










PRE-OPERATIVE MEDICATION MANAGEMENT RECOMMENDATIONS



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Disclaimer: This guideline provides a general framework for the management of medications prior to surgery. It is not intended to replace clinical judgement or to establish a protocol for all patients.

Symbol Key	
	Continue
	Caution - specific directions
	Hold

ANALGESIC (PAIN) AGENTS	
Drug Class	Recommended strategy for Surgery
GABA Agonists <p style="text-align: center;">Examples: Gabapentin (Neurontin) Pregabalin (Lyrica)</p>	 Continue therapy up to and including day of surgery
Opioids <p style="text-align: center;">Examples: Hydrocodone Oxycodone (Roxicodone) Hydromorphone (Dilaudid) Tramadol (Ultram) ***Including combination products***</p>	 Continue therapy up to and including day of surgery
OTC Analgesics <p style="text-align: center;">Examples: Acetaminophen (Tylenol) NSAIDs (ibuprofen (Motrin, Advil), naproxen (Aleve))</p>	 <p>Acetaminophen: May continue therapy up to and including day of surgery NSAIDs: Stop taking at least 3 days before surgery. Ibuprofen can be stopped 24 hours prior to surgery</p>
Skeletal Muscle Relaxants <p style="text-align: center;">Examples: Methocarbamol (Robaxin) Baclofen (Lioresal) Cyclobenzaprine (Flexeril, Amrix) Tizanidine (Zanaflex)</p>	 Continue therapy up to and including day of surgery
Opioid Agonists-Antagonists (mixed) & Opioid Antagonists <p style="text-align: center;">Examples: Buprenorphine (Belbuca, Butrans, Buprenex) Buprenorphine-Naloxone (Suboxone, Zubsolv)</p>	 <ul style="list-style-type: none"> • Refer to primary prescriber for management and follow up in all cases • For surgeries where moderate or high level of surgical pain is anticipated, it is recommended for primary prescriber to consider, if clinically appropriate, tapering off meds and switching to full opioid agonist (process will take 5 days). • If such prior arrangement is unavailable, continue medication as prescribed and take on day of surgery
<p style="text-align: center;">Naltrexone (Vivitrol)</p>	 <ul style="list-style-type: none"> • Refer to primary prescriber • Oral formula: Recommend discontinuation 72 hours prior to surgery • IM formula: Discontinue 4 weeks prior to surgery

ANTIRETROVIRAL/ANTIVIRAL AGENTS	
Drug Class	Recommended strategy for Surgery
Antiretrovirals <p style="text-align: center;">Examples: Abacavir (Ziagen) Tenofovir (Viread, Vemlidy) Emtricitabine (Emtriva)</p>	 Continue therapy up to and including day of surgery
Antivirals <p style="text-align: center;">Examples: Acyclovir (Zovirax) Famciclovir (Famvir) Valacyclovir (Valtrex)</p>	 Continue therapy up to and including day of surgery

CARDIOVASCULAR AGENTS	
Drug Class	Recommended Strategy for Surgery
Beta Blockers <i>Examples:</i> Atenolol (Tenormin) Bisoprolol (Zebeta) Carvedilol (Coreg) Metoprolol (Toprol, Lopressor) Nebivolol (Bystolic)	<input type="radio"/> Continue therapy up to and including day of surgery
Calcium Channel Blockers <i>Examples:</i> Amlodipine (Norvasc) Nifedipine (Adalat, Procardia) Diltiazem (Cardizem, Tiazac) Verapamil (Calan, Verelan)	<input type="radio"/> Continue therapy up to and including day of surgery
Alpha ₂ agonists <i>Examples:</i> Clonidine (Catapres) Methyldopa (Aldomet)	<input type="radio"/> Continue therapy up to and including day of surgery
Vasodilators <i>Examples:</i> Hydralazine (Apresoline)	<input type="radio"/> Continue therapy up to and including day of surgery
Nitrates <i>Examples:</i> Nitroglycerin Isosorbide mononitrate/dinitrate (Imdur, Isordil)	<input type="radio"/> Continue therapy up to and including day of surgery
Antiarrhythmics <i>Examples:</i> Amiodarone (Cordarone) Digoxin (Lanoxin) Sotalol (Betapace) Dofetilide (Tikosyn)	<input type="radio"/> Continue therapy up to and including day of surgery
Statins (HMG-CoA Reductase Inhibitors) <i>Examples:</i> Atorvastatin (Lipitor) Pravastatin (Pravachol) Rosuvastatin (Crestor) Simvastatin (Zocor)	<input type="radio"/> Continue therapy up to and including day of surgery
ACE Inhibitors <i>Examples:</i> Enalapril (Vasotec, Epaned) Lisinopril (Prinivil, Zestril) Ramipril (Altace)	<input checked="" type="checkbox"/> Hold morning dose day of surgery
Angiotensin Receptor Blockers (ARBs) <i>Examples:</i> Losartan (Cozaar) Valsartan (Diovan) Candesartan (Atacand)	<input checked="" type="checkbox"/> Hold morning dose day of surgery











Direct Renin Inhibitors Example: Aliskiren (Tekturna)	<input checked="" type="checkbox"/> Hold morning dose day of surgery
Combination ARB/Calcium channel blocker Examples: Valsartan/Amlodipine (Exforge) Telmisartan/Amlodipine (Twynsta)	<input checked="" type="checkbox"/> Hold morning dose day of surgery
Diuretics Examples: Hydrochlorothiazide (Oretic) Furosemide (Lasix) Bumetanide (Bumex)	<input checked="" type="checkbox"/> Hold morning dose day of surgery
Non-Statin Lipid-Lowering agents Examples: Ezetimibe (Zetia) Niacin (Niaspan) Fenofibrate (Tricor) Cholestyramine (Questran)	<input checked="" type="checkbox"/> Stop taking the day before surgery



ENDOCRINE AGENTS

Drug Class	Recommended strategy for Surgery
Aromatase Inhibitors Examples: Anastrozole (Arimidex) Exemestane (Aromasin) Letrozole (Femara)	<input type="radio"/> Continue therapy up to and including day of surgery
Bisphosphonates Examples: Alendronate (Fosamax) Ibandronate (Boniva)	<input checked="" type="checkbox"/> Hold morning dose day of surgery
Thyroid Agents Examples: Levothyroxine (Synthroid, Tirosint) Methimazole (Tapazole)	<input type="radio"/> Continue therapy up to and including day of surgery

DIABETES AGENTS

SGLT-2 Inhibitors Examples: Canagliflozin (Invokana) Empagliflozin (Jardiance)	<input checked="" type="checkbox"/> Hold morning dose day of surgery
Dipeptidyl Peptidase-4 (DPP-4) Inhibitors Examples: Sitagliptin (Januvia) Saxagliptin (Onglyza)	<input checked="" type="checkbox"/> Hold morning dose day of surgery

Thiazolidinediones Examples: Pioglitazone (Actos)	 Hold morning dose day of surgery
Biguanides Examples: Metformin (Glucophage)	 Hold morning dose day of surgery
Meglitinides Examples: Nateglinide (Starlix)	 Hold morning dose day of surgery
Sulfonylureas Examples: Glimepiride (Amaryl) Glyburide (Diabeta)	 Hold morning dose day of surgery
Insulin - Rapid acting Examples: Insulin aspart (Novolog) Insulin lispro (Humalog)	 Hold morning dose day of surgery
Insulin - Short acting Examples: Insulin Regular (Novolin R, Humulin R)	 Hold morning dose day of surgery
Insulin - Premixed Combinations Examples: Novolog 70/30 Humalog 75/25	 <ul style="list-style-type: none"> • Take 1/2 usual dose the night before surgery • Hold morning dose day of surgery
Insulin - Intermediate Acting Examples: NPH (Humulin N)	 <ul style="list-style-type: none"> • Take 1/2 usual dose the night before surgery • Hold morning dose day of surgery
Insulin - Long Acting Examples: Insulin glargine (Lantus) Insulin detemir (Levemir)	 <ul style="list-style-type: none"> • Reduce dose by 20% evening before surgery
Insulin - U500 Concentrated Examples: Humulin R U500	 Hold on morning of surgery, unless specified by primary prescriber

ESTROGEN AND RELATED HORMONAL AGENTS	
Oral Contraceptives Examples: Estrogen and progestin components	<p>***Determine risk of VTE with modified Caprini Score***</p>  <ul style="list-style-type: none"> • Low to moderate risk of VTE: continue therapy up to and including day of surgery • High risk of VTE (e.g. total joint replacements, pelvic surgeries, leg fractures, or if stroke < 1 month ... see Caprini Score below): stop 4 weeks before surgery
Postmenopausal Hormone Therapy Examples: Estrogens	<p>** *Determine risk of VTE with modified Caprini Score***</p>  <ul style="list-style-type: none"> • Low to moderate risk of VTE: continue therapy up to and including day of surgery • High risk of VTE: stop 2 weeks before surgery



<p>Selective Estrogen Receptor Modulators (SERMs)</p> <p style="text-align: center;"><u>Examples:</u> Raloxifene (Evista) Tamoxifen (Nolvadex)</p>	<p style="text-align: center;">***Determine risk of VTE with modified Caprini Score***</p> <ul style="list-style-type: none"> • Low to moderate risk of VTE: continue therapy up to and including day of surgery • High risk of VTE: <ul style="list-style-type: none"> ○ <i>Raloxifene</i> -stop 3 days before surgery ○ <i>Tamoxifen:</i> <ul style="list-style-type: none"> ■ Taken for breast cancer prevention - stop 2 weeks before surgery ■ Taken for breast cancer treatment - discuss with treating oncologist
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GASTROINTESTINAL AGENTS	
Drug Class	Recommended strategy for Surgery
<p>H₂ Blockers</p> <p style="text-align: center;"><u>Examples:</u> Famotidine (Pepcid) Nizatidine (Axid)</p>	<p style="text-align: center;">○ Continue therapy up to and including day of surgery</p>
<p>Proton Pump Inhibitors (PPIs)</p> <p style="text-align: center;"><u>Examples:</u> Pantoprazole (Protonix) Omeprazole (Prilosec) Esomeprazole (Nexium) Lansoprazole (Prevacid)</p>	<p style="text-align: center;">○ Continue therapy up to and including day of surgery</p>



ANTIPLATELETS/ANTICOAGULANTS - AGENTS AFFECTING HEMOSTASIS	
***MANAGEMENT OF THESE MEDICATIONS WILL BE DEFERRED TO THE PRIMARY PRESCRIBING PHYSICIAN/CARDIOLOGIST OR SURGEON**	
● If spinal/epidural/nerve block anesthesia is planned, please refer to the published guidelines of the <u>American Society of Regional Anesthesia (ASRA)</u>	
Drug Class	Recommended strategy for Surgery
<p>Aspirin</p>	<p style="text-align: center;">Discontinue aspirin approximately seven days prior to non-cardiovascular therapy</p> <p style="text-align: center;">***CARDIOVASCULAR EXCEPTIONS***</p> <ul style="list-style-type: none"> • Patients with coronary stents: CONTINUE low-dose aspirin therapy throughout surgery unless bleeding risk is too high • Intracranial or carotid enclartectomy: CONTINUE to take aspirin • Taking aspirin for secondary prevention other than for CAD: discuss risk/benefit with patient, surgeon, and prescribing subspecialist






<p>P2Y12 Receptor Blockers</p> <p style="text-align: right;">Examples: Clopidogrel (Plavix) Prasugrel (Effient) Ticagrelor (Brilinta)</p>	<p style="text-align: center;">***Refer to the ASRA guidelines*** ***Elective procedures should be delayed until mandatory period of platelet inhibition is completed***</p> <p>X</p> <ul style="list-style-type: none"> • Long term stroke prophylaxis: should be discontinued 7-10 days • If discontinuing... <ul style="list-style-type: none"> ○ Clopidogrel and ticagrelor - stop at least 5 days before surgery ○ Prasugrel - stop 7 days before surgery ○ Ticlopidine - stop 10 days before surgery
<p>Vitamin K Antagonists</p> <p style="text-align: right;">Examples: Warfarin (Coumadin, Jantoven)</p>	<p>X</p> <p>Discontinue 5 days before elective surgery and resume 12-24 hours after surgery</p> <p>***When possible, check PT/INR on the day before surgery***</p> <ul style="list-style-type: none"> • Proceed with surgery if INR < 1.4 • If INR > 1.5: administer low dose oral Vitamin K (1-2 mg) and re-check INR the day of surgery <p>***Stopping therapy for 5 days will cause sub-therapeutic INR for approx. 8 days - for patients with high thromboembolic risk, consider bridging***</p>
<p>Direct Oral Anticoagulants (inhibitors of factor Xa)</p> <p style="text-align: right;">Examples: Rivaroxaban (Xarelto) Apixaban (Eliquis) Edoxaban (Savaysa) Dabigatran (Pradaxa)</p>	<p style="text-align: center;">***Refer to the ASRA guidelines***</p> <p>X</p> <p>Discontinuation is based on each agent as well as renal function and bleeding risk - agents can be continued the day of surgery when hemostasis is met</p> <ul style="list-style-type: none"> • Dabigatran: stop 3 days before surgery for CrCl >50 and 3- 4 days for CrCl between 30-50 • Rivaroxaban, Apixaban, and Edoxaban: stop 3 days/72 hours before surgery based on bleeding risk of procedure • Can be stopped 1 day prior to minor surgery <p>**For procedures with high bleeding risk, consider holding therapy for 2-3 days post-op and LMWH can be used PRN***</p>
<p>Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)</p> <p style="text-align: right;">Examples: ibuprofen (Advil, Motrin) naproxen (Aleve)</p>	<p>X</p> <p>Stop taking at least 3 days before surgery. Ibuprofen can be stopped 24 hours prior to surgery, per surgeon discretion.</p>



NEUROLOGIC AGENTS	
Drug Class	Recommended strategy for Surgery
<p>Anticholinesterase Inhibitors (Alzheimer's agents)</p> <p style="text-align: right;">Examples: Donepezil (Aricept) Memantine (Namenda) Rivastigmine (Exelon)</p>	<p>○ Continue therapy up to and including day of surgery</p>


Antiepileptics	<p>Examples: Levetiracetam (Keppra) Carbamazepine (Tegretol) Phenytoin (Dilantin)</p>	 Continue therapy up to and including day of surgery
Dopamine Agonists/Anti-Parkinson's	<p>Examples: Amantadine (Symmetrel) Carbidopa/levodopa (Sinemet) Entacapone (Comtan)</p>	 Continue therapy up to and including day of surgery











PSYCHOTROPIC AGENTS		
Drug Class	Recommended strategy for Surgery	
Antipsychotics	<p>Examples: Haloperidol (Haldol) Olanzapine (Zyprexa) Risperidone (Risperdal) Ziprasidone (Geodon)</p>	 Continue therapy up to and including day of surgery
Benzodiazepines	<p>Examples: Alprazolam (Xanax) Clonazepam (Klonopin) Diazepam (Valium) Lorazepam (Ativan)</p>	 Continue therapy up to and including day of surgery
Miscellaneous Anti-Anxiety Agents	<p>Examples: Buspirone (Buspar)</p>	 Continue therapy up to and including day of surgery
Mood Stabilizing	<p>Examples: Lithium Valproic acid (Depakene)</p>	 Continue therapy up to and including day of surgery
Monoamine Oxidase (MAO) Inhibitors	<p>Examples: Selegiline (Zelapar) Isocarboxazid (Marplan)</p>	 <ul style="list-style-type: none"> • May continue preoperatively including morning of surgery if no clinical assessment made by primary prescriber or if benefits of continuing the medication (mood stabilization) outweigh the risk of side effects. • If taper is preferred for high risk procedures, then complete tapering 14 days prior to surgery under primary prescriber's supervision.
Neurotransmitter Reuptake Inhibitors (Serotonin, Norepinephrine, Dopamine)	<p>Examples: Bupropion (Wellbutrin) Duloxetine (Cymbalta) Citalopram (Celexa) Sertraline (Zooft) Paroxetine (Paxil)</p>	 <ul style="list-style-type: none"> • May continue preoperatively including morning of surgery if clinical benefits (mood stabilization) outweigh the risk of side effects (bleeding). • If taper is preferred for high risk procedures, complete a taper that finishes 3 weeks before surgery under primary prescriber's supervision

Stimulants/Anti-ADHD	<p>Examples: Dextroamphetamine (Adderall) Methylphenidate (Ritalin) Modafinil (Provigil)</p>	 Hold morning dose day of surgery
Tricyclic Antidepressants	<p>Examples: Amitriptyline (Elavil) Doxepin (Sinequan) Imipramine (Tofranil) Nortriptyline (Pamelor)</p>	 <ul style="list-style-type: none"> • May continue preoperatively including morning of surgery if clinical benefits (mood disorder stabilization) outweigh risk of side effects (arrhythmias). • If stopped by primary prescriber, then taper should be completed 7 days before surgery

<u>PULMONARY AGENTS</u>	
Drug Class	Recommended strategy for Surgery
Inhaled Bronchodilators (Beta ₂ agonists) <p>Examples: Albuterol (Ventolin HFA)</p>	 Continue therapy up to and including day of surgery
Anticholinergics (Inhaled) <p>Examples: Ipratropium (Atrovent) Tiotropium (Spiriva)</p>	 Continue therapy up to and including day of surgery
Glucocorticoids (systemic/inhaled) <p>Examples: Budesonide (Pulmicort) Fluticasone (Flonase) Hydrocortisone Prednisone</p>	 Continue therapy up to and including day of surgery
Leukotriene Inhibitors <p>Examples: Montelukast (Singulair)</p>	 Continue therapy up to and including day of surgery
Theophylline <p>Examples: Theophylline (Theo-24)</p>	 Stop taking the evening before surgery

<u>URINARY AGENTS</u>	
Drug Class	Recommended Strategy for Surgery
Alpha, blockers <p>Examples: Doxazosin (Cardura) Terazosin (Hytrin) Tamsulosin (Flomax)</p>	 Continue therapy up to and including day of surgery
5-alpha reductase Inhibitors <p>Examples: Finasteride (Proscar)</p>	 Continue therapy up to and including day of surgery

Anticholinergic/Antispasmodic Agents	<p>Examples: Tolterodine (Detrol; Detrol LA) Oxybutynin (Ditropan)</p>	 Continue therapy up to and including day of surgery
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MISCELLANEOUS AGENTS		
Drug Class		Recommended strategy for Surgery
Aminosalicylates	<p>Examples: Sulfasalazine (Azulfidine) Mesalamine (Asacol)</p>	 Hold morning dose day of surgery
Antigout	<p>Examples: Allopurinol (Zyloprim) Colchicine (Colcrys)</p>	 Continue therapy up to and including day of surgery
Antihistamines	<p>Examples: Loratadine (Claritin)</p>	 Continue therapy up to and including day of surgery
Antimigraine	<p>Examples: Sumatriptan (Imitrex)</p>	 Stop taking on the day of surgery
Immunosuppressants	<p>Examples: Adalimumab (Humira) Methotrexate (Trexall)</p>	 ***DO NOT STOP WITHOUT CONSULTING PRESCRIBER***
Oral Chemotherapy	<p>Examples: Capecitabine (Xeloda) Imatinib (Gleevec)</p>	 <ul style="list-style-type: none"> • Discuss with oncologist • If no arrangements made, continue on day of surgery
OTC Eye/Nasal Products	<p>Examples: Artificial tears Nasal saline spray</p>	 Continue therapy up to and including day of surgery
Erectile Dysfunction drugs: Phosphodiesterase Type 5 Inhibitors (PDE5)	<p>Examples: Sildenafil (Viagra) Tadalafil (Cialis)</p>	 <ul style="list-style-type: none"> • Sildenafil, and Vardenafil: Stop taking at least 24 hours before surgery. Tadalafil: 48 hours. • if taken for pulmonary hypertension: continue medication on day of surgery
Vitamins/Supplements	<p>Examples: Multivitamins Herbals</p>	 Stop taking 7 days before surgery
Weight Loss/CNS Stimulants	<p>Examples: Phentermine (Lomaira) Phentermine/topiramate (Qsymia)</p>	 Stop taking 7 days before surgery

Appendix 1: Modified Caprini Risk Assessment Model for VTE in General Surgical Patients

Risk score			
1 point	2 points	3 points	5 points
Age 41 to 60 years	Age 61 to 74 years	Age ≥75 years	Stroke (<1 month)
Minor surgery	Arthroscopic surgery	History of VTE	Elective arthroplasty
BMI >25 kg/m ²	Major open surgery (>45 minutes)	Family history of VTE	Hip, pelvis, leg fracture
Swollen legs	Laparoscopic surgery (>45 minutes)	Factor V Leiden	Acute spinal cord injury (<1 month)
Varicose veins	Malignancy	Prothrombin 20210A	
Pregnancy or postpartum	Confined to bed (>72 hours)	Lupus anticoagulant	
History of unexplained or recurrent spontaneous abortion	Immobilizing plaster cast	Anticardiolipin antibodies	
Oral contraceptives or hormone replacement	Central venous access	Elevated serum homocysteine	
Sepsis (<1 month)		Heparin-induced thrombocytopenia	
Serious lung disease, including pneumonia (<1 month)		Other congenital or acquired thrombophilia	
Abnormal pulmonary function			
Acute myocardial infarction			
Congestive heart failure (<1 month)			
History of inflammatory bowel disease			
Medical patient at bed rest			
Interpretation			
Surgical risk category*	Score		Estimated VTE risk in the absence of pharmacologic or mechanical prophylaxis (percent)
Very low (see text for definition)	0		< 0.5
Low	1 to 2		1.5
Moderate	3 to 4		3.0
High	≥5		6.0

VTE: venous thromboembolism; BMI: body mass index.

* This table is applicable only to general, abdominal -pelvic, bariatric, vascular, and plastic and reconstructive surgery.

Appendix 2: 2018 ASRA Guidelines For Timing Neuraxial Block on Patients Receiving Anticoagulants

Drug	Recommended time to hold medication before performing neuraxial block:
Warfarin	4-5 days, Verify normal INR
Heparin (Unfractionated): - IV, or SQ Low prophylactic dose: - SQ High dose:	4-6 Hours, verify normal PTT 24 hours, verify normal PTT
Heparin (Low molecular weight): - Prophylactic: - Therapeutic:	>12 hours >24 hours
Direct oral factor Xa inhibitors:	
Rivaroxaban: Xarelto	3 Days or measure factor X. Consider longer hold time with renal impairment
Apixaban: Eliquis	Stop 2 - 3 days prior to surgery
Edoxaban: Savaysa	Can be stop 1 day prior to surgery
Betrixaban: Bevyxxa	
Thrombin inhibitors:	3 days if creat clearance >80 ml/min.
Dabigatran: Pralaxa	4 days if creat CI 50-79. 5 days if 30-49. NOT RECOMMENDED if Creat Clearance <30.
Antiplatelets:	
Aspirin, NSAIDs:	May continue
Ticlopidine: Ticlid	10 days
Clopiclogrel: Plavix	
Prasugrel: Effient	7 Days
Ticagrelor: Brilinta	
Cilostazol: Pletal	2 Days
Dipyridamole: Persantine	24 Hours

Note: For complete list of recommendations please refer to ASRA guidelines.

Concurrent use of medications may further affect coagulation.

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