Adult elective peri-operative medication guideline

Purpose

This information refers to adult elective patients and is for guidance only. It is not a protocol.

Where there is doubt about peri-operative medication seek advice from the Surgeon (or Surgical Team) and/or the Anaesthetist.

Emergency and paediatric patients should be discussed with an Anaesthetist. Drug Information: 80900

Ward Pharmacist - See Ward white boards for contact details

Scope/Audience

Nurse/Midwife

Level 1 IV Certificated Nurse/Midwife (for IV administration)

RMO

Peri-Operative Medication - to continue or omit?

See text for details. This document is available on the CDHB intranet Clinical Pharmacology website (http://intraweb.cdhb.local/cph/Bulletins+Guidelines/Campaigns-Projects/medsin1_.pdf).

This information refers to adult elective patients and is for guidance only. It is not a protocol. Where there is doubt about peri-operative medication seek advice from an Anaesthetist and/or the patient's medical team. Emergency and paediatric patients should be discussed with an Anaesthetist.

Useful contacts: Duty Anaesthetist: Bleep 8120 Drug Information: 80900 Ward Pharmacists – See Ward white boards for contact details

Agent	Class	Example	Continue/Stop Bold high priority	When to stop if stopping and when to restart. Default - start day after surgery or pm day of surgery if pm dose due.
CNS Agents	Opioids	morphine, oxycodone, codeine, methadone	***Continue***	***If stopping do so on the day of surgery and substitute with another analgesic (risk of withdrawal - consult the acute pain team, bleep 8114).*** Restart day of surgery if tolerating oral intake, consider IV substitute
	Opioids (serotonergic)	pethidine, tramadol	***Continue BUT risk of seizures and serotonin toxicity***	***If stopping do so on the day of surgery and substitute with another analgesic (risk of withdrawal - consult the acute pain team, bleep 8114).*** Restart day of surgery if tolerating oral intake, consider IV substitute
	Monoamine oxidase inhibitor antidepressants (MAOIs)	Irreversible, Non Selective: phenelzine, tranylcypromine Reversible, Selective: moclobemide	Irreversible – consult with an anaesthetist & psychiatrist Reversible - continue	Irreversible - if stopping (risk of suicide/depression) do so 14 days before surgery or continue (risk of hypertensive crisis) and use a MAO-safe anaesthetic technique.
	Tricyclic antidepressants (TCAs)	amitriptyline, clomipramine, nortriptyline,	Continue BUT risk of arrhythmia	If stopping do so 7 days before surgery.
	Selective Serotonin Reuptake inhibitor (SSRI) Selective Noradrenaline reuptake inhibitor (SNRI) antidepressants	fluoxetine, paroxetine, citalopram, venlafaxine	Continue BUT risk of serotonin syndrome and bleeding	If stopping - fluoxetine 75 days pre op - paroxetine 4 days pre op - citalopram 7 days pre op - venlafaxine 1 day pre op (risk of withdrawal/relapse)
	Lithium	lithium	Continue BUT risk of lithium toxicity if renal function deteriorates	If stopping do so 24 hours before major surgery.
	Antipsychotics	chlorpromazine, haloperidol, clozapine, olanzapine	Continue BUT consult a pharmacist if on clozapine as risk of agranulocytosis	
	Anticonvulsants	carbamazepine, lamotrigine, phenytoin, sodium valproate	Continue	
	Anxiolytics	diazepam, lorazepam, oxazepam	Continue	
	Skeletal Muscle Relaxant	baclofen	Continue	

	Anti-Parkinsonian drugs	anticholinergics: benztropine, procyclidine	Continue BUT risk of arrhythmia and hypotension	If stopping do so on the day of surgery.
		Dopamine agonists: bromocriptine, pergolide, Madopar™, Sinemet™	Continue BUT risk of hypotension	If stopping do so on the day of surgery.
		MAOI reversible, selective, type B: selegiline	Continue BUT risk of hypertensive crisis	If stopping do so on the day of surgery.
	Acetylcholinesterase inhibitors	peripheral: pyridostigmine central: donepezil, galantamine, rivastigmine	Continue	Omit long acting preparations the night before surgery and substitute with short acting preparations

Agent	Class	Example	Continue/Stop Bold high priority	When to stop if stopping and when to restart. Default - start day after surgery or pm day of surgery if pm dose due.
Anti-coagulants and adjuvants	Coumarin anticoagulant	warfarin	See table 2 and section1.12	
		aspirin	Continue if known cardiovascular disease BUT risk of bleeding, otherwise stop	If stopping do so 4 to 7 days before surgery but increased risk of cardiovascular events.
		clopidogrel	Discuss with Cardiologist / Anaesthetist	If stopping do so 7 days before surgery but increased risk of cardiovascular events.
		dipyridamole	Continue	If stopping do so 2 days before surgery but increased risk of cardiovascular events.
Agents that have anti-platelet properties	NSAIDs	diclofenac, ibuprofen (short acting), naproxen, indomethacin, celecoxib	Continue BUT risk of bleeding	If stopping do so 4 days before surgery.
Steroids	Glucocorticoids	dexamethasone, hydrocortisone, prednisone	See table 3 and section 1.14	
Diabetic Agents	Oral hypoglycaemics & insulin	glibenclamide, gliclazide, glipizide, metformin, pioglitazone, insulins	***See form C160011***	

Hormones	Combined oral contraceptive (COC)	Loette™, Monofeme™	Continue BUT increased DVT risk	If stopping do so 4 to 6 weeks before surgery.
	Hormone replacement therapy (HRT)	Cilmara™, Kliogest™, Menoprem™, Premarin™	Continue BUT increased DVT risk	If stopping do so 4 to 6 weeks before surgery.
	Thyroid hormones	Levothyroxine	Continue	
	Progestogen-only oral contraceptive	Farlutal™, Femulen™, Microval™, Noriday™	Continue	
	Selective oestrogen modulators	tamoxifen, anastrozole, exemestane	Continue BUT increased DVT risk	If stopping do so 4 to 6 weeks before surgery.
Biologic response modifiers		etanercept, infliximab, rituximab, adalimumab	Rheumatology - stop 14 days before surgery (risk of sepsis) Gastroenterology - continue	Rheumatology - restart 14 days post op if tolerating oral intake (risk of sepsis)
Rheum-atological agents	Bisphosphonates	alendronate, etidronate	Continue	
	Gout agents	colchicine, allopurinol, probenecid	Continue BUT risk of allopurinol toxicity if renally impaired.	If stopping do so on the day of surgery
	Disease modifying agent	leflunomide	Continue BUT risk of infection	If stopping do so 11 days before surgery and chelate with cholestyramine day one post op if tolerating oral intake - consult a pharmacist/ gastroenterologist.
		methotrexate, azathioprine	Continue BUT risk of infection	If stopping do so 7 days before surgery Restart 7 days post surgery
		hydroxychloroquine, sulphasalazine	Continue	

Agent	Class	Example	Continue/Stop Bold high priority	When to stop if stopping and when to restart. Default - start day after surgery or pm day of surgery if pm dose due.
Cardiovascular Agents	ß-blockers	atenolol, carvedilol, celiprolol, labetolol, metoprolol,	Continue	
	Antiarrhythmics	amiodarone, flecainide	Continue/Stop	Stop if having an electrophysiological procedure where induction of arrhythmia is required.
	Cardiac glycosides	digoxin	Continue	
	Calcium channel blockers	amlodipine, diltiazem, felodipine, nifedipine, verapamil	Continue	
	ACE Inhibitors	captopril, enalapril, lisinopril, quinapril, cilazapril	Continue BUT risk of hypotension	
	ACE Inhibitors + diuretics	Hyzaar™, Inhibace Plus™, Accuretic™	Continue BUT risk of hypotension	Check blood pressure before re-starting.
	Angiotension II Antagonists	candesartan, losartan	Continue	
	α-blockers	prazosin, terazosin, doxazosin	Continue	
	Lipid modifying agents	nicotinic acid, bezafibrate, simvastatin, atorvastatin	Continue	If stopping do so 1 day before surgery.
	Diuretics	amiloride, bendrofluazide, furosemide (frusemide), spironolactone	Stop BUT risk of heart failure if on large doses	Stop on the day of surgery (or before if the patient is nil by mouth). Check blood pressure before re-starting.
	Nitrates	isosorbide mononitrate, glyceryl trinitrate	Continue	
Respiratory agents	Xanthine derivative	theophylline	Continue BUT risk of arrhythmias and interactions	If stopping do so 1 day before surgery.
	Inhaled bronchodilators	salbutamol, ipratropium, tiotropium	Continue	

	Leukotriene inhibitors	monteluekast	Continue	
Antispasmodics	Urinary antispamodic	oxybutynin	Continue BUT risk of confusion	If stopping do so on the day of surgery
Gastrointestinal agents	H_2 receptor antagonists	ranitidine, famotidine	Continue	
	Proton pump inhibitors	omeprazole, lansoprazole, pantoprazole	Continue	
	Digestive supplements and cholelitholytics	Pancrex™, Creon™, ursodeoxycholic acid	Stop when not eating	
Herbals		Arnica, calcium, chondrotin, ephedra, garlic, ginkgo, glucosamine, kava, multivitamins, omega 3, omega 6, parsley, Remifemin™ black cohosh, vitamin B complex, vitamin E	Stop	Stop 7 to 14 days before surgery
		St John's Wort	Stop	Stop 7 to 14 days before surgery.

Table 2: Management of Patients on Warfarin Therapy Undergoing Surgery (Based on the Blue Book 13th Edition)

Long term oral anticoagulants may be given for atrial fibrillation, prosthetic heart valves, history of venous thromboembolism or arterial emboli. In each patient the risk of surgical bleeding must be balanced against the risk of recurrent (or new) thrombosis or emboli. The following is a suggested management plan for patients having elective surgery. However the final decision on what prophylaxis to use (if any) is taken by the Surgeon caring for that patient.

HISTORY	BEFORE SURGERY	AFTER SURGERY
DVT or PE <1 month ago (defer surgery if possible) or Acute Arterial emboli < 1 month ago	• Withhold warfarin for 4 days prior to operation day. The aim is to allow INR to drop to <1.5 on day of surgery. • Commence LMWH (e.g. enoxaparin 1 mg/kg Q12h) at treatment dose when INR <2. Last dose prior to surgery given in morning, the day BEFORE surgery i.e. no LMWH for 12-24 hours prior to surgery **Or** • Commence IV unfractionated heparin when INR <2. Stop 6 hours prior to surgery. • Test INR on day of surgery. If still ≥ 1.5 discuss with Surgeon / Anaesthetist.	• Restart warfarin (patient's usual daily dosing) AND either IV unfractionated heparin or LMWH at treatment dose, commencing 12-24 hours after surgery. Discuss with Surgeon / Anaesthetist prior to recommencing therapy. • Continue with heparin until INR >2.
DVT or PE >1 month ago or Acute Arterial emboli >1 month ago	• Withhold warfarin for 4 days prior to operation day. The aim is to allow INR to drop to <1.5 on day of surgery. • Commence on LMWH at prophylactic dose e.g., enoxaparin 40 mg SC daily. Last dose given on the day BEFORE surgery. • Test INR on day of surgery. If INR ≥ 1.5 discuss with Surgeon / Anaesthetist.	• Continue with LMWH at prophylactic dose after procedure, preferably on day of surgery. • Restart warfarin (patient's usual daily dosing) 12-24 hours after the surgery. Ensure therapy commenced only after discussion with Surgeon / Anaesthetist. • Continue with heparin until INR >2.
Atrial Fibrillation	• Withhold warfarin for 4 days prior to operation day. The aim is to allow INR to drop to <1.5 on day of surgery. • Test INR on day of surgery. If INR ≥ 1.5 discuss with Surgeon / Anaesthetist.	• Restart warfarin (patient's usual daily dose) preferably on evening of day of surgery. Ensure therapy is recommenced only after discussion with Surgeon / Anaesthetist.
Prosthetic Heart Valves	If uncertain about management before or after surgery, discuss with Cardiac Surgeon. 1. Mechanical aortic valve only inserted >6 months ago and no other additional risk factors (history of TIAs, CVA, systemic emboli, atrial fibrillation, severe LV systolic dysfunction, recurrent CHF, previous thromboembolism, hypercoagulable conditions): • Thromboembolic risk is low, follow regimen as for atrial fibrillation. 2. Other valves, multiple valves, valve replacement <6 months ago or additional risk factors: • Before Surgery: Thromboembolic risk is **high**, follow regimen as for DVT/PE <1 month ago	1. Mechanical aortic valve only inserted >6 months ago and no other additional risk factors: • Regimen as for atrial fibrillation 2. Other valves, multiple valves, valve replacement < 6 months ago or additional risk factors: • Regimen as for DVT/PE <1 month ago.

Table 3: Guidelines for Perioperative Steroids in Patients Already on Steroids (Based on Blue Book 13th Edition)

Note: Approximate equivalent doses: prednisone 5 mg ≈ hydrocortisone 20 mg ≈ dexamethasone 0.75 mg ≈ methylprednisolone 4 mg.

- Patients with intrinsic lack of ACTH or with primary adrenal insufficiency are especially sensitive to acute stress illness.
- Patients taking supraphysiological doses of steroids (>5-7 mg prednisone or equivalent per day) for <3 weeks are unlikely to have significant HPA axis suppression, but if in doubt treat as steroid deficient. Patients on high doses of inhaled glucocorticoids (>1500 mcg beclomethasone or >750 mcg fluticasone daily) may have HPA axis suppression.

All patients should take their usual steroid doses on day of surgery (or IV equivalent) and supplementation (see table below).
Monitor fluid status, electrolytes and glucose daily

Patients currently taking steroids	≤ 5mg prednisone daily (and not known to be steroid deficient)	Assume normal HPA response	Additional steroid cover not usually required.
	> 5mg prednisone daily or high dose inhaled steroids	**Minor surgery** e.g. hernia repair, tooth extraction, laparoscopic procedures	Double usual dose oral steroids on day of procedure or 25 mg hydrocortisone IV at induction.
		Moderate surgery e.g. hemicolectomy, open cholecystectomy, nephrectomy	50mg hydrocortisone IV at induction then 50mg Q8H for 24 hours and reduce to maintenance over 1-2 days.
		Major surgery e.g. AAA repair, Whipples, major cardiothoracic surgery, liver resection	50-100mg hydrocortisone IV at induction then 50-100mg Q8H for 48-72 hours and reduce to maintenance over 2-4 days.
		Critically ill e.g. shock, sepsis induced hypotension	50-100mg hydrocortisone IV Q8H for 24-48 hrs and taper to maintenance as condition improves, usually 2-4 days.

Patients stopped taking steroids (>5mg prednisone/day)	< 3 months	Check Synacthen test* pre-op, if normal no steroids; if urgent procedure, treat as if on steroids.
	> 3 months	No peri-operative steroids necessary.

To arrange test ring 80934, if test not possible treat as if on steroids

General Post Operative Medication Requirements

- After major surgery, patients may be unable to take drugs by mouth because of nausea, vomiting, delayed gastric emptying or because they are nil by mouth.
- Continuation of a medication may require administration via an alternative route, or changing to an alternative agent with a similar action.
- Selection of alternative treatments needs care, as even switching to a different formulation of the same drug may involve a change in dose due to differing bioavailability of the active drug.
- Advice for the selection of alternative treatments can be obtained from your clinical pharmacist or Drug Information (80900) if required.

Associated documents

CDHB documents, e.g.

- CDHB Manual, Legal and Quality (Volume 2)
- informed consent
- Burwood Hospital Manual, Volume C - health and safety
- hazard identification
- related procedure documents, if any
- relevant external documents

References

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Blue Book 13th edition 2009.

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