

PERIOPERATIVE MEDICATION MANAGEMENT

In general, one should stop any medication that may prove harmful around the time of surgery (e.g., MAO inhibitors, anticoagulants), continue any medications that are necessary for the patient’s health (e.g., steroids, anti-arrhythmic agents, beta blockers), and exercise judgment on the rest. Substitute parenteral or topical forms of medications when necessary if the patient is unable to take their medications by mouth.

Preoperative evaluation

<p>Drugs to hold at least 2 weeks preoperatively</p>	<p>Aspirin (minimum 1 week—consider 2 wks for neurosurgery/spine surgery). **WARNING: MUST EVALUATE WHETHER PATIENT HAS RECEIVED A CARDIAC STENT. SEE DISCUSSION BELOW AND “Cardiac Stents” section. Clopidogrel (Plavix) (minimum 5 days) **WARNING: MUST EVALUATE WHETHER PATIENT HAS RECEIVED A CARDIAC STENT. SEE DISCUSSION BELOW AND “Cardiac Stents” section. MAO inhibitors (Including selective MAO B inhibitors used for Parkinson's e.g. selegiline, rasagiline) Guanethidine Methyldopa Guanabenz Most herbal remedies (Garlic, ginkgo, high dose vitamin supplements, etc) ± Oral contraceptives (see discussion) Estrogen replacement (see discussion) ± SSRIs in orthopedic patients (see discussion)</p>
<p>Drugs to hold for 4-5 days preoperatively</p>	<p>NSAIDs Dipyridamole (<i>Persantine</i>) Warfarin (typically hold 4 doses); see “Anticoagulation”</p>
<p>Drugs to hold on the morning of surgery</p>	<p>Oral hypoglycemic agents Prandial insulin – See “Perioperative Diabetes Management” Non-insulin injectable hypoglycemic agents (e.g., exenatide) Niacin, gemfibrozil, cholestyramine and colestipol Stimulant medications (e.g., methylphenidate=Ritalin) Diuretics</p>
<p>Drugs to give on the morning of surgery and continue post-operatively if able</p>	<p>Most cardiac meds (anti-arrhythmics, digoxin, nitrates, beta-blockers) Certain hypertensive medications (see discussion re: ACE-I/ARB's and calcium channel blockers) Pulmonary medications (E.g. nebulizers and inhalers) Endocrine medications (Including steroids—may need stress dosing, see “Stress Dose Steroids”) Most GI medications (E.g. H2 blockers, PPIs) Most psych meds (consider withholding SSRIs—see discussion. Not MAO inhibitors—see above) Statin drugs (if taken in the morning) Seizure medications Eye drops Narcotics (Coordinate with anesthesia and primary team) Transdermal medications Transplant medications and immunosuppressives</p>

An accurate medication list is essential.

When patients take meds on the morning of surgery they may take them with a small sip of water only. No juice, milk, coffee, etc.

General Principles

Postoperative management

Resume usual outpatient medications as tolerated by patient's ability to take oral pills and current and expected medical indication, with certain exceptions such as metformin (see "**Perioperative Diabetes Management**"). Use caution with blood thinners and diuretics.

Most cardiovascular medications should be continued postoperatively if at all possible. However, a patient's blood pressure often falls postoperatively (especially if the patient has an epidural), so WRITE HOLD PARAMETERS for all vasoactive medications. Dose reduction is frequently necessary for the first 2 to 3 days.

Discussion

Aspirin: In high risk patients (e.g., those with unstable coronary syndromes or cerebrovascular disease) it may not be feasible to stop aspirin for a prolonged period preoperatively. For patients with cardiac stents, there must be a thorough evaluation and discussion regarding the risks of stopping antiplatelet therapy, as acute, in-stent thrombosis may be fatal. It is best to discuss high risk cases with the patient's cardiologist and the surgical team. In some instances aspirin can/should be continued perioperatively, or held for a shorter duration of time (e.g., one week).

OCPs: Increase the risk of thrombosis, especially for high risk procedures (e.g., hip arthroplasty). Consider stopping preoperatively, though you must weigh the risk of DVT against the risk of an unwanted pregnancy.

HRT: Increases the risk of thrombosis, especially for high risk procedures (e.g. hip arthroplasty). If possible, it should be discontinued at least 6 weeks preoperatively if possible.

Diuretics: Should be resumed postoperatively with caution and in close consultation with the surgical team. Most patients are intravascularly depleted postop due to third spacing. Often diuretics do not need to be restarted for several days postop. There are exceptions (e.g., severe CHF), however, so do discuss with the team.

ACE Inhibitors (ACE-Is) and Angiotensin Receptor Blockers (ARBs): There is currently controversy about use of ACE inhibitors and ARBs perioperatively. Anecdotal experience and a number of relatively small studies have suggested that the use of ACE inhibitors and ARBs on the morning of surgery may lead to excessive intraoperative hypotension¹. The current UWMC recommendation is that these agents be held, unless the patient is persistently hypertensive with a systolic BP consistently above 150 - 160 mmHg. The other situation where they should be held is if renal blood flow will be compromised during the surgical procedure (e.g., AAA repairs).

Beta Blockers: Abrupt withdrawal of beta blockers can precipitate rebound tachycardia and hypertension, and precipitate angina. If patients are on beta-blocker therapy, it should be continued perioperatively if at all possible (use low dose IV metoprolol if NPO). The initiation of beta blockade strictly for perioperative reasons is decreasing in light of evidence of potential harm in low risk patients—see "**Perioperative Beta Blockers**".

Calcium channel blockers: Some authors recommend holding calcium channel blockers perioperatively particularly if the patient's blood pressure runs low preoperatively.

Clonidine: Abrupt withdrawal may precipitate hypertension and tachycardia. Substitute a transdermal patch if possible. It takes 2-3 days for the patches to begin working. If possible initiate the patch preop. Have the patient take their full oral dose on the first day the patch is applied, 1/2 their normal dose on day 2, 1/4 of their normal dose on day 3, then stop the oral medications. Patches are changed every 7 days.

Statins: There is some evidence that use of the HMG CoA reductase inhibitors (statins), perioperatively may reduce the risk of perioperative cardiovascular events (e.g., MI, angina, stroke). The data comes from retrospective studies and a few very small prospective studies². Conclusive evidence is lacking. If a patient has indications for lipid lowering therapy it should be considered preoperatively if there is sufficient time (e.g., > 2 weeks) and they will have appropriate follow-up. If the patient is on a statin it should be given on the morning of surgery, and resumed postoperatively as able.

SSRIs: A retrospective study from 2003 showed that exposure to serotonin antagonists (not necessarily selective) increased degree of intraoperative bleeding and increased risk of blood transfusion in patients undergoing orthopedic surgery (6/26 = 23% in serotonin antagonist group versus 20/494 = 4% of non-exposed group).³ Interestingly, the transfusion group also had lower baseline hemoglobin values. A cohort study of patients receiving CABG did not show difference in perioperative bleeding, however.⁴ The putative mechanism for potential increased bleeding risk is effect on platelet aggregation. Based on the available evidence, one may consider recommending patients discontinue SSRIs prior to orthopedic surgery, but must weigh carefully the risk of worsening or recurrent depression.

References

1. Comfere T, Sprung J, Kumar MM, et al., Angiotension system inhibitors in a general surgery population. *Anesth Analg.* 2005;100:636-644.
2. Durazzo AE, Machado FS, Ikeoka DT, et al. Reduction in cardiovascular events after vascular surgery with atorvastatin: a randomized trial. *J Vasc Surg.* 2004;39:967-976.
3. Mobig KL, Janssen MW, de Waal Malefijt J, et al. Relationship of serotonergic antidepressants and need for blood transfusion in orthopedic surgical patients. *Arch Intern Med.* 2003; 163: 2354-2358.
4. Andreasen JJ, Riis A, Hjortdal VE, et al. Effect of selective serotonin reuptake inhibitors on requirement for allogeneic red blood cell transfusion following coronary artery bypass surgery. *Am J Cardiovasc Drugs.* 2006;6:243-250.