Pre-Anesthesia Medication Guidelines

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 In an effort to be concise, this document will list medications that require a change in administration in the timeframe around having an elective anesthetic. Rather than list the majority of drugs that can be taken safely before receiving anesthesia, it should be assumed that any medication not discussed here should be continued. Of course, these are guidelines only and all decisions should be made on a case by case basis.

Hypertension

* ACE Inhibitors (-prils): Hold on the day of surgery. Multiple studies have demonstrated profound and refractory hypotension when patients receive an ACE inhibitor on the morning of surgery.
* Angiotensin Receptor Blockers (-artans): Hold on the day of surgery. Same as above for ACE inhibitors.
* Direct Renin Inhibitors (Tekturna, Amturnide, Tekamlo): Hold 48 hours before surgery. Similar to the above
* Diuretics: Hold on the day of surgery. Ok to continue if it is combined with another drug, i.e., in combination with a beta blocker. There isn’t strong evidence against diuretics, however they may contribute to hypotension and can easily be administered intravenously.

Diabetes

* Oral medications (Glucotrol / glipizide, Actose / pioglitazone, Amaryl / glimepiride, Avandaryl / rosiglitazone / glimepiride, Diabeta, Micronase / glyburide, Duetact / pioglitazone / glimepiride, Oseni / alogliptin / pioglitazone, Starlix / nateglinide, Prandin / repaglinide, Avandia / rosiglitazone, Glyset / miglitol, Precose / acarbose, Januvia / sitagliptin, Nesina / alogliptin, Onglyza / saxagliptin, Tradjenta / linagliptin): The ones listed should be held the morning of surgery, to prevent hypoglycemia intra- and post-operatively.
* GLP-1 Agonists (Bydureon, Byetta / exenatide, Tanzeum / albiglutide, Trulicity / dulaglutide, Victoza / liraglutide): These should all be stopped 24-48 hours before surgery.
* SGLT2 Inhibitors (Farxiga / dapagliflozin, Glyxambi / empagliflozin / linagliptin, Invokana / canagliflozin, Jardiance / empagliflozin): These should be held on the morning of surgery just as with the other oral medications due to concerns of hypoglycemia. Additionally, the manufacturer’s literature indicates it can cause intravascular depletion, which would be a poor addition to the vasodilation that occurs during anesthesia.
* Metformin, and all combination pills containing it: Hold for 48 hours before surgery. It can lead to lactic acidosis.
* Regular insulin: Hold morning of surgery
* Mixed insulin (NPH / Reg): Hold morning of surgery
* Insulin – Long acting (MPH, Lente, Ultra lente): May hold morning of surgery. Alternatively may take half the usual dosage.
* Insulin – sustained release (Lantus / glargine, Levemier / insulin detemir): Give usual PM dose. If prone to hypoglycemia, reduce dose 10-30%

Anti-Coagulants

* Aspirin – This one has traditionally been the most confusing one. However, recent evidence has shown that it can be continued in the perioperative period without causing excess bleeding. Patients should continue it unless directed not to by their surgeon. Currently, the only ones asking for it to be stopped are those undergoing neurosurgery or spine surgery. Due to the small spaces involved and the proximity to the spinal cord and brain, patients having spine surgery or neurosurgery MUST stop their aspirin 5 DAYS before surgery to prevent a hematoma.
* Ticlopidine / Ticlid – Stop 10-14 days before surgery, unless other instructions have been given by the surgeon and a cardiologist (if for cardiac stents)
* Coumadin / Warfarin – Stop 4-5 days before surgery, with a pre-operative INR.
	+ **Factor Xa Inhibitors**
* Rivaroxaban / Xarelto – Stop 2 days before surgery. Those with renal clearance below 30 mL/min should stop it 3 days before surgery.
* Apixaban / Eliquis - Stop 2 days before surgery. Those with renal clearance below 30 mL/min should stop it 3 days before surgery.
	+ **Direct Thrombin Inhibitors**
* Bivalirudin / Angiomax – An intravenous medication, it should not be seen in patients coming for elective surgery. It cannot be reversed but can be removed through hemodialysis. Thanks to its short half-life, it can be stopped at the beginning of a procedure.
* Dabigatran / Pradaxa – Stop 2 days prior to surgery, or 4 days in patients with renal disease, or those coming for spine or neurosurgery.
	+ **Adenosine Diphosphate Antagonists**. These are the trickiest, as they’re the antiplatelet therapy given after cardiac angioplasty or stent placement. (Rarely a surgeon will request that the patient continue their normal regimen through surgery. This is most often seen with vascular surgery when the patient has a critically narrow blood vessel - especially the carotid artery.)
		- *Balloon angioplasty only*: defer elective surgery until at least 2 weeks after the intervention. After that, the drug can be stopped in the time frame below, provided aspirin is continued.
		- *Bare metal stent*: defer elective surgery until at least 6 weeks after placement. After that, they can be held as below, provided aspirin is continued.
		- *Drug eluting stent*: defer elective surgery until at least 6 months after placement. From 6-12 months, their use should be discussed in consultation with a cardiologist. Beyond 12 months, they can be held as below, provided aspirin is continued.
* Prasugrel / Effient – Stop 7 days before surgery
* Ticagrelor / Brillinta – Stop 3-5 days before surgery
* Clopidogrel / Plavix - Stop 5 days before surgery
	+ **Glycoprotein IIb/IIIa inhibitors.** There are current studies researching the use of these as bridging therapy for patients who need to come off dual antiplatelet therapy (aspirin plus one of prasugrel, ticagrelor, or clopidogrel) for surgery, but that practice is experimental and not recommended yet.
* Abciximab / Reopro – An intravenous medication, it should not be seen in patients coming for elective surgery. It cannot be reversed, nor removed by dialysis. It should be discontinued for 24 hours before a non-emergent procedure, with platelets given to support management.
* Eptifibatide / Integrillin – An intravenous medication, it should not be seen in patients coming for elective surgery. It cannot be reversed, nor removed by dialysis. It should be discontinued for 2 - 4 hours before a non-emergent procedure, with platelets given to support management.
* Tirofiban / Aggrastat - An intravenous medication, it should not be seen in patients coming for elective surgery. It cannot be reversed but can be removed through hemodialysis. It can be stopped at the beginning of a procedure, with platelets given to support management.

Non-Steroidal Anti-inflammatory Drugs: The concern here is for platelet effects of NSAIDs, which are known to occur but are poorly defined by the literature.

* Non-selective NSAIDs (naproxen, indomethacin, ketorolac, ketoprofen) – Should be discontinued one week prior to surgery. Acetominophen can be substituted until the day of surgery
* Selective COX2 Inhibitors (Celebrex / celecoxib, Vioxx / rofecoxib, Bextra / valdecoxib) – While their platelet effects are known to be less, they should still be discontinued a week before surgery, substituting acetominopen.
* Ibuprofen – Due to the much shorter half-life of ibuprofen, platelet function returns to normal within 24 hours. Hold on the day of surgery.

Gout

* Colchicine, allopurinol, probenecid – Hold on the day of surgery. While surgery can precipitate an acute gouty arthropathy, there is concern that these medications can interact unfavorably with anesthetic drugs. Colchicine in particular has a narrow therapeutic window and can cause issues with muscle weakness, which could create problems in patients emerging from anesthesia.

Hormones: Estrogens are known to cause increases in coagulation and the formation of venous thromboses. However, in order to reduce this risk in patients undergoing surgery, estrogen would have to be stopped six weeks before the procedure, something that isn’t practical for the majority of patients. This also applies to Tamoxifen.

* Hormone replacement therapy – Hold on the day of surgery.
* Birth control pills – Continue on the day of surgery. The risk of thrombosis would not be significantly reduced by holding birth control, however it would put the patient at risk for a pregnancy that they wanted to avoid. Interrupting the BCP regimen isn’t warranted.

Erectile dysfunction

* Sildenafil / Viagara, tadalafil / Cialis, vardenafil / Levitra - All ED medications can have significant interactions with anesthetic agents, specifically with nitroglycerin, to the point of being life threatening. Hold on the day of surgery.

Herbals

* Ephedra – may increase risk of MI and stroke. Hold on the day of surgery
* Garlic – may increase bleeding risk. Hold 7 days prior to surgery
* Ginkgo – may increase bleeding risk. Hold 2 days prior to surgery
* Ginseng – may increase bleeding risk and have effects on blood sugar. Hold 7 days prior to surgery
* Kava – may increase sedation effects. Hold day of surgery
* St. John’s Wort – induces cytochrome P450 system, may diminish drug effects. Hold 5 days prior to surgery
* Valerian – may increase sedative effects and associated with benzodiazepine-like withdrawal effects. Ideal to be tapered weeks before surgery. Should be treated with benzodiazepines to prevent withdrawal if it can’t be.