Medication Instructions Prior to Surgery
Updated August 2016

The tables below offer guidance on whether to hold certain common classes of medications prior to surgery. It is not meant to replace sound clinical judgment. The decision of whether to give or hold medications should always take patient-specific considerations into account. The decision depends on the type of surgery (organs involved, major vs minor), the duration, whether there will be epidural or spinal catheters placed, the urgency (elective vs emergent), and the current state of the patient's medical conditions (controlled or uncontrolled blood pressure or blood glucose, renal and hepatic function, thrombotic risk, etc.).

Table 1. Cardiovascular Agents: ACE Inhibitors, ARBs, Diuretics, Statins, Others

Medication Class	Medication Names	Instructions for Holding	Reason
Angiotensin Converting Enzyme (ACE) Inhibitors	Benazepril + amlodipine (Lotrel) Benazepril (Lotensin) Benazepril + HCTZ (Lotensin HCT) Captopril (Capoten), Captopril + HCTZ (Capozide) Enalapril (Vasotec), Enalapril + HCTZ (Vaseretic) Fosinopril (Monopril) Fosinopril + HCTZ (Monopril HCT) Lisinopril (Prinivil, Zestril) Lisinopril + HCTZ (Prinzide or Zestoretic) Moexipril (Univasc), Moexipril + HCTZ (Uniretic) Perindopril (Aceon) Quinapril (Accupril), Quinapril + HCTZ (Accuretic) Ramipril (Altace) Trandolapril (Mavik) Trandolapril + verapamil (Tarka)	Hold day of surgery	Adverse hemodynamic changes during surgery (i.e. hypotension)
Angiotensin Receptor Blockers (ARBs)	Azilsartan (Edarbi) Candesartan (Atacand), Candesartan + HCTZ (Atacand HCT) Eprosartan (Teveten) Eprosartan + HCTZ (Teveten HCT) Irbesartan (Avapro), Irbesartan + HCTZ (Avalide) Losartan (Cozaar) Losartan + HCTZ (Hyzaar) Olmesartan (Benicar) Olmesartan + HCTZ (Benicar HCT) Telmisartan (Micardis) Telmisartan + HCTZ (Micardis HCT) Valsartan (Diovan) Valsartan / HCTZ (Diovan HCT)	Hold day of surgery	Adverse hemodynamic changes during surgery (i.e. hypotension)

Medication Class	Medication Names	Instructions for Holding	Reason
Beta Blockers	Acebutolol (Sectral) Atenolol (Tenormin) Betaxolol (Kerlone) Bisoprolol (Zebeta) Carvedilol (Coreg) Metoprolol (Lopressor, Toprol XL) Nadolol (Corgard) Nebivolol (Bystolic) Penbutolol (Levatol) Pindolol (Visken) Propranolol (Inderal) Sotalol (Betapace)	Do **NOT** hold	Withdrawal/rebound effects if held
Beta Blocker/Diuretic Combinations	Atenolol/chlorthalidone (Tenoretic) Nadolol/bendroflumethiazide (Corzide) Bisoprolol/hydrochlorothiazide (Ziac) Propranolol/ hydrochlorothiazide (Inderide) Metoprolol/HCTZ (Lopressor HCT)		
Calcium Channel Blockers	Amlodipine (Norvasc) Clevipidine (Cleviprex) Diltiazem (Cardizem) Felodipine (Plendil) Isradipine (Dynacirc) Nicardipine (Cardene) Nifedipine (Procardia, Adalat) Nimodipine (Nimotop) Verapamil (Calan, Covera-HS, Verelan)	OK to continue unless significant bradycardia, hypotension, or left ventricular dysfunction (LVEF < 40%)	
Clonidine	Clonidine (Catapres)	Do **NOT** hold	Withdrawal/rebound effects if held
Digoxin	Digoxin (Lanoxin)	OK to continue	
Diuretics	Acetazolamide (Diamox) Amiloride Amiloride/Hydrochlorothiazide (Moduretic) Bumetanide (Bumex) Chlorothiazide (Diuril) Chlorthalidone (Thalitone) Eplerenone (Inspra) Ethacrynic acid (Edecrin)	Hold day of surgery	Increases the risk of hypokalemia / hypovolemia

	Furosemide (Lasix) Hydrochlorothiazide (HCTZ, Microzide) Indapamide (Lozol) Metolazone (Zaroxolyn) Methazolamide Metolazone (Zaroxoxlyn) Spironolactone (Aldactone) Spironolactone/HCTZ (Aldactazide) Torsemide (Demadex) Triamterene (Dyrenium) Triamterene / HCTZ (Dyazide, Maxzide)		
Renin Inhibitors	Aliskiren (Tekturna) Aliskiren/Amlodipine (Tekamlo) Aliskiren/Amlodipine/HCTZ (Amturnide)	Hold day of surgery	Hypotension during surgery
Statins	Atorvastatin (Lipitor) Fluvastatin (Lescol) Lovastatin (Mevacor) Pitavastatin (Livalo) Pravastatin (Pravachol) Rosuvastatin (Crestor) Simvastatin (Zocor)	Do not hold	

Table 2. Anticoagulants and Antiplatelets

Anticoagulants and antiplatelet agents are commonly held prior to procedures due to an increased risk of bleeding. The risk of bleeding is higher for certain procedures and if renal or hepatic disease exists. Longer hold times are usually necessary for patients undergoing major surgery, spinal puncture, or placement of a spinal or epidural catheter or port. The risk of a cardiovascular and/or thromboembolic event must always be weighed against the risk of bleeding for the specific patient and procedure. The risk of stent thrombosis is highest in the first 4 to 6 weeks after stent implantation. **It is important to find out the indication for use of anticoagulants and antiplatelets (e.g., coronary artery disease, valve replacement, coronary stents, cerebrovascular disease [stroke], etc.) as the recommendations differ. The decision to hold or continue and the optimal way to do so may need to be determined by consensus of the surgeon, anesthesiologist, cardiologist or neurologist based on the risks of bleeding and potential for thrombosis. Check with the appropriate physician for specific instructions regarding IF, WHEN, and HOW to stop and restart therapy.**

Standard Bleeding Risk: breast biopsy, cardiac catheterizations, cataract surgery, colonoscopy, electrophysiology procedures, lithotripsy, polypectomy, no additional patient specific risk factors

High Bleeding Risk: Surgery involving major organs such as heart, neurosurgery, ophthalmologic, genitourinary, spine surgery, procedures requiring hemostasis (e.g. spinal anesthesia) or when additional patient specific risk factors are present.

Medication Class	**Medication Name**	**When to Hold Before Surgery – Standard Bleeding Risk**	**When to Hold Before Surgery – High Bleeding Risk**	**Minimum time to hold PRIOR to epidural catheter placement or spinal inj**	**Minimum time to RESTART after catheter removal** *(must wait longer if traumatic puncture)*
Anticoagulants - Direct Thrombin Inhibitors	Argatroban	4 hours	4 hours	4 hours (aPTT <30)	2 hours
	Bivalirudin (Angiomax)	2 hours	2 hours	aPTT <30	2 hours
	Dabigatran (Pradaxa)	24 hours if CrCl > 50mL/min 48 hours if CrCl 31-49mL/min 4-5 days if CrCl ≤ 30	2-3 days if CrCl ≥ 50 mL/min 2-3 days if CrCl 31-49mL/min 6 days if CrCl ≤ 30	2-4 days if CrCl ≥ 50 mL/min 4-5 days if CrCl 31-49mL/min 6 days if CrCl ≤ 30	24 hours. If VTE risk very high, can give half usual dabigatran dose 12 hours after removal

Medication Class	**Medication Name**	**When to Hold Before Surgery – Standard Bleeding Risk**	**When to Hold Before Surgery – High Bleeding Risk**	**Minimum time to hold PRIOR to epidural catheter placement or spinal inj**	**Minimum time to RESTART after catheter removal** *(must wait longer if traumatic puncture)*
Anticoagulants - Factor XA Inhibitors	Apixaban (Eliquis) Edoxaban (Savaysa) Fondaparinux (Arixtra) Rivaroxaban (Xarelto)	24 hours 24 hours hours if CrCl ≥50mL/min 48 hours if CrCl 15-49mL/min 2 days 24 hours if CrCl ≥30mL/min 48 hours if CrCl 15-30mL/min	3-5 days 72 hours if CrCl ≥50mL/min 96 hours if CrCl 15-50mL/min 3-4 days 72 hours if CrCl ≥30mL/min 96 hours if CrCl 15-30mL/min	24 hours 72 hours if CrCl ≥50mL/min 96 hours if CrCl 15-50mL/min 48 hours (prophylactic dosing), 3-4 days (treatment dosing) 72 hours if CrCl ≥30mL/min 96 hours if CrCl <30mL/min	24 hours 24 hours 24 hours 24 hours. If VTE risk very high, can give half usual rivaroxaban dose 12 hours after removal
Anticoagulants - Heparin	Heparin IV Heparin subQ	4 hours 8-10 hours	4-6 hours 8-10 hours	4 hours (PTT <33) 8-10 hours	2 hours. Time to resume may be up to 24 hr if traumatic puncture
Anticoagulants - Low molecular weight heparin	Enoxaparin (Lovenox) or Dalteparin (Fragmin) **Prophylactic dosing**	12 hours	12 hours	12 hours	4-24 hours depending on bleeding risk of procedure
Anticoagulants - Low molecular weight heparin	Enoxaparin (Lovenox) or Dalteparin (Fragmin) **Treatment dosing**	24 hours	24 hours	24 hours	4 hours low risk; 12-24 hrs after medium and high bleeding risk procedure

Anticoagulants - Warfarin	Warfarin (Coumadin) – **be sure to consider thrombotic risk and need for bridging with low molecular weight heparin or heparin**	Shared assessment risk and decision between treating physicians recommended.	5 days **and** INR < 1.5	5 days **and** INR < 1.5	24 hours

Medication Class	Medication Name	When to Hold Before Surgery – Standard Bleeding Risk	When to Hold Before Surgery – High Bleeding Risk	Minimum time to hold PRIOR to epidural catheter placement or spinal inj	Minimum time to RESTART after catheter removal *(must wait longer if traumatic puncture)*
Antiplatelets – Aspirin & aspirin-containing products	Aspirin Shared assessment risk and decision between treating physicians recommended. Aspirin and aspirin-containing products used for analgesia (Excedrin, Fiorinal, Soma Compound, Norgesic, Percodan)	**Patients with CAD, recent stent placement, stroke, should be continued on aspirin whenever possible**. Peripheral Vascular or Cardiac Surgery: patients may be asked by the surgeon to continue aspirin until time of surgery 7 days	4-6 days (especially ophthalmologic [not cataract], neurosurgical, ortho spine procedures) 7 days	6 days	24 hours
Antiplatelets	Cilostazol (Pletal) Dipyridamole (Persantine) Aspirin/ dipyridamole (Aggrenox)	48 hours 48 hours 7 days	48 hours 48 hours 7 days	48 hours 48 hours 6 days	24 hours 24 hours 24 hours
Antiplatelets – P2Y12 Inhibitors **Refer to disclaimer above regarding indication and stents**	Clopidogrel (Plavix) Prasugrel (Effient) Ticagrelor (Brilinta) Ticlopidine (Ticlid)	7 days 7 days 5 days 14 days	7 days 7 days 5 days 14 days	7 days 7 days 5 days 14 days	12 hours; 24 hours if loading dose 24 hours 24 hours 24 hours

Medication Class	Medication Name	When to Hold Before Surgery – Standard Bleeding Risk	When to Hold Before Surgery – High Bleeding Risk	Minimum time to hold PRIOR to epidural catheter placement or spinal inj	Minimum time to RESTART after catheter removal *(must wait longer if traumatic puncture)*
Antiplatelets – GPIIb/IIIa Inhibitors	Abciximab (Reopro)	48 hours	5 days	5 days	8-12 hours
	Eptifibatide (Integrilin)	8 hours	24 hours	24 hours	8-12 hours
	Tirofiban (Aggrastat)	8 hours	24 hours	24 hours	8-12 hours
Antiplatelets - Analgesics Short-acting NSAIDs	Diclofenac (Cataflam, Voltaren) Ibuprofen (Advil, Motrin) Ibuprofen/Hydrocodone (Vicoprofen) Ibuprofen/Oxycodone (Combunox) Fenoprofen (Nalfon) Ketoprofen ketorolac (Toradol) Meclofenamate Mefenamic Acid Tolmetin	Day prior to surgery	Day prior to surgery	24 hours	24 hours
	Diflunisal Etodolac (Lodine) Indomethacin (Indocin) Flurbiprofen	2 days			
Antiplatelets - Analgesics Long-acting NSAIDs	Meloxicam (Mobic) Naproxen (Aleve, Anaprox, Naprosyn) Sulindac	4 days	4 days	4 days	24 hours
	Nabumetone (Relafen)	6 days			
	Oxaprozin (Daypro) Piroxicam (Feldene)	10 days			
Antiplatelets - Analgesics Cox-2 Inhibitors	Celecoxib (Celebrex)	OK to continue	OK to continue	No restrictions	No restrictions

Table 3. Antidiabetic Medications: Also consider baseline needs, length and type of surgery; Refer to PCP for specific instructions

Drug Class	Drugs in Class	Instructions for Holding	Reason
Oral Antidiabetics	Acarbose (Precose)	Hold day of surgery	Increased risk of hypoglycemia
	Acetohexamide (Dymelor)		
	Alogliptin (Nesina)		
	Canagliflozin (Invokana)		
	Chlorpropamide (Diabinese)		
	Dapagliflozin (Farxiga)		
	Empagliflozin (Jardiance)		
	Glimepiride (Amaryl)		
	Glipizide (Glucotrol)		
	Glipizide/Metformin (Metaglip)		
	Glyburide (Micronase,Diabeta)		
	Glyburide/Metformin (Glucovance)		
	Glimepiride (Amaryl)		
	Linagliptin (Tradjenta)		
	Metformin (Glucophage)	**Hold At least 12 hours before surgery**	
	Metformin-containing products	**Hold At least 12 hours before surgery**	
	Miglitol (Glyset)	Hold day of surgery	
	Nateglinide (Starlix)		
	Pioglitazone (Actos)		
	Repaglinide (Prandin)		
	Rosiglitazone (Avandia)		
	Saxagliptin (Onglyza)	Hold day of surgery	
	Sitagliptin (Januvia)		
	Tolazamide (Tolinase)		
	Tolbutamide (Orinase)		
Intermediate and long acting (basal) insulin	NPH (Humulin N, Novolin N)	Take 50% of AM dose day of surgery	Increased risk of hypoglycemia
	NPH 70%/Regular 30% (Humulin/Novolin Mix 70/30)	Mixes: Take 50% of AM dose day of surgery (hold if BG<140)	
	Lispro protamine 75%/Lispro 25% (HumaLog Mix 75/25)		
	Aspart protamine 70%/Aspart 30% (NovoLog Mix 70/30)		
	Detemir insulin (Levemir)	Take 50% of AM dose day of surgery	
	Glargine insulin (Lantus)	Take 50% of AM dose day of surgery	
	Glargine insulin (Toujeo)	Take 50% of AM dose day of surgery	
		Take the usual dose of long-acting insulin the day before surgery and have a 30gm carbohydrate PM snack the night prior to surgery, unless directed otherwise.	

Drug Class	Drugs in Class	Instructions for Holding	Reason
Short and rapid-acting insulin	Aspart insulin (NovoLog) Glulisine insulin (Apidra) Lispro insulin (HumaLog) Regular insulin (Humulin R, Novolin R) Regular Insulin, inhaled (Afrezza)	Hold day of surgery (last dose is with dinner night before surgery); decrease basal rate by 10% if on a continuous pump	Increased risk of hypoglycemia
Injectable Antidiabetics/Non-insulin	Albiglutide (Tanzeum) Dulaglutide (Trulicity) Exenatide (Bydureon, Byetta) Liraglutide (Victoza) Pramlintide acetate (Symlin)	Hold day of surgery	Increased risk of hypoglycemia

Table 4. Other Medications

Drug Class	Drugs in Class	Instructions for Holding	Reason
Benzodiazepines	Alprazolam (Xanax)	OK to continue	Risk of withdrawal if stopped abruptly
Monoamine Oxidase Inhibitors	Isocarboxazid (Marplan) Phenelzine (Nardil) Tranylcypromine (Parnate) Rasagiline (Azilect) Selegiline patch (Emsam)	Taper off 2 weeks prior to surgery if possible; if not, use MAOI-safe anesthesia techniques OK to continue; notify Anesthesia DC at least 10 days prior to surgery if possible	Drug interactions (e.g., ephedrine, meperidine, methadone, tramadol), which could cause a hypertensive crisis
Selective Serotonin Reuptake Inhibitors (SSRIs)	Citalopram (Celexa) Escitalopram (Lexapro) Fluoxetine (Prozac) Fluvoxamine (Luvox) Paroxetine (Paxil) Sertraline (Zoloft)	OK to continue	Risk of withdrawal if stopped abruptly
Estrogen Replacement Therapy	Conjugated estrogens (Premarin), other products containing estrogen	Hold 4 weeks prior to surgery **if mod-high DVT risk procedure**	Increased risk of thromboembolism
Estrogen Receptor Modulators	Raloxifene (Evista) Tamoxifen (Nolvadex)	Hold 72 hours Hold 3 weeks prior to surgery **based on DVT risk**	Increased risk of thromboembolism
Oral Contraceptives and patches	Multiple brands	Hold 4 weeks prior to surgery **if mod-high DVT risk or as instructed by physician. Consider risk of unwanted pregnancy vs VTE risk**	Increased risk of thromboembolism

Urinary Analgesic	Pentosan Polysulfate Sodium (Elmiron)	Hold 24 hours prior to surgery	Increased risk of bleeding

Table 5. Herbals/Vitamins: There are unknown risks with any herbal or dietary supplement

Drug Class	Drugs in Class	Instructions for Holding	Reason
Herbals/Vitamins	Herbs with the potential to enhance bleeding: Agrimony, Angelica, Anise, Arnica, Asafoetida, Aspen, Black Haw, Bladder Wrack (Fucus), Bogbean, Boldo, Bromelain, Buchu, Capsicum, Celery, Chamomile, Clove, Fenugreek, Feverfew, Garlic, German Sarsaparilla, Ginger, Ginkgo Biloba, Ginseng (Panax), Horse Chestnut, Horseradish, Inositol Nicotinate, Licorice, Meadowsweet, Onion, Passion Flower, Pau d'Arco, Policosanol, Poplar, Prickly Ash (Northern), Quassia, Red Clover, Senega, Sweet Clover, Sweet Woodruff, Tamarind, Tonka Beans, Vitamin E, Wild Carrot, Wild Lettuce, Willow, Wintergreen Herbs that may increase sedative effects: Kava, valerian	Hold 2 weeks if possible	May interact with anesthetic agents and/or affect platelet function, increasing the risk of bleeding

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Authors: Bonnie Bachenheimer, PharmD, Drug Information Clinical Pharmacist, Ellen Keith, RPh, Anticoagulant Clinical Pharmacist, David Young, MD, Anesthesiology

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