataz), darunavir (Prezista), fosamprenavir (Telzir), indinavir (Crixivan), lopinavir/ritonavir (Kaletra), nelfinavir (Viracept), ritonavir (Norvir), saquinavir (Invirase), tipranavir (Aptivus), darunavir/cobicistat (Prezcobix)	**Continue
elvitegravir/cobicistat (Stribild)	***Continue

* If normally taken with food, **preoperatively** these medications may be taken with water.

** **Midazolam is CONTRAINDICATED** with these **protease inhibitors**.¹¹ Due to the potential for serious and/or life threatening reactions such as prolonged or increased sedation or respiratory depression co-administration of these agents (Protease Inhibitors and midazolam) should be avoided and alternate sedatives used for procedures (patient should continue antiretroviral medications). If the combination is used, intensive monitoring is required. Lorazepam is suggested as the benzodiazepine of choice.

***Contraindicated with oral midazolam.¹¹ Potential for increased midazolam concentrations with parenteral midazolam. Co-administration should be done in a setting that ensures close clinical monitoring and appropriate medical management in case of respiratory depression and/or prolonged sedation. Dosage reduction for midazolam should be considered, especially if more than a single dose of midazolam is administered. Lorazepam is suggested as the benzodiazepine of choice.

NOTE: Propofol (Diprivan) - Possible decreased propofol concentrations with protease inhibitor/ritonavir-boosted regimens and Efavirenz or Nevirapine-based regimens. Titrate Propofol to effect.

Each patient's antiretroviral medication must be individually assessed for anaesthetic drug interactions, as new medications are constantly being added to the WRHA formulary.

SECTION B -MEDICATIONS TO BE ADDRESSED BY THE SURGEON

*** Clinical judgment and critical thinking must always be employed***

This document does not identify all medications (and potential drug interactions) that prolong the QT interval. Individual assessment of medications and patient risk factors is required.

Please note this is only a guideline and are suggestions from anaesthesia leadership, based on available evidence and expert opinion. Any agents prescribed for specific disease processes (i.e. Wilson’s disease, metabolic disorders, etc.) may need further review and discussion with the prescribing physician. PAC will not be calling patients to direct them regarding the list below, and patients will be encouraged to seek direction from their prescriber or their surgeon. In the absence of direction from these care providers they will be advised according to the following, with further consideration from anaesthesia as warranted. Please communicate if your directions differ from the suggestions below, or if you require further clarification.

NAME	Suggested Preoperative Management
Herbs, vitamins & supplements	STOP 7 days before surgery
Vitalux, Folic Acid, Vitamin B	Continue - Hold on morning of surgery
iron	Continue - Hold on morning of surgery
Bisphosphonates (alendronate, risedronate etc)	Continue perioperatively (Hold the morning of surgery if due on that day). Oral and Maxillofacial Surgeons concerned about osteonecrosis of the jaw, may wish to recommend alternate directions. It is suggested they consult with the prescriber or pharmacist.
hydrochloroquine	Continue as long as the gut is functional
sulfasalazine	
leflunomide	
rituximab	4-6 months post last infusion is ideal
etanercept	Hold 1-2 doses prior to surgery (Goal: surgery scheduled when dose would be due. i.e. one month has passed after last monthly dose)
abatacept	
adalimumab	
infliximab	
anakinra	
certolizumab	
golimumab	
tocilizumab	
azathioprine, 6 mercaptoprine	Continue
cyclosporine	Continue
methotrexate	Continue
mycophenolate	Continue
sodium aurothiomalate (Myochrysine)	Continue
tacrolimus	Continue
interferon interferon beta-1B (Betaseron), interferon beta-1a (Avonex, Rebif), glatiramer acetate (Copaxone), teriflunomide (Aubagio)	Continue

dimethyl fumarate (Tecfidera),	Do not take on day of surgery (must be taken with food)
natalizumab (Tysabri),	2-3 weeks post monthly infusion is best timing for surgery. If delay in scheduled dose, NOTIFY MS Clinic RN (204-787-5111, option 3)
gilenya (Fingolimod),	Must discuss with prescriber for directions, and anaesthesiologist for management. Do not advise without consultation with prescriber (MS Clinic Physician). Multiple significant drug interactions.
tofacitinib (Xeljanz)	Discontinue 2 weeks before surgery
Oral Chemotherapy- capecitabine (Xeloda), sunitinib (Sutent), imatinib (Gleevec), etc)	Consult with oncologist
Hormone Agents	
Hormone replacement therapy(HRT)	See footnote*
Contraceptive Medications (OCP, patches)	See footnote**
Selective estrogen receptor modulators**for osteoporosis (raloxifene)	See footnote***
Selective estrogen receptor modulators- when indicated for <u>treatment</u> of breast cancer, (tamoxifen, raloxifene)	See footnote***

*HRT is associated with a small increased risk of venous thromboembolism (1.5 additional VTE events per 10,000 women per year in a community setting).⁸

However, preoperative discontinuation is complicated by a need to stop these medications 4-6 weeks prior to surgery and the recurrence of menopausal symptoms that were severe enough to justify HRT in the first place. Further, it is unknown how effective contemporary postoperative VTE prophylaxis regimens would be in mitigating the increased risks historically observed. If sufficient time exists preoperatively for discontinuation, and the risk of VTE is high, discontinuation of these medications should be considered, in discussion with the patient.

**OCP is associated with a small increased risk of venous thromboembolism (approximately 3 additional VTE events per 10,000 women per year in a community setting and being dependent upon the type of formulation).⁹

However, preoperative discontinuation is complicated by a need to stop these medications 4-6 weeks prior to surgery and the potential risk of unwanted pregnancy, which carries an even higher risk of VTE and most likely a delay in surgery until after pregnancy. Further, it is unknown how effective contemporary postoperative VTE prophylaxis regimens would be in mitigating the increased risks historically observed. If sufficient time exists preoperatively for discontinuation, the risk of VTE is high, and the patient is comfortable using other contraceptive methods, discontinuation of these medications should be considered, in discussion with the patient.

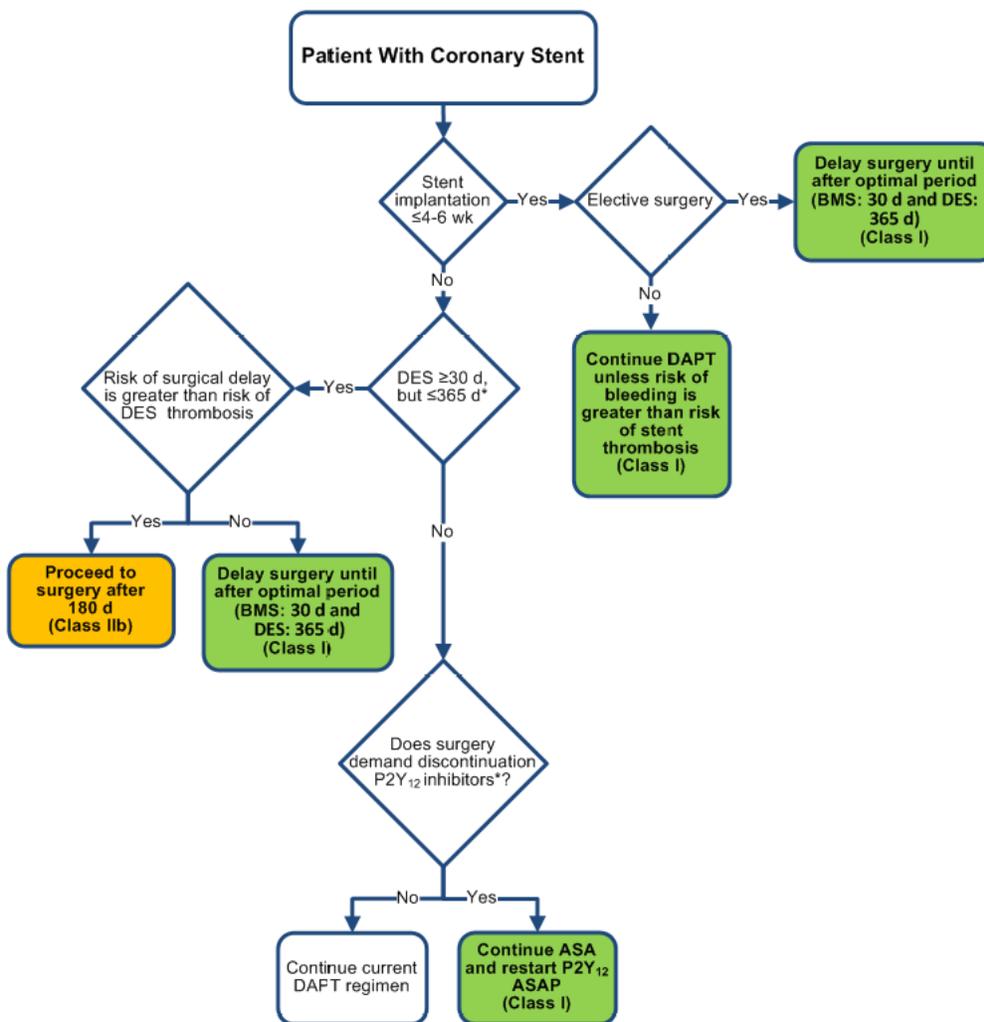
***The risk of venous thromboembolism (VTE) is increased with the selective estrogen receptor modulator (SERM) drugs tamoxifen, and especially raloxifene. (Absolute increase of pulmonary embolism for tamoxifen of 4.5 per 10000 women in a community setting and absolute increase of VTE for raloxifene of 6.5 per 1000 women, also in a community setting with raloxifene. ^{6,7}

However, to mitigate this risk, these medications would have to be stopped 4 weeks preoperatively. For patients in whom fewer than 4 weeks remain before surgery, do not alter the patient's current regimen and

consider discussing the case with the anesthesiologist. For patients in whom at least 4 weeks remain before surgery, consider discontinuing the SERM if it is being used for **prevention** of cancer or osteoporosis AND the risk of VTE is moderate or high. If the SERM is being used for breast cancer **treatment**, AND the risk of VTE is moderate or high then consult with the patient's oncologist regarding whether or not to discontinue the drug. If the risk of VTE is low then the SERM should probably be continued.

Figure 1. Proposed Algorithm for Antiplatelet Management in Patients With PCI and Noncardiac Surgery

Clinical judgement must be exercised in balancing the risk of stent thrombosis with the risk of bleeding at surgery, the risks and benefits of neuraxial or regional anesthesia/ analgesia and the risks of delaying surgery. In addition to consultation between surgeon and anesthesiologist, the involvement of a cardiologist may be helpful for difficult cases.



*Assuming patient is currently on dual antiplatelet therapy (DAPT).

ASA :aspirin; ASAP:as soon as possible; BMS: bare-metal stent; DAPT: dual antiplatelet therapy; .DES: drug eluting stent; and PCI: percutaneous coronary intervention.

Directly taken from: Fleisher LA, et al. 2014 ACC/AHA Perioperative Guideline