Antiplatelet Medications: ASA, clopidogrel, ticagrelor, prasugrel

Antiplatelet Agent	When to STOP before surgery
ASA	No Need to Stop
Clopidogrel (Plavix) Ticagrelor (Brilinta)	Hold for 6 full days, LAST DOSE 7 days before surgery
Prasugrel (Effient)	Hold for 7 full days, LAST DOSE 8 days before surgery

Parenteral Anticoagulants: low molecular weight heparin, unfractionated heparin, fondaparinux

Anticoagulant	When to STOP before surgery
VTE Prophylaxis Doses	
Enoxaparin 40 mg sc qhs Enoxaparin 30 mg sc qhs	LAST DOSE 1 day before surgery
Heparin 5000 units sc BID	LAST DOSE 1 day before surgery
Therapeutic anticoagulation	
Enoxaparin 1.5 mg/kg sc daily (preferred time is 1000h)	LAST DOSE 1000h 1 day before surgery *If the patient has been receiving doses at 2200h:* • *Do NOT give a dose the evening before surgery* • *Give last dose in the evening of 2 days before surgery OR convert patient to 1 mg/kg BID dosing and follow guideline for enoxaparin 1mg/kg sc BID*
Enoxaparin 1 mg/kg sc BID	LAST DOSE 2 days before surgery
Fondaparinux	LAST DOSE at 1000h 2 days before surgery

Oral Anticoagulants: warfarin, dabigatran, apixaban, rivaroxaban, edoxaban

Oral Anticoagulant	When to STOP before surgery
Warfarin (Coumadin)	**<u>If NO bridging required</u>** (low thrombosis risk patients): Hold warfarin for 5 full days, LAST DOSE 6 days before surgery

<table>
<tr><td></td><td><u>If bridging is required (high thrombosis risk patients)</u>:

1. Hold warfarin for 5 full days, LAST DOSE 6 days before surgery
2. Start enoxaparin 3 days before OR at a dose of 1.5 mg/kg sc daily in the morning (for patients with normal renal function)
3. LAST DOSE of enoxaparin to be given 1 day before surgery

Criteria for bridging may include: DVT less than 3 months ago, prosthetic mitral heart valves, high risk aortic valves (previous TIA/stroke, atrial fibrillation, severe LV dysfunction), cardiac thrombus presumed to be present less than 3 months</td></tr>
<tr><td>Direct Oral Anticoagulants (DOACs)</td><td>No overlapping is required between DOACs and LMWH
Start therapeutic LMWH or IV heparin only If DOAC is held for longer than the following stated days</td></tr>
<tr><td>Dabigatran (Pradaxa)</td><td>Determine patient’s renal function (eGFR, mL/min/1.73^2)

<table>
<tr><td>Renal Function (eGFR, mL/min/1.73^2)</td><td></td><td>Hold dose</td></tr>
<tr><td>Equal or greater than 80 mL/min/1.73^2</td><td></td><td>3 days before surgery</td></tr>
<tr><td>50 - 70 mL/min/1.73^2</td><td></td><td>4 days before surgery</td></tr>
<tr><td>30 – 49 mL/min</td><td></td><td>5 days before surgery</td></tr>
</table>
In patients with severe renal dysfunction (CrCl less than 30 mL/min) who are generally ineligible for DOACs, peri-operative management is unclear.</td></tr>
<tr><td>Apixaban (Eliquis)</td><td>Determine patient’s renal function (eGFR, mL/min/1.73m^2)

<table>
<tr><td>Dose</td><td>Renal Function (eGFR, mL/min/1.73m^2)</td><td></td><td>Hold dose</td></tr>
<tr><td>5 mg BID</td><td></td><td></td><td>3 days before surgery</td></tr>
<tr><td>2.5 mg BID</td><td>Equal or greater than 30 mL/min/1.73m^2</td><td></td><td>2 days before surgery</td></tr>
<tr><td>2.5 mg BID</td><td>Less than 30 mL/min/1.73m^2</td><td></td><td>3 days before surgery</td></tr>
</table>
In patients with severe renal dysfunction (CrCl less than 30 mL/min) who are generally ineligible for DOACs, peri-operative management is unclear.</td></tr>
<tr><td>Rivaroxaban (Xarelto)</td><td>
<table>
<tr><td>Dose</td><td></td><td></td><td>Hold dose</td></tr>
<tr><td>20 mg once daily</td><td></td><td></td><td>4 days before surgery</td></tr>
<tr><td>10 mg once daily</td><td></td><td></td><td>3 days before surgery</td></tr>
</table>
</td></tr>
</table>

<table>
<tr>
<td>Edoxaban (Lixiana)</td>
<td>Determine patient's renal function (eGFR, mL/min/1.73m^2)
<table>
<tr><th>Dose</th><th>Renal Function (eGFR, mL/min/1.73m^2)</th><th></th><th>Hold dose</th></tr>
<tr><td>60 mg once daily</td><td>Equal or greater than 30 mL/min/1.73m^2</td><td></td><td>4 days before surgery</td></tr>
<tr><td>60 mg once daily</td><td>Less than 30 mL/min/1.73m^2</td><td></td><td>5 days before surgery</td></tr>
<tr><td>30 mg once daily</td><td>Equal or greater than 30 mL/min/1.73m^2</td><td></td><td>2 days before surgery</td></tr>
<tr><td>30 mg once daily</td><td>Less than 30 mL/min/1.73m^2</td><td></td><td>3 days before surgery</td></tr>
</table>
</td>
</tr>
</table>

Anti-hypertensives: beta blockers, ACEis, ARBs, Entresto, CCBs, vasodilators, diuretics, MRAs, alpha agonists, alpha blockers, vasodilators, nitrates, direct rening inhibitors

Antihypertensive Agent	When to STOP before surgery
Beta blockers: Atenolol, acebutolol, bisoprolol, carvedilol Metoprolol, nadolol, nebivolol, pindolol, propranolol, sotalol, timolol	CONTINUE on the morning of surgery (prevents POAF)
<u>RAAS Inhibitors</u>: **ACE-Inhibitors**: Ramipril, perindopril, fosinopril, lisinopril, quinapril, trandolapril, enalapril, cilazapril, benazepril, captopril **ARBs:** Candesartan, eprosartan, irbesartan, losartan, , olmesartan, telmisartan, valsartan **ARB/Neprilysin Inhibitor:** Sacubitril/valsartan (**Entresto)** **Direct Renin Inhibitor:** Aliskerin (Rasilez)	LAST DOSE day before surgery. (Risk of vasoplegia post-op)
Diuretics: Amiloride, chlorthalidone, furosemide, hydrochlorothiazide, indapamide, metolazone, **MRAs**: Eplerenone, spironolactone	HOLD on the morning of surgery

Alpha blocker: Doxazosin, terazosin, **Alpha 2 agonists**: Clonidine, methyldopa **Calcium channel blockers:** Amlodipine, diltiazem, felodipine, nifedipine, verapamil **Nitrates:** Isosorbide dinitrate, nitroglycerin patch **Vasodilators:** Hydralazine	CONTINUE on the morning of surgery

Anti-hyperglycemic agents: Insulins, metformin, SGLT2is, GLP1s, DPP4is, sulfunylureas, acarbose, thiazolidinediones

- For outpatients: Refer to **RADAR** clinic if A1C >8.5% and surgery more than one week away

*Consensus with Endocrinology and Diabetes Educators

Antidiabetic Agent	When to STOP before surgery
Insulin **<u>Long-acting e.g</u>**: Glargine (Basaglar, Lantus, Toujeo), Degludec (Tresiba) Detemer (Levemer) **<u>Intermediate-acting e.g</u>**: Humulin N Novolin ge NPH **<u>Mixed insulin e.g:</u>** Humalog Mix25 Humalog Mix40 Humulin 30/70 Novomix30 **<u>Short-acting e.g</u>**: Aspart (Novorapid, Trurapi, Fiap) Lispro (Humalog, Admelog) Glulisine (Apidra) Humulin R Novolin ge Toronto	• **Insulin pump**: Consult Endocrinology • **Type I diabetes**: Consult Endocrinology • **Long-acting basal or intermediate insulin:** Give 75% of patient's usual dose the night before AND on the morning of surgery • **Mixed insulins**: HOLD on the morning of surgery • **Short-acting meal insulin**: HOLD on the morning of surgery

SGLT2 inhibitors canagliflozin (Invokana) Dapagliflozin (Forxiga Empagliflozin (Jardiance) Canagliflozin/Metformin (Invokamet) Empagliflozin/Metformin (synjardy) Empagliflozin/Linagliptin (Giyxambi) Dapagliflozin/Metformin (Xigduo) Dapagliflozin/Saxagliptin (Qtern) Ertugliflozin (Steglatto) Ertugliflozin/Metformin (Segluromet) Ertugliflozin/Sitagliptin (Steglujan)	*(HOLD for 3 full days before and on morning of surgery. LAST DOSE 4 days before surgery - Risk of euglycemic DKA)*
Metformin **Sulfonylureas:** Gliclazide (Diamicron), glyburide, glimepiride (Amaryl) **DPP4 inhibitors**: Linagliptin (Trajenta), sitagliptin (Januvia), saxagliptin (Onglyza) **Thiazolidinediones;** Rosiglitazone, pioglitazone (Actos) **Alpha-glucosidase Inhibitor:** Acarbose **Meglitinides:** Repaglinide (Gluconorm), nateglinide (Starlix)	HOLD on the morning of surgery *(Consider holding longer in renal dysfunction or AKI)*
GLP1 agonist: Semaglutide (Ozempic, Rybelsus) Dulaglutide (Trulicity)	HOLD for ALL IN PATIENTS *(Risk of delayed gastric emptying and pulmonary aspiration during anesthesia)* • **Weekly dosing**: semaglutide sc (Ozempic), dulaglutide (Trulicity), Trizapatide (Mounjaro) o If for weight loss: HOLD for 3 weeks preop if time allows

Liraglutide (Viktoza, Saxenda) Tirzepatide (Mounjaro) Glargine/Lixisenatide (Soliqua®)	○ If for diabetes: SKIP one dose preop • **Daily dosing:** semaglutide po (Rybelsus), liraglutide (Viktoza or Saxenda), Soliqua ○ HOLD for 2 days before surgery (last dose 3 days preop) For Type 2 DM: If HbA1C > 8.5% and NOT taking insulin, refer to RADAR clinic preoperatively. If no HbA1C available, please order one in PAC and refer to RADAR clinic as necessary.

Disease Modifying Agents DMARDs and Biologics:

**Consider risk of discontinuing therapy (disease flare-up) VS continuing therapy (increased risk of SSIs and wound healing) **

DMARD Agent	**When to STOP before surgery**
Leflunomide	HOLD 2 weeks before surgery and resume 1-2 weeks after surgery
Methotrexate	Consider holding 1 week before surgery and resume 1-2 weeks after surgery (e.g. in elderly and renal dysfunction when higher chance of build up occur)
Hydroxychloroquine	Continue with no interruption
Sulfasalazine	Continue with no interruption (consider holding 1 day before and resume 3 days after surgery)
Biologics Agent	**When to STOP before surgery** **(Generally, hold 2-3 half-lives) before surgery and restart in 2-4 weeks when good wound healing achieved with no evidence of infection**
TNF-alpha inhibitors	• **Adalimumab** (q2 weeks injection): HOLD for 3 weeks • **Etanercept** (weekly injection) **:** HOLD for 2 weeks; Last dose 3 weeks before surgery • **Golimumab** (monthly injection): HOLD for 6 weeks (skip one injection) • **Infliximab** (q 4-8 weeks injection) **:** HOLD for 8 weeks • **Certolizumab** (monthly injection): HOLD for 6 weeks • **Tocilizumab** ○ **SC injection:** HOLD for 3 weeks ○ **IV injection:** HOLD for 4 weeks
Rituximab	Plan surgery at the end of cycle
Abatcept	**SC injection**: HOLD 1 week **IV injection**: HOLD 1 month