BNF Chapter 1 **Gastro-intestinal system**	Drug Examples	Route	Risks/ Cautions/Contraindications	Recommendations	Notes
1.3.5 Proton Pump inhibitors	Omeprazole, Lansoprazole, Esomeprazole, Pantoprazole, Rabeprazole	Oral	Cessation or omission of dose may worsen control of gastric acid, leading to increased risk of aspiration perioperatively. May need a reduced dose in liver impairment and following liver resection.	Continue; ensure dose is given on morning of surgery. Omeprazole may be given by intravenous injection (IV)if patient is Nil by Mouth post op.	In patients with uncontrolled reflux, the BNF advises omeprazole 40mg orally the evening prior to surgery and 40mg 2-6 hours before surgery.[1]
1.4.1 Adsorbents and bulk forming drugs	Loperamide Co-phenotrope	Oral	Contraindicated in ileus.[1] Use with caution in patients prescribed opiates or ondansetron post operatively as may worsen constipation.	Continue in patients with ongoing diarrhoea, monitor regularly for constipation. Avoid in bowel surgery.	Stop in patients with normal bowel motions, particularly those on opiates or ondansetron post operatively.
1.5.1 Aminosalicylates	Mesalazine Sulfasalazine Olsalazine	Oral	Increased risk of blood dyscrasias post operatively. May worsen condition if doses missed.	Continue Ensure dose is given on morning of surgery Monitor FBC	
1.5.3 Drugs affecting the immune response (see section 8.2.2)	Azathioprine Ciclosporin Methotrexate Infliximab Adalimumab	Oral / SC/ IV	Risk of worsening of condition if doses missed. Patients may be more susceptible to infections or develop more severe infections.	Continue. Discontinue if serious post operative infection occurs.	May be used following organ transplantation, risk of rejection if doses missed. See section 8.2.2
1.6 Laxatives	Laxido® Lactulose Senna Docusate Fybogel®	Oral	Some oral preparations require to be made up in water. Fluid intake is undesirable immediately prior to surgery.	Consider withholding Laxido and Fybogel on morning of surgery due to the fluid quantities required to administer. Consider withholding as bowel prep plan may be in place prior to surgery.	

BNF Chapter 1 **Gastro-intestinal system**	Drug Examples	Route	Risks/ Cautions/Contraindications	Recommendations	Notes
1.6.7 Other drugs used in constipation	Linaclotide	Oral	Contraindicated in intestinal perforation or bowel obstruction and inflammatory diseases of the gastro-intestinal (GI) tract.[1]		
1.7.4 Management of anal fissure.	Glyceryl trinitrate Ointment (GTN)	Topical	Absorption of GTN ointment may potentiate side effects such as headache and hypotension	Avoid on day of surgery.	
1.9.2 Bile acid sequestrants.	Cholestyramine	Oral	Cholestyramine must be made up in water, risk of aspiration if given on morning of surgery		

BNF Chapter 2 Cardiovascular system	Drug Examples	Route	Risk/Cautions/Contraindications	Recommendations	Notes
2.1.1 Cardiac Glycosides	Digoxin	Oral	Risk of arrhythmias, embolism, cardiac failure and poor tissue healing if omitted. Good history of safe use for AF and CCF perioperatively [2]	Continue. [2] Ensure dose is given on morning of surgery	
2.2.1 Thiazide diuretics 2.2.2 Loop Diuretics	Indapamide Bendroflumethiazide Furosemide Bumetanide	Oral	May cause hypokalaemia (correct pre-operatively if necessary) [2 3 4] May cause hypokalaemia (correct pre-operatively if necessary) [2 3 4]	Continue [2 3 4] Ensure dose is given on morning of surgery Continue [2 3 4] Ensure dose is given on morning of surgery	
2.2.3 Potassium sparing diuretics, Aldosterone antagonists 2.2.4 Potassium sparing diuretics with other diuretics	Spironolactone Amiloride Eplerenone Co-amilofruse Co-amilozide Navispare®	Oral	Tissue damage and reduced kidney perfusion in immediate post-operative period may lead to hyperkalaemia (but no clear evidence) [3 4]	Consider withholding dose on morning of surgery. [3 4]	
2.3.2 Anti-arrhythmic Drugs	Amiodarone Flecainide Dronedarone	Oral	Risk of arrhythmias greater than detrimental effects of continuing drug through surgery. [3] Can prolong duration of action of non-depolarising neuromuscular blockers. [3] Amiodarone – Risk of atropine resistant bradycardia, hypotension and pro-arrhythmic effect. More recent data suggests safe for use. Impractical to discontinue due to long half life. [2 3 5 6]	Continue. [2 3 4 5 6] Ensure dose is given on morning of surgery	

BNF Chapter 2 Cardiovascular System	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
2.4 Adrenoceptor blocking drugs	Atenolol Metoprolol Bisoprolol Sotalol Propranolol Carvedilol	Oral	Patients at risk of coronary artery disease have substantially reduced mortality and cardiovascular events following discharge after non-cardiac surgery if beta blockers are continued. [8] Beta blockers may counteract tachycardia and increased BP provoked by surgery and anaesthesia in patients with hypertension. [3] Abrupt withdrawal may cause side-effects which may not manifest until 12- 72 hours after discontinuation and may increase morbidity and mortality. [2 5 6] Continuation of beta blockers is associated with a more stable haemodynamic profile, reduced incidence of arrhythmias, myocardial ischaemia and MI. [6] Beta blockers may reduce the risk of major perioperative cardiovascular events but increase the risk of bradycardia and hypotension needing treatment. [9 10] Increased risk of CVA if patients are over-treated with beta blockers or commenced on a beta blocker immediately prior to operation. [11]	Continue. [2 3 4 5 6 7 8 9] Ensure dose is given on morning of surgery Consider reducing dose if patient is hypotensive or bradycardic.	

BNF Chapter 2 Cardiovascular System	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
2.5.1 Vasodilator antihypertensive drugs	Hydralazine	Oral	No specific issues noted	Continue. [4 7] Ensure dose is given on morning of surgery	
2.5.2 Centrally acting antihypertensive drugs	Clonidine Methyldopa Moxonidine	Oral	Risk of severe rebound hypertension if clonidine is withdrawn suddenly. [2 6] Avoid abrupt withdrawal[12]	Continue. [2 4 6 7] Ensure dose is given on morning of surgery	
2.5.4 Alpha Blockers	Doxazosin Indoramin Prazosin Terazosinr Phenoxybenzamine	Oral Oral	May cause Intra-operative floppy iris syndrome. [1 13] Patients may be at risk of acute urinary retention if stopped.	Discontinue 1-2 weeks prior to cataract surgery. [13] Continue in other types of surgery. [4 7] Ensure dose is given on morning of surgery Discuss pre operative management with Consultant/Surgeon	See also BNF section 7.4.1 Irreversible non selective alpha blocker. Half life 24 hours
2.5.5.1 ACE Inhibitors 2.5.5.2 Angiotensin receptor antagonists	Enalapril Ramipril Lisinopril Perindopril Candesartan Irbesartan Losartan Valsartan	Oral Oral	May intensify hypotensive effect of anaesthetics which may be less responsive to vasopressors. [2 3 5 6 14 15] Requirement for ephedrine to maintain BP more frequent when ACEI continued [15] Increased risk of renal impairment, especially if patient is dehydrated, hypotensive or being given other nephrotoxic drugs. [7] Withholding doses may worsen control in patients with cardiac failure	Consider continuation if prescribed for Cardiac failure. [7] Consider reducing the dose if patient is persistently hypotensive. Consider omitting morning dose and or prior evening dose if prescribed for hypertension. [2 5 6 7] Consider withholding post operatively if patient is dehydrated, hypotensive or has been given nephrotoxic drugs (e.g. gentamicin)	

BNF Chapter 2 Cardiovascular System	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
2.6.1 Nitrates	Isosorbide mononitrate	Oral	Potential risk of Acute coronary syndrome (ACS) / worsening angina if stopped. [3 7]	Continue [3] Ensure dose given on day of surgery	
2.6.2 Calcium Channel Blockers (rate limiting)	Verapamil Diltiazem Amlodipine Felodipine Nifedipine Nimodipine	Oral	Continuation is recommended for control of hypertension and angina, haemodynamic stability and reduction of ischaemic burden and to avoid withdrawal syndromes [3 4 6 7] Withdrawal may increase rate in patients treated for Atrial fibrillation (AF) May reduce cardiovascular morbidity and mortality in non-cardiac surgery.[9] Continue unless severe Left ventricular dysfunction is evident. (caution in patients with LVEF <40%) [2 5]	Continue [2 3 4 5 6 7] Ensure dose given on day of surgery Consider risks / benefits to withholding morning dose in patients with severe LVF.	Verapamil may cause constipation. Consider laxatives in patients on Verapamil and opioids and / or ondansetron post op as increased risk of constipation.
2.6.3 Other antianginal drugs	Nicorandil Ivabradine Ranolazine	Oral	Potential risk of ACS / worsening angina if stopped. [3 7]	Continue [3] Ensure dose given on day of surgery	
2.6.4 Peripheral vasodilators and related drugs	Naftidrofuryl Cilostazol	Oral	No known issues with naftidrofuryl. Increased surgical bleeding risk with cilostazol. [18]	Continue naftidrofuryl If a patient is to undergo elective surgery and anti-platelet effect is not necessary, cilostazol should be stopped 5 days prior to surgery. [18]	

BNF Chapter 2 Cardiovascular System	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
2.8.1 Parenteral anticoagulants	Heparin Dalteparin Fondaparinux	Parenteral	Risk of excessive bleeding if continued. Risk of VTE if stopped. [7]	Assess risks on an individual patient basis. [5] In patients on long term prophylactic or therapeutic dosing consider postponing non-urgent surgery until course is complete **Where surgery is urgent:** **In low bleed risk and low VTE risk** (surgical prophylaxis) patients, stop low molecular weight heparin or subcutaneous unfractionated heparins 12 hours prior to surgery. Restart post surgery (withhold for 12 hours if still bleeding) [5] **In high bleed risk and high VTE risk** It may be beneficial to give unfractionated heparin by continuous infusion which can be stopped 4-6 hours prior to surgery and restarted immediately after surgery (may be delayed for 12 hours if still bleeding) [5 6]	
				Spinal needle or epidural catheter placement or removal should be performed when anticoagulant effect is minimal. [5]	See Acute Pain Service Epidural Guidelines [19]
			Risk of spinal haematoma if spinal needle or epidural catheter is placed or removed whilst anticoagulant is effective. [5 6]	Spinal needle or epidural catheter should not be placed until at least 12 hours after administration of a LMWH or 6 hours for standard heparin [19] LMWH should not be administered until at least 6 hours following spinal needle or epidural catheter removal. [19] Standard heparin should not be administered until at least 2 hours following spinal needle or epidural catheter removal. [19]	For patients on continuous IV heparin, please discuss with anaesthetist.

BNF Chapter 2 **Cardiovascular System**	Drug Examples	Route	Risk/Cautions/Contraindications	Recommendations	Notes
2.8.1 Heparinoids Direct Thrombin Inhibitor	Danaparoid Argatroban	Sc / IV	Increased bleed risk. Specialist use for anticoagulation in patients with Heparin Induced Thrombocytopenia.	Contact haematology for advice	
2.8.2 Oral anticoagulants	Warfarin Phenindione	Oral	Risk of excessive bleeding even when INR is in therapeutic range. Risk of spinal haematoma if spinal needle epidural catheter is placed or removed whilst anticoagulant is effective. [5] [6] Risk of Venous Thromboembolism (VTE) if patient under coagulated. [7]	Assess bleeding risk prior to surgery, in certain types of surgery warfarin can be continued. Spinal needle or epidural catheter placement or removal should be performed when anticoagulant effect is minimal. [5] Warfarin should not be restarted in patients with an epidural catheter in situ. Discuss with anaesthetist. [19] In surgery involving increased bleeding risk oral anticoagulants will need to stop a minimum of five days prior to surgery. Patients at higher risk of VTE may require bridging therapy either with unfractionated heparin or low weight molecular heparin. Factors affecting choice of VTE therapy include indication for anticoagulant therapy and renal function. Patients at low risk, cessation of the anticoagulant combined with VTE prophylaxis is sufficient	No requirement to stop in dental extraction and cataract surgery Discuss with consultant/ anaesthetist

BNF Chapter 2 **Cardiovascular System**	Drug Examples	Route	Risk/Cautions/Contraindications	Recommendations	Notes
2.8.2 Oral anticoagulants (NOAC'S)	Dabigatran Rivaroxaban Apixaban	Oral	Increased surgical bleed risk [20] [21]	For patients following elective orthopaedic surgery, ideally postpone surgery until course complete.	aPTT can be used to estimate the degree of anticoagulation. [20] [21]
			Risk of spinal haematoma if spinal needle or epidural catheter is placed or removed. [20] [21]	Start Dabigatran no sooner than 2 hours following removal of spinal catheter. [20] Discuss with anaesthetist prior to restarting Dabigatran or Rivaroxaban if patient has an epidural catheter in situ. Spinal catheters not to be removed earlier than **18 hours** after last dose of Rivaroxaban and not to be restarted until minimum **6 hours** after catheter removal (24 hours in cases of traumatic catheterisation) [21] Epidural/spinal catheters cannot be removed earlier than **20 hours** after the last dose of Apixaban and be restarted until a minimum of **5 hours** after catheter removal [118]	
			Minor dental work	Continue	It is recommended that the last dose of Apixaban /Dabigatran is taken 12 hours before procedure and the last dose of Rivaroxaban taken 24 hours before procedure.
			Invasive dental work(extractions, biopsies) Upper and lower GI endoscopy Joint injections Cataract extraction with lens implantation	Last dose of Apixaban/ Dabigatran/ Rivaroxaban 24 hours before procedure	Refer to Management of New Oral Anticoagulants In Surgery.[22]

<table>
<tr><th>BNF Chapter 2 Cardiovascular System</th><th>Drug Examples</th><th>Route</th><th>Risk/Cautions/Contraindications</th><th>Recommendations</th><th>Notes</th></tr>
<tr><td></td><td>Apixaban</td><td>Oral</td><td>Apixaban cessation dependent on major/minor surgery , renal function and bleeding risk</td><td>Stopping Apixaban
<table>
<tr><td>Renal function
(CrCL in mL/min)</td><td colspan="2">Stopping Apixaban before elective surgery</td></tr>
<tr><td></td><td>High risk of bleeding or major surgery</td><td>Non major surgery and low bleeding risk</td></tr>
<tr><td>≥ 50</td><td>2 days before
Omit 4 doses</td><td>24 hours before
Omit 2 doses</td></tr>
<tr><td>≥ 30 < 50</td><td>3 days before
6 doses</td><td>2 days before
4 doses</td></tr>
<tr><td>< 30</td><td>Seek advice</td><td>Seek advice</td></tr>
</table></td><td>If significant renal impairment CrCl < 50mL/min – refer to separate drug tables below

Refer to:

Management of New Oral Anticoagulants In Surgery.[22]

Consider prophylactic LWMH
Or
Therapeutic LWMH dosing dependent on thrombosis and bleeding risk</td></tr>
</table>

<table>
<tr><th>BNF Chapter 2 Cardiovascular System</th><th>Drug Examples</th><th>Route</th><th>Risk/Cautions/Contraindications</th><th>Recommendations</th><th>Notes</th></tr>
<tr>
<td></td>
<td>Dabigatran</td>
<td>Oral</td>
<td>Dabigatran cessation dependent on major/minor surgery renal function. [20] and bleeding risk</td>
<td>Stopping dabigatran: [20]
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(CrCL in mL/min)</td><td colspan="2">Stopping dabigatran before elective surgery</td></tr>
<tr><td></td><td>High risk of bleeding or major surgery</td><td>Non major surgery and low bleeding risk</td></tr>
<tr><td>≥ 80</td><td>2 days before
4 doses</td><td>24 hours before
2 doses</td></tr>
<tr><td>≥ 50-< 80</td><td>2-3 days before
4-6 doses</td><td>1-2 days before
2-4 doses</td></tr>
<tr><td>≥ 30-< 50</td><td>4 days before
8 doses</td><td>2-3 days before
4-6 doses</td></tr>
</table>
</td>
<td>Refer to:

Management of New Oral Anticoagulants In Surgery[22]

Consider prophylactic LMWH.
Or
Therapeutic LWMH dosing dependent on thrombosis and bleeding risk</td>
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<tr>
<td></td>
<td>Rivaroxaban</td>
<td>Oral</td>
<td>Rivaroxaban cessation dependent on major/minor surgery , renal function and bleeding risk

Risk of VTE or stroke if stopped.</td>
<td>Stopping Rivaroxaban
<table>
<tr><th rowspan="2">Renal function
(CrCL in mL/min)</th><th colspan="2">Stopping Rivaroxaban before elective surgery</th></tr>
<tr><th>High risk of bleeding or major surgery</th><th>Non major surgery and low bleeding risk</th></tr>
<tr><td>≥ 50</td><td>2 days before
Omit 2 doses</td><td>24 hours before
Omit 1 dose</td></tr>
<tr><td>≥ 30 < 50</td><td>2 days before
2 doses</td><td>24 hours before
Omit 1 dose</td></tr>
<tr><td>≥ 15 <30</td><td>3 days before
3 doses</td><td>2 days before
2 doses</td></tr>
</table>
</td>
<td>If significant renal impairment CrCl < 50mL/min – refer to separate drug tables below

Refer to:

Management of New Oral Anticoagulants In Surgery[22]

Consider prophylactic LMWH.
Or
Therapeutic LWMH dosing dependent on thrombosis and bleeding risk</td>
</tr>
</table>

BNF Chapter 2 Cardiovascular System	Drug Examples	Route	Risk/Cautions/Contraindications	Recommendations	Notes
2.9 Antiplatelet drugs	Aspirin Clopidogrel Dipyridamole Ticagrelor Prasugrel	Oral	Risk of cardiovascular event or stent thrombosis if antiplatelet drugs discontinued. [2 3 9 17]	Assess bleeding risk prior to surgery. For patients on antiplatelet agents following recent ACS, stents or recent stroke, consideration should be given to postponing non-urgent surgery. [9] Low-dose aspirin therapy should only be withheld before non-cardiac surgery in patients with coronary heart disease where the aspirin related bleeding complications are expected to be high [9]	
	Aspirin	Oral		Aspirin discontinuation is not generally required for invasive procedures. The risk-benefit ratio of interrupting low dose aspirin prophylaxis should be assessed individually with consideration given to the planned procedure. [24]	
	Clopidogrel	Oral	Clopidogrel is a thienopyridine antiplatelet agent. Continuation of clopidogrel 5 days preceding cardiac surgery was not associated with a lower rate of post operative myocardial infarction (MI) but was associated with increased risks of post operative stroke, re-operation for bleeding and all cause mortality. [23] Risk of excessive bleeding during surgery. [2 3 9] Aspirin and clopidogrel cause irreversible platelet inhibition. [17] Dual therapies are associated with increase intra-operative bleeding. [9]	Consideration should be given to temporary discontinuation of clopidogrel seven days prior to invasive procedures if the risk of increased bleeding is deemed to exceed the risk of thrombosis. [24] If cessation of irreversible platelet inhibitors is necessary it should be done 7-10 days prior to surgery to allow for maximum recovery of platelet function. [2 5] then reinstated as soon as possible after surgery. [3 9]	

BNF Chapter 2 Cardiovascular System	Drug Examples	Route	Risk/Cautions/Contraindications	Recommendations	Notes
	Dipyridamole	Oral	Dipyridamole when used in combination with other antiplatelet agents may increase the likelihood of bleeding.	Discontinuation of Dipyridamole (monotherapy) not generally required prior to invasive procedures, however, the risks of interrupting therapy and of bleeding if continued should be individually assessed. [24]	
	Ticagrelor	Oral	Ticagrelor- is a novel reversible platelet inhibitor at P2Y12 adenosine diphosphate receptor, inhibiting platelet aggregation and thrombus formation	Discontinue 7 days prior to elective surgery. Consult anaesthetist / cardiology for advice [118]	Ideally defer surgery until after Ticagrelor course complete. If urgent surgery, wait until minimum one month after coronary event / stenting, stop Ticagrelor 7-10 days prior to op, but continue aspirin 75mg.
	Prasugrel	Oral	Prasugrel is an irreversible inhibitor of platelet activation and aggregation at P2Y12 adenosine phosphate receptor. Increased frequency(3-fold) and severity of bleeding may occur in patients where prasugrel not discontinued 7 days before surgery	Discontinue 7 days prior to elective surgery, if antiplatelet effect not desired. Consult anaesthetist /cardiology for advice [119]	
			Risk of spinal haematoma if spinal needle is placed or epidural catheter is removed whilst antiplatelet effect is still present. [5]	Aspirin need not be discontinued in regional anaesthesia. Discontinue if it can be done without compromising patient's cardiac function to prevent risk of increased bleeding. [6] Antiplatelet dose should not be given until at least two hours after spinal needle placement or epidural catheter removal. [5]	
Glycoprotein IIb/IIIa inhibitors	Tirofiban Abciximab	Parenteral		Use of glycoprotein IIb/IIIa inhibitors must be discontinued preoperatively for greater than 12 hours to allow normal haemostasis. [17]They are contraindicated in major surgery.	Discuss with anaesthetist prior to restarting antiplatelets if patient has an epidural catheter in situ.

BNF Chapter 2 Cardiovascular System	Drug Examples	Route	Risk/Cautions/Contraindications	Recommendations	Notes
2.12 Lipid regulating drugs	Simvastatin Atorvastatin Bezafibrate	Oral	Statins have a plaque stabilising effect and may reduce inflammatory response to surgery.[2] Statin therapy should be continued through the perioperative period.[9] Statin withdrawal has been associated with an increased risk of cardiovascular events.[16]	Continue statins.[2 9 16] Continue bezafibrate	
	Cholestyramine	Oral	Cholestyramine is made up in water Risk of aspiration if given on the morning of surgery.	Avoid cholestyramine on morning of surgery	

BNF Chapter 3 Respiratory system	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
3.1.1.1 Selective Beta$_2$ agonists	Salbutamol Salmeterol Terbutaline	Inhaled	Worsening of Asthma / Chronic Obstructive Pulmonary Disease (COPD) if regular treatment discontinued.	Patients using regular long acting beta2 agonist therapy should continue up until and including the morning of surgery. If patient is unable to use regular inhalers containing long acting beta$_2$ agonists or has poorly controlled asthma/COPD, consider using spacer device with inhaler. Alternatively regular or as required nebulised salbutamol.	Long acting beta$_2$ agonists are often combined with steroids in inhalers. E.g. Seretide® or Symbicort®. Monitor potassium perioperatively.
3.1.2 Antimuscarinic bronchodilators	Tiotropium Ipratropium	Inhaled	Worsening of COPD if regular treatment discontinued	If patient is unable to use inhaler, consider switching to regular nebulised ipratropium.	Tiotropium and ipratropium should not be administered together due to risk of urinary retention.
3.1.3 Theophylline	Nuelin SA® Uniphyllin Continus® Slo-Phyllin® Aminophylline	Oral	Withdrawal of treatment may exacerbate asthma / COPD	Continue. Ensure dose is given on morning of surgery Consider aminophylline infusion in patients nil by mouth. Monitor levels closely.	Theophylline has a narrow therapeutic range and must be monitored closely. Avoid giving interacting medicines where possible
3.2 Corticosteroids (inhaled)	Beclometasone Fluticasone Budesonide	Inhaled	Withdrawal of treatment may exacerbate asthma / COPD	Patients using inhaled steroid therapy should continue up until and including the morning of surgery. High dose (≥500microgram Beclometasone, >750microgram fluticasone) may need extra cover - see Appendix 1	Long acting beta$_2$ agonists are often combined with steroids in inhalers. E.g. Seretide® or Symbicort®. Appendix 1 – Management of patients on long term corticosteroid treatment in the Perioperative period

BNF Chapter 3 **Respiratory system**	Drug Examples	Route	Risk/Cautions/Contraindications	Recommendations	Notes
3.3.2 Leukotriene Receptor Antagonist	Montelukast Zafirlukast	Oral	Withdrawal of treatment may exacerbate asthma / COPD	Continue. Ensure doses are given as prescribed up until and including morning of surgery.	
3.4.1 Antihistamines	Cetirizine Loratadine Chlorphenamine Hydroxyzine Fexofenadine	Oral	Patients may be on regular treatment to control allergies or skin complaints. Withdrawal may exacerbate these conditions.	Continue Ensure doses are given as prescribed up until and including morning of surgery.	

BNF Chapter 4 **Central Nervous system**	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
4.1.1 Hypnotics	Temazepam Nitrazepam Zopiclone	Oral	Risk of anxiety, confusion, convulsions, withdrawal syndromes in chronic users	Continue Ensure doses are given as prescribed up until and including evening before surgery.	Consider parenteral benzodiazepines if nil by mouth (NBM) patient experiences withdrawal
4.1.2 Anxiolytics	Diazepam Lorazepam Chlordiazepoxide	Oral	Risk of anxiety, confusion, convulsions, withdrawal syndromes in chronic users	Continue Ensure doses are given as prescribed up until and including morning of surgery.	
4.2.1 Antipsychotics	1st generation Haloperidol Chlorpromazine	Oral	Risk of extra-pyramidal symptoms during surgery but psychiatric disturbances if omitted.[2 7]	Continue [4 6 7 25] Ensure doses are given as prescribed up until and including morning of surgery.	Ensure preventative measures for VTE taken.[37]
	2nd generation Olanzapine Risperidone	Oral	Can cause ECG changes , including prolonged QT interval.[25] Risk of arrhythmias or hypotension preoperatively Long term therapy with major tranquilisers may prolong sedation , reduce seizure threshold and reduce anaesthetic requirements .[2 4 6]	Unclear with first generation antipsychotics [2]	

BNF Chapter 4 **Central Nervous system**	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
	Clozapine	Oral	Risk of extra-pyramidal symptoms , psychiatric disturbances if omitted [7] Discontinuation may cause severe withdrawal phenomena and disease relapse.[2 25] May cause hypotension [2] Risk of gastrointestinal hypo motility and life threatening bowel Obstruction. [35 39] Contraindicated in paralytic ileus. [40] Increased risk of VTE [37]	Check white cell count prior to surgery Consult Psychiatrist for advice on management of patients on clozapine .[2] Withhold 12 hours before surgery. Restart 12 hours after surgery if vital signs are stable	My counteract the effects of adrenaline and noradrenaline [40] Increased risk of circulatory relapse with benzodiazepines [40] ****Note**** **If omitted for 48 hours or longer then clozapine must be restarted at a low dose and titrated up to therapeutic level [40]**

BNF Chapter 4 **Central Nervous system**	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
4.2.3 Drugs used for mania and hypomania	Lithium (Priadel ® Camcolit®)	Oral	Lithium direct effects cause hazardous risks in surgery, especially when haemodynamic instabilities occur and renal excretion becomes impeded. No withdrawal effects from Lithium. If being withdrawn completely a gradual reduction will reduce risk of relapse. Prolongs the action of depolarising and non-depolarising muscle relaxants. This is not considered a sufficient reason to discontinue perioperatively.	Ideally continue unless risks outweigh benefits [2 6] **Minor surgery** - not stopped [25] **Major surgery**: (D/W psychiatrist) If discontinuation is required, stop 24-72 hours before surgery, restore when haemodynamically stable and when U&Es in normal range and patient is able and allowed to drink. Check blood levels after 1 week. [4] Monitoring of lithium levels is recommended perioperatively in: Renal impairment. Significant concurrent disease. Concurrent infection. Significant change in sodium intake Significant change in fluid intake Treatment with drugs altering renal clearance of lithium Treatment with drugs likely to upset electrolyte balance. Patients experiencing polydipsia and/or	Lithium toxicity can be exacerbated by hyponatraemia. Renal failure can precipitate or exacerbate lithium toxicity. Lithium has a narrow therapeutic index. Toxicity would be expected at levels over 1.5mmol/L (although can occur below this) Emergency treatment of poisoning where levels are above 2mmol/L. Monitoring of lithium levels is recommended perioperatively in: Renal impairment. Significant concurrent disease. Concurrent infection. Significant change in sodium intake Significant change in fluid intake Treatment with drugs altering renal clearance of lithium

BNF Chapter 4 **Central Nervous system**	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
4.3.1 Tricyclic and related antidepressant drugs (TCA)	Amitriptyline Nortriptyline Trazodone Dosulepin	Oral	Withdrawal may exacerbate depression and cause withdrawal symptoms (see below) [7 25 26] Risk of cardiac arrhythmias even in patients on long term therapeutic doses and when pro-arrhythmic drugs such as halothane used. [5] Blocks uptake of noradrenaline, cases of vasodilatation and hypotension resistant to phenylephrine, ephedrine and dopamine (but responsive to large doses of noradrenaline) reported. [5] TCAs have a long half life. Effects of therapy may continue for up to a week after cessation. [5 6]	Continue unless clear clinical reason to stop [6 26] Use safe anaesthetic technique Noradrenaline should be considered the vasopressor of choice in TCA related hypotension. [5]	If withdrawing treatment gradually taper dose. After courses less than 8 weeks, taper over 1-2 weeks, courses lasting 6-8 months over 6-8 weeks. Reducing by quarter of the treatment dose every 4-6 weeks if even more gradual withdrawal required. Should not be stopped unless clear clinical reason. [26]
4.3.2 Monoamine-oxidase inhibitors (reversible)	Moclobemide	Oral	Withdrawal may exacerbate or cause re-emergence of depression and precipitate withdrawal symptoms [7] Interaction with sympathomimetics leading to massive release of stored noradrenaline and potentially fatal hypertensive crisis. Can have fatal adverse drug reactions as a result of excess of serotonin and catecholamines, causing headaches, agitation, haemodynamic instability leading to pyrexia, seizures and possibly coma and death [2] Can inhibit opiate metabolism. [2] causing depression reaction due to elevated free opioid characterised by respiratory depression, hypotension and coma.	Use an MAOI safe anaesthetic technique (Widely considered unnecessary to discontinue MAOIs before elective surgery if MAOI-safe anaesthesia is used.) [5] If unable to use safe technique: Stop 24 hours before surgery [25]	Likely to need D/W psychiatrist Avoid pethidine, dextromethorphan and indirect acting sympathomimetics such as noradrenaline and adrenaline in patients on MAOIs Use morphine, fentanyl and direct acting sympathomimetics (isoprenaline and phenylephrine) instead. [4 5]

BNF Chapter 4 **Central Nervous system**	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
4.3.2 Monoamine-oxidase inhibitors (irreversible)	Phenelzine Isocarboxazid Tranylcypromine	oral	Withdrawal may exacerbate or cause re-emergence of depression and precipitate withdrawal symptoms [7] Interaction with sympathomimetics leading to massive release of stored noradrenaline and potentially fatal hypertensive crisis. Can have fatal adverse drug reactions as a result of excess of serotonin and catecholamines, causing headaches, agitation, haemodynamic instability leading to pyrexia, seizures and possibly coma and death [2] Can inhibit opiate metabolism. [2] causing depression reaction due to elevated free opioid characterised by respiratory depression, hypotension and coma. Recovery of MAO activity may take up to two weeks after stopping irreversible MAOI and may cause setback to depression treatment. [6]	Use an MAOI safe anaesthetic technique (Widely considered unnecessary to discontinue MAOIs before elective surgery if MAOI-safe anaesthesia is used.) [5 6] If unable to use safe technique: Discontinue irreversible MAOI. Could change to reversible MAOI two weeks before surgery then stop 24 hours before surgery. Do not stop for local anaesthesia. [2 4 6 25]	Likely to need discussion with psychiatrist Avoid pethidine, dextromethorphan and indirect acting sympathomimetics such as noradrenaline and adrenaline in patients on MAOIs Use morphine, fentanyl and direct acting sympathomimetics (isoprenaline and phenylephrine) instead. [4 5]

BNF Chapter 4 Central Nervous system	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
4.3.3 Selective serotonin reuptake inhibitors (SSRIs)	Citalopram Fluoxetine Sertraline	Oral	Generally considered safe [2] Withdrawal may exacerbate depression, withdrawal syndromes may begin 24-72 hours after stopping drug and last as long as 1-2 weeks or more. [5 7 25 26] May cause hyponatraemia, address this pre-operatively [5] Gastro-intestinal Bleed risk with Non-steroidal anti-inflammatory drugs (NSAIDs) and SSRIs (especially in older patients) [25] Risk of rare but potentially fatal serotonin syndrome (increased serotonin levels in the brain stem and spinal cord) if given concurrently with other serotonergic drugs such as tramadol, pethidine, pentazocine, dextromethorphan. [4 25 30 31] Suggested diagnostic criteria include the presence of at least three of the following features: agitation, tremor, mental state changes (e.g. confusion, hypomania), myoclonus, hyperreflexia, fever, shivering, diarrhoea, diaphoresis, and in coordination. [31]	Continue, should not be stopped unless clear clinical reason, but use a serotonin free anaesthetic technique [2 5 25 26] Ensure dose given on morning of surgery. Continue, but if high dosage therapy is stopped, consider restarting at a reduced dosage then gradually increasing. [5]	If withdrawing treatment gradually taper dose. After courses less than 8 weeks, taper over 1-2 weeks, courses lasting 6-8 months over 6-8 weeks. Reducing by quarter of the treatment dose every 4-6 weeks if even more gradual withdrawal required. [26] Reinstating high doses may precipitate serotonin syndrome. [5]

BNF Chapter 4 **Central Nervous system**	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
4.3.4 Other antidepressant drugs	Mirtazapine Venlafaxine Duloxetine	Oral	Withdrawal may exacerbate or cause re-emergence of depression and precipitate withdrawal symptoms such as: headache, dizziness, nausea, diarrhoea and shock like sensations which can be severe [7] [25] [26] Occurrences of perioperative complications are unlikely. [25]	Continue, should not be stopped unless clear clinical reason [26] Balance risks and benefits [25]	Duloxetine is also used in the treatment of stress incontinence. If withdrawing venlafaxine treatment gradually taper dose. After courses less than 8 weeks, taper over 1-2 weeks, courses lasting 6-8 months over 6-8 weeks. Reducing by quarter of the treatment dose every 4-6 weeks if even more gradual withdrawal required. [26]
4.4 CNS Stimulants	Atomoxetine Dexamphetamine Methylphenidate	Oral	Discontinuation may precipitate ADHD symptoms [27] No withdrawal symptoms [27] Risk of sudden blood pressure increase during surgery where halogenated anaesthetics used. [28] Withdrawal may unmask severe depression. [28] Serious adverse events, including sudden death, have been reported in concomitant use with clonidine	Avoid methylphenidate on day of surgery [28] Continue following surgery.	
4.5.1 Anti-obesity drugs acting on the gastro-intestinal tract	Orlistat®	Oral	Can cause diarrhoea whilst patients are eating fatty meals. (should be less of a problem in fasted patients)	Consider withholding dose on morning of surgery and day after surgery if patient has been experiencing diarrhoea.	Consider stopping where patient is having bowel surgery.

BNF Chapter 4 **Central Nervous system**	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
4.6 Drugs used in nausea and vertigo	Cinnarizine Cyclizine Prochlorperazine Domperidone Metoclopramide Ondansetron	Oral	No specific issues Increased gastric motility with domperidone / metoclopramide. Constipation with ondansetron.	Continue	
4.7.1 Non opioid analgesics	Paracetamol	Oral IV	Risk of liver damage in underweight patients. [29] Reduce frequency of administration in patients with renal failure. [29] Reduce dose for patients with additional risk factors for hepatotoxicity (hepatocellular insufficiency, chronic alcoholism, chronic malnutrition, dehydration). [29]	Continue. Reduce dose in underweight patients or children. [29] Reduce frequency to a maximum of every six hours in patients with creatinine clearance less than 30mLs/min. [29] Reduce maximum daily dose to 3g in those patients over 50kg with risk factors for hepatotoxicity. [29]	Check patient's weight on admission and amend dose appropriately for patients with low weight.
4.7.2 Opioid analgesics	Dihydrocodeine Tramadol Morphine Oxycodone	Oral	Tramadol lowers seizure threshold in patients with epilepsy. Increased risk of serotonin syndrome if tramadol given with other serotonergic drugs.	Continue Give dose on morning of surgery	Avoid tramadol in patients with a history of epilepsy and patients on SSRIs.
4.7.3 Neuropathic pain	Amitriptyline Nortriptyline Gabapentin Pregabalin	Oral	Amitriptyline - see section 4.3.1 No specific issues with gabapentin or pregabalin	Continue gabapentin and pregabalin. Give dose on morning of surgery	
4.7.4 Antimigraine drugs	Sumatriptan Rizatriptan Pizotifen	Oral	Withdrawal of pizotifen may increase likelihood of migraine. Nothing specific issues with for triptans	Continue pizotifen prophylaxis prior to surgery. Could give sumatriptan or rizatriptan to treat migraine on day of surgery.	Do not use Aspirin in the treatment of migraine immediately prior to surgery.

BNF Chapter 4 **Central Nervous system**	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
4.8 Antiepileptic drugs	Carbamazepine Sodium valproate Phenytoin Lamotrigine Phenobarbital	Oral	Abrupt withdrawal, particularly of benzodiazepines and barbiturates can precipitate severe rebound seizures, hypoxia and aspiration pneumonia [1 2 7] Cardiac monitoring advised for IV Phenytoin [4] May be a reduced requirement for general anaesthetic agents. [6] Withdrawal syndromes associated with some agents [6]	Continue [2 4 6] Ensure dose given on morning of surgery. Consider different formulations if patient is nil by mouth	Appendix 2 – Alternative routes and dose adjustments for patients on antiepileptic medication
4.9.1 Dopaminergic drugs used in Parkinson's Disease	Co-beneldopa Co-careldopa Ropinirole	Oral	Small risk of arrhythmias or hypertension during anaesthesia in patients on levodopa/dopa decarboxylase inhibitors. [4] Some anti-emetics can exacerbate Parkinson's or increase levodopa concentrations. [4] Withdrawal may cause immobility quickly following missed doses and pulmonary complications and has been associated with neuroleptic malignant syndrome [2 6 7]	Continue [2 4 6 7] Ensure dose given on morning of surgery.	Following surgery, different options such as liquids or dispersible tablets may be available. Contact ward pharmacist for advice In patients who are Nil by Mouth contact Parkinson's disease specialists.
4.9.1 Monoamine oxidase (MAOI) B inhibitors	Selegiline Rasagiline	Oral	MAOI type drugs -contraindicated with Pethidine and sympathomimetics. [32] Avoid abrupt withdrawal due to the risk of neuroleptic malignant like syndrome.[1 33]	As for MAOI antidepressants: Use an MAOI safe anaesthetic technique and continue Selegiline. If must be stopped, dose should be tapered off, but last dose must be minimum 14 days before surgery.	

BNF Chapter 4 **Central Nervous system**	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
4.9.1 Catechol-O-methyltransferase inhibitors	Entacapone Tolcapone	Oral	Avoid abrupt withdrawal due to the risk of neuroleptic malignant like syndrome.[1]	Continue	
4.9.2 Antimuscarinic drugs used in parkinsonism	Procyclidine Orphenadrine	Oral	Risk of symptoms of drug induced Parkinsonism returning if stopped.	Continue	Reminder – patients may also be on Depot antipsychotics. Please check before discontinuing these drugs. Avoid antimuscarinic drugs in bowel obstruction and post operative urinary retention.[1]
4.10.1 Drugs used in alcohol dependence	Acamprosate Disulfiram	Oral	Disulfiram may prolong effect of benzodiazepines and opiates.[1]	Continue	Do not use oral medicines containing alcohol. E.g. ranitidine liquid Oral morphine liquid
4.10.2 Nicotine dependence	Bupropion Nicotine replacement Varenicline	Oral / topical	No specific issues Discontinuation of NRT may cause nicotine withdrawal.	Continue	

BNF Chapter 4 **Central Nervous system**	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
4.10.3 Opioid dependence	Methadone Buprenorphine Naltrexone	Oral	Continue methadone; also give adequate analgesia post operatively. [34] Methadone patients may need increased anaesthetic doses. Naloxone may cause opiate withdrawal symptoms. [4] Naltrexone is an opiate antagonist; concomitant administration with opiates is not advisable due to increased likelihood of life-threatening opiate toxicity. [35 36]	Continue methadone and buprenorphine [4] Ensure dose given on morning of surgery Opioid analgesia required for patients on naltrexone, larger doses than usual may be required and the patients must be closely monitored for signs of opiate toxicity. [35] Consider using paracetamol and NSAIDs as first line therapy.	
4.11 Drugs for dementia	Donepezil Rivastigmine Galantamine	Oral / Patch	May prolong effects of neuromuscular blocking drugs such as suxamethonium. Not contra-indicated with anaesthetics, but stopping before surgery is advisable [4 41 42 44 45 46 47 49 50]	Consider discontinuation if prolonged neuromuscular block is likely to present a problem, otherwise continue. Rivastigmine - Miss the last dose on the day before and the dose on the morning of surgery [48] Withdraw donepezil 2-3 weeks prior to planned surgery due to long half life (although in emergency surgery anaesthetist should be aware of risk of prolonged neuromuscular blockade) [41 42 49] Consider discontinuing galantamine 1-2 days prior to surgery, enzyme inhibition vanished 24 hours after withdrawal of galantamine. [41 43 50] If galantamine treatment is substantially interrupted, consider re-titrating dose [50]	If rivastigmine is interrupted for more than several days, it should be re-initiated at 1.5 mg twice daily and titrated up. [44] Galantamine not recommended for patients recovering from bladder or bowel surgery or with GI obstruction. [50]

BNF Chapter 5 Infections	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
5.1 Antibacterial drugs	Rifampicin	Oral	Rifampicin reduces plasma concentration of midazolam. [51] Orally administered midazolam is ineffective during rifampicin treatment. [51]	May require increased doses of midazolam or use alternative benzodiazepine for patients on rifampicin.	
	Linezolid		Linezolid is a weak monoamine oxidase inhibitor similar to the MAOI antidepressants.[52]	Use MAOI safe anaesthetic technique for patients taking Linezolid.	
	Erythromycin		Erythromycin reduced clearance of intravenously administered midazolam by 54% [53] Hepatic enzyme inducing drugs may increase the metabolism of isoflurane.	Prescription of midazolam for patients receiving erythromycin should be avoided or the dose of midazolam should be reduced by 50% to 75%. [53]	
	Isoniazid		Administration of isoniazid in human patients may increase the metabolism of enflurane and increase serum fluoride ion concentrations to levels that may transiently impair renal function [54]	Continue isoniazid with caution.	
5.2 Antifungal drugs	Fluconazole Itraconazole	Oral	No known issues	Continue	
5.3 Antiviral drugs	HIV medications Aciclovir Ganciclovir Valganciclovir	Oral/iV	Midazolam interacts with protease inhibitors - increased respiratory depression [2] Potential adverse effects of drug withdrawal include drug resistance [7] and worsening of condition	Protease inhibitors interact with midazolam (do not use), continue HIV treatment [2 7]	

BNF Chapter 6 Endocrine system	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
6.1.1 .1 Insulins (Short acting)	Actrapid® Novorapid® Humalog®	SC	Stress response to surgery involves a rise in blood sugar levels. In a type 1 diabetic patient these effects can lead to severe hyperglycaemia, ketoacidosis, electrolyte disturbances and protein catabolism. Hypoglycaemia occurs if given when patient fasted.	**For procedures with no more than one missed meal (morning surgery)** Basal bolus regimens: Omit the morning and lunchtime short acting insulin's. Keep the basal unchanged. [55] Premixed am insulin: Halve the morning dose and omit lunchtime dose For procedures with more than one missed meal[55] **For procedures with no more than one missed meal (Afternoon surgery)** Take usual morning insulin dose(s). Omit lunchtime dose. Check blood glucose on admission.[55] **For procedures with more than one missed meal** Consider variable rate insulin infusion. Check blood glucose on admission. [55]	Short procedures should be scheduled early in the morning and the usual diabetes treatment delayed until food is ingested.[55] Generally a reduced dose of insulin the night before and omission of insulin or reduced dose morning of surgery. [55]

BNF Chapter 6 Endocrine system	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
6.1.1 .2 Insulins (Twice daily dosing)	Novomix® Humalog® mix Mixtard	SC	Stress response to surgery involves a rise in blood sugar levels. In a type 1 diabetic patient these effects can lead to severe hyperglycaemia, ketoacidosis, electrolyte disturbances, and protein catabolism. Hypoglycaemia if given when patient fasted.	**For procedures with no more than one missed meal** Give half the dose of insulin on morning of surgery. Check blood glucose on admission. (both for AM and PM surgery) [55] **For procedures with more than one missed meal** Consider variable rate insulin infusion. Give half dose of insulin on morning of surgery. Check blood glucose on admission	In patients on regimen of short and intermediate acting insulin (premixed such as mixtard 30) continue until morning of surgery (and give intermediate acting night before) [55]
6.1.1.2 Insulins (Long Acting)	Lantus Levemir Insulatard	SC	Stress response to surgery involves a rise in blood sugar levels. In a type 1 diabetic patient these effects can lead to severe hyperglycaemia, ketoacidosis, electrolyte disturbances, and protein catabolism.	Therapies providing basal insulin can be continued with careful management. Long acting insulins may be replaced by intermediate acting insulins [57] **For procedures with no more than one missed meal** Continue as usual, check blood glucose on admission **For procedures with more than one missed meal** Give basal insulin as usual, consider variable rate insulin infusion. [2 55]	Short procedures should be scheduled early in the morning and the usual diabetes treatment delayed until food is ingested.[55] Generally a reduced dose of insulin the night before and omission of insulin or reduced dose morning of surgery. [55]

BNF Chapter 6 Endocrine system	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
6.1.2.1 Sulfonylureas	Gliclazide Glipizide Glimepiride Glibenclamide	Oral	Discontinue before surgery. Sulphonylureas may interfere with ischaemic conditioning and increase risk of myocardial injury perioperatively. [56] They can precipitate perioperative hypoglycaemia. [56] If long acting sulphonylureas are not stopped, consider glucose supplementation perioperatively. [2 56]	**For procedures with no more than one missed meal** AM Surgery: Omit morning dose.[55] **For procedures with more than one missed meal** AM Surgery: Omit any morning doses, continue evening doses if eating. [55] PM Surgery: Omit morning and evening doses. [55] Consider a temporary switch to insulin [56] Glibenclamide is long acting. Consider a switch to a shorter acting sulphonylureas prior to surgery, and then omit the morning dose.	

BNF Chapter 6 Endocrine system	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
6.1.2.2 Biguanides	Metformin	Oral	Increased risk of lactic acidosis if renal function decreases. Consider with holding from 48 hours prior to surgery. [2]	**For procedures with no more than one missed meal** AM Surgery: Take as normal (omit for procedures involving contrast media) [55] **For procedures with more than one missed meal** IS Surgery: ** Take morning and evening doses as usual, omit lunchtime dose. [55] PM Surgery: Take morning and evening doses as usual, omit lunchtime dose. [55]	Metformin should be restarted when eGFR >50.[55] For procedures involving contrast media, metformin should be withheld for 48 hours if patient's eGFR >50. [55] ** Current practice in ARI is to omit morning dose
6.1.2.3 Other diabetic drugs	Acarbose	Oral	Risk of hypoglycaemia.	**For procedures with no more than one missed meal** AM Surgery: Omit morning dose if NBM[55] **For procedures with more than one missed meal** AM Surgery: Omit morning dose (if fasted) [55] PM Surgery: Take morning dose if eating breakfast, omit lunchtime dose. [55]	

BNF Chapter 6 Endocrine system	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
Insulin secretagogues	Nateglinide repaglinide	Oral	May precipitate perioperative hypoglycaemia	Discontinue before surgery. Discontinue short acting secretagogues evening before or morning of surgery. [2] If longer acting secretagogues are discontinued for extended periods, patient may need insulin. [2] **For procedures with no more than one missed meal** AM Surgery: Omit morning dose if nil by mouth[55] **For procedures with more than one missed meal** AM Surgery: Omit morning dose (if fasted) [55] PM Surgery: Take morning dose if eating breakfast, omit lunchtime dose. [55]	
Thiazolidinediones	Pioglitazone	Oral	Prolonged duration of action, little risk of precipitating hypoglycaemia. Discontinuation a short period of time prior to operation may have little impact on glycaemic control [2]	**For procedures with no more than one missed meal** AM Surgery: Take as usual. [55] **For procedures with more than one missed meal** AM Surgery: Take as usual. [55] PM Surgery: Take as usual. [55]	Should not be used in patients with bladder cancer

BNF Chapter 6 Endocrine system	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
Dipeptidylpeptidase inhibitors	Sitagliptin Saxagliptin	Oral	Risk of hypoglycaemia.	**For procedures with no more than one missed meal** AM Surgery: Omit on day of surgery.[55] **For procedures with more than one missed meal** AM Surgery: Omit morning dose.[55] PM Surgery: Omit morning dose. [55]	
GLP-1 Agonists	Exenatide, Liraglutide	SC	Risk of hypoglycaemia.	**For procedures with no more than one missed meal** AM Surgery: Omit on day of surgery. [55] **For procedures with more than one missed meal** AM Surgery: Omit on day of surgery. [55] PM Surgery: Omit on day of surgery. [55]	
6.2.1 Thyroid Hormones	Levothyroxine Liothyronine	Oral	Due to long half life of levothyroxine, a missed dose is unlikely to have a clinical effect. [2]	Continue [2]	
6.2.2 Antithyroid drugs	Carbimazole Propylthiouracil	Oral	Risk of arrhythmias if discontinued	Continue	
6.2 Corticosteroids	Prednisolone Dexamethasone Hydrocortisone Fludrocortisone	Oral / IV/ Inhaled	Risk of Addisonian crisis if long term steroids stopped suddenly. Risk of deterioration of condition if steroids stopped.	See Appendix 1 **Patients on long term steroids must be given doses promptly. If steroid is not in stock, it must be obtained urgently.**	Appendix 1 – Management of patients on long term corticosteroid treatment in the Perioperative period

BNF Chapter 6 Endocrine system	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
6.4.1.1 Oestrogens and Hormone Replacement Therapy (HRT)	See current BNF	Oral Topical	Risk of recurrence of menopausal symptoms if HRT stopped. [58] Likely to increase risk of post operative VTE, but not well quantified [58] VTE risk still increased up to 90 days post surgery [2 4]	Minor surgery Continue HRT, thromboprophylaxis not necessary. [58] Major surgery Continue HRT, but with thromboprophylaxis [58] In major surgery with prolonged immobility, consider discontinuation 4 weeks prior to surgery. [2 4] Stop raloxifene at least 1 week pre-operatively for moderate to major surgery [2]	
6.4.2 Male sex hormones and antagonists	Testosterone Finasteride Dutasteride Cyproterone	Oral / topical / IM	Cyproterone may increase risk of thromboembolism	Continue Consider thromboprophylaxis for patients on cyproterone [59]	
	Alendronate Risedronate Ibandronic Acid Strontium	Oral	Must be given with glass of water Strontium associated with increased risk of VTE [62]	May not be suitable for fasted patient on day of surgery due to volume of liquid required to take. Ensure adequate thromboprophylaxis used for patients on strontium. [62]	Weekly bisphosphonate tablets may be taken one day before or one day after due date [60 61]

BNF Chapter 7 Obstetrics, Gynaecology & Urinary Tract	Drug Examples	Route	Risk/Cautions/Contraindications	Recommendations	Notes
7.3.1. Combined Oral Contraceptives (COCs)s)	Microgynon® Logynon® Marvelon® Cilest® Ovranette® Evra® patches NuvaRing®	Oral	Estimated 3-4 fold increased risk of VTE perioperatively if continued.[58] (risk same for newer COCs) [70] Risk of unplanned pregnancy if stopped. [58]	Major Surgery (and leg surgery), prolonged immobilisation, smoker, over 35 years of age. [117] Consider risks and either continue, but with thromboprophylaxis or change to different form of contraception , either non-hormonal contraception or Progestogen only pill four weeks prior to surgery and for two weeks after surgery [58, 117] Minor Surgery Consider thromboprophylaxis. [58]	
7.3.2 Progestogen Only Contraceptives (POPs)	Cerazette® Femulen® Noriday® Micronor® Depo-provera ® Injection Nexplanon® Intra-uterine system – Mirena®	Oral	No evidence of increased VTE risk [58]	No need to discontinue during surgery. [58]	
7.4.1 Drugs for urinary retention	Alfuzosin Doxazosin Tamsulosin	Oral	May cause Intra-operative floppy iris syndrome. [13] Patients may be at risk of acute urinary retention if stopped.	Discontinue 1-2 weeks prior to cataract surgery. [13] Continue in other types of surgery. [4 7] Ensure dose is given on morning of surgery	See also section 2.5.4
7.4.2 Drugs for urinary frequency, enuresis and incontinence	Oxybutynin Solifenacin Tolterodine	Oral	Contraindicated in paralytic ileus Contraindicated in patients with bladder outflow obstruction (may precipitate retention) [63 64 65]	Continue, but use with caution in bowel surgery.	May contribute to post operative confusion and constipation

BNF Chapter 8 **Malignant disease**	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
8.1 Cytotoxic drugs		Various		Patient specific	Contact oncology/ haematology for advice
8.2.2 Immunosuppressants	Azathioprine Mycophenolate Tacrolimus Ciclosporin	Oral/IV	May be used following organ transplantation, risk of rejection if doses missed. Risk of relapse in condition if doses omitted. Risk of more severe post op infections in immunosuppressed patients	Continue, ensure no doses missed. Use alternative formulations in patients who are nil by mouth [4] Discuss withholding doses with prescribing consultant if severe post operative infection occurs.	Doses of alternative formulations may not be equivalent to oral dosing. Consult pharmacist for advice.
8.2.3 Monoclonal Antibodies	Rituximab	IV	Risk of worsening of condition if doses missed. Patients may be more susceptible to infections or develop more severe infections. [67] [68]	Continue. Discontinue if serious post operative infection occurs. [68]	
8.2.4 Other immunomodulating drugs	Interferon Thalidomide Lenalidomide	IV Oral	Risk of relapse in condition if doses omitted. Increased risk of VTE for patients on Lenalidomide or Thalidomide [69] [70] [71]	Continue Ensure thromboprophylaxis used.	
8.3.4 Hormone antagonists	Anastrozole Letrozole Tamoxifen	Oral	Increased VTE risk. (40% of these cases occurred within 3 months of surgery or following immobility) [72]	Treatment for breast cancer - continue treatment (unless risk clearly outweighs risk of interrupting treatment) Patient should receive appropriate thromboprophylaxis measures. [2] [72] Treatment for anovulatory infertility - Stop tamoxifen 6 weeks before surgery or long term immobility and restart only when patient is fully mobile.	

BNF Chapter 9 Nutrition and Blood	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
9.5.1 Calcium Supplements	Calcichew® Calcichew D3 Forte® Calfovit® Adcal D3®	Oral	Some preparations dissolved in water Absorption may be delayed		
9.5.2 Phosphate binding agents	Lanthanum Aluminium Sevelamer	Oral	Absorption may be delayed	Avoid if patient fasted	

BNF Chapter 10 **Musculoskeletal & joint diseases**	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
10.1.1 Non-steroidal anti-inflammatory drugs	Ibuprofen Diclofenac Naproxen Celecoxib Mefenamic Acid Meloxicam	Oral	May increase perioperative bleed risk if continued. May compromise pain control if discontinued. May also reduce perioperative requirements for anaesthesia and analgesics. [6] Discontinuation of NSAID monotherapy is rarely indicated [2] Widely published evidence for use with regional anaesthesia. [6]	Continue if low bleed risk. (including regional anaesthesia) If discontinuation is required - Long acting NSAIDs – Stop 3 days before surgery. [4] Short acting NSAIDs – Stop 1 day before surgery. [4]	
10.1.3 Drugs which suppress the rheumatic disease process	Penicillamine Hydroxychloroquine Sulfasalazine Methotrexate	Oral / SC	May exacerbate condition if doses missed. It may be acceptable to omit one or two doses, but withholding for 4 weeks or more was associated with RA flare [74] Methotrexate may increase the rate of short term surgical complications such as delaying wound healing, but does not increase the risk of infections [73] Methotrexate is contra-indicated in infectious disease [75] Patients on leflunomide may be more susceptible to infection and experience more severe infection. [77] No known issues with other disease modifying anti rheumatic drugs	Continue [74 76] Consider withholding methotrexate if post operative infection present. (as per SPC) Consider stopping leflunomide in cases of severe post operative infection (see reference for washout procedure) [77]	

BNF Chapter 10 Musculoskeletal & joint diseases	Drug Examples	Route	Risks/Cautions/Contraindications	Recommendations	Notes
10.1.3 Cytokine modulators	Adalimumab Etanercept Infliximab	IV / SC	Risk of worsening of condition if doses missed. Patients may be more susceptible to infections or develop more severe infections. [78] [79] [80]	Continue. Discontinue if serious post operative infection occurs. [78] [79] [80]	
10.1.4 Gout and cytotoxic induced hyperuricaemia	Allopurinol Febuxostat Probenecid	Oral	Risk of recurrence of gout if omitted.	Continue.	Reduce Allopurinol dose or discontinue if post operative renal dysfunction occurs
10.2.1 Drugs that enhance neuromuscular transmission	Pyridostigmine Neostigmine	Oral	Pyridostigmine antagonises the effect of non-depolarising muscle relaxants (e.g. pancuronium and vecuronium). [81] Pyridostigmine may prolong the effect of depolarising muscle relaxants (e.g. suxamethonium). [81] Cessation may exacerbate symptoms of myasthenia gravis.	Be aware of interaction and avoid use of interacting drugs. If cessation of pyridostigmine is required miss one to two doses prior to surgery. (based on half life of 3-4 hours)	
10.2.2 Skeletal muscle relaxants	Baclofen Dantrolene Tizanidine	Oral	Severe withdrawal effect when baclofen or tizanidine stopped abruptly. [82] [83] Baclofen may prolong effects of fentanyl anaesthesia [82] Baclofen stimulates gastric acid secretion. [82] Dantrolene may potentiate the effects of non-depolarising muscle relaxants. [84] Cessation of these medicines leaves patient without treatment for spasticity.	Continue	Caution Some patients receive baclofen by intrathecal pump. Check prior to surgery.

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Consultation List

Grampian Area Anaesthetic Senior Staff Committee – February 2104.

M Abdelfattah	Consultant Gynaecology
Mr K Ah-See	Consultant Ear/Nose/Throat
Mr I Ahmed	Consultant General Surgery
Mr B Alkari	Consultant General Surgery
Mr E Aly	Consultant General Surgery
Ms P Ashok	Consultant Gynaecology
Mrs C Bain	Consultant Gynaecology
Mr M Bearn	Consultant Ophthalmology
Professor Bevan	Endocrinology
Mr J Bidwell	Consultant Orthopaedics
Mr N Binnie	Consultant General Surgery
Dr P Bourke	Consultant Anaesthetist
Mr D Boddie	Consultant Orthopaedics
Mr C Brewis	Consultant Ear/Nose/Throat
Professor D Bruce	Consultant General Surgery
Mr K Buchan	Consultant Cardiothoracic
Mr D Cairns	Consultant Orthopaedics
Mrs M Cairns	Consultant Gynaecology
Mr S Chaturverdi	Consultant General Surgery
Chee Cheng	Consultant Ophthalmology
Mr E Chrysafis	Consultant Urology
Mr N Cohen	Consultant Urology
Mr K Cooper	Consultant Gynaecology
Mr K Cornish	Consultant Ophthalmology
Ms W Craig	Consultant General Surgery
Mr N Craig	Consultant Orthopaedics
M Cruickshank	Consultant Gynaecology
Kim Cruttenden	Principal Pharmacist – Clinical services
Mr H El-Shafi	Consultant Cardiothoracic
Frances Ferguson	Surgical Pharmacy Team leader
Mr A Frost	Consultant Orthopaedics
Mr G Gibson	Consultant Cardiothoracic
Ms K Greiner	Consultant Ophthalmology
Mr Habib	Consultant General Surgery
Mr S Hamilton	Consultant Orthopaedics
Ms J Harcourt	Consultant Ophthalmology
Mr A Hussian	Consultant Ear/Nose/Throat
Mr S Hussain	Consultant Orthopaedics
Mr J Jansen	Consultant General Surgery
Mr A Johnstone	Consultant Orthopaedics
Professor A Johnstone	Consultant Orthopaedics
Mr K Khan	Consultant Orthopaedics
Mr P King	Consultant General Surgery
Mr Krukowski	Consultant General Surgery
Ms L Kuffova	Consultant Ophthalmology
Mr K Kumar	Consultant Orthopaedics

Mr M Kumar	Consultant General Surgery
Manjula Kumarasamy	Consultant Ophthalmology
Mr Lam	Consultant Urology
Mr D Lawrie	Consultant Orthopaedics
Mr M Loudon	Consultant General Surgery
Mr T Lowe	Consultant Maxillofacial
Mr T Lowe	Consultant Maxillofacial
Mr Mahmood	Consultant Cardiothoracic
Miss Maini	Consultant Ear/Nose/Throat
Mr S McClinton	Consultant Urology
Miss McKinley	Consultant General Surgery
Dr D Metcalfe	Consultant Cardiology
Mr S Mishriki	Consultant Urology
Mr Morrison	Consultant Maxillofacial
Mr S Nanthukamaran	Consultant General Surgery
MrJ N'Dow	Consultant Urology
Mr T O'Kelly	Consultant General Surgery
Mr J Olson	Consultant Ophthalmology
Mr K Park	Consultant General Surgery
Mr D Parkin	Consultant Gynaecology
Mr C Parnaby	Consultant General Surgery
Mr A Quadir	Consultant General Surgery
Mr Ram	Consultant Ear/Nose/Throat
Mr A Reddy	Consultant Ophthalmology
Mr H Remmen	Consultant Cardiothoracic
Mr N Rennie	Consultant Maxillofacial
Karen Richardson	Lead – Pre-assessment Clinic
Ms J Royle	Consultant Urology
Mr Ryan	Consultant Maxillofacial
Ms C Santiago	Consultant Ophthalmology
Mr C Scott	Consultant Ophthalmology
Mr Stevenson	Consultant Orthopaedics
Dr B Stickle	Consultant Anaesthetist
Mr Veitch	Consultant Ear/Nose/Throat
Ms S Wallage	Consultant Gynaecology
Medicines Information	Pharmacy
Pharmacy	Surgical Pharmacists

Appendix 1 – Management of patients on long term corticosteroid treatment in the Perioperative period

Scenario	Course of action Minor Surgery	Course of action Moderate Surgery	Course of action Major Surgery
Patients on long term steroid therapy prednisolone 5mg per day or less (or equivalent – see below) [85]	Continue steroid therapy, ensure **double** dose given on day of surgery. [85 86]	Continue steroid therapy, ensure double dose given on day of surgery	If in doubt, cover with parenteral hydrocortisone as in the box below.
Patients on long term therapy greater than prednisolone 5mg (or equivalent) daily [85]	Continue steroid therapy, ensure **double** dose given on day of surgery. [85] In addition, give hydrocortisone (sodium succinate) 25mg IV at induction. [85 86 87]	Continue steroid therapy; ensure doses throughout Perioperative period if possible. [85 86 87] Give 50mg hydrocortisone IV at induction Give 25mg IV hydrocortisone TDS on day of surgery, taper down over next 1-2 days. [85]	Continue steroid therapy; ensure doses throughout Perioperative period if possible. [85 86 87] Give 100mg hydrocortisone IV at induction Give 50mg IV hydrocortisone TDS on day of surgery, taper down over next 1-2 days. [85] Recommence usual steroid dose following cessation of IV hydrocortisone. (BNF)
Patients with more than 3 courses of oral steroids in last 6 months	In addition, give hydrocortisone (sodium succinate) 25mg IV at induction. [85 86 87]	Give 50mg hydrocortisone IV at induction Give 25mg IV hydrocortisone TDS on day of surgery, taper down over next 1-2 days. [85]	Give 100mg hydrocortisone IV at induction Give 50mg IV hydrocortisone TDS on day of surgery, taper down over next 1-2 days. [85]
Patients on high dose inhaled steroids Management of chronic asthma: British National Formulary	Give hydrocortisone (sodium succinate) 25mg IV on day of surgery.	Give 50mg hydrocortisone IV at induction	Give 100mg hydrocortisone IV at induction

1000mcg of inhaled Beclometasone twice daily 1000mcg of inhaled Budesonide twice daily 500mcg of inhaled Fluticasone propionate twice daily 400mcg of inhaled Mometasone furoate twice daily		Give 25mg IV hydrocortisone TDS on day of surgery, taper down over next 1-2 days. [85]	Give 50mg IV hydrocortisone TDS on day of surgery, taper down over next 1-2 days. [85]
Patients with Addison's disease or Hypopituitarism on glucocorticoid replacement therapy (most will be on hydrocortisone, but some may be on cortisone acetate, prednisolone or dexamethasone). **ALWAYS consult with Endocrinology (see below for contact details) **** **'Hydrocortisone Not in Stock' is not an acceptable Kardex entry for patients on replacement steroids.**	Give DOUBLE the usual oral dose of glucocorticoid on the morning of surgery. Parenteral hydrocortisone is not required if surgery is straightforward. Double dose of oral steroids for 24 hours then return to usual dose. [88]	Give 50mg hydrocortisone IV at induction Give 25mg IV hydrocortisone TDS on day of surgery, taper down over next 1-2 days. [85]	Give 100mg hydrocortisone IV at induction Give 50mg IV hydrocortisone TDS on day of surgery, taper down over next 1-2 days. **Continue to obtain specialist advice from Endocrinology**

** Specialist Endocrinology advice is always available at Aberdeen Royal Infirmary
09.00 to 21.00: Endocrinology registrar on Page 2476
21.00 to 09.00: Consultant on-call for Endocrinology & Diabetes can be contacted via ARI Switchboard

Steroid equivalence

Equivalent anti-inflammatory doses corticosteroids (relative to prednisolone 5mg dose).
In practice, this table also provides a useful guide to glucocorticoid potency.

Prednisolone 5mg	Betamethasone 750micrograms
	Cortisone acetate 25mg
	Deflazacort 6mg
	Dexamethasone 750 micrograms
	Hydrocortisone 20mg
	Methylprednisolone 4mg
	Triamcinolone 4mg

Appendix 2 – Alternative routes and dose adjustments for patients on antiepileptic medication

Patients on antiepileptic medication must have their medication continued if possible to reduce the likelihood of seizures. If, for any reason, a patient cannot receive their anticonvulsants, contact the on-call neurology SpR on page 3141 or via switchboard.

Medication	Alternative routes available	Dosage adjustments / Plan if patient NBM
Carbamazepine (standard release) tabs	Liquid Suppositories – short term use only. Maximum of 7 days	If giving liquid (via NG or PEG) use the same total daily dose but smaller, more frequent doses may be required (e.g. twice daily tablets changed to thrice daily liquid). [89] If giving suppositories, increase dose by 25% (125mg suppository is equivalent to 100mg tablet) (max 250mg PR four times daily) [90]
Carbamazepine (modified release) tabs	Liquid Suppositories – short term use only. Maximum of 7 days	If giving liquid (via NG or PEG) use the same total daily dose but smaller, more frequent doses may be required (e.g. twice daily tablets changed to thrice daily liquid). [90] If giving suppositories, increase dose by 25% (125mg suppository is equivalent to 100mg tablet) (max 250mg PR four times daily) [90]
Gabapentin capsules	No liquid or parenteral alternative available	Capsules may be opened, dissolved in water and given immediately via NG or PEG tube. [91] If patient NBM, contact on call neurology SpR on page 3141 for advice.
Pregabalin capsules	Liquid No parenteral alternative available	If liquid unavailable capsules may be opened, dissolved in water and given immediately via NG or PEG tube. [91] If patient NBM, contact on call neurology SpR on page 3141 for advice.
Lamotrigine tablets	Dispersible tablets No liquid or parenteral alternative available	Dose for dispersible tablet is equivalent to standard oral dose tablets. Can be dissolved in water and given via NG or PEG tube. [91] If patient NBM, contact on call neurology SpR on page 3141 for advice.
Levetiracetam tablets	Liquid Solution for IV infusion	Dose for liquid and solution for infusion is equivalent to dose for tablets. [92] If patient NBM give by Parenteral route
Phenobarbital tablets	Liquid formulation available	Dose for liquid is equivalent to tablets If patient NBM, contact on call neurology SpR on page 3141 for advice.

Phenytoin capsules / tablets	Capsules Liquid IV Infusion (Epanutin ready mixed) IM Injection (Epanutin ready mixed)	Capsules can be opened, dissolved in water and given immediately via NG or PEG tube. Standard practice in neurology Liquid is not exactly equivalent to capsules, (100mg capsule is equivalent to 92mg of phenytoin liquid) – Serum monitoring is advised. [93] Infusion is equivalent to oral dose capsules, but not liquid formulation (100mg of infusion is equivalent to 92mg of phenytoin liquid) Serum monitoring is advised. [94] IV route preferred but if giving by IM route, increase oral dose by 50% When returning to oral dose, the oral dose should be reduced by 50% for the length of time IM route was used before returning to usual oral dose. [94]
Topiramate	No liquid or parenteral alternative available	If patient NBM, contact on call neurology SpR on page 3141 for advice.
Sodium valproate	Liquid IV route	Doses of liquid are equivalent to doses of enteric coated and modified release tablets [95] IV dosage is equivalent to oral dose. [96]

Appendix 3 – Risks associated with herbal medicines and supplements during surgery and anaesthesia

Herbal Medicine / Supplement	Route	Risks	Recommendation	Notes
Black Cohosh	Oral	Reports of liver dysfunction reported with Black Cohosh.[97]	Stop 14 days prior to surgery	Other possible effects – Bradycardia , altered clotting time
Camomile	Oral	May competitively inhibit binding of several benzodiazepines and is a potent P450 enzyme inhibitor. Can impair effectiveness of other drugs when administered concurrently. Sedative effects noted from 6oz cup of tea. Long term consumption may have cumulative effects. [106]	Stop 14 days prior to surgery [106]	
Chaparral	Oral	Known to cause severe acute hepatitis [99]		
Coenzyme q 10	Oral	May lower blood pressure and blood sugar. a May interact with blood thinners and thyroid medication Avoid in kidney disease, liver disease and CCF [100]	Stop 14 days before surgery [101]	
Dandelion root	Oral	Increases gastric acid. Theoretically may increase risk of bleeding. Diuretic, so may cause electrolyte disturbance May lower blood sugar levels [102]	Stop 14 days prior to surgery	
Devils claw	Oral	May alter levels of gastric acid. May lower blood sugar levels. May increase bleed risk? Individuals with heart disease, abnormal heart rhythm or gallstones should consult their health care provider before taking devil's claw [103]	Stop 14 days prior to surgery	
Dong Quai	Oral	Known to prolong prothrombin time (and increase INR). May interact with coumarins [99] May have oestrogen-like effects. [104]	Stop 14 days prior to surgery	
Echinacea	Oral	Long term use may result in increased risk of surgical complications e.g. poor wound healing and infection. Chronic use (over 8 weeks) linked with immunosuppression. Contraindicated with Immunosuppressant's. Avoid with known hepatotoxic drugs. May decrease the effectiveness of ciclosporin and steroids. May potentiate barbiturate toxicity [98 99 105 106]	Stop 14 days prior to surgery. [99]	

Herbal Medicine / Supplement	Route	Risks	Recommendation	Notes
Ephedra (Ma Huang)	Oral	Herbal precursor to ephedrine and therefore a potent stimulant. Increases BP and blood glucose particularly when combined with caffeine May cause hypertension, palpitations, tachycardia, CVAs and seizures. Also case reports of MI, myocarditis, fatal cardiac arrhythmias, acute hepatitis, mania, psychosis, nephrolithiasis, anxiety, tremors and insomnia. Long term use may cause depletion of catecholamine stores and contribute to Perioperative haemodynamic instability. May cause ventricular arrhythmias with volatile anaesthetics. May cause refractory hypotension. Concern about inhibition of the complement pathway in vitro. May also affect CV function by causing hypersensitivity myocarditis, characterised by cardiomyopathy with myocardial lymphocyte and eosinophil infiltration [5 98 99 105 106]	Stop at least 24 hours before surgery. [98 99]	
Evening Primrose Oil	Oral	Reduces platelet aggregation. Can interact with antiplatelet or anticoagulant drugs to increase bleeding time. May also reduce seizure threshold. [98 108]		
Feverfew	Oral	Inhibits platelet aggregation. Can interact with anticoagulant drugs or antiplatelet drugs to increase the risk of bleeding. Use caution in administering with drugs that increase serotonin Abrupt discontinuation can cause rebound headache or joint / muscle stiffness and pain [98 109]	Stop 14 days prior to surgery	
Garlic	Oral	Can inhibit platelet aggregation irreversibly in a dose dependent fashion. Avoid with aspirin as it enhances platelet activity leading to increased bleed risk Increases INR and prolongs effect of warfarin. Increased bleed risk.	Stop 14 days prior to surgery. [98 99 106]	

Herbal Medicine / Supplement	Route	Risks	Recommendation	Notes
		Potential for epidural haematoma with epidural or spinal anaesthesia. Has a hypoglycaemic activity so may potentiate antidiabetic drugs. Also has marginal antihypertensive effect Report of spontaneous epidural haematoma and post op bleeding. Chronic or excessive doses can reduce haemoglobin production. [5] [98] [99] [105] [107]		
Ginger	Oral	May impair platelet function and inhibit platelet aggregation, increasing bleed risk. Caution with antiplatelet and anticoagulant medicines. Potential for epidural haematoma with epidural or spinal anaesthesia. Potent agonist at the serotonin receptor in GI tract (anti-nausea effect) May affect blood pressure May affect blood glucose (hyperglycaemia) [5] [98] [99] [105]	Stop 14 days prior to surgery [98]	
Gingko Biloba	Oral	Alters vasoregulation, modulates neurotransmitter and receptor activity. Inhibits platelet activating factor. Can decrease blood viscosity and erythrocyte aggregation Several cases of bleeding reported Potential for epidural haematoma with epidural or spinal anaesthesia. Lowers seizure threshold. Can reduce effectiveness of Carbamazepine, phenytoin and Phenobarbital in epileptic patients May cause prolonged sedation with barbiturate anaesthetics. [5] [98] [99] [105] [106] [107]	Stop at least 36 hours before surgery but preferably two weeks. [98] [99]	
Ginseng	Oral	Can potentiate GABA and increase serotonin. Anecdotal reports of hypertension, nervousness, insomnia due to CNS stimulatory effects. Avoid concurrent administration with MAOIs.	Stop 7 days before surgery [98] [99]	

Herbal Medicine / Supplement	Route	Risks	Recommendation	Notes
		May have weak oestrogenic effects causing mastalgia and vaginal bleeding in some patients. Increased glucocorticoid synthesis. Case report of a patient with stable INR starting ginseng and INR being reduced. Inhibits platelet aggregation in vitro. Increased bleed risk Can cause significant changes in heart rate and BP during anaesthesia. Decreases therapeutic effect of coumarins, inhibits platelet adhesiveness and antagonises platelet activating factor. May also cause hypertension and hypoglycaemia. Lowers post-prandial glucose in patients with or without type 2 diabetes (may cause unintended hypoglycaemia especially in fasted patients). 5 98 99 105 106 107		
Glucosamine (+/- Chondroitin)	Oral	May raise blood pressure and blood sugar. May increase bleed risk, particularly with other antiplatelet medicines or warfarin 99 116	Stop 14 days prior to surgery [99]	
Goldenseal	Oral	May cause sodium depletion (due to diuretic effect) and inhibits liver enzymes (CYP 3A4) Inhibits Cytochrome P450 3A4, may lead to possible barbiturate and benzodiazepine toxicity and excessive post operative sedation 99 107	Stop 14 days prior to op [99]	
Guar gum	Oral	Has caused oesophageal and small bowel obstructions. [99]	Avoid in bowel surgery Stop 5 days prior to surgery .	
Hops	Oral	Acts as a mild depressant on higher nerve centres, may have additive effects with other CNS depressants avoid in depressive states. May cause increased drowsiness with anaesthetic agents. Contains substances with estrogenic activity. Potentially interacts with drugs metabolized by the cytochrome P450 liver enzyme system. 110	Stop 14 days prior to surgery. [110]	

Herbal Medicine / Supplement	Route	Risks	Recommendation	Notes
Horse Chestnut	Oral	Contains coumarin constituents. Can interact with anticoagulants and antiplatelet to increase risk of bleeding. Can cause severe bleeding and bruising. Can cause liver or kidney damage. Can turn urine red.[98]	Stop 14 days prior to surgery.[98]	
Kava Kava	Oral	Causes sedation, avoid with benzodiazepines and barbiturates. Interacts with levodopa to potentiate Parkinson's symptoms. (Inhibits dopamine and Monoamine oxidase uptake). Can impair motor function Dose dependent effects on CNS including antiepileptic, neuroprotective, and local anaesthetic properties. May act as a sedative hypnotic / anxiolytic by potentiating GABA transmission May prolong sedation associated with anaesthesia, particularly barbiturate anaesthetics. Potentiates CNS depressants resulting in prolonged sedation (e.g. benzodiazepines or opiates) Inhibits COX and thromboxane synthesis leading to antiplatelet effects (may interact with other antiplatelet / anticoagulants to increase bleeding risk) Continuous heavy use can cause changes in blood chemistry and pulmonary hypertension. No evidence of potential for dependency, although long term use may have abuse potential, with addiction, tolerance and withdrawal[5 98 99 105 106 107]	Stop 7-14 days prior to surgery[106]	
Liquorice	Oral	Can cause hypertension, arrhythmias and sodium retention. May also cause hypokalaemia (which can be magnified by diuretic use). Inhibits CYP 3A4 in vitro so may affect the metabolism of drugs. Liquorice contains coumarin and inhibits platelet aggregation.[99]	Stop 14 days prior to surgery	

Herbal Medicine / Supplement	Route	Risks	Recommendation	Notes
Milk thistle	Oral	May interfere with breakdown of benzodiazepines and blood thinning agents. Not advised with phenothiazines, e.g. prochlorperazine. May lower blood sugar levels [99 111 112]	Stop 14 days prior to surgery [99]	
Omega 3 Fish Oils	Oral	May inhibit platelet aggregation [99]	Stop 14 days prior to surgery [99]	
Passion Flower	Oral	Primary component has benzodiazepine receptor activity. Possible additive effects with other CNS depressants. Reports of hepatotoxicity and pancreatic toxicity. No evidence of potential for dependency May increase bleeding risk. [98 113]	Stop 14 days prior to surgery	
Red clover	Oral	May lower blood sugar May potentiate the effects of blood thinners [114]	Stop 14 days prior to surgery (Author's recommendation)	
Saw Palmetto	Oral	Thought to act similarly to finasteride. (thought to have anti-oestrogenic activity and antiandrogenic activity) Potential for additive effects with other hormonal treatments One report of severe intra operative bleeding. Theoretically interacts with phenylephrine and noradrenaline Can cause Hypertension and GI disturbances. [98 99 107]	Stop 14 days prior to surgery [99]	
St John's Wort	Oral	Induces cytochrome P450 3A4, affecting the metabolism of a number of drugs used preoperatively, including midazolam, alfentanil, lidocaine, calcium channel blockers and serotonin antagonists. Inhibits serotonin reuptake, weakly inhibits MAOI (A&B) and inhibits dopamine and noradrenaline reuptake. Also has a high affinity for GABA receptors. Serotonin syndrome may occur when given with other serotonergic drugs. Potent inducer of Cytochrome P450 enzymes so interacts with warfarin, digoxin, theophylline, ciclosporin, anticonvulsant and antiretroviral drugs. May potentiate or prolong action of anaesthetic agents. [105] Particularly important for patients waiting for transplants as interacts with ciclosporin and also patients requiring anticoagulants. [5 105 98 99]	Stop 5 days prior to surgery (based on half life) [98 99]	

Herbal Medicine / Supplement	Route	Risks	Recommendation	Notes
Valerian	Oral	Inhibits the degradation and reuptake of GABA. May cause excessive smooth muscle relaxation and sedation through interactions with GABA receptors. Causes sedation, avoid with benzodiazepines and barbiturates. (Increases barbiturate induced sleep) may potentiate sedative effects of benzodiazepines such as midazolam. Contraindicated with barbiturates (potentiates effects of barbiturates). Risk of benzodiazepine-like withdrawal, so in long term users, taper the dose several weeks prior to surgery. Benzodiazepines can be used to treat withdrawal symptoms. Can cause cardiac disturbances and liver toxicity. [5 98 99 105 106 107]	Consider stopping prior to surgery. [99] Taper dose gradually over two weeks if stopping. Aim to have stopped 7 days prior to surgery. [99] Monitor for withdrawal effects on admission and treat with benzodiazepines if necessary.	
Vitamin E	Oral	High doses may increase likelihood of bleeding. [115]	Stop 14 days prior to surgery	