Anaesthetic Services, Pre-Operative Assessment and Investigations Guideline

Contents

1. Purpose

This guideline is intended for use by the pre-assessment nurse, surgical team, and anaesthetists as a reference for booking emergency cases for theatre, pre-operative assessment, and investigations, and perioperative management of common problems. Additional queries are to be directed to the responsible anaesthetists.

2. Guideline

2.1 Provision of Emergency Anaesthetic Services

The anaesthetic department is staffed by a mixture of Rural Generalists Anaesthetists (RGA – previously known as GP anaesthetists) and specialist anaesthetists. There are 12 -15 elective all day lists and 4-5 endoscopy lists Monday-Friday. There is some provision for daytime emergency theatre. Urgent or life/limb cases will be done as soon as possible. If there is no daytime emergency theatre, elective list can be interrupted to accommodate for urgent cases.

It is best practice to do major and high-risk emergency cases during daytime. After hours, only life/limb cases, including lower uterine segment caesarean section (LUSCS), should be done.

Booking of emergency/urgent theatre cases

The booking process for emergency/urgent theatre cases is as follows:

- the surgeon or one of their team is to book all emergency cases via the theatre co-ordinator
- a booking slip with all patient details, surgery, co-morbidities, urgency, and fasting time is to be filled in.
- the on-call anaesthetist is to be contacted by the surgical team. This should be a doctor-to-doctor communication. Handover details of patient co-morbidities, any optimisation, abnormal investigation results and fasting time are expected
- the theatre co-ordinator will liaise with the team and the time scheduled for the emergency cases is to be communicated to the surgeon, anaesthetist, and the theatre team in a timely manner
- the on-call anaesthetist is responsible for covering all emergencies from 08.00 - 08.00. If the on-call anaesthetist cannot cover emergency cases during the day, they are responsible to source alternative anaesthetic cover. This information should be communicated to the theatre co-ordinator and switch board. This is to ensure that there is robust anaesthetic cover for emergencies 24 hours a day.

WA Emergency Surgery Urgency Categories

Category	Time	Description	Example procedures
EC1	<15 mins	• Immediate life, limb, or organ-saving intervention. • Resuscitation simultaneous with surgical intervention. Normally within minutes of decision to operate	• Ruptured aortic aneurysm • Laparotomy/ thoracotomy for control of major haemorrhage (life, limb/ organ threatening) • Craniotomy for life-threatening high intracranial pressure (ICP)
EC2	<2 hours	• Serious condition requiring imminent treatment. Resuscitation simultaneous with surgical treatment. • The patient has life, limb or organ-threatening condition but is responding to resuscitative measures	• Major trauma • Leaking aortic aneurysm • Laparotomy for perforation • Gastrointestinal bleeding • Sepsis with impending organ failure • Testicular torsion • Fasciotomy
EC3	<6 hours	• Operation not required immediately but must take place as soon as possible. • The patient is physiologically stable, but problem may undergo significant deterioration if left untreated	• Intra-abdominal sepsis • Debridement plus fixation of open/ complex fractures • Acute ischaemic limb • Dental abscess/ deep neck infection
EC4	24 hours	• Operation as soon as possible after resuscitation. • The patient is physiologically stable, but some risk of deterioration if left overnight	• Irreducible hernia • Intestinal obstruction • Major fractures
EC5	<48 hours	• Time critical surgery. The patient's condition is stable	• Required to maximise functional recovery

Table 1: WA Emergency Surgery Categories

Source: West Australian Department of Health. 2017. WA Emergency Surgery Urgency Categories. Perth, Western Australia: Government of Western Australia.

Life, limb, or organ saving emergencies

These should be done as soon as possible regardless of the time of the day. Help from a specialist anaesthetist should be considered if it is a high-risk case or major haemorrhage is expected.

Day time urgent cases when emergency theatre is not available

Urgent cases should be slotted into elective list which will be interrupted. The anaesthetist doing the list should be given all the relevant patient information with appropriate time allowed for pre-assessment. This may result in unavoidable cancellation of some elective cases. If urgent cases are added to an existing elective list in the morning, patients should be booked with the anaesthetist as soon as possible to allow time for pre-assessment and informed consent. Inpatients booked onto the emergency lists need all their paper documentation with them when sent for. This may mean a delayed start time or interruption during the list. The anaesthetic group is happy to be informed of these cases and take clinical handover up to 19.00 hours the evening before. Alternatively, the on-call anaesthetist should be contacted to assess complex patients.

Evening urgent cases

Urgent cases should be started as soon as elective lists are finished and there is adequate staffing to proceed. High risk urgent but stable patients should be postponed and scheduled for the next day.

It is expected that everyone should use common sense to ensure urgent/emergency cases are done as soon as time and safety allows. This decision should be made based on best clinical judgement preferably involving multiple specialities (Emergency Department (ED), High Dependency Unit (HDU), Anaesthesia and Surgery).

Request for epidurals or lower uterine segment caesarean section

The same standard of handover as above is expected from GP Obstetrician (GPO) to anaesthetist when epidurals or LUSCS are requested.

Lower Uterine Segment Caesarean Section urgency categories

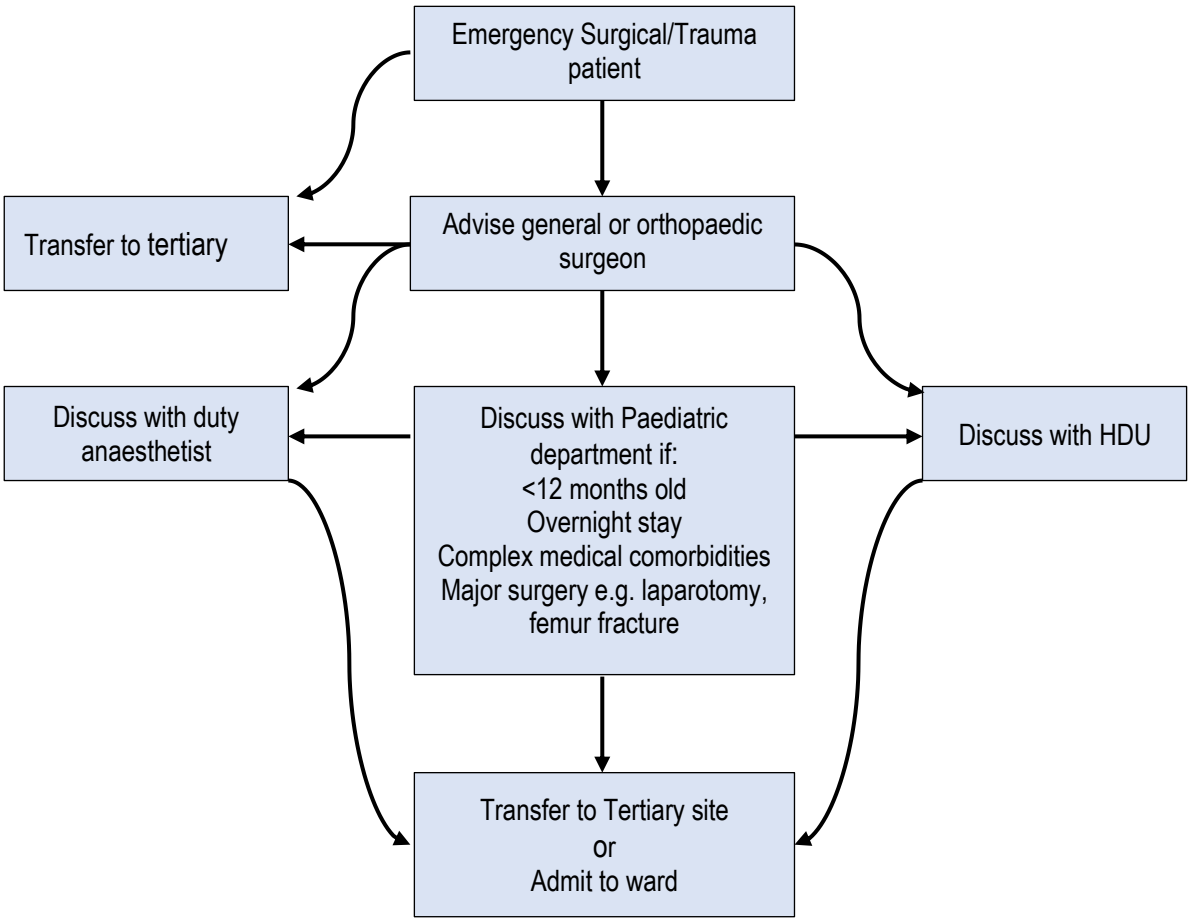
Category	Suggested decision to delivery time	Description	Example procedures
1	Within 30 minutes	Immediate threat to the life of a woman or fetus	Placental abruption Fetal distress
2	Within 60 minutes	Maternal or fetal compromise but not immediately life threatening	Failure to progress
3	Within next 24 hours	Without current fetal or maternal compromise. Needing earlier than planned delivery	

Table 2: Lower Uterine Segment Caesarean Section urgency categories

Decision to delivery time for LUSCS should be made on clinical decision on each individual case.

Paediatric emergencies

Paediatric patients (under the age of 16) requiring intermediate or major surgery e.g. complex open fractures, laparotomy, bleeding tonsils; or have significant co-morbidities e.g. diabetes, severe asthma, congenital heart disease should be discussed with the paediatric team as per flow chart below. This is to determine the best treatment for these patients and to ensure they are safely transferred or treated in Albany according to the consensus decision.



Elective Surgery

There are 3 clinical categories for classifying patients for elective surgery. Patients with the most urgent medical need (Category 1 - urgent) will be scheduled for surgery first.

Category	Clinical description	Desirable waiting time
1. Urgent	Has the potential to deteriorate quickly to the point where it may become an emergency	Admission within 30 days
2. Semi-urgent	Causes pain, dysfunction, or disability. Unlikely to deteriorate quickly. Unlikely to become an emergency	Admission within 90 days
3. Non-urgent	Causes pain, dysfunction, or disability. Unlikely to deteriorate quickly	Admission within 365 days

Table 3: Clinical Categories

For further information refer to MP 0169/21 Elective Services Access and Management Policy.

2.2 Fasting Instructions for Elective Surgery

All Elective Surgical patients requiring general anaesthesia (GA) and procedures under local anaesthesia (LA) and sedation.

Objective: to minimise the risk of aspiration during general anaesthesia or decreased level of consciousness

Adults (>16 years of age)

Meal type	Recommended fasting time
Light meal – Milk included	6 hours
Clear fluids e.g., water, clear fruit juices, non-carbonated drinks, tea/ coffee without milk	2 hours

Table 4: Fasting instructions for elective surgery - adults

Note: patient may take a small amount of water less than 2 hours pre-procedure to swallow medication.

Children/Infants

Meal type	Infants ≤ 6 months and	Patients > 6 months
Food/ Cow's milk	6 hours	6 hours
Formula	4 hours	6 hours
Breast milk	3 hours	4 hours
Clear Fluids – 1-6 years: up to 60ml of water or clear apple juice; >6 years up: up to 120ml	1 hour	

Table 5: Fasting instructions for elective surgery – children/infants

Clear fluids: when held to the light is transparent. They include water, glucose-based drinks, dilute cordials, clear juices.

Not clear fluids: Jelly, chewing gum and hard lollies are NOT clear fluids. Thickeners should be considered as food/cow's milk.

The rules in table 4 and table 5 apply for all patients undergoing any level of sedation +/- LA.

2.3 Perioperative Medication Instructions

Most medications should continue except for those listed below in Table 6.

Medication	Action	Recommendation
Anticoagulant agents		
Antiplatelets/anticoagulants	Patient specific	See guideline in later section +/- consultation with the anaesthetist +/- cardiologist
Warfarin	Depends on type of surgery and risk of thromboembolism vs bleeding	See guideline in later section
Enoxaparin	Withhold	Cease 12 hours prior to surgery
Heparin	Withhold	Cease 6 hours prior to surgery.
Direct oral anticoagulants (DOAC)	See Direct oral anticoagulants	See Direct oral anticoagulants
Cardiovascular agents		
Angiotensin Converting Enzyme (ACE) inhibitors Angiotensin II receptor antagonists	Varies	Anaesthetist preference May cause labile BP after induction if not omitted on day of surgery
Beta blockers	Continue	
Calcium channel blockers	Continue	
Diuretics	Continue	Consider withholding K+ sparing diuretic on day of surgery
Digoxin	Continue	Measure levels, especially in renal impairment
Statins	Continue	

Table 6: Perioperative Medication Instructions

2.4 Perioperative Management of Diabetes

Diabetic patients are at greater risk of perioperative mortality and morbidity after major surgery. Good glycaemic control in the perioperative period results in a lower incidence of perioperative and post-operative complications. Elective surgery should be postponed if glycaemic control is poor (HbA1c ≥ 9%)

All Type 1 Diabetes Mellitus (T1DM) patients should be pre-assessed and managed individually by the attending anaesthetist, preferably with some help from a medical team.

Diabetic patients should be placed first on the operating list where possible. Inform Anaesthetist if patient's blood glucose level (BGL) <4 or >12 mmol/l within 24 hours of surgery. Aim for BGL of 5 to 10 mmol/l in the perioperative period.

Regime for insulin requiring and poorly controlled Type 2 Diabetes Mellitus

Major Surgery:

- night before: give patients **normal** insulin dose. Long acting (basal) insulin e.g. Lantus, Levemir should be continued. Consider reducing long- acting insulin dose by 20% in prolonged fasting or in patients with recent fasting BGL consistently <5.0mmol/l
- prior to theatre, normal fasting rules apply
- for an AM case:
  - withhold morning insulin.
  - BGL on admission and hourly from admission on day of surgery
  - insulin and dextrose infusions to commence as per MR157A WACHS Insulin Infusion Order Chart.
- for a PM case:
  - light breakfast at 6am with half usual insulin dose
  - first on PM list where possible
  - **BGL on admission and hourly after that**
  - insulin and dextrose infusions to start as per MR157A WACHS Insulin Infusion Order Chart.

Note: patients who may experience hypoglycaemic episodes on the morning of surgery may be advised to take or may be given clear apple juice **or** commenced on a glucose infusion. This may delay surgery by 2 hours but is unlikely to result in cancellation.

Minor Surgery:

- night before: give patients NORMAL insulin dose
- normal fasting rules apply
- **AM cases only**: this regime is only suitable for patients whose random blood sugar level is <10mmol/l on admission, will only miss one meal preoperatively and are first on the list for very minor surgery e.g. cystoscopy.
  - no breakfast, no insulin, place first on list
  - blood glucose: 1 hour pre-op and at least once during operation. Hourly if operation >1 hour. Post-operatively every 2 hours until eating, then 4 hourly
  - restart normal subcutaneous (SC) insulin regime with first meal.

Regime for Type 2 Diabetes Mellitus

No oral medication:

- normal fasting rules apply for both am and pm operation.
- BGL on admission to ward.

Oral medication e.g., metformin:

- continue medication the night before (unless precautions required such as renal impairment or IV contrast)
- normal fasting rules apply
- omit AM diabetic medication.
- BGL on admission and 2 hourly from 0800 day of surgery
- institute guidelines for Insulin-requiring DM if BGL >12mmol/l

- resume normal oral medication once eating and drinking post-operatively.

Oral Medication **and** Insulin:

- continue night before NORMAL diabetic medication (applying caution to metformin as above)
- normal fasting rules apply.
- for **AM** case:
  - withhold morning insulin and oral diabetic medication.
  - BGL on admission and hourly
  - institute guidelines for insulin requiring DM if BGL >12mmol/l.
- for **PM** case:
  - light breakfast at 6-7am with half usual insulin dose.
  - no oral hypoglycaemic to be given.
  - BGL on admission and hourly from 1000
  - institute guidelines for insulin requiring DM if BGL >12mmol/l.

Post-operative guidelines for Management of Insulin-requiring Diabetics

For the patient who will be nil by mouth post-operatively e.g., bowel surgery, and whose BGL is likely to be elevated as part of the stress response to surgery and lack of insulin, an insulin infusion should be commenced. Glucose will need to be provided as a substrate to protect from inadvertent hypoglycaemia. Note that in general 1-2 hourly monitoring of BGL is required and that patients on insulin infusions require prior and ongoing monitoring of their K+ and creatinine.

Resumption of normal medications

Once the patient is eating, they may be converted back to their normal insulin requirement. The insulin/dextrose infusions should be ceased **ONE HOUR** after their SC dose of insulin has been given. If they are on oral hypoglycaemics in addition, these may also be resumed.

Caution should be exercised with the resumption of metformin with regards to ensuring adequate hydration, particularly if vomiting has been present.

Summary of peri-operative protocol for patients on the morning list

Pre-operative

- Pre-operative assessment and optimisation of BGL (target BGL 5-10, HbA1c < 7.0%)
- Usual dose of insulin and oral AHG on the day prior to surgery
- Fast from midnight
- Patients should not drive themselves to hospital
- Should be the first case on the morning list

Major Surgery	Minor Surgery
Insulin-Requiring * • Omit morning dose of insulin (as well as all oral AHG) and cease insulin pump • Commence I/G infusion before induction of anaesthetics (before 10am) • Patients on insulin pump will stop the pump when I/G infusion is started **Non-insulin requiring** • Omit all oral AHG on day of surgery • Monitor BGL hourly in pre-operative ward and during surgery: IV glucose if BGL< 4.0 • Low threshold to start I/G infusion if BGL erratic during peri-operative period	• Omit all oral AHG on morning of surgery • Modify insulin dose as suggested **in table below** (If procedure is completed and patient can eat **by 10am**, can delay usual morning dose of insulin/AHG and have late breakfast) • Monitor BGL hourly in pre-operative ward and IV glucose if BGL <4.0 • Consider I/G infusion if BGL erratic during peri- operative period
Post operative • Continue I/G infusion and monitor BGL hourly • Restart s/c insulin / oral AHG / insulin pump when patients are able to tolerate solids • Restart Metformin after 24 hrs if haemodynamically stable and serum	**Post operative** • Monitor BGL hourly in the post-operative ward • For day-only surgery, consider admitting patients if their BGL very erratic or their oral intake inadequate post-procedure • Restart usual s/c insulin / oral AHG including Metformin with next meal
Insulin regimen • AHG and night time Glargine/ Detemir/ Isophane only • Meal-time bolus insulin and night-time Isophane / Detemir • Meal-time bolus and morning Glargine / Detemir/ Isophane	**Suggested modification for minor surgery** • Stop AHG and give usual dose of insulin night before. May reduce dose by 10-20% if recent fasting BGL consistently <5.0mmol/l • ½ combined morning and lunch time bolus insulin dose but given as intermediate-acting insulin in the morning • Omit bolus insulin in the morning and give usual morning dose of intermediate- or long-acting insulin

* Includes patients with type 1 diabetes as well as insulin-requiring type 2 diabetes
Abbreviations: **I/G**: Insulin-glucose infusion **AHG**: Anti-hyperglycaemic agents **BGL**: Blood glucose level

Summary of perioperative protocol for patients on the afternoon list

Pre-operative
- Afternoon list not ideal for patients with diabetes: more disruptive to their control
- Pre-operative assessment and optimisation of BGL (target BGL 5-10, HbA1c < 7.0%)
- Usual dose of insulin and oral AHG on the day prior to surgery
- Patients should not drive themselves to hospital

On the day of surgery
- Stop all AHG on morning of surgery
- Modify insulin doses as suggested in table below
- Light breakfast and fast from 6am
- Should present to pre-operative ward early (eg 9am)
- Monitor BGL hourly: IV glucose if BGL<4.0mmol/l

Major Surgery

Insulin-Requiring *
- Start I/G infusion before induction of anaesthesia
- Insulin pump to be stopped when I/G is commenced
- Monitor BGL hourly during surgery

Non-insulin requiring
- Omit AHG on day of surgery
- Monitor BGL hourly during surgeryLow threshold to start I/G infusion if BGL

Minor Surgery
- Can continue insulin pump at basal rate
- Monitor BGL hourly during surgery
- Consider I/G infusion if BGL erratic during surgery

Post operative
- Monitor BGL hourly in the post-operative ward
- Restart s/c insulin / AHG when patients able to tolerate solids
- For day-only procedures, consider admitting patients if their BGL become erratic post-procedure or if their oral intake remains inadequate
- For patient who had abnormal renal function or had undergone major surgery, restart Metformin after 24 hrs only if haemo-dynamically stable and serum creatinine level normal post-procedure. For patients who had minor surgery, Metformin can be restarted with the next meal.

Insulin regimen
- AHG and night time Glargine/ Detemir/ Isophane only
- Meal-time bolus insulin and night-time Isophane / Detemir
- Meal-time bolus and morning Glargine / Detemir/ Isophane
- Meal-time bolus and night-time Glargine
- Pre-mixed Insulin

Suggested modification for minor surgery
- Stop AHG and give usual dose of insulin night before. May reduce dose by 10-20% if recent fasting BGL consistently <5.0mmol/l
- ½ combined morning and lunch time bolus insulin dose but given as intermediate-acting insulin in the morning
- Omit bolus insulin in the morning and give usual morning dose of intermediate- or long-acting insulin
- ½ morning bolus insulin dose before light breakfast; and give usual dose of Glargine the night before
- ½ usual morning dose of insulin

Bowel preparation for patients with diabetes

While patients are on clear fluids:

- omit all Anti-Hyperglycaemic (AHG) agents
- if patients are on insulin, modify insulin regimen as per Table 7.
- more frequent BGL monitoring (every 2 hours)
- may consume glucose-containing fluid or jelly
- add extra glucose in fluid if BGL <5.0mmol/l
- avoid diet drinks or diet jelly unless BGL > 10mmol/l
- consider admitting patients with unstable glycaemic control to hospital during the period of clear fluid
- patients should have access to their diabetes physician for advice.

Insulin Regimen	
Short-acting insulin (with meals) and Glargine	• Omit short acting insulin and continue Glargine
Short-acting insulin (with meals) and Detemir/Isophane twice daily	• Omit short-acting insulin and continue Detemir /Isophane twice daily
Short-acting insulin (with meals) and Detemir/Isophane at night only	• ½ sum of all mealtime short-acting insulin and administer as Detemir/ Isophane in the morning • Continue Detemir/ Isophane in the evening/night
Pre-mixed insulin	• ½ the pre-mixed insulin doses
Insulin pump	• Continue at the basal infusion rate

Table 7: Insulin Regimen

Pre-Operative Management of Non-Insulin Anti-Hyperglycaemic agents

Procedures	Pre-operative Management
• requiring overnight admission • colonoscopy/requiring bowel prep	• SGLT1 Inhibitors (Gliflozins)/combination with other oral hypoglycaemic: ○ stop 3 doses (2 days prior and on day of procedure) • other oral hypoglycaemics/non-insulin injectables: ○ continue up to and including the night before procedure ○ withheld on day of procedure
• day procedure • gastroscopy	• SGLT1 Inhibitors (Gliflozins)/combination with other oral hypoglycaemic: ○ stop on day of procedure ○ minimise fasting time before and after procedure • other oral hypoglycaemics/non-insulin injectables ○ stop on day of procedure ○ minimise fasting time before and after procedure

Table 8: Pre-operative management of non-insulin anti-hyperglycaemic agents

ATTENTION

SGLT2 inhibitors may cause diabetic ketoacidosis which can be euglycemic. This leads to below recommendations by ANZCA.

Examples:

- SGLTT2 inhibitors:
  - Dapagliflozin (Foxiga), Empagliflozin (Jardiance), Ertugliflozin (Steglatro)
- fixed dose combination of SCLT2 inhibitors with Metformin
  - Xigduo, Jardiamet, Segluromet
- fixed dose combination of SGLT2 inhibitors with gliptins:
  - Glyxambi, Qtern, Steglujan
- non-insulin injectables (GLP 1 agonist):
  - Exenatide, Liraglutide, Dulaglutide, semaglutide

There are reports of severe euglycaemic ketoacidosis with the use of SGLT2 (sodium glucose co-co-transporter 2) inhibitors in the perioperative period in diabetic patients. ANZCA has recommended stopping this group of drugs for **3 days** pre-operatively (2 days prior and on day of surgery)

SGLT2 inhibitor-induced diabetic ketoacidosis is postulated to be caused by increased glucagon relative to insulin, leading to lipolysis and excess free fatty acid production with increased hepatic ketogenesis. In diabetes, or pre-diabetes, there is a relative or absolute insulin deficiency, which contributes to this process. Individuals without diabetes secrete adequate insulin, which is protective, and ketoacidosis is not generally described.

Most guidelines do not distinguish between patients with or without diabetes. SGLT2 inhibitors were initially approved for type 2 diabetes. They are also used in the treatment of heart failure with reduced or preserved ejection fraction, and chronic kidney disease, irrespective of diabetes status. The guideline has led to delay of some procedures when these patients have not withheld their SGLT2 inhibitors before surgery.

Clinical practice recommendation prior to endoscopic procedures for users of agonist medications

With respect to users of endogenous Glucagon-like Peptide-1 (GLP-1) receptor agonists and dual GLP-1 and Glucose-dependent Insulinotropic Peptide (GIP) agonists, there are reports of retained gastric contents and pulmonary aspiration during sedation for endoscopy or GA in people with diabetes or obesity treated with this group of drugs.

Consensus based on evidence and expert opinion from the Australian Diabetes Society (ADS), National Association of Clinical Obesity Services (NACOS), Gastroenterological Society of Australia (GESA), and Australian and New Zealand College of Anaesthetists (ANZCA) are as follows:

- ask about use of these drugs prior to undergoing surgery
- there is insufficient data to support the omission of these drugs
- all patients taking the above drugs within 4 weeks prior to an elective upper endoscopic procedure should follow a fluid diet 24 hours before the procedure. For endoscopy, routine preparation according to local procedure should continue

- if there are clinical concerns regarding retained gastric contents, consider topical anaesthesia and minimally sedated gastroscopy (with a 5mm gastroscope) to inspect the stomach. If solid gastric contents are present, the endoscopic procedure(s) should be abandoned
- if retained gastric contents are present on gastroscopy, planned synchronous colonoscopy should be considered with minimal sedation and appropriate equipment for mouth suction or after rapid sequence induction GA
- for emergency or urgent endoscopy, use of erythromycin 3mg/kg IV (if no contraindications) has been shown to accelerate gastric emptying within 15 minutes. If possible the procedure should be delayed for 1 – 2 hours after erythromycin

Examples of GLP-1 receptor agonists and GIP co-agonists include:
- GLP-1: Exenatide, Liraglutide, dulaglutide, semaglutide
- GLP -1 and GIP: trizepatide

2.5 Perioperative Anti-Coagulant Management

The question of whether antithrombotic therapy should be suspended in an elective surgical patient depends on balancing the risk of perioperative surgical bleeding against the thromboembolic risk with suspension of treatment and the use of bridging anticoagulant therapy.

Summary of indications for anticoagulation and associated level of risk of thromboembolism

Reason for anticoagulation	High risk (>10%)	Moderate risk (5-10%)	Low risk (<5%)
Mechanical heart valve	• Any prosthetic mitral valve • Caged ball or tilting AV prosthesis • Recent (<6 months) CVA/TIA	Bi-leaflet aortic valve with one or more of the followings risk factors: • AF, previous CVA/TIA • Hypertension • Diabetes • CCF • Age>75	Bi-leaflet aortic valve without AF and risk factors for CVA
Chronic atrial fibrillation CHADS2 score: CHF 1point Hypertension 1 point Diabetes 1 point Age>75 1 point Prev CVA/TIA 2 points	• CHAD2 score 5-6 • CVA/TIA within 3 months • Rheumatic valvular heart disease • Prosthetic heart valve • LV ejection fraction<35%	CHADS2 score 3-4	CHADS2 score 0-2 (assuming no prior CVA/TIA)
Venous Thromboembolism (VTE)	• VTE within 3 months • Severe thrombophilia e.g., deficiency of protein C/S/ antithrombin, antiphospholipid	• VTE 3-12 months ago • Recurrent VTE • Active cancer treated within 6 months or palliative.	Single VTE>12 months ago and no other risk factors

	antibodies, multiple abnormalities • Recurrent VTE on warfarin	• Non severe thrombophilia e.g., heterozygous factor V Leiden or prothrombin gene mutation	
Other causes	• Intracardiac thrombosis • ACS • Coronary stent after MI		Dilated cardiomyopathy or LV aneurysm

Table 9: Summary of indications for anticoagulation and associated level of risk of thromboembolism

2.6 Risk stratification

Bleeding

The risk of bleeding is best assessed by the surgeon. Advice regarding perioperative anticoagulant should be documented on the waitlist booking form (MR20 WACHS Request for Admission/Waitlist Inclusion Form)

Examples of high bleeding risk procedure in patients on warfarin:

- any major operation of duration >45 minutes
- cardiothoracic surgery: all
- cardiovascular: diagnostic coronary angiography, cardiac implantable electronic devices, transcatheter valve therapies
- dental: reconstructive procedure, tooth extraction
- ear, nose and throat (ENT): any sinus surgery, nasal polypectomy, parotidectomy, septoplasty, cautery of turbinates
- gastroenterology: large polypectomy (>1cm), variceal treatment, biliary sphincterectomy, pneumatic dilatation, endoscopically guided fine needle aspiration
- general surgery: major tissue injury, vascular organs (spleen, liver, kidney), bowel resection, thyroidectomy
- gynaecology: hysterectomy and oophorectomy, laparotomy, oncology surgery
- ophthalmology: all except cataract extraction
- orthopaedic surgery: joint replacement including foot/ hand/ shoulder surgery, hip and knee replacement, laminectomy.
- plastic surgery: reconstructive/ cosmetic surgery, hand surgery, breast implant
- neurosurgical, head and neck, abdominal and breast cancer surgery
- urology: trans-urethral resection of prostate (TURP), trans-urethral removal of bladder tumour (TURBT), nephrectomy, kidney biopsy
- vascular surgery.

Warfarin

In general, patients taking warfarin are at increased risk of bleeding if it is continued pre-operatively and at increased risk of thrombo-embolic complications if it is withheld. The pre-operative management of these patients depends on the original indication for anticoagulation, the time since the last thrombotic event, and the extent/ type of surgery planned.

The following steps to be taken for all patients:

- identify patient risk group for cessation of warfarin (see flowchart)
- check International Normalised Ration (INR)
- consider risk of surgery with residual anticoagulation
- INR less than 1.5 is acceptable for most surgery
- the risks associated with modifying anticoagulation in the perioperative patient should be included in the general discussion of perioperative risks as part of informed consent.

Warfarin bridging

There has been a shift away from routinely bridging patients. Mounting evidence suggests that bridging confers an increase in both major bleeding and major cardiovascular events, but without an appreciable decrease in thromboembolic events. Currently the following key points are recommended:

- warfarin should not be interrupted for procedures of low bleeding risk.
- patients at low VTE should not be bridged.
- in patients at highest risk of VTE, but not excessive bleeding risk, bridging should be considered.
- intermediate risk cases should be considered on an individual patient basis, with the risk of bleeding vs risk of VTE assessed.

Warfarin bridging protocol:

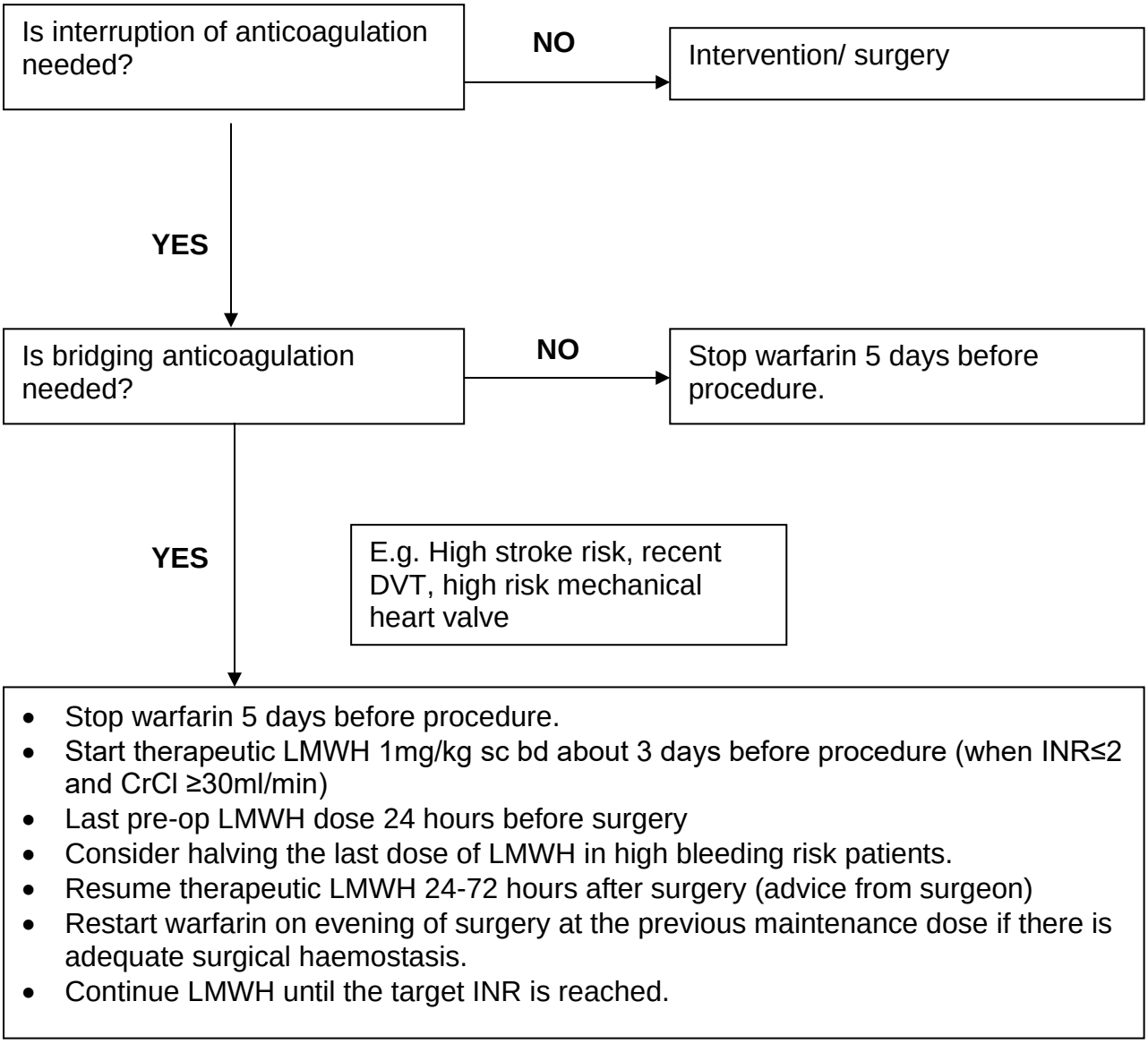
- The last warfarin dose should be 5 days pre-procedure.
- A rest day should follow with no anticoagulant to allow the effects of warfarin to diminished and INR< 2 before heparin is initiated (about 3 days before surgery)
- LMWH (enoxaparin) have superseded unfractionated heparin as the bridging agent of choice (more predictable pharmacokinetic profile, less frequent dosing without requirement of monitoring essays, reduced cost and can be used in out-patient setting)
- Use Enoxaparin SC. 1.5mg/kg once a day or 1mg/kg twice a day.
- The 1mg/kg bd regime is more efficacious and should therefore be used for high risk VTE patients and high-risk bleeding patients, as peak concentrations are reduced should bleeding occur.
- The 1.5mg/kg once a day regime can be used for lower risk patients.
- There should be a 24-hour mandate period between the last dose of heparin and surgery, to make certain the residual anticoagulant effect has ceased sufficiently.
- If prescribing the once daily schedule, the last 1.5mg/kg dose should be halved to 0.75mg/kg to allow adequate time for anticoagulant effects to subside.
- Postoperatively, warfarin should be recommenced when patient has resumed oral fluids and when surgical bleeding risk is low.
- For low-risk patient, prophylactic enoxaparin 40mg OD should be started once surgical bleeding risk is low (check with surgeons)
- For moderate and high risk VTE patients, enoxaparin 1mg/kg BD should be started once surgical bleeding risk is low. Discontinue enoxaparin when the INR is in the therapeutic range (4-5 days later)

Exception/Issues:

- Patients with chronic renal failure (calculated Creatinine Clearance (CrCl) 30ml/min) should not receive Enoxaparin/Clexane. Use SC Heparin or Dalteparin/Fragmin instead.
- Dalteparin dose for high-risk patients: 100IU/kg BD or IV unfractionated heparin to attain APTT 1,5-2X the control (therapeutic dosing)

- Elective surgery should be avoided in the three months after an acute episode of venous thromboembolism or systemic arterial embolism when anticoagulation should be continued. If this is not possible follow high risk protocol.
- Inferior vena cava filter may be indicated if pulmonary thromboembolism or proximal deep vein thrombosis has occurred within the previous 4 weeks and an urgent procedure is required. In such cases, filters can prevent pulmonary embolic events and allow temporary discontinuation of anticoagulant therapy.

Summary of perioperative bridging protocol for patients on warfarin



Direct oral anticoagulants (e.g. dabigatran, rivaroxaban, apixaban)

Bridging is not usually recommended because the duration necessary for the drug to be withheld before surgery is short and the restoration of clinical effect upon re-initiation is rapid, without a procoagulant effect. Bridging may be contemplated in a patient with high thrombotic risk and requires prolonged preoperative cessation of anticoagulant.

For **EMERGENCY** surgery in patients on a DOAC:

- anticipate increased risk of bleeding

- avoid neuraxial anaesthesia
- consider consultation with specialist haematologist.

For **URGENT** surgery in patient on a DOAC:
- delay surgery for 24-36 hours (longer if significant renal impairment)
- consider consultation with specialist haematologist.

For **MINOR** bleeding risk procedures:
- DOAC may be continued without interruption (anticipated effect is similar to performing procedure while on warfarin or LMWH).

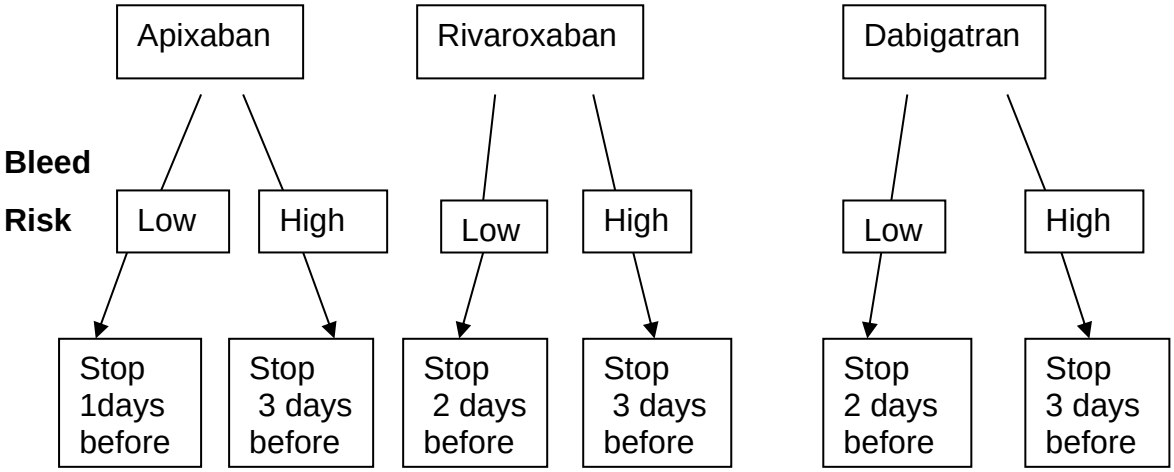
For **ALL OTHER** procedures:
- management is dependent on the patient's renal function and procedure related bleeding risk.

Pre-procedure	Half-life (Range) Hours	Low bleeding risk procedures (2-3 drug half-lives between last dose and surgery)	Moderate to high bleeding risk procedures (4-5 drug half-lives between last dose and surgery)
Dabigatran (Pradaxa 150mg BD)			
CrCl>50 ml/min	12-18 hours	Last dose: 2 days before surgery	Last dose 3 days before surgery
CrCl 30-50 ml/min	13-23 hours	Last dose: 3 days before surgery	Last dose 4 days before surgery
Rivaroxaban			
(Xarelto) 20mg OD CrCl>50 ml/min	7-10 hours	Last dose: 2 days before surgery	Last dose: 3 days before surgery
Cr Cl 30-50 ml/min	9-13 hours	Last dose: 2 days before surgery	Last dose: 3 days before surgery
Apixaban			
(Eliquis) 5mg BD CrCl>50 ml/min	7-8 hours	Last dose: 1 day before surgery	Last dose: 3 days before surgery
Cr Cl 30-50 ml/min	9-13 hours	Last dose 2 days before surgery	Last dose: 4 days before surgery

Table 10: Direct Oral Anticoagulants and Bleeding Risk

Post procedure:
- delay re-initiation until haemostasis is certain (24-72 hours)
- low bleeding risk: resume on day after procedure (24 hours post-op)
- high bleeding risk: resume 2-3 days after procedure (48-72 hours post-op)

Suggested DOAC interruption scheme for patients with CrCl>50ml/min



Neck of Femur Fracture Passage

Special Patents Group: patients with neck of femur (NOF) fracture for emergency surgery who are on DOAC.

Four consensus statements were achieved:

1. Peripheral nerve blocks can reasonably be performed on presentation for patients with hip fracture who are receiving direct oral anticoagulants.
2. Hip fracture surgery can reasonably be performed for patients taking direct oral anticoagulants < 36 h from last dose.
3. General anaesthesia could reasonably be administered for patients with hip fracture and who are taking direct oral anticoagulants < 36 h from last dose (assuming eGFR > 60 $mL.min^{-1}.1.73\ m^{-2}$); and it is generally reasonable to consider recommencing direct oral anticoagulants (considering blood loss and haemoglobin) < 48 h after hip fracture surgery.
4. No consensus was achieved regarding timing of spinal anaesthesia.

The consensus statements (endorsed by Australian authorities) were developed to aid clinicians in their decision-making and to reduce practice variations in the management of patients with hip fracture and who are taking direct oral anticoagulants.

Perioperative management of antiplatelet agents

Clinical judgement is to be exercised based on the patient's risk of cardiovascular event vs surgical bleeding. Specialist advice from the surgeon and specialist managing the antiplatelet agents should be sought. The following is only a guideline:

- Patients at increased risk of thromboembolism undergoing low bleeding risk surgery, treatment can be continued.
- Patients at low risk of thromboembolism undergoing high bleeding risk surgery, treatment can potentially be suspended.
- Patients with a low risk of thromboembolism and a low risk of procedural bleeding, aspirin can be continued.

Dual antiplatelet therapy (DAPT): prescribed for post-acute coronary syndrome (ACS) +/- coronary stents. Stent thrombosis causing myocardial infarction (MI) has a high mortality

rate >50%. Elective surgery should be delayed and DAPT continued for the recommended period of DAPT:

- 12 months for drug eluting stents (DES)
- 4-6 weeks for bare metal stent (BMS)
- 12 months after ACS irrespective of type of stent

The risk of in-stent thrombosis is highest for BMS in the first 6 weeks after insertion and for DES within the first 6 months. Postpone surgery for this period if possible. If it is not possible, DAPT can potentially be continued in low bleeding risk surgery. **At least aspirin should be continued,** and another antiplatelet agent should be stopped for a brief a period as possible. Surgery should take place in a centre that offer 24 hours interventional cardiology.

Recommended time interval between discontinuation of antiplatelet agents prior to procedure (**if required**).

Antiplatelet agent	When to cease antiplatelet therapy (if required)
Aspirin	**DO NOT STOP**
Clopidogrel	At least 7 days prior
Prasugrel	At least 7 days prior
Ticagrelor	At least 5 days prior
Ticlopidine	At least 14 days prior

Table 11: Cessation of Antiplatelet Agents

Aspirin

At present, there is no indication for any patient to stop the Aspirin for any procedure, the risk of stopping the aspirin carries a risk of perioperative thrombotic event (MI, stroke, pulmonary embolism (PE)) to unacceptably high level. Low dose aspirin is **not** a contraindication to spinal or epidural procedures. When ceased pre-operatively for any reasons, it should be given post-operatively as soon as there is no risk of surgical bleeding. Early post-operative aspirin +/- another antiplatelet agent should be given when surgically appropriate. **If in doubt** specialist advice should be sought from the prescribing physician.

ATTENTION

For advice on reversal of anticoagulant therapy in emergency surgery, please contact the haematologist on call at Sir Charles Gairdner Hospital via the switchboard - phone: 9346 3333

Non-Steroidal Anti-inflammatory Drugs

Non-selective cyclo-oxygenase (COX) inhibitors produce a reversible inhibition of enzymes, which normalises if the drug is stopped for 3 days. Selective COX-2 inhibitors do not cause significant platelet dysfunction. In general, for **regular** user of non-steroidal anti-inflammatory drugs (NSAIDs), withhold on day of surgery.

Dipyridamole

Dipyridamole acts on vascular smooth muscle and reversibly on platelet activity but does not have clinically significant haemorrhagic complications. Withhold on day of surgery.

Anticoagulation and neuraxial anaesthesia

Anticoagulant	Epidural/Spinal insertion and catheter removal
SC heparin (unfractionated) 5000iu (Usually given 08.00 and 20.00)	• A minimum of 6 hours after last dose • Wait at least 2 hours before giving next dose
LMWH (Clexane) prophylactic dose (Usually given 20.00)	• A minimum of 12 hours after last dose • Wait at least 2 hours before giving next dose
LMWH (Clexane) therapeutic dose (1.5mg/kg)	• A minimum of 24 hours after last dose • Wait at least 4 hours before giving next dose
Warfarin	• Stop for 5 days. • Ensure INR<1.5. • If>1.5 might need FFP cover • Do not administer warfarin until 4 hours after catheter removal. May require alternative anticoagulant
IV unfractionated heparin infusion	• Cease infusion for 6 hours, check APTT and ensure normal. • 2 hours after catheter removal, bolus heparin and recommence infusion

Table 12: Anticoagulation and Neuraxial Anaesthesia

Cessation of Direct Oral Anticoagulants before neuraxial anaesthesia

There is limited data on neuraxial procedures and DOAC. Spinal or epidural anaesthesia is contraindicated in patients receiving therapeutic dose of DOAC. If DOAC has been ceased for sufficient time to predict absence of anticoagulant effect, then epidural or spinal anaesthesia can be sited. If in doubt, avoid neuraxial block unless laboratory test is available to confirm the absence of anticoagulant effect.

Effect of Direct Oral Anticoagulants on routinely performed coagulation assays

Effect	Dabigatran	Rivaroxaban	Apixaban
Significant anticoagulant effect unlikely	APTT and TT normal	PT normal	Normal PT **DOES NOT** exclude presence of therapeutic apixaban
Anticoagulant effect present	TT prolonged APTT prolonged	PT prolonged	PT prolonged or normal
Specific essays to quantify drug presence	Diluted thrombin clotting time	Modified anti Xa assay specific for Rivaroxaban	Modified anti Xa assay specific for Apixaban

Table 13: Effect of Direct Oral Anticoagulants on Routinely Performed Coagulation Assays

2.7 Cardiac Problems Requiring Referral to Cardiologist Pre-Op

Patients with uncontrolled heart failure, unstable angina, and new symptoms of dyspnoea on minimal exertion should be deferred to the cardiologist/ consultant physician for opinion and optimisation therapy. Waitlist clerk should be informed and communication passed onto the surgical team.

2.8 Hypertension

Traditionally patients with “uncontrolled” hypertension have been deferred. However, there is little evidence as to when to treat, what agent to treat with and for how long. There is currently **NO** evidence that a systolic blood pressure (BP) <180mmHg or a diastolic of <110mmHg has any untoward effects perioperatively. Obviously long-term health may be affected, but surgery should not be delayed.

Even in patients with systolic>180 or diastolic>110mmHg, there is no evidence of direct harm. However, there is increased risk of intraoperative haemodynamic instability, which has itself been linked to complications. Therefore, a prudent approach is to defer all patients having non-essential surgery until BP is **<180/110**. If patient is having urgent surgery (e.g., malignancy), it is reasonable to proceed with therapy pre-operatively using invasive monitoring intraoperatively and continuing this in the postoperative period on HDU.

Letters should be sent/faxed to GPs in the event of the following concerns about BP:

- BP>140/90 but less than 180/110- this is a general health issue. GPs are to be informed about the elevated reading, which they may like to repeat and observe/ treat
- BP>180 systolic or diastolic>110 and having non-essential surgery- this is to defer patients until GP has obtained a satisfactory reading (<180/110)
- BP>180 systolic or diastolic>110 and having urgent surgery (e.g. suspected malignancy)- this again is just to inform the GP.

Please remember to obtain at least 3 readings if the BP is elevated at the clinic and accept the lowest one. White coat hypertension is extremely common. A satisfactory value should have a systolic <180mmHg **and** a diastolic <110mmHg (e.g., 182/78 fails, 160/112 fails, 178/108 passes).

There is some evidence in animals that cerebral autoregulation can take around 6 weeks to stabilise after the initiation of antihypertensive treatment. Therefore, if a patient's BP is high but not requiring deferment, initiation of treatment should be delayed until after surgery.

New introduced beta blocker therapy needs to defer elective procedure for at least 3 weeks.

2.9 Indications of Echocardiography

This can be a very useful tool prior to surgery, particularly in major cases in which large fluid shifts may be predicted (e.g., vascular surgery, colonic resections, TURPs). Indications for referral for echocardiography include:

- all patients with an undiagnosed systolic murmur should have an echocardiogram to exclude aortic stenosis
- patients with unexplained shortness of breath or poor exercise tolerance
- patients having major surgery with a past diagnosis or clinical suspicion of impaired ventricular function or heart failure
- significant arrhythmias
- severe valvular heart disease
- known cardiac problem with echo older than 12 months.

When considering referral for an echocardiogram, remember that the decision is to be based on a combination of clinical symptoms/ signs and the proposed surgery. For example, a patient who can walk 3km a day is unlikely to require an echo, even if they had a previous MI. A patient who can only walk 200m before becoming exhausted may not require an echo for minor surgery.

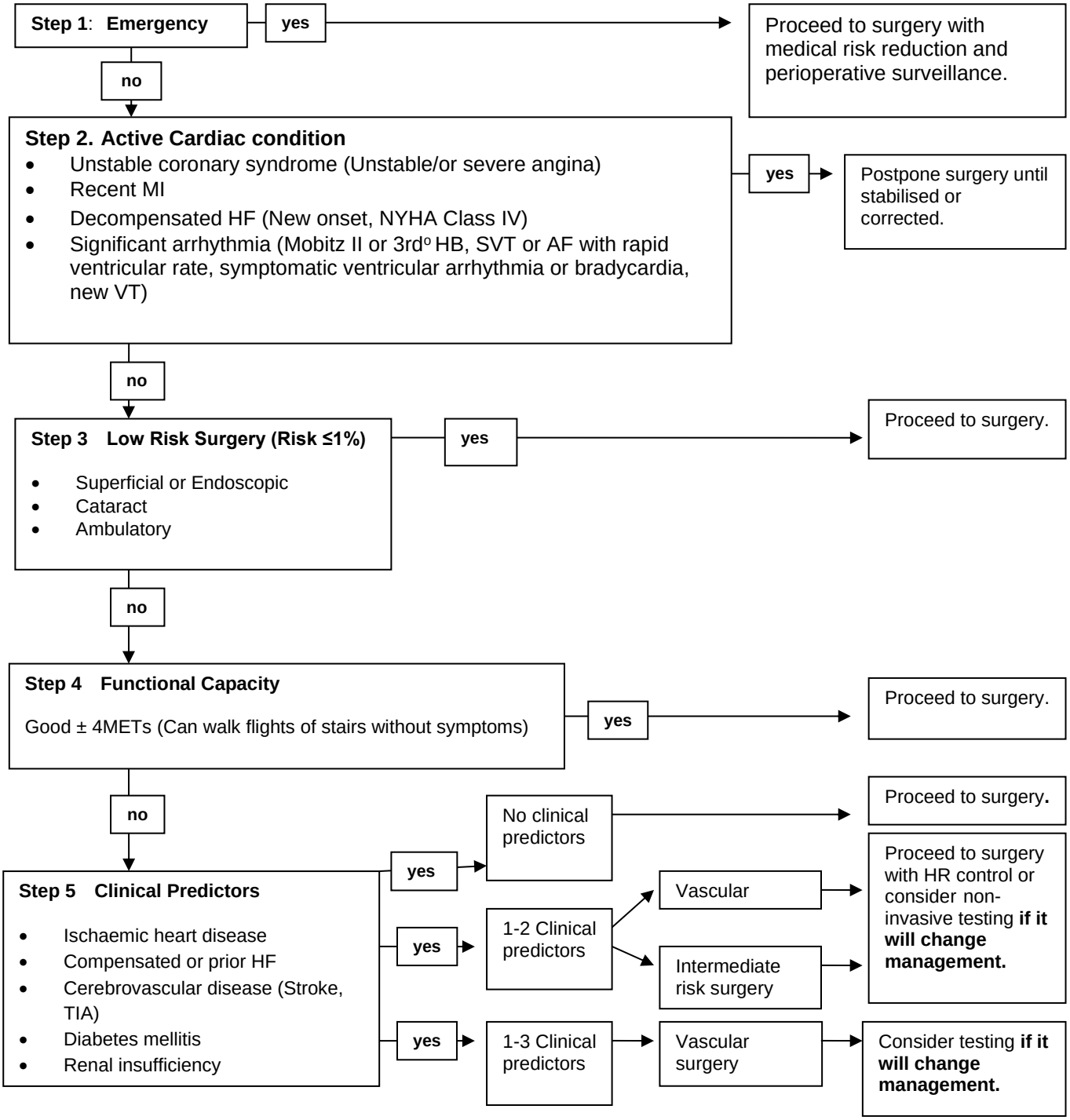
How to organise an echocardiogram

Non-urgent Echocardiogram can be organised by emailing a request form to local providers.

An urgent echo can be requested. A provisional report can be obtained immediately after the procedure. Ensure that the formal report is reviewed and forwarded to the responsible surgeon and anaesthetist.

2.10 Simplified Cardiac Evaluation for Non-Cardiac Surgery

The following flow chart is provided as a decision-making guide for patients with underlying cardiac conditions presenting for non-cardiac surgery.



2.11 Respiratory Disease

Patient with severe asthma and COPD with limited exercise tolerance may require respiratory function tests. They should be referred to the technician at the local respiratory testing services. Booking of these tests should happen with the help of the on-site Medical team.

2.12 Obstructive Sleep Apnoea

Obstructive sleep apnoea (OSA) is a common condition that remains undiagnosed in many subjects (60 - 92% with severe and moderate OSA) and is associated with increased perioperative airway, respiratory and cardiovascular complications. The STOP-BANG questionnaire (Appendix A) is a simple eight-point patient-administered screening tool that is useful in detecting those at risk of OSA. A score of ≥5 indicates a high probability of moderate or severe OSA.

Patients with known OSA, partially treated/untreated and suspected OSA with optimized co-morbid conditions may proceed to surgery provided strategies for mitigation of postoperative complications are implemented.

Pre-anaesthesia evaluation of baseline risk

Any combination of the following factors may warrant preop optimisation and/or HDU admission post-op and should be considered on a case-by-case basis:

- severity of OSA
  - high probability of moderate-severe OSA if STOP-BANG score ≥ 5
  - confirmed moderate-severe OSA by sleep study pre-op.
- severity of comorbid disease
  - morbid obesity
  - respiratory failure
  - heart failure
  - ischaemic heart disease (IHD)
  - significant arrhythmia
  - refractory systemic hypertension
  - pulmonary hypertension
  - CVA or TIA
  - (Pregnancy)
- impact of surgery and anaesthesia
  - surgery: airway or major (e.g., intracavity or spinal surgery) > peripheral or superficial surgery
  - anaesthesia: GA> sedation> no sedation
- postoperative opioid requirement.

As these patients are at risk of sleep apnoea worsening, non-opioid techniques (regional anaesthesia, NSAID's, paracetamol) are encouraged. When opioids are deemed necessary, a specialist needs to be consulted.

2.13 Perioperative Management of Delirium

Delirium is a neuro-inflammatory condition that is characterised by inattention and fluctuating conscious level. Delirium is a major cause of preventable morbidity and

mortality. It increases length of stay, reduces quality of life, and increases dependency for basic activities of daily living.

Early screening and diagnosis have been demonstrated to reduce the severity and duration of delirium. For patients identified as at risk of post-operative delirium or cognitive dysfunction, alert stickers are placed on the perioperative nursing record by the pre-assessment nurse. The anaesthetists and nursing staff will avoid factors that may exacerbate the risk in the perioperative period.

Risk factors for delirium

Predisposing factors	Intra-op precipitating factors	Post-operative factors
Age	Cumulative time with low bispectral index value	Dehydration/hypovoalemia
Cognitive impairment	Variance in blood pressure	Sensory impairment
Complex comorbidities – e.g prior stroke, heart disease, COPD, OSA, Diabetes, Chronic kidney disease	Significant intraoperative blood loss	Sleep deprivation
Frailty, dementia, sensory impairment & previous episode of delirium	Hypothermia	Constipation & urinary retention
Depression, alcoholism, and cigarette smoking	Glucose and electrolyte disturbance- hypernatremia, hypokalaemia/ hypomagnesaemia	Sepsis
Emergency surgery	Acid/base disturbance	Pain
Lab measures: dehydration, CRP, abnormal sodium and potassium, low albumin, and haematocrit (anaemia)		Drugs (opioids, benzodiazepines, dihydropyridines)
Disability, living in institutions		Hypoxaemia

Table 14: Risks factors for delirium

Anaesthetic strategies for the prevention of delirium:

- avoid and minimise the dose of high-risk medications, including long-acting benzodiazepines and anticholinergics
- avoid prolonged fasting and maintain hydration.
- use of depth of anaesthesia monitoring e.g., bispectral index (BIS) to guide titration of anaesthetic drugs to avoid excessively deep anaesthesia. A target value of between 40 and 60 for general anaesthesia is considered ideal
- multi-model analgesia to achieve adequate post-operative analgesia.

It is unclear whether neuraxial anaesthesia compared with general anaesthesia reduces the development of delirium.

Behavioural and non-pharmacological strategies for the prevention of delirium:
- sensory enhancement (ensuring glasses, hearing aids, or listening amplifiers)
- mobility enhancement (ambulating at least twice a day)
- cognitive orientation and therapeutic activities (tailored to the individual)
- adequate pain control
- cognitive stimulation tailored to the individual interests and mental status.
- simple communication standards and approaches to prevent the escalation of behaviours.
- nutrition and fluid repletion enhancement
- sleep enhancement
- medication review and appropriate medication management
- multi-disciplinary ward round to reinforce interventions.

2.14 Perioperative Management of Disease-Modifying Anti-rheumatic Drugs

There are concerns about the immunosuppressive nature of disease-modifying anti-rheumatic drugs (DMARDs) causing increased risk of postoperative complications, including infection and wound healing. However, temporary cessation in the pre-operative period could lead to disease flare, which might also increase perioperative complications and worse overall outcome. Refer to Table 15

Common conditions treated by disease modifying anti-rheumatic drugs	
Speciality	**Condition**
Gastroenterology	• Crohn's disease • Ulcerative colitis
Dermatology	• Psoriasis • Cutaneous sarcoidosis
Neurology	• Multiple sclerosis • Myastenia gravis
Rheumatology	• Rheumatoid arthritis • Systemic lupus erythematosus • Ankylosing spondylitis • Psoriatic arthritis • Juvenile idiopathic arthritis

Table 15: Common conditions treated by DMARDs

2.15 Categories of Disease-Modifying Anti-rheumatic Drugs

Conventional DMARDs

Conventional DMARDs	
Medication Group	**Medication Name**
Antimetabolites	Methotrexate, 6-mercaptopurine, azathioprine, thioguanine, mycophenolate, leflunomide
Antimalarials	Hydroxychloroquine
Aminosalicylates	Sulfasalzine, mesalazine
Calcineurin inhibitors	Cyclosporin, voclosporin, tacrolimus

Table 16: Conventional DMARDs

Conventional DMARDS exert their effects on the inflammatory cascade.

Recommendations:
- Continue perioperatively for most patients, with a small number of exceptions (eg history of poor wound healing).

Targeted synthetic DMARDs

Targeted synthetic DMARDs	
Medication Group	**Medication Name**
Janus kinase (JAK) inhibitors	Baricitinib, tofacitnib, upadacitinib, deucravacitnib
Phosphodiesterase 4 (pDE4) inhibitor	Apremilast

Table 17: Targeted synthetic DMARDs

Targeted synthetic DMARDs inhibit intracellular enzymes that form part of the transduction pathway for proinflammatory response, in particular the cytokine inflammatory response.

Recommendations:
- Apremilast can be continued for most patients.
- JAK inhibitors should be ceased 3 days prior to surgery for most patients.

Biologic DMARDs

Biologic DMARDs	
Medication Group	**Medication Name**
Inhibition of cytokine function	Adalimumub, certolizumab, elanercept, gplimumab, infliximabbelimumab, anakinra, canakinumab, rilonacept, tocilizumab, saeilumah, sarralizumab, brodalumab, ixekizumab, secukinumab, guselkumab, Risankizumab, tidrakizumab, ustekinumab, anifrolumab
Inhibition or depletion of lymphocytes	Rituximab, ocrelizumab, ofatumumab, ublituximab, inebilizumab, alemtuzumab, abatacept, vedolizumab, natalizumab
Inhibition of complement system	euclizumab

Table 18: Biologic DMARDs

Biologic DMARDs are isolated from living cells or tissues in humans, animals or microorganism. They modulate the immune system through inhibition of cytokine function, inhibition or depletion of lymphocytes or inhibition of the complement system.

Recommendations:
- There are large knowledge gaps and significant disagreement between expert groups.
- Rheumatology and dermatology guidelines lean towards withholding biologics perioperatively (schedule surgery 3-4 months after the last infusion, but at least 4 weeks prior to the next infusion).
- Neurology guidelines advise continuation, and gastroenterology guidelines are conflicting.
- It is importantto have a patient – centred, multidisciplinary, perioperative management plan. Discussion of individual case with the treatment specialists, consider the patient circumstances, severity of the underlying conditions and specifics of the surgical intervention

2.16 Recommended Pre-Operative Investigations

The recommended pre-operative testing regime consists of:
- chest X-ray: do not routinely offer to patient before surgery
- echocardiography (resting): before surgery. refer to section 2.8
- consider resting echocardiography in patient who has:
  - a heart murmur and any cardiac symptom (including dyspnoea, pre-syncope, syncope, or chest pain) or - Signs and symptoms of heart failure
  - electrocardiography (ECG; resting) – patient at risk (DM, Hypertension, previous MI)
  - full blood count (haemoglobin, white blood cell and platelet count)
  - major surgery
  - known anaemia
- glycated haemoglobin (HbA1c) testing:
  - major surgery
  - implants (joints replacements, Mesh hernia repairs)
  - pregnant

- haemostasis tests: only order if indicated e.g., liver disease, high alcohol consumption and on warfarin.
- kidney function (estimated glomerular filtration rate, electrolytes, urea, and creatinine)
- lung function tests (spirometry, including peak expiratory flow rate, forced vital capacity, and forced expiratory volume) +/- arterial blood gas analysis.
- to be performed if unable to walk up two flights of stairs in conjunction with any one of the following:
  - current smokers
  - cigarettes/day for 20 years
  - asthmatics or COPD
- polysomnography: should be considered in patient with suspected sleep apnoea or STOPBANG score 5 or greater.
- pregnancy testing:
  - this should be performed on the day of surgery with informed consent, on any woman from menarche to menopause (12 to 50 years of age) undergoing GA or sedation unless they have had a hysterectomy. Patients who have had a tubal ligation/IUD or other forms of contraception still need to be tested. If the patient refuses to be tested, the surgeon/anaesthetist is to be informed and this documented in the notes.
- sickle cell disease/ trait tests:
  - do not routinely offer these tests
  - ask the person having surgery if they or any member of their family have sickle cell disease
  - if the person is known to have sickle cell disease and has their disease managed by a specialist sickle cell service, liaise with the team before surgery
  - children of Afro-Caribbean origin not born in Australia –inform anaesthetist.
- urine tests:
  - consider microscopy and culture of midstream urine sample before surgery if the presence of a urinary tract infection would influence the decision to operate.
- **group and hold** to be considered for patients having major or complex surgery (see Table 19).

The recommendations are relevant for all type of surgery, taking into consideration of the following comorbidities:

- Cardiovascular
- Diabetes
- Renal
- Respiratory
- Obesity (in adults) see WACHS Management of Elective Surgical Patients with a High Body Mass Index Procedure.

For children, Appendix B: Data Table for BME of Age Chart – Great Southern should be used to determine whether the patient needs to see the anaesthetist. Children over the 85th percentile BMI value will need to see a specialist anaesthetist or consider referring to tertiary centre.

The following recommendations for investigations are specific to surgery grade and American Society of Anaesthesiologists (ASA) grade.

Surgery grades

Surgery grades	Examples
Minor	• Excision of skin lesion • Drainage of breast abscess • hysteroscopy
Intermediate	• Primary repair of inguinal hernia • Excision of varicose veins in the leg • Tonsillectomy or adenotonsillectomy • Knee arthroscopy
Major or complex	• Total abdominal hysterectomy • Endoscopic resection of prostate • Lumbar discectomy • Thyroidectomy • Total joint replacement • Lung operations • Colonic resection • Radical neck dissection • Peripheral vascular by-pass

Table 19: Surgery grades

American Society of Anaesthesiologists grades

The ASA Physical Status Classification System is a simple scale describing fitness to undergo an anaesthetic.

ASA Physical Status Classification System	
Classification	**Definition**
ASA1	A normal healthy patient
ASA2	A patient with mild systemic disease
ASA3	A patient with severe systemic disease
ASA4	A patient with severe systemic disease that is a constant threat to life
ASA5	Moribund Patient, not expected to survive the next 24 hours, with or without surgery
ASA6	Declared brain dead, entering the theatre for organ retrieval purposes

Table 20: ASA Physical Status Classification System (adapted from Statement on ASA Physical Status Classification System [asahq.org])

Table 21 lists the recommended testing regime prior to elective surgery. Consult the treating team if unsure.

Test	ASA grade		
	ASA1	ASA2	ASA 3 or ASA4
Minor surgery			
Full blood count	Not routinely	Not routinely	Not routinely
Haemostasis	Not routinely	Not routinely	Not routinely
Kidney function	Not routinely	Not routinely	Consider in people at risk of AKI
ECG	Not routinely	Not routinely	Consider if no ECG results available from past 12 months
Lung function/ arterial blood gases	Not routinely	Not routinely	Not routinely
Intermediate surgery			
Full blood count	Not routinely	Not routinely	Consider for people with cardiovascular or renal disease if any symptoms not recently investigated
Haemostasis	Not routinely	Consider in people with chronic liver disease: • If people taking anticoagulants need modification of their treatment regime, make an individual plan in line with AHC guideline. • If clotting status needs to be tested before surgery, use point-of-care testing	Yes
Kidney function	Not routinely	Consider in people at risk of AKI (DM, HTN, previous AKI)	Yes
ECG	Not routinely	Consider for people with cardiovascular renal or diabetes comorbidities	Yes
Lung function/ arterial blood gases	Not routinely	Not routinely	Consider seeking advice from the respiratory physician as soon as possible after assessment for people who are ASA 3 or 4 due to known or suspected respiratory disease/OSA
Major or complex surgery			
Full blood count	Yes	Yes	Yes
Haemostasis	Not routinely	Not routinely	Consider in people with chronic liver disease. • If people taking anticoagulants need modification of their treatment regime, make an individual plan in line with AHC guideline.

Test	ASA grade		
	ASA1	ASA2	ASA 3 or ASA4
			• If clotting status needs to be tested before surgery, use point- of- care testing.
Kidney function	Consider in people with AKI.	Yes	Yes
ECG	Consider for patients with risk factors	Yes	Yes
Lung function/ arterial blood gas	Not routinely	Not routinely	Consider seeking advice from the respiratory physician as soon as possible after assessment for people who are ASA 3 or 4 due to known or suspected respiratory disease/OSA

Table 21: Pre-operative Testing Regime Prior to Elective Surgery

Key to recommendations in Table 21:
- **Yes**: offer the test
- **Not routinely**: do not routinely offer the test.
- **Consider**: consider the test (the value of carrying out the test may depend on specific patient characteristics)

2.17 Children presenting for surgery/anaesthesia

All patients requiring general or local anaesthesia for surgery or interventional procedures need to be adequately prepared to ensure their safety, as well as reducing unnecessary delays to the theatre lists. Paediatric patients present additional challenges due to their cognition, behaviours and the presence of their parents/cares.

Preop assessment

Children can be particularly anxious when presenting for surgery. Resources are provided to help with preparing the child for surgery, and ideally should be discussed at the preoperative clinic visit. For further information refer to EPIC (epickids.org.au) and Anaesthesia and children (youtube.com). All elective patients with medical conditions and behavioural issues should have a face-to-face assessment. This includes children with high BMI – see Appendix B.

Fasting

Instructions differ for children, refer to Section 2.2 Fasting Instructions for Elective Surgery. If there are delays to the scheduled time, inform the anaesthetist to avoid excessive dehydration.

Premedication Drugs

Premedication drugs may be required -see Appendix C for guidance. (Doses may need to adjusted according to ideal body weight {IBW}).

Topical local anaesthetic cream under an occlusive dressing should be applied onto the dorsum of the hands and antecubital fossae of the child (>12 months) as soon as they arrive at the holding bay, unless previously instructed by the anaesthetist or patient/parent refusal. This is to allow adequate time for the local anaesthetic to work (usually 1 hour). Patients attending from the Emergency department should have their local anaesthetic cream placed there as soon as possible.

Brand name	Active ingredient(s)	Time to be effective	Duration of action
Numit	Lignocaine 2.5% + prilocaine 2.5%	60 minutes	4 hours
EMLA	Lignocaine 2.5% + prilocaine 2.5%	60 minutes	4 hours
LMX4	Lignocaine 4%	30 minutes	2-3hours

Table 23: Premedication Drugs

Monitoring

Baseline observations should be taken in the usual fashion unless it is evident that this will distress the patient – inform the anaesthetist if this is the case, rather than persisting. Minimal monitoring will be required if the patient has received a sedative premed. This will be **continuous pulse oximetry**. Heart rate, oxygen saturation and respiratory rate should be recorded every 15 minutes without needing to wake the child. Blood pressure is rarely required unless clinically indicated e.g., heart disease.

Attire

Young children should be encouraged to attend in their own clean pyjamas – two-piece, front fastening, short sleeve pyjamas are preferred. If these are not available, or the patient is over 12 years, they can be offered a theatre gown that has back tie-fastening and poppers on the sleeve. Exceptions may be made for patients with neurodevelopmental conditions (e.g. autism) and/or behavioural challenges that will not tolerate a theatre gown.

Children who are unwell, have painful/broken limbs, head injury do not need to change into theatre gowns and the patient/carer should be informed that the clothing may be damaged during the procedure. Theatre hats can be offered to children, but not mandated.

Accompanying persons

Parent/carers who wish to attend theatre to support the child for induction of anaesthesia should be properly attired as per WACHS Perioperative – Attire Procedure. The final decision as to whether it is advisable for the parent to accompany their child will be made by the anaesthetist. A member of the theatre team should be allocated to escort the parent/carer from theatre after induction. Only one parent/carer can attend to support their child in theatre due to staffing issues.

Emergency drugs

Emergency charts for each child should be printed in landscape orientation and attached to the notes on arrival in the holding bay. Copies of the charts can be accessed via: kidshealthwa | Emergency Calculator.

For other perioperative drugs see Appendix D. This is also available on the paediatric trolley kept in theatre and the post-anaesthesia care unit (PACU).

Appendix D – Great Southern Paed Emergency Drug Calculator
Appendix E – Paediatric Airway Sizing Chart
Appendix F – Paediatric Laryngospasm Algorithm

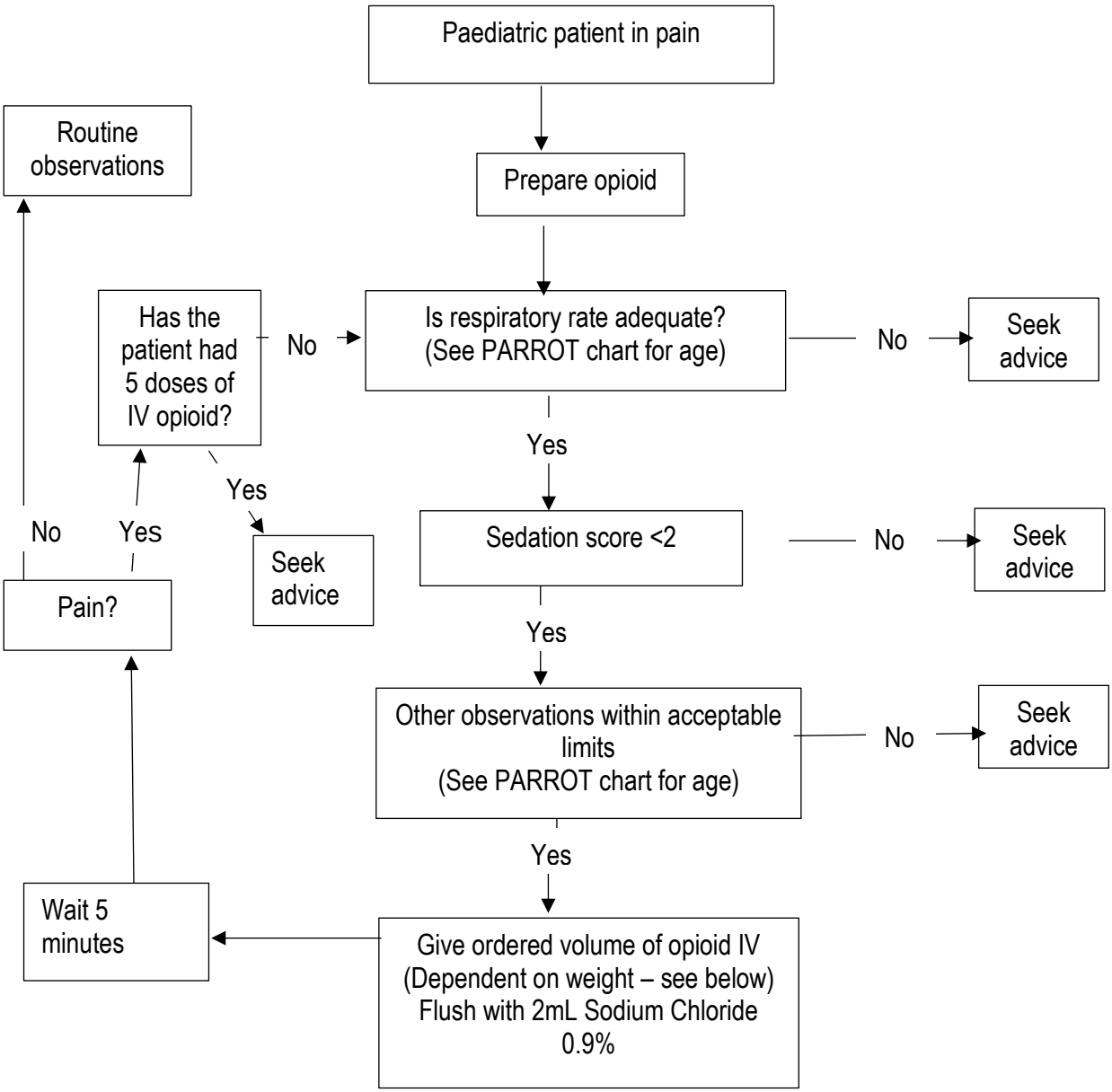
Analgesia

For post op pain protocol in PACU using opioids, see flowchart. Please insert all doses in mg/kg as well as the actual amount prescribed on the drug chart. Refer Appendix D for recommended analgesic and post-operative nausea and vomiting (PONV) drugs and doses.

Protocol for preparing opioid medications for intravenous administration in PACU for Children:

- Morphine:
  - 10mg of morphine sulphate (1mL) diluted with 19mL of Sodium Chloride 0.9%, to make finished concentration of 1mL=0.5mg, in 20mL..
- Fentanyl:
  - 100microg of Fentanyl (2mL) diluted with 18mL of Sodium Chloride 0.9%, to make finished concentration of 1mL=5microg, in 20mL.
  - to administer, transfer to 1mL or 2mL syringe as required.

Paediatric flowchart for opioid administration in PACU



Paediatric weight based opioid dosing for PACU protocol – contact anaesthetist outside these ranges:

Paediatric weight based opioid dosing for PACU protocol										
Weight (kg)	10	12.5	15	20	25	30	35	40	45	50
Dose (mL)	0.5	0.625	0.75	1	1.25	1.5	1.75	2	2.25	2.5
Fentanyl (microg) Dose: 0.25 microg/kg	2.5	3.125	3.75	5	6.25	7.5	8.75	10	11.25	12.5
Morphine (mg) Dose: 0.025mg/kg	0.25	0.3125	0.375	0.5	0.625	0.75	0.875	1	1.125	1.25

Table 24: Paediatric weight based opioid dosing for PACU protocol

Fluids

If children require intravenous fluids during or after surgery, refer to Fluid Calculator - Kids Health WA (PMH ED Guidelines) or MR176P WACHS Neonatal/Paediatric Intravenous Fluid Treatment Form for types and amount of fluid. Children returning to the ward will require an infusion pump – if a burette was used in theatre, this will need to be disconnected. Placing a bung/J-loop on the end of the iv cannula and securing it well will prevent interference with the cannula in PACU.

Discharge criteria following General Anaesthetic

Unless specified by surgeon or anaesthetist, routine postoperative observations to be used in Day Procedure Unit. The CAHS Discharge Criteria Following General Anaesthesia Procedure can be used as a guide for post op observations and when to discharge patients.

Routine post anaesthetic observations include assessment of:

- vital signs, at a minimum:
  - Respiratory rate, respiratory effort, oxygen saturations (SpO_2), heart rate, temperature, blood pressure, level of consciousness
  - Pain score
- assessment of wound sites/dressings
- presence and patency of intravenous access.

Frequency of post anaesthetic observations at a minimum:

- full set of vital signs/Early Warning Tool/PARROT score on return to DPU followed by:
  - ½ hourly until child is awake
  - a full set of vital signs should be undertaken on discharge.

It is not essential to have children pass urine before discharge. Parents/carers should be given advice to monitor urine output at home.

The following discharge criteria has been adapted from CAHS Discharge Criteria Following General Anaesthesia (always refer to the source):

- The child is conscious and alert.
- Observations post anaesthesia are within acceptable limits / returned to preanaesthetic baseline.
- The child can tolerate fluids and be deemed able to maintain adequate hydration post discharge.
- Wound site checked and no concerns identified.
- Oral analgesics prescribed for pain relief post discharge will be acceptable / tolerated by the patient.
- The child receiving oxycodone or other immediate release strong opioid for discharge may require a test dose in hospital and remain under observation in the unit for 2 hours.
- Parents will be provided with appropriate verbal and written discharge information.
- A responsible adult is available to stay with the child for at least the first 24 hours post procedure or as directed.
- All documentation has been completed.
- Follow up appointment has been organised (where appropriate).

Obesity

Note: Children aged 2 to 16 with a BMI >85th percentile (see Recommended Pre-Operative Investigations) may need dose adjustment for certain drugs.

Calculating Ideal Body Weight (IBW) IBW is calculated using the “reverse BMI method” as described immediately below:

- take the value for the 50th centile BMI (BMI50) which is appropriate for the patient’s age and gender from (see BMI charts in Appendix B)
- measure the patient’s height (in metres)
- with the BMI50 value and patient’s measured height, calculate the IBW using the following formula: IBW = BMI50 x (patient’s height in metres)^2
- Measured Body Weight is shown in the table below as MBW

Drug dosing recommendations		
Drug	**Weight/weight formula used for drug dosing**	**Comments**
Fentanyl	[0.25 x (MBW-IBW)] + IBW	MBW for anaesthetic induction
Hydromorphone	[0.25 x (MBW-IBW)] + IBW	
Ibuprofen	[0.4 x (MBW-IBW)] + IBW	
Ketamine	IBW	
Midazolam	IBW	Dose titrated to clinical response
Morphine	IBW	
Oxycodone	[0.25 x (MBW-IBW)] + IBW	
Paracetamol	IBW	
Metoclopramide	IBW	
Ondansetron	MBW	

Table 25: Drug dosing recommendations - Adapted from: CAHS Medication Management Manual - Guidelines for Drug Dosing in Overweight and Obese Children 2 to 18 Years of Age.

3. Roles and Responsibilities

The on-call **anaesthetist** is responsible for:
- covering all emergencies from 0800 - 2000
- Sourcing alternative anaesthetic cover for day cases if they are unavailable
    - this information is to be communicated to the theatre coordinator and switchboard.

The **surgical team** is responsible for:
- Booking emergency cases via the theatre coordinator
- providing handover to the on-call anaesthetist, including patient comorbidities, any optimisation, abnormal investigation results, and fasting time

The **theatre coordinator** is responsible for:
- booking emergency cases
- communicating schedules theatre time to the surgeon, anaesthetist, and theatre team in a timely manner

All staff can use this document for guidance for booking emergency surgical cases for theatre, pre-operative assessment, and investigations in surgical patients at Albany Health Campus.

All staff are required to comply with the directions in WACHS policies and procedures as per their roles and responsibilities. Guidelines are the recommended course of action for WACHS and staff are expected to use this information to guide practice. If staff are unsure which policies procedures and guidelines apply to their role or scope of practice, and/or are unsure of the application of directions they should consult their manager in the first instance.

4. Monitoring and Evaluation

This document will be reviewed by the Head of Department or a delegated specialist anaesthetist at Albany Health Campus to ensure that the content of the guideline is up to date according to latest evidence.

5. References

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Guidelines for the perioperative care of people with dementia. Anaesthesia 2019, 74,357-372

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Principles for management of hip fracture for older adults taking direct oral anticoagulants: an international consensus statement 2024 Feb 6.

6. Definitions

Nil

7. Document Summary

Coverage	Great Southern – Albany Health Campus
Audience	Anaesthetists, surgical team and pre-assessment nurse
Records Management	Non Clinical: Corporate Recordkeeping Compliance Policy Clinical: Health Record Management Policy
Related Legislation	*Health Services Act 2016* (WA)
Related Mandatory Policies / Frameworks	• MP 0169/21 Elective Services Access and Management Policy • Clinical Governance, Safety and Quality Policy Framework
Related WACHS Policy Documents	• Management of Elective Surgical Patients with a High Body Mass Index Procedure • Recommendations for Acute Pain Management in Adults – Systemic Guideline – Albany Hospital
Other Related Documents	• CAHS Discharge Criteria Following General Anaesthesia • CAHS Preoperative Preparation Procedure • CAHS Procedural Sedation Guideline
Related Forms	• MR20 WACHS Request for Admission/Waitlist Inclusion Form • MR140E Paediatric Acute Recognition and Response Observation Tool (PARROT <3 Months) • MR140F Paediatric Acute Recognition and Response Observation Tool (PARROT 3-12 Months) • MR140G Paediatric Acute Recognition and Response Observation Tool (PARROT 1-4 Years) • MR140H Paediatric Acute Recognition and Response Observation Tool (PARROT 5-11 Years) • MR140i Paediatric Acute Recognition and Response Observation Tool (PARROT 12+ Years) • MR157A WACHS Insulin Infusion Order Chart • MR176P WACHS Neonatal/Paediatric Intravenous Fluid Treatment Form
Related Training	Nil
Aboriginal Health Impact Statement Declaration (ISD)	ISD Record ID: 3909
National Safety and Quality Health Service (NSQHS) Standards	1.14(d), 2.7, 4.5, 4.6, 4.7, 4.8, 4.9, 6.8
Aged Care Quality Standards	Nil
Chief Psychiatrist's Standards for Clinical Care	Nil
Other Standards	Nil

8. Document Control

Version	Published date	Current from	Summary of changes
3.00	08 April 2025	08 April 2025	• information added in relation to Paediatric surgical/anaesthetic services • information removed that is now covered in other documents • document reviewed in line with latest available evidence based literature

9. Approval

Policy Owner	Executive Director Great Southern
Co-approver	Executive Director Clinical Excellence Executive Director Medical Services Executive Director Nursing and Midwifery Services
Contact	Head of Department, Anaesthetics
Business Unit	Anaesthetics, Albany Health Campus
EDRMS #	ED-CO-17-8840

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This document can be made available in alternative formats on request.

Appendix A: STOP BANG Questionnaire

Snoring? Do you **Snore Loudly** (loud enough to be heard through closed doors or your partner elbows you for snoring at night)?	Yes/No
Tired? Do you often feel **tired, Fatigued, or Sleepy** during daytime (e.g. falling asleep when driving	Yes/No
Observed? Has anyone **observed** you **stop breathing** or **Choking/Gasping** during your sleep?	Yes/No
Pressure? Do you have, or are being treated for, **High Blood Pressure**?	Yes/No
Body Mass Index more than 35kg/m2?	Yes/No
Age: older than 50-year-old?	Yes/No
Neck circumference greater than 40 cm (16 inches) measured around Adam's apple?	Yes/No
Gender = Male?	Yes/No

Scoring criteria for general population:

- Low risk of OSA: yes to 0-2 questions
- Intermediate risk of OSA: Yes to 3-4 questions
- High risk of OSA: Yes to 5-8 questions or:
  - yes to 2 or more of 4 STOP questions + male gender
  - yes to 2 or more of 4 STOP questions + BMI > 35 kg/m2
  - yes to 2 or more of 4 STOP questions + neck circumference > 40 cm

Adapted from: SASM Educational Resources - Society of Anesthesia and Sleep Medicine

Appendix B: Data Table of BMI for age Charts – Great Southern

Data Table of BMI-for-age Charts
75th Percentile BMI Value – inform anaesthetist
85th Percentile BMI Value – to be seen in clinic by anaesthetist prior to booking

Males

Age (years)	10th Percentile BMI Value	25th Percentile BMI value	50th Percentile BMI value	75th Percentile BMI Value	85th Percentile BMI value
2	15.09033	15.74164	16.575	17.55719	18.16219
3	14.66086	15.26016	16.0003	16.83376	17.32627
4	14.34695	14.91694	15.62817	16.4397	16.92501
5	14.1378	14.69504	15.41914	16.29148	16.84076
6	14.03772	14.6112	15.38353	16.36346	17.01418
7	14.04216	14.66082	15.51287	16.63112	17.40122
8	14.14712	14.82965	15.78231	17.05799	17.95575
9	14.34903	15.10433	16.16712	17.60683	18.63222
10	14.6426	15.4727	16.64614	18.24521	19.39041
11	15.02022	15.92268	17.20089	18.94588	20.19667
12	15.47187	16.44158	17.81463	19.68614	21.02386
13	15.9852	17.01583	18.4718	20.44731	21.85104
14	16.54568	17.63086	19.15759	21.21433	22.66325
15	17.1367	18.27093	19.85766	21.97532	23.45117
16	17.73974	18.919	20.55765	22.72115	24.21087

Females

Age (years)	10th Percentile BMI Value	25th Percentile BMI value	50th Percentile BMI value	75th Percentile BMI Value	85th Percentile BMI value
2	14.80134	15.52808	16.4234	17.42746	18.01821
3	14.32806	14.9295	15.69924	16.60687	17.16634
4	14.00895	14.56345	15.29855	16.20988	16.80058
5	13.81726	14.38345	15.15188	16.13843	16.80197
6	13.74694	14.36552	15.2169	16.33273	17.09974
7	13.7919	14.48765	15.45357	16.73462	17.62557
8	13.94445	14.73005	15.827	17.29206	18.31718
9	14.19478	15.07378	16.30609	17.95912	19.11937
10	14.531	15.49992	16.86231	18.6952	19.984
11	14.93913	15.98919	17.46907	19.46462	20.86984
12	15.40311	16.52179	18.10149	20.23648	21.74263
13	15.90476	17.07738	18.73643	20.98472	22.57506
14	16.42378	17.63509	19.35257	21.68819	23.34689
15	16.93767	18.1736	19.93057	22.3309	24.04503
16	17.42171	18.67121	20.45326	22.90219	24.66372

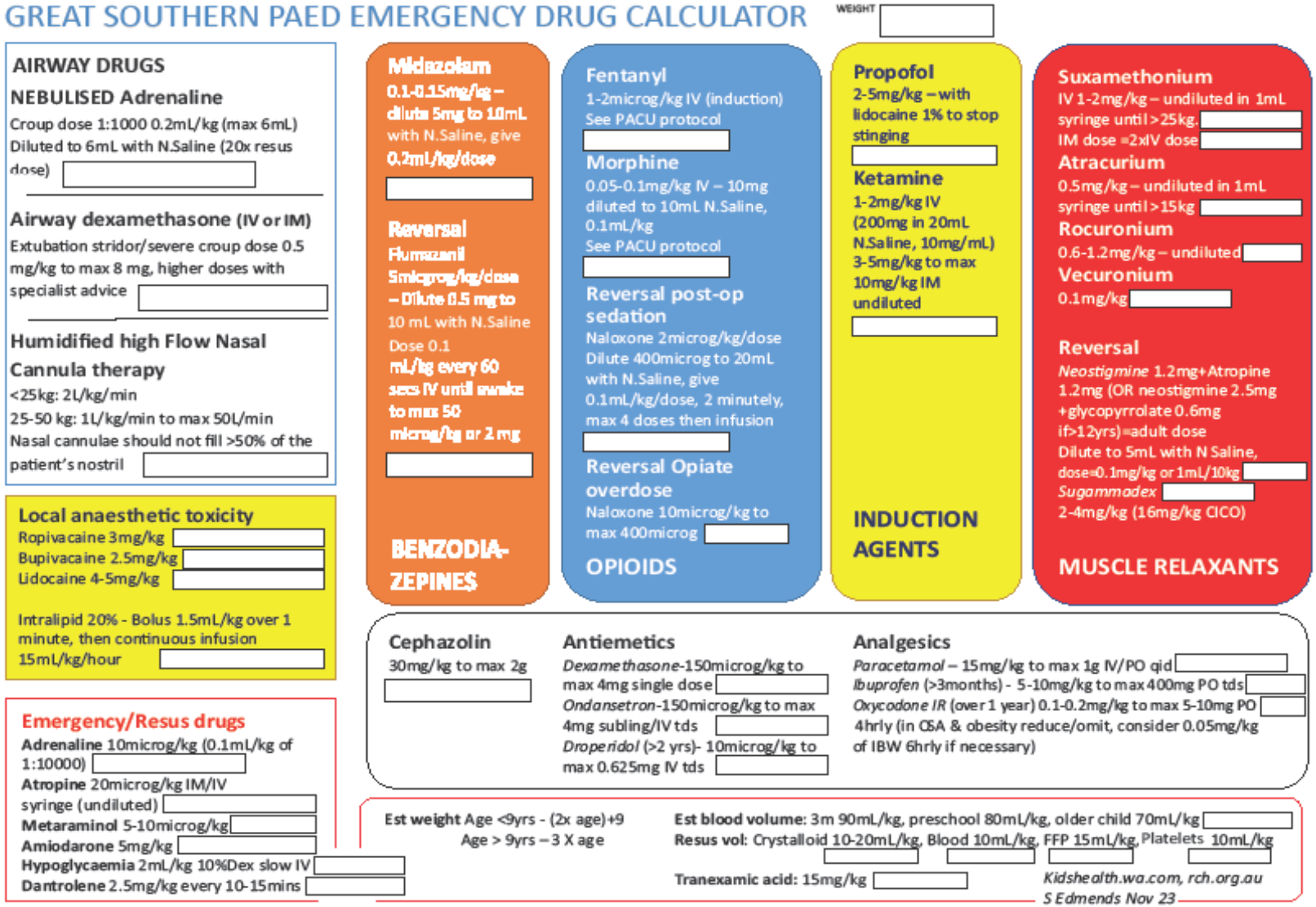
Compiled by Dr. Shireen Edmends and Dr. Sophie Sparkes
Source: Centers for Disease Control and Prevention, National Center for Health Statistics

Appendix C: Premedication Drug Options for Children Presenting for Anaesthesia

Agent	Sedation	Analgesia	Route	Common Dose	Admin time	Important considerations
Paracetamol	+/-	++	Oral Rectal	Oral loading 15-30mg.kg^{-1} Maximum 90mg.kg^{-1}.day^{-1}	Oral ~30 min prior	• Caution in hepatic dysfunction • Rectal absorption slower and less predictable.
Ibuprofen	+/-	++	Oral	Oral loading 10mg.kg^{-1} Maximum 30-40mg.kg^{-1}.day^{-1}	Oral ~30 min prior	• Caution with history of GI bleeding or reactive airways. • Tablet absorption slower than suspension.
Midazolam	+++	-	Oral Buccal Nasal	Oral 0.2-0.5mg.kg^{-1} Buccal and Nasal 0.1 - 0.2mg.kg^{-1} (Use IV preparation)	Oral ~30 min prior Buccal and Nasal ~15min prior	• Oral is slower onset and longer lasting. • Do not mix midazolam with grapefruit juice. • Respiratory depression, hiccups, nasal irritation, and emergence agitation are prominent side effects.
Temazepam	++	-	Oral	10-20 mg	Onset 45 minutes	• For older children > 11 years old. Duration 3-4 hours.
Clonidine	++	+	Oral Nasal	Nasal, Oral, 2-4 microg.kg^{-1} (Use IV preparation)	Nasal ~30 min prior oral ~45 min prior	• Consider coadministration of nasal atropine at 20microg.kg-1 or oral at 30-40 microg.kg-1 to mitigate bradycardia and hypotension on induction.
Fentanyl	++	++	Nasal	Nasal 1 - 1.5 Microg.kg^{-1} (Use IV preparation)	Nasal 10-20min prior	• Intranasal use of parenteral formulation is preferred due to higher risks of oversedation and respiratory depression when administering buccal lozenges.
Melatonin	+/-	-	Oral	Oral 0.25-0.75mg.kg^{-1}	45-60 mins prior	• Care with hepatic impairment (limited data). Potential wide-dose range.
Ketamine	+	+	Oral Intramuscular	Oral 5mg.kg^{-1} IM 5-10mg.kg^{-1}	Oral 15-20 mins prior. IM onset 3-5 mins	• Use iv preparation. Consider adding midazolam 0.5mg.kg-1 PO with oral dose.

Note: (Doses may need to adjusted according to ideal body weight {IBW})

Appendix D: Great Southern Paed Emergency Drug Calculator



Appendix E – Paediatric Airway Sizing Chart

AGE	CUFFED TUBE AGE/4+3.5	UNCUFFED TUBE AGE/4+4	LMA SIZE (CLASSSIC)	STYLET	BOUGIE	GUEDEL (Oropharyngeal)	Nasopharyngeal	SUCTION CATHETER FG	NG TUBE
1 Months	2.5-3.0	3.0	1	6 FR (2-2.5mm)	5 FR	Pink 000 (30mm)	-	6 FG	6 FR
3 Months	3.0	3.0-3.5	1	6 FR (2-2.5mm)	5 FR	Orange 00 (40mm)	-	8 FG	8 FR
6 Months	3.0	3.5	1.5	10 FR (4mm)	10 FR	Orange/Blue 00-0 (40-50mm)	16 FR	8 FG	8 FR
1 Years	3.5	4.0	1.5-2.0	10 FR (4mm)	10 FR	Blue 0 (50mm)	18 Fr	8 FG	8 FR
2 Years	4.0	4.5	2.0	10 FR (4mm)	10 FR	Purple 1 (60mm)	19 FR	8 FG	8 FR
3 Years	4.0-4.5	4.5-5.0	2.0	14 FR (5mm)	10 FR	Purple 1 (60mm)	19 FR	8 FG	8 FR
4 Years	4.5	5.0	2.0	14 FR (5mm)	10 FR	White 2 (70mm)	20 FR	10 FG	10 FR
5 Years	4.5-5.0	5.0-5.5	2.0-2.5	14 FR (5mm)	10 FR	White 2 (70mm)	20 FR	10 FG	10 FR
6 Years	5.0	5.5	2.5	14 FR (5mm)	10 FR	White 2 (70mm)	22 FR	10 FG	10 FR
7 Years	5.0-5.5	5.5-6.0	2.5	14 FR (5mm)	15 FR	White 2 (70mm)	22 FR	10 FG	10 FR
8 Years	5.5	6.0	2.5	14 FR (5mm)	15 FR	White 2 (70mm)	24 FR	10 FG	10 FR
9 Years	5.5-6.0	6.0-6.5	2.5-3.0	14 FR (5mm)	15 FR	Green 3 (80mm)	24 FR	12 FG	12 FR
10 Years	6.0	6.5	3.0	14 FR (5mm)	15 FR	Green 3 (80mm)	26 FR	12 FG	12 FR

Appendix F – Paediatric Laryngospasm Algorithm