CAIRNS ANAESTHETIC ASSOCIATION

PROTOCOLS & GUIDELINES

2025 edition

INDEX

Introduction

Philosophy:

The Department recognises the value of clear protocols, guidelines and policies ('protocols') in a wide range of clinical and administrative situations, for the following reasons:

1. A superior method, if one exists, should be followed by all clinicians.

2. A checklist, or 'aide-memoire', is helpful to avoid embarrassing oversights.

3. A standard approach minimises confusion and facilitates continuity of care, even if neither of the above is relevant.

Location of useful departmental resources:

1. This Department Protocol Booklet & the APS Guidelines can be found at:

   - On the Department Intranet

   - On the Cairns Anaesthetists Association website: http://cairnsanaesthesia.org

   - On the QHEPS Procedures page

2. The Orientation Booklet is available as hard copy only

3. ICU Clinical Practice Guidelines are available through ICU

4. CHHHS A-Z of Policies and Procedures

Asthma and Reflux Therapies

Asthma

- Asthmatics are at higher risk of perioperative respiratory complications, including bronchospasm.
- Optimal control of asthma in the preoperative period is important to minimise this risk.
- Patients should continue their usual therapy (especially ‘preventers’).
- Nebulised salbutamol immediately pre-operatively is usually warranted.
- Consider oral prednisolone 0.5 – 1.0 mg/kg for three days preoperatively in the following asthmatic patients:
    - Currently wheezy
    - FEV1 <60%
    - Admitted to the intensive case until with asthma in the past
    - Inpatient admission with asthma in the past year
    - Visit to Emergency Department in the past 6 months due to the asthma
    - Normally on oral prednisolone
    - Have taken oral prednisolone in the past 6 months.

    (Oral prednisolone is available ‘pre-packed’ in the Anaesthetic Clinic)
- Explain to the patient the reason for these measures, to improve compliance.

Reflux (GORD)

- Patients with gastro-oesophageal reflux are at higher risk of pulmonary aspiration during anaesthesia.
- The following is advised for such patients:
    - Attention to fasting guidelines and consideration of regional anaesthesia
    - Continuation of any current anti-reflux treatments (i.e. PPIs or H2 blockers)
    - Advise patient to take their PPI/H2 blocker on the morning of surgery

- If not on treatment, give one famotidine 40 mg tablet the night before and one on the morning of surgery (‘pre-packed’ in anaesthetic pre admission clinic), or prescribe a PPI (e.g. omeprazole 20 mg).

- Patients for elective caesarean section should receive **famotidine** as above; **sodium citrate** should be given for emergency caesarean section.

Explanation of the reason for these measures (‘to avoid food or acid going into the lungs’) seems to improve compliance.

Pre-operative Fasting for Adult Patients

Background:

Fasting is required before undergoing **general anaesthesia, sedation, or regional anaesthesia** (due to the possibility of conversion from regional to sedation or general anaesthesia) to reduce the risk of regurgitation and pulmonary aspiration.

Pulmonary aspiration can lead to severe respiratory complication, morbidity and mortality. Therefore, appropriate fasting is required to reduce the likelihood of these complications.

However, excessive fasting (>6 hours) is unnecessary, uncomfortable, and can result in dehydration, ketosis, and hypoglycaemia. Clear fluids should be encouraged until shortly before surgery to mitigate the negative effects of fasting.

The Sip Til Send program shortens the time patients need to fast from liquids without increasing the risk of pulmonary aspiration. It allows patients to sip clear fluids (as defined below) until called to theatre or procedure area. Most patients will be eligible for Sip Til Send.

Patients booked under **local anaesthesia ONLY** (no sedation) are not required to fast pre-operatively if the procedure will **definitely** be performed without sedation. If there is any possibility of the patient requiring **sedation**, the fasting guidelines below need to be followed.

This protocol is intended to balance the risk of aspiration and the physiological impact of fasting.

Definitions:

CLEAR FLUIDS are transparent when held to the light. They include:

- **Water**
- **Clear cordial**
- **Clear juice (no pulp),**
- **Black tea / black coffee**
- **Carbohydrate drinks specifically designed for perioperative use**

NON-CLEAR FLUIDS

- **Milk-containing drinks**
- **Jelly**
- **Fluid containing particulates (eg fruit juice with pulp)**
- **Thickened fluids**

Recommendations for Patients Undergoing Elective Surgery

- **Solids** & **Non-Clear Fluids** may be consumed up to **6 hours** before theatre.

- Sip til Send: **Clear Fluids** may be consumed until called to theatre (3ml/kg/hr, max

200mL/hr).

- Non-Sip Til Send: **Clear Fluids** may be consumed until 2 hours prior to theatre.

- Please note that a patient is scheduled on a PM-only operating list will be able to have a light breakfast around 0600 since surgery will be after 1230.

- Routine medication should be taken pre-operatively, with a sip of water if needed, unless otherwise indicated.

- Chewing gum must be discarded pre-op, primarily due to its risk as a foreign body rather than increasing gastric contents.

- Certain patient groups (diabetics, elderly etc) are at greater risk from prolonged fasting compared to the general population. Please consider prioritizing these patients and making them 1st on the theatre list in order to reduce fasting time.

- Patients taking GLP-1 receptor antagonists (e.g.Ozempic) may be at higher risk of aspiration due to significant changes to gastric emptying. In addition to withholding these medications in the pre-operative period, patients may require conservative airway management (e.g. intubation and RSI). Extended fasting times are **not** recommended given the current lack of evidence that prolonged fasting reduces the risk of retained gastric contents. However, these patients are currently **excluded** from SipTilSend, and should be fasted from clear fluids for 2 hours pre-op.

- Each patient should be individually assessed to exclude co-morbidities that may necessitate variation in fasting times or the use of prokinetic or alkalinising agents. Please contact the duty (DECT #66910) or treating anaesthetist if there are patient-specific concerns regarding fasting times.

Who can be offered Sip Til Send?

- Emergency and electively booked procedures/investigations, where an anaesthetist will be involved in care.

- Inpatients as well as patients admitted from home for their surgery (Sip Til Send begins once they reach hospital).

- Women having elective Caesarean sections and non-labouring emergency Caesarean sections.

- Patients undergoing endoscopy, cardiology and radiology procedures WITH an anaesthetist present. These patients may have specific requirements, see relevant sections below.

Who should not be offered Sip Til Send?

- Patients who shouldn't eat or drink because of medical conditions (like after a stroke or needing special diets).

- Patients who shouldn't eat or drink because of a surgical condition (like those with an obstruction in their gastro-intestinal system).

- Any patient considered unsuitable by an anaesthetist or doctor performing the surgery or procedure. This decision will be communicated clearly by the doctor to nurses/midwives and the patient, and documented in ieMR.

- Patients undergoing endoscopy, cardiology and radiology procedures WITHOUT an anaesthetist present.

- ALL THE ABOVE PATIENTS are still allowed to moisten their lips and mouth with water.

Perioperative Iron Deficiency Anaemia

Consider IV iron infusion pre-op:

- If patient is anaemic (Males < 130 g/L, Females < 120 g/L) and
  - Ferritin < 30 MICROg/L or
  - if Ferritin 30-100 MICROg/L **and** elevated CRP, consider clinical context and discuss with haematology as appropriate

- And operation is not deferrable and has potential for substantial blood loss (and thus transfusion) eg: Colectomy.

When iron deficiency does not meet the above criteria

- Send a prefilled letter (found in blood management folder) and a copy of the patients' iron studies to their GP and/or home team for further investigation and management. Please contact the patient to let them know of the diagnosis and the need for them to see their GP. PAC nurses will assist with this.

- Consider deferring operation.

IV Iron therapy:

Use below graph to determine how much iron the patient requires (based of ideal body weight) to reach their target Hb (Males < 130 g/L, Females < 120 g/L).
If body weight less than 66kg round down to the nearest 100 mg, if more than 66 kg round up to the nearest 100 mg.

Haemoglobin increase required (g/L) →	20	30	40	50	60	70
Body Weight	**Total iron dose required (expressed in mg of elemental iron)**					
40kg	600	700	800	900	1000	1100
45kg	700	800	900	1000	1100	1200
50kg	700	800	900	1100	1200	1300
55kg	700	800	1000	1100	1200	1400
60kg	700	900	1000	1200	1300	1500
65kg	800	900	1100	1200	1400	1500
70kg	900	1100	1200	1400	Use Ganzoni method; requires slow infusion	
75kg	900	1100	1300	1400		
80kg	900	1100	1300	1500		
85kg	1000	1200	1400			

Use Ganzoni method (see below) to calculate doses for any ideal body weight or Haemoglobin increase not specified in the above table.
*Cumulative iron dose = [total Hb (g/L) – actual Hb (g/L)] * 0.24 + 500 mg (if less than 35 kg then replace '500 mg' with 15 mg/kg)*

If patient requires 1 g or less:

- Prescribe Ferric Carboxymaltose, specifying the amount in mg of elemental Iron required (example: “specific iron dose in 250 mL 0.9% Normal Saline, over 15 mins”) on a fluid prescription chart.

If patient requires more than <u>1 g:</u>

- Prescribe Ferric Polymaltose, specifying the amount in mg of elemental iron required (example: “[specific iron dose] in 250 mL 0.9% Normal Saline, as per protocol”) on a fluid prescription chart.

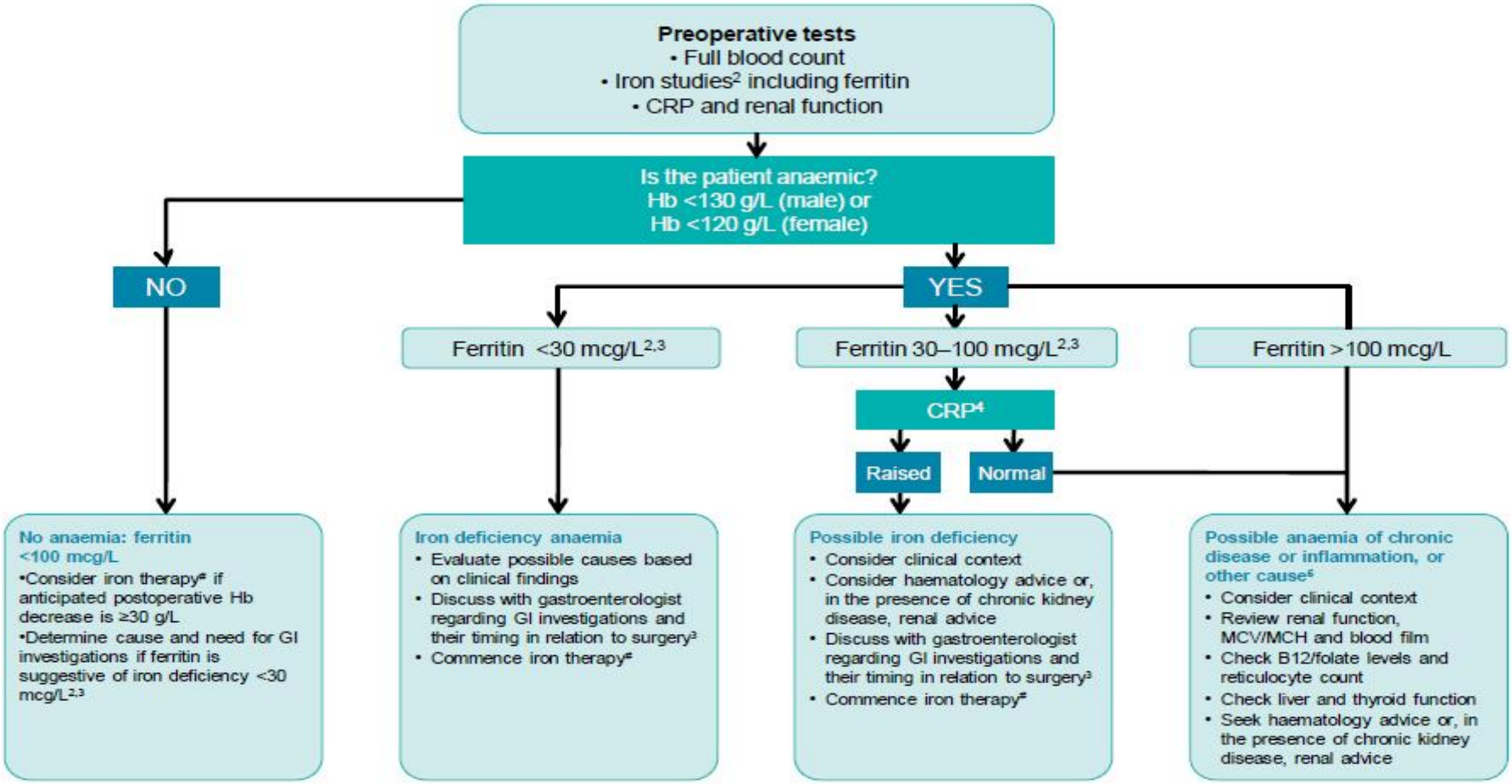
If patient requires more than 1.5 g of iron, please discuss with Jed Mangano or Stuart Andrews (depending on the situation they may require either a prolonged transfusion or multiple transfusions).

Refer to Patient Blood Management (PBM) Anaemia Clinic (Tel 69868). They will organise for the patient to be admitted through the Minor Procedures Unit and organise the infusion. Further follow up will be managed by the Blood Management Nurse (#42269868)

Please see the examples of the fluid order, hospital prescription and MR51 form in the Blood Management folder in the multidisciplinary preadmission clinic

Preoperative haemoglobin assessment and optimisation template

This template[1] is for patients undergoing procedures in which substantial blood loss is anticipated such as cardiac surgery, major orthopaedic, vascular and general surgery. Specific details, including reference ranges and therapies, may need adaptation for local needs, expertise or patient groups.



Management of cardiac implantable electronic devices (CIEDs)

Does the patient have a pacemaker (PPM) or implantable cardioverter defibrillator (ICD)?

In the event a patient with a pacemaker or implantable cardioverter-defibrillator is planned for a surgical procedure at Cairns Hospital, consider the following management:

Pre-operative management:

Device Interrogation: The patients underlying rhythm and current device parameter should be confirmed with the surgical team through preadmission. Heart Rhythm Society (HRS) guidelines state the previous interrogation should be as follows:

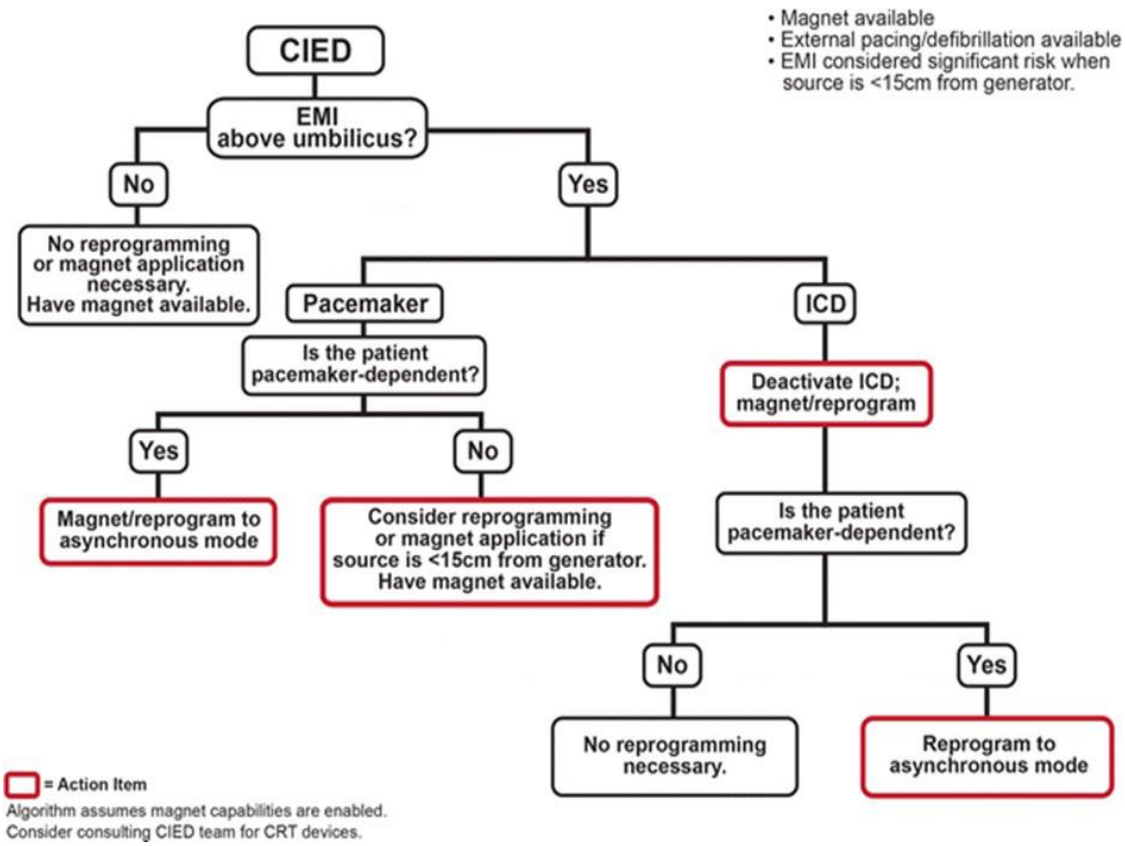
ICD – Within the previous 6 months

PPM – Within the previous 12 months

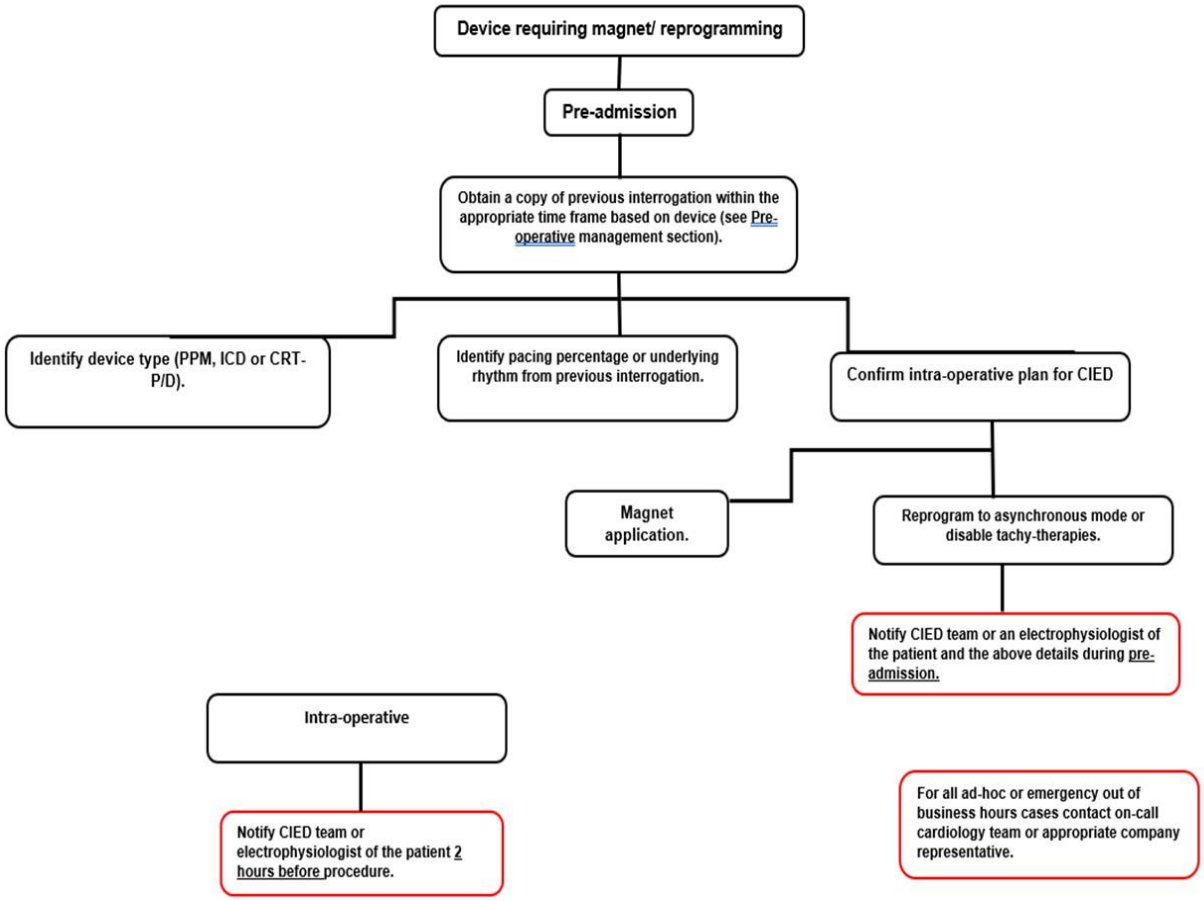
CRT- Within the previous 3 months

Intra-operative:

CIED management should follow the decision tree below. For clarification contact the Cairns Hospital Cardiac Scientists on 4226 9879



Patients with CIED (workflow for surgical/ anaesthetic team):



- Pacemaker dependant is determined by RV pacing >40% or no underlying rhythm.
- All Biotronik and Sorin devices must be notified during pre-admission with CIED team, regardless of intra-operative plan.

Magnet uses for surgical procedures

Where the above algorithm gives an option for magnet use (medical grade magnet, securely taped to skin over the device, this should be considered the preferred option, where appropriate.

Benefits of magnet use (over reprogramming):

- Quickly and readily available in all surgical settings/ environments
- Eliminates risk of “failure to restore programming” post operatively
- Immediately reversible (at end of case or in emergency.
- Less resource intensive

Magnet Application to a CIED will have the following effect:

PPM - Application of a magnet will initiate an asynchronous pacing mode at a fixed rate and fixed AV delay (applicable for dual chamber devices). The fixed pacing rate is generally between 65- 90bpm but is company dependant. Please contact the Cairns Hospital pacing team for these details, if required.

CRT-P - Application of a magnet will initiate an asynchronous pacing mode at a fixed rate and fixed AV delay (applicable for dual chamber devices). The fixed pacing rate is generally between 65- 90bpm but is company dependant. Please contact the Cairns Hospital pacing team for these details, if required.

ICD – Application will suspend tachyarrhythmia detection and therapy but will have no effect on pacing.

CRT-D – Application will suspend tachyarrhythmia detection and therapy but will have no effect on pacing.

Electromagnetic Interference (EMI):

EMI can cause potential disruption of electronic devices when within the vicinity of a CIED. The below image indicates the likelihood of EMI altering the device.

In the event diathermy is used:

- For general surgery below the umbilicus or below the elbows (marked in green). No change is required for pacemakers as interference is very unlikely.
- For general surgery above the elbow, at the head, or neck (marked in yellow). Interference may occur and use of a magnet or reprogramming is recommended if patient is pacing dependant.
- For general surgery within the **orange zone,** interference is likely and reprogramming or use of a magnet is recommended.

Post operative management

Where peri-operative management was by magnet application (or where no reprogramming was necessary), an additional post operative check/ reprogramming is NOT required unless there is reason to believe that direct damage to the CIED may have occurred.

Where peri-operative management was by a programming change, device check and reprogramming are required post operatively.

For any concerns or clarification contact the Cairns Hospital Cardiac Scientists on: 4226 9879

Perioperative Medication in Fasting Patients

It is important that most prescribed medications are given to patients, even during a designated period of fasting before an operation. Surgery may be delayed if appropriate medication has not been given.

Unless instructions to the contrary are given for a specific patient, the following guidelines apply:

Guideline

Medication to Give:

1- Premedication prescribed for the operation

2- Analgesia

3- An insulin regimen specifically prescribed for the operation

4- The patient's usual medication. This is particularly important with:

   a. **Cardiovascular** drugs, ie. for hypertension, angina, arrhythmias and heart failure.

   b. **Respiratory** drugs (including inhalers), to prevent deterioration in the patient's condition over the peri-operative period.

   c. **Anti-reflux** therapy, to minimise the risk of pulmonary aspiration of gastric acid.

Points to note:

Patients with vomiting or peritonitis should receive medication by a non-oral route if possible.

It is acceptable to give prescribed medicines with a **small sip of water only** up to 30 min before theatre, though 60 min or more beforehand is preferable.

Medication to Withhold:

These drugs should initially be withheld, pending discussion with the surgeon and anaesthetist responsible for the patient.

- Oral hypoglycaemic drugs, which may cause hypoglycaemia in fasting patients.
- Anticoagulants such as aspirin, clopidogrel, warfarin and heparin.
- Non- steroidal anti-inflammatory drugs (eg. Brufen) may also result in increased haemorrhage during surgery.

Points to note:

- A management plan should be made for each diabetic patient.
- All patients on anticoagulants require specific management plans. They should all be referred to the Anaesthetic Clinic or the Anaesthetist on call, preferably at least 1 week prior to surgery, to minimise the chance of cancellation or delay.

- Heparin DVT prophylaxis should generally be withheld if a spinal or epidural anaesthetic is intended. Low dose (ie 20 – 40mg daily) Clexane can be given at 1800 hrs the day before surgery.
- On occasions it may be preferable to withhold other medications, such as oral contraceptives or anti-depressants, but this should be done in consultation with the treating medical staff.

Routine Pre-operative Investigations

Routine pre-operative Investigations

Test	ASA 1	ASA 2	ASA 3 or 4
Minor surgery (examples: excising skin lesion; hysteroscopy)			
Full blood count	Not routinely	Not routinely	Consider if no FBC results in past 12 months or abnormal
Haemostasis	Not routinely	Not routinely	If clinically indicated e.g.– cirrhosis, bleeding disorder, on warfarin
Chem 20	Not routinely	Not routinely	Consider if no Chem 20 results in past 12 months or abnormal
ECG	Not routinely	Not routinely	Consider if no ECG in past 12 months or abnormal
Intermediate surgery (examples: inguinal hernia repair; varicose veins; knee arthroscopy)			
Full blood count	Not routinely	>70 years old or If clinically indicated e.g.– cardiovascular, renal, hepatic or diabetes comorbidities	Yes
Haemostasis	Not routinely	If clinically indicated e.g.– cirrhosis, bleeding disorder, on warfarin	If clinically indicated e.g.– cirrhosis, bleeding disorder, on warfarin
Chem 20	Not routinely	>70 years old or If clinically indicated e.g.– cardiovascular, renal, hepatic or diabetes comorbidities	Yes
ECG	Not routinely	>70 years old or If clinically indicated e.g.– cardiovascular, renal or diabetes comorbidities	Yes

Major surgery (examples: TAH; TURP; thyroidectomy; THR; TKR; colonic resection, vascular surgery)			
Full blood count	Yes	Yes	Yes
Haemostasis	Not routinely	If clinically indicated e.g.– cirrhosis, bleeding disorder, on warfarin	If clinically indicated e.g.– cirrhosis, bleeding disorder, on warfarin
Chem 20	Yes	Yes	Yes
ECG	>70 years old	>70 years old or If clinically indicated e.g.- cardiovascular, renal or diabetes comorbidities	Yes

- Order G+H depending on operation and [Hb]
- Order TFT if patient has thyroid disease
- Order HbA1C if ordering blood test for patient with diabetes
- Order Fe Studies according to Pre-op Anaemia Protocol
- Chest X-ray if clinically indicated

Fractured Neck of Femur Perioperative Management

FUN/SUN Spot Pathway

To minimize delays getting vulnerable patients with Fractured Neck of Femur to theatre Cairns Hospital is utilizing a multi-disciplinary pathway – FUN/SUN (First Up NOF / Second Up NOF) Spot.

Pre-op assessment Anaesthetics Review

All patients should be referred to APS pre-op (APS Reg in hours / Duty Reg out-of-hours)

Consider Fascia Iliaca block if not already done by ED – generally place a Fascia Iliaca catheter not a single shot block (see Fascia Iliaca Guideline)

If the fascia iliaca block was inserted by the emergency department or in a remote hospital site, please ensure that the ongoing infusion is correctly prescribed on MAR

All patients need a pre-operative anaesthetic assessment. This may be initiated as a chart review following the NOF/FUN Spot Proforma and documented in ieMR (see below) and completed in the induction bay.

- Refer to:
    - APS PM Registrar
    - Trauma AM Registrar if patient 2nd on trauma list has not been reviewed by APS
    - These are often complex patients and should be discussed with the Trauma list anaesthetist

Ensure usual meds are given (apart from anticoagulant and diabetic medications). If unsure refer to Anaesthetic Registrar.

Check FBC, Chem 20, Coags (if liver disease or on warfarin), G+H and ECG

Management of anticoagulation (General Plan – refer also to Perioperative Anti-coagulant and Antiplatelet Protocols)

Should not delay surgery > 24hrs

A. Warfarin:

Check INR; if > 1.5 give vit K 3mg IV (in 100ml saline)
Repeat INR in anaesthetic bay using iSTAT; consider Prothrombinex (25-50 IU/kg)

Neuraxial block is OK if INR <1.5
Clexane 20mg sc daily, start >12 hours post-op

B. NOACs and Clopidogrel

- Wait 24h ONLY before OT from last dose unless neuraxial anaesthetic considered optimal
- If neuraxial anaesthetic required, follow standard NOAC protocols. (Refer to *Perioperative anti-coagulant and antiplatelet protocols*)
- Check renal function

Fasting guidelines

- No food (including milky drinks) after 0200 on the day of surgery
- Clear fluids until 0600 day of surgery
- IVF prescribed
- Allow to eat and drink asap if surgery to be postponed

Trauma list management

- Anaesthetic Review for FUN/SUN Spot (see Appendix.
- Confirm with Orthopaedic Registrar suitability for FUN/SUN Spot. Orthopaedic Registrar to book as FUN/SUN Case.
- Where possible identify day prior to surgery to facilitate list and equipment planning.
- Send for FUN patient at 0730
- Orthopaedic Registrar/PHO to be available to complete sign in at 0815
- Avoid prolonged and repeated fasting if surgery delayed
- Category B or paediatric cases may need to go 1st on list

Anaesthetic Choice

- No recommendation about particular anaesthetic technique
- Tailor to patient requirements
- Senior anaesthetist should be involved

Post-op Care

- Post op Hb check
- Acute Pain Service Follow-up
- Analgesia
- Fluids and encourage oral intake unless considered aspiration risk

Criteria for FUN/SUN spot:

SpO2 >90% on RA (or >88% if COPD)	Yes / No
HR <110	Yes / No
ECG Completed and in ieMR	Yes / No
Hb >90	Yes / No
Na 125 – 145	Yes / No
K 3.5 – 5.5	Yes / No
Appropriate ARP completed and in ieMR	Yes / No
Orthopaedic review and consent complete	Yes / No

If NO to any of the above, patient requires optimisation/correction prior to FUN/SUN spot booking

If diabetic; DKA	Yes / No
Acute Arrhythmia	Yes / No
Acute cardiac failure	Yes / No
Coagulopathy	Yes / No
Respiratory failure	Yes / No

If YES to any of the above, discuss patient with trauma consultant / coordinator prior to FUN/SUN spot booking

Anaesthetic plan:

1. Suitable for FUN spot
2. Ortho team advised on suitability of FUN/SUN spot

Perioperative Management of Anticoagulants

Changes: Studies have shown that bridging anti-coagulation is unwarranted in patients at low or moderate Thrombo-Embolic (TE) risk and have further established the place of more rapid warfarin reversal with Vitamin K and/or Prothrombin Complex (e.g originally 3 factor Prothrombinex VF was used but this has now been replaced with 4 factor Beriplex)

Pre-operative bridging therapy is no longer recommended for DOAC (Direct Oral AntiCoagulants), and the time of abstinence has been shortened for Dabigatran.

Disclaimer: There are inconsistencies between published guidelines, reflecting the lack of good clinical data. Therefore, these should be seen a practical guide rather than a strict protocol. Good communication, documentation and clinical judgement are imperative.

General Instructions

1. **Make a clear plan for each patient:**
   - If possible, anticoagulated patients should be seen in the Pre-Anaesthetic Clinic (PAC) at least 1 week before surgery.
2. **Determine the need to stop anticoagulants:**
   - Continuation may be acceptable for specific procedures such as cataract extractions and endoscopies without intended biopsy – if any doubt check with the surgeon.
3. **Stratify the Patient's Thrombo-Embolic (TE) Risk (Table 1):**
   - Patients with Atrial Fibrillation (AF), Mechanical Heart Valves (MHVs) or Venous Thrombo-Embolism (VTE) who meet the criteria in Table 1 should be managed as High TE Risk in the perioperative period.
   - All other patients with MHVs, AF or VTE may be managed as Low TE Risk. Some borderline patients may reasonably be managed as High Risk based on clinical judgement.
4. **Implement plan for the patient's TE Risk for their specific medication and surgery**
   - See relevant medication section below
   - Consider guidelines for neuraxial anaesthesia (Section 4) if relevant.
- **Document the management plan**
   - On the Anaesthetic assessment sheet and/or on the IEMR
   - Give written instructions to the patient
   - Discuss with PAC staff early. They have systems in place to facilitate this protocol.

Table 1. High Thrombo-Embolic (TE) Risk Factors

• AF:
  ○ With CHADS2 Score of 5-6 (see Table 2)
  ○ With recent (<3 months) stroke/TIA/systemic embolus
  ○ attributable to valvular heart disease
• MHVs:
  ○ Mitral valve
  ○ Older aortic valve (caged ball/tilting disc); bi-leaflet aortic valve with any CHADS2 risk factors
  ○ Any mechanical valve with previous stroke, TIA, or systemic embolic event
• VTE:
  ○ Recent (<3 months ago) DVT or Pulmonary Embolism
  ○ High Risk Thrombophilia (deficiency in Antithrombin, Protein C, Protein S, Antiphospholipid syndrome, Homozygous Factor V Leiden and Prothrombin variant) or VTE due to active cancer (< 6 months since diagnosis)

Table 2. CHADS2 Score (Establish by totalling points for patients with non-valvular AF)		
C	**Congestive Heart Failure**	**1**
H	**Hypertension**	**1**
A	**Age > 75**	**1**
D	**Diabetes**	**1**
S2	**Stroke/TIA**	**2**

Specific Anticoagulant Medications

WARFARIN – Vitamin K antagonist

Pre-operative Warfarin Management – High TE Risk Patients (Table 3)

- **Two days** before surgery take last dose of warfarin
- **One day** before surgery give Vitamin K1 (Konakion) - 5 mg oral or 3 mg IV (eg at Preadmission Clinic or DSU)
- **Check INR on the day of surgery** (i-stat). Give Beriplex if INR ≥ 1.5 (see Table 5) and repeat INR to ensure < 1.5 30 minutes after infusion.

Table 3. Preop Warfarin for High Thrombotic Risk		
Pre-op Day 2	**Pre-op Day 1**	**Day of op**
Normal Warfarin	**Vitamin K 5mg oral or 3mg IV**	**-Check INR (i-stat)** - Beriplex **as required**

Post-operative Warfarin Management – High TE Risk Patients

- Recommence regular warfarin dose on the night of surgery unless there are bleeding concerns (discuss with surgical team).
- Unless there are bleeding concerns, start either IV UFH infusion (without loading dose) at 12-24 hours post-op aiming for 1.5X APTT; or LMWH at prophylactic dose for 24-72 hours (depending on bleeding risk), then treatment dose (eg enoxaparin 1.5mg/kg daily or 1mg/kg bd).
- Continue UFH or LMWH for 2 days after INR is therapeutic

Pre-operative Warfarin Management – Low TE Risk Patients (Table 4)

- Give last warfarin dose 5 days pre-operatively
- Check INR on the day of surgery (i-stat). Give Beriplex if INR ≥ 1.5 (see protocol on reversal of Warfarin) and repeat INR to ensure <1.5.

Table 4. Preop Warfarin for Low Thrombotic Risk					
Pre-op Day 5	Pre-op Day 4	Pre-op Day 3	Pre-op Day 2	Pre-op Day 1	Day of Surgery
Normal Warfarin	Rest Day (No warfarin)	Rest Day	Rest Day	Rest Day	Check INR (i-stat) Beriplex as required

Post-operative Warfarin Management – Low TE Risk Patients

- Recommence regular warfarin dose on the night of surgery unless there are bleeding concerns.
- Bridging anticoagulant therapy is not required (but VTE prophylaxis as indicated).

URGENT SURGERY ON WARFARIN

Immediate reversal required, but no active bleeding

- Give Beriplex. Adequate reversal of warfarin can be achieved without the need for additional FFP in most cases.
- Beriplex can normalise the INR in 10-30 minutes in appropriate doses (see Table 5)
- The median plasma half-lives vary significantly between Prothrombin complex factors. Therefore, vitamin K IV eg 1-3 mg will need to be given for sustained effect.
- If Beriplex is unavailable administer FFP 15ml/kg

Table 5. Beriplex Dosing

	Initial INR			
Dose	Less than 2	2.0 – 3.9	4.0 – 5.9	>6
mL/kg	Consider the need for a dose of 10 to 20 units/kg at the clinician's discretion	1 mL/kg	1.4 mL/kg	2 mL/kg
Units (Factor IX)/kg		25 units/kg	35 units/kg	50 units/kg
Maximum dose*		2500 units	3500 units	5000 units

*Dose is based on body weight up to but not exceeding 100kg. For patients weighing more than 100 kg the maximum single dose (IU of factor IX) should therefore not exceed 2500 IU for an INR of 1.6–3.9, 3500 IU for an INR of 4.0–6.0 and 5000 IU for an INR of >6.0.

Immediate warfarin reversal for life-threatening bleeding

Give:

- Vitamin K 5-10mg IV
- Beriplex Dosing
  - INR known – use table 5
  - INR unknown and unsafe to wait – use 50 IU/kg (dose is based on body weight up to but not exceeding 100kg).
- FFP 150-300ml
- If Beriplex is unavailable administer FFP 15ml/kg

DABIGATRAN (Pradaxa®) – Direct Thrombin Inhibitor

General Notes

- Popular because of rapid anticoagulation and no need for routine monitoring
- Not currently indicated for Mechanical Heart Valves or Valvular AF
- Mostly (80%) renally excreted; T½ varies accordingly: 14h with normal eGFR, 20 hours with eGFR 30-50ml/min; 30h eGFR <30 ml/min
- Contra-indicated with eGFR < 30ml/min

Pre-operative Dabigatran Management – both Low and High TE Risk

- Assess patient's renal function. If eGFR < 30, then cease Dabigatran immediately
- Timing of last dose of Dabigatran depends on eGFR (Table 6)
- Check Thrombin Time (TT) on admission or prior to surgery IF considering neuraxial blockade or very high bleeding risk; not routinely required. If normal, no Dabigatran present.
- Bridging therapy is not required due to short period of abstinence

Table 6. Pre-op Dabigatran Management

Pre-op Day 5	Pre-op Day 4	Pre-op Day 3	Pre-op Day 2	Pre-op Day 1	Day of surgery
Normal doses (for most) Rest Day if: eGFR < 30ml/min	Normal doses (for most) Rest Day if: eGFR < 50ml/min	Normal doses (for most) Rest Day if: eGFR < 80ml/min	Rest Day (omit)	Rest Day	Rest Day

Post-operative Dabigatran Management – Low and High Thrombotic Risk

- Re-starting must involve discussion with the surgical team re bleeding risk
- Do not restart Dabigatran if eGFR < 30ml/min; discuss with treating physician re alternative treatment.
- If haemostasis satisfactory then Dabigatran may be started at usual dose 12-24 hours post-op (low bleeding risk) or 48-72 hours (higher bleeding risk)
- Bridging therapy is generally not required due to rapid onset of anti-coagulant effect.
- If commencement of Dabigatran is delayed, and the patient is High TE Risk, then consider either IV UFH infusion without a bolus dose, or SC LMWH (prophylactic dose for 24-72 hours, depending on bleeding risk, then treatment dose).

URGENT SURGERY ON DABIGATRAN

- Consider oral activated charcoal if Dabigatran ingested in last 2 hours
- Delay surgery for 4-5 half-lives if possible (eg 3 days, or Table 6)
- Check Thrombin Time, renal function
- Neuraxial anaesthesia contraindicated unless TT normal
- Cross match blood and see advice for Management of Bleeding

Management of Bleeding on Dabigatran

- Supportive measures
- Identification and management of bleeding source
- Consider Tranexamic acid IV 15 mg/kg, followed by infusion of 1mg/kg/hr
- Consider bolus dose of Factor VIIa (50 mcg/kg) and repeat if severe haemorrhage.
- Haemodialysis for 4-6 hours is effective and can remove up to 65 % of Dabigatran
- Beriplex, Vitamin K and FFP are NOT effective. The effect of Factor VIIa is currently unknown.
- Idarucizumab is a Dabigatran-specific (Fab) antibody which rapidly reverses the effect of Dabigatran. It is AVAILABLE and stored in the emergency department. Contact haematology for indications and dosing advice.

RIVAROXABAN (Xarelto®) (t ½ 8h)

APIXABAN (Eliquis®) (t ½ 12h)

(Direct Factor Xa Inhibitors)

General Notes

- Popular because of rapid dosing and no need for routine monitoring
- Not currently indicated for Mechanical Heart Valves or Valvular AF
- Although the half-lives are slightly different, recommended time intervals for abstinence are currently the same for the different agents
- Excretion is approximately 30% renal and 70% hepatic.
- Contra-indicated with eGFR <30ml/min or hepatic disease with coagulopathy

Pre-operative Riv/Apixaban Management – both Low and High TE Risk

- Check renal and hepatic function (and coags if likely hepatic disease)
- Give last pre-operative dose Riv/Apixaban according to Table 7.
- A shorter period of abstinence (eg 2 days) is adequate for low-moderate bleeding risk procedures in patients without hepato-renal disease, esp for low dose (eg thromboprophylaxis) Riv/Apixaban.
- No pre-op bridging therapy is required due to the short period of abstinence
- Pre-operative coagulation studies are generally NOT recommended. However, establishing that PT (and esp anti-Xa levels if available) are normal may be reasonable if absolute haemostasis is required, especially if the period of abstinence is shorter than desired.

Table 7. Pre-op Riv/Apixaban Management					
Pre-op Day 5	Pre-op Day 4	Pre-op Day 3	Pre-op Day 2	Pre-op Day 1	Day of surgery
Normal dose (for most) <u>Rest Day if:</u> Child-Pugh C	Normal dose (for most) <u>Rest Day if:</u> eGFR < 30 OR Child-Pugh B	Normal dose (for most) Rest Day if: eGFR < 50 OR Age >70	Rest Day (omit)	Rest Day	Rest Day

Post-operative Riv/Apixaban Management

1. Re-starting must involve discussion with surgical team re bleeding risk
2. Do not restart Riv/Apixaban if eGFR < 30ml/min or Child-Pugh B or C. Discuss with treating physician regarding alternative treatment.
3. If haemostasis is satisfactory then Riv/Apixaban may be re-started at usual dose 12-24 hours post-op
4. Bridging therapy is generally not required due to rapid onset of anti-coagulant effect.
5. If higher bleeding risk, re-start Riv/Apixaban 48-72 hours postoperatively
6. If commencement of Riv/Apixaban is delayed (eg ileus), AND the patient is High TE Risk, then consider either IV UFH infusion without a bolus dose, or SC LMWH (prophylactic dose for 24-72 hours, depending on bleeding risk, then treatment dose).

URGENT SURGERY ON RIV/APIXABAN

1. Consider oral activated charcoal if Riv/Apixaban was ingested in the last 2 hours
2. Consider delaying surgery for 4-5 half-lives (eg 2-3 days, or Table 7)
3. Cross match blood, check PT +/- anti-Xa levels, renal and hepatic function
4. Neuraxial anaesthesia contraindicated unless anti-Xa levels normal

Management of Bleeding in Riv/Apixaban

1. Supportive measures
2. Identification and management of bleeding source
3. In severe bleeding consider:
    a. Beriplex 25-50 IU/kg (max dose 5000 units) (check dosing chart on table 5 if INR available)
    b. Tranexamic acid 1g then infusion 1mg/kg/hr
    c. Factor VIIa 50mcg/kg and repeat if critical bleeding (Novoseven half life is significantly shorter than apixaban – continued close monitoring of the patient

is required).

4. (Andexanet alpha is a binding reversal agent for Xa inhibitors that is under development but not yet commercially available)

Neuraxial Blockade

1. Neuraxial blockade should only be undertaken:
    a. with a normal (<1.5) INR – Warfarin
    b. after the time period in Table 6 or normal TT – Dabigatran
    c. after the time period in Table 7 or normal PT/anti-Xa – Riv/Apixaban.

2. Epidural catheters are contraindicated with treatment dose Dabigatran or Riv/Apixaban. If treatment doses are given inadvertently, epidural catheter removal should be delayed for a time period according to Tables 6 and 7.

3. Removal of an epidural catheter should be delayed for >24 hours after low dose once daily (DVT prophylaxis) Dabigatran or Riva/Apixaban.

4. Dabigatran or Riv/apixaban should not be administered until at least 6 hours after spinal anaesthesia or epidural catheter removal.

Perioperative Management of Diabetic Medication

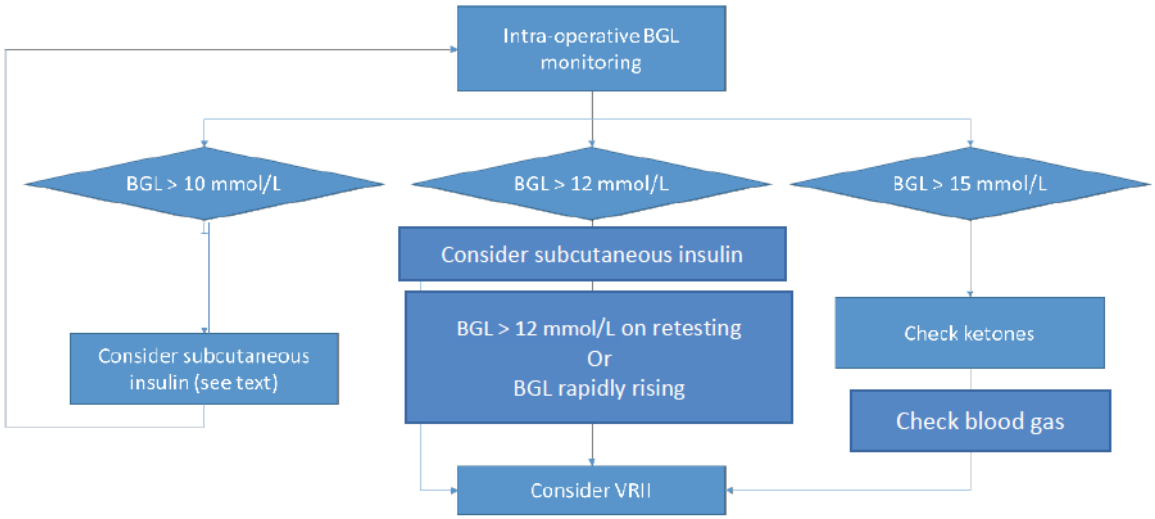
General Guidelines

- Ensure optimal glycaemic control prior to surgery – Aim ideally for a BGL of 5 – 10 mmol/L in the perioperative period.
- Poor control (HbA1c ≥ 9% or *mean* BGL ≥ 11.9 mmol/L) is associated with poor wound healing, infections, and osmotic diuresis.
- Treat hypoglycaemia when BGL <5.0 mmol/L with IV dextrose or clear sugar-containing fluids (clear apple juice, cordial)
- Patients with diabetes, especially those requiring insulin, should be on the morning list, preferably first on the list.
- Following admission to hospital, BGL should be monitored hourly while fasting and during the procedure.
- Glucose-containing fluids should be avoided except to treat hypoglycaemia. 0.9% Saline, Hartmann's or Plasmalyte solutions are considered appropriate for general hydration of the patient. When the patient is on an intravenous insulin-glucose infusion, potassium should be monitored and replaced as required.
- The following management plan and insulin regimens are guidelines only, and experienced medical staff may choose to vary management in specific situations.
- Patients must be given clear written instructions concerning the management of their diabetes both pre- and post-operatively prior to surgery.
- All treatment orders should be clearly prescribed

Diabetics normally on drug treatment should be discussed with the relevant anaesthetist preoperatively. The endocrine unit is available for consultation and should be notified of all unstable patients.

General Intraoperative Management of Diabetic Patients

- Monitor BGL hourly, increasing in frequency if it trends off-target.
- Consider treating hyperglycaemia when BGL > 10 mmol/L with SC insulin.
- Consider commencing Variable Rate Insulin Infusion (VVRI) when BGL is over 12 mmol/L.
- If type 1 diabetes and BGL > 15 mmol/L check for ketoacidosis with blood gas and ketones.
- If patient has taken SGLT2i within 72 hours and is unwell, blood gas and ketones should be checked for ketoacidosis.



Patients treated with Insulin

All patients with diabetes treated with insulin should be managed in the same way, irrespective of whether they have Type I or Type II Diabetes Mellitus.

Unless the fasting BGLs have been relatively low (consistently < 5 mmol/L), **the usual dose of insulin should be given the evening prior to surgery.**

A. Pre-operative Management

a. BGLs Well-Controlled (BGL consistently < 12 mmol/L)

- Continue all basal insulin at usual dose and time. Exception: Reduce basal insulin dose by 20% if recent overnight hypoglycaemia.
- If pre-mixed insulin, reduce usual morning dose by 50%. Omit any lunchtime dose.
- If co-formulated insulin and morning procedure, delay any morning dose till lunchtime (if eating) or evening (if not usually on evening co-formulated insulin). If usually lunchtime co-formulated insulin and morning procedure, continue usual lunchtime dose if eating lunch or delay till evening meal. If co-formulated insulin and afternoon procedure, reduce any morning dose by 50%. Omit any lunchtime dose. Resume usual evening dose if eating.

b. BGLs poorly controlled (BGL consistently ≥ 12 mmol/L or widely fluctuating)

- Will need stabilisation pre-operatively
- Commence VRII (variable rate insulin infusion) or STAT SC insulin dose.

Insulin Regimen	Morning Procedure	Afternoon Procedure

Evening basal insulin only	No dose change.	No dose change.
Morning basal insulin only	No dose change.	No dose change.
Basal bolus regimen - Levemir - Optinsulin - Toujeo - Semglee	Omit the morning and lunch time rapid/short-acting insulin. Keep the basal dose unchanged.	Advise half the morning rapid/short-acting insulin with light breakfast. Omit the lunch dose(fasting). Keep the basal and evening meal dose unchanged if eating.
Pre-mixed insulin - Mixtard - Humulin - Humalog - NovoMix	Halve the usual morning dose. Omit lunchtime dose (if any) if not eating. Leave the evening meal dose unchanged.	Advise half the usual morning dose with light breakfast. Omit lunchtime dose (if any). Leave the evening meal dose unchanged if eating.
Co-formulated insulin - Ryzodeg	Omit on morning of surgery for morning procedure. Give usual morning dose at lunchtime if able to eat by then. If usually lunchtime dose give as usual if able to eat by then. If patient is on morning or lunchtime only dose, give usual dose with evening meal if not able to eat before then.	Advise half of usual morning dose with light breakfast. Omit if usually lunchtime dose. If usually lunchtime dose only give usual dose with evening meal if able to eat by then. If usually evening dose, give usual dose with evening meal if eating. If unable to eat post op by evening recommend insulin infusion or switch to basal bolus insulin
Intermediate acting insulin with 2-3 rapidacting or short-acting insulin doses for meals - Protaphane - Humulin R	Calculate the total dose of all insulins for the morning and lunch. Half of the total insulin dose should be given as an intermediate acting insulin only in the morning. Leave evening meal and pre-bed doses unchanged.	Calculate the total dose of all insulins for the morning and lunch. Half of the total insulin should be given as an intermediate acting insulin only in the morning. Half the morning rapid-acting insulin can be given with a light-breakfast. Leave evening meal (if eating) and pre-bed doses unchanged.
Subcutaneous insulin pump Ask patient to place infusion site away from surgical site, bring spare	Continue basal infusion at usual rates - or: Use temporary basal of 80% if fasting BG <5 mmol/L or HbA1c <48 mmol/ mol (6.5%). If automode pump, set exercise	Half calculated bolus at breakfast Continue basal infusion at usual rates- or use temporary basal of 80% if fasting BG <5 mmol/L.

giving sets and glucose monitor (needed for autopump to work)	blood glucose target.	If automode pump, set exercise blood glucose target.

Consider weather it is more suitable to continue the insulin pump during surgery OR disconnect it and change to a sliding scale or basal rate insulin during the procedure.

Pumps can easily become disconnected, or the cannula dislodged during surgery.

B. Blood Glucose Monitoring

a. 1-2 hourly pre-operatively when fasting from time patient wakes up
b. 1 hourly intra-operatively
c. 1-2 hourly post-operatively for a minimum of 6 hours, and then 4-6 hourly if BGL stable and insulin infusion not required.

C. Post-operative Management

d. Monitor BGLs 1-2 hourly until return to normal diet
e. If BGLs are satisfactory may revert to usual therapy, otherwise VRII order or Insulin Subcutaneous Stat/Supplemental order requires dose adjustment.

Patients treated with Oral Anti-hyperglycemic Agents (AHG)

Sodium Glucose Cotransporter 2 Inhibitors ("Gliflozins") are dealt with separately below due to their associated risk of Diabetic Ketoacidosis (DKA).

The usual dose of all other AHG should be given the day prior to surgery.

A. Pre-operative Management

a. Omit all AHG on the morning of surgery
b. BGLs Well-Controlled (BGL consistently < 12 mmol/L)
    - No additional management needed.
c. BGLs Poorly-Controlled (BGL consistently ≥ 12 mmol/L or widely fluctuating)
    - More frequent BGL monitoring
    - Will need stabilization pre-operatively
    - Commence VRII or STAT SC insulin

B. Blood Glucose Monitoring

a. 1-2 hourly pre-operatively when fasting from time patient wakes up
b. 1 hourly intra-operatively, 2 hourly if T2DM, well controlled and on single agent metformin

c. 1-2 hourly post-operatively for a minimum of 6 hours, and then 4-6 hourly if BGL stable.

C. Post-operative Management

a. Commence or continue insulin therapy (as above) if BGL consistently ≥ 12 mmol/L

b. Resume usual oral AHG when eating and drinking normally and insulin therapy (as above) no longer required

c. In radiologic procedures where intravenous radio-contrast has been given to a patient with mild renal impairment, delay restarting Metformin until 24-48 hours post-procedure and it is known that renal function has not deteriorated

Oral Antihyperglycaemic	**Morning Procedure**
Metformin	Day before surgery – take as normal. Day of surgery – omit
Sulphonylureas - eg Glicizide	Day before surgery – take as normal. Day of surgery – omit
GLP-1RA - eg Semaglutide	Day before surgery – take as normal. Day of surgery – omit
DPP-4 inhibitors - eg Sitagliptin	Day before surgery – take as normal. Day of surgery – omit

Patients treated with Sodium Glucose Cotransporter 2 Inhibitors (SGLT2i)

SGLT2i carry a small but definite risk of severe diabetic ketoacidosis (DKA). *Sometimes this occurs with a normal or only modestly elevated BGL*.

The risk of DKA is linked to the physiological stress induced by surgery. Other risk factors include:

- Fasting or very restricted dietary intake
- Bowel preparation
- Dehydration
- Intercurrent illness eg active infection
- Insulin deficiency (eg Type 1 DM, insulin-requiring Type 2 DM, especially if poorly controlled)

Examples of SGLT2i ("Gliflozins") available in Australia include:

Commercial Name	Generic Name
Forxiga	Dapagliflozin
Xigduo	Dapagliflozin + metformin
Qtern	Dapagliflozin + saxagliptin
Jardiance	Empagliflozin
Jardiamet	Empagliflozin + metformin
Glyxambi	Empagliflozin + linagliptin
Steglatro	Ertugliflozin
Segluromet	Ertugliflozin + metformin
Steglujan	Ertugliflozin + sitagliptin

A. Pre-operative Management

a. **For day surgery procedures** (*not requiring bowel prep i.e., gastroscopy*)

- Omit SGLT2i on the morning of surgery *if* there is no risk of dehydration *and* expected rapid resumption of normal food and fluid post-operatively

b. For surgery or procedures with planned overnight stay

- Cease SGLT2i 3 days pre-operatively (including the day of surgery)

c. **For surgery and procedures requiring bowel prep** (i.e., colonoscopy)

- Cease SGLT2i 3 days pre-operatively (including the day of surgery)

B. Blood Glucose and Blood Ketone Monitoring

a. 1-2 hourly pre-operatively
b. 1 hourly intra-operatively
c. BGL 1-2 hourly (until stable), and blood ketone level 2-4 hourly, post-operatively

C. Post-operative Management

a. Commence or continue insulin therapy (as above) if BGL consistently ≥ 12 mmol/L

b. Resume usual SGLT2i when eating and drinking normally and insulin therapy (as above) no longer required

c. Prior to discharge from hospital, advise patient to check BGL and blood ketone level if unwell in the week following surgery

D. Strongly consider postponing non-urgent surgery/procedures in an unwell patient.

If blood ketone level is > 1.0 mmol/L urgently perform an arterial or venous blood gas (ABG or VBG respectively)

a. If the Standard Base Excess (SBE) is < -5 mmol/L the patient has presumed DKA and should be managed accordingly.

b. Commence insulin management as per protocol.

c. Monitor BGL, blood ketone level, and ABG (or VBG) 1 hourly

d. All patients with DKA are to be reviewed by an endocrinologist (or physician on-call) and/or intensive care team.

E. If SGLT2i has not been ceased prior to non-urgent surgery and the patient is clinically well, see table below

Table: Suggested Management of CLINICALLY WELL a person with diabetes who has NOT ceased SGLT2i

Ketones	Base Excess	Comments
<1	> -5	**No ketosis and no metabolic acidosis.** Consider proceeding with day surgery: hourly monitoring of blood ketones during the procedure, and 2nd hourly following the procedure until eating and drinking normally or discharged. Where blood gas analysis is not available proceed only if added risk is consistent with goals of care. More extensive surgery: consider goals of care and collaboration with endocrinology and critical care. Perioperative insulin and glucose infusion may reduce risk.
>1	> -5	**Ketosis without metabolic acidosis.** Seek endocrinology or general medicine advice. Ketosis without acidosis may reflect starvation, particularly in individuals with HbA1c < 9% (<75 mmol/mol). Consider proceeding, but with perioperative insulin and glucose infusion to reduce risk of ketoacidosis
>1	< -5	**Ketosis with metabolic acidosis.** Postpone non-urgent surgery. Escalate care with endocrinology and critical care. Urgent surgery to proceed with insulin and glucose infusion and ketone monitoring with guidance from endocrinology and/or critical care

Footnote: Blood gas analysis is recommended to assess for presence of metabolic acidosis. Where blood gas analysis is not readily available, and the ketones are > 1.0 mmol/L the procedure should not be performed.

Patients treated with Dietary modification alone

A. Pre-operative Management

a. BGLs Well-Controlled (BGL consistently < 12 mmol/L)

- No additional management

b. BGLs Poorly-Controlled (BGL consistently ≥ 12 mmol/L or widely fluctuating)

- More frequent BGL monitoring
- Will need stabilization pre-operatively
- Commence VRII or STAT SC insulin dose depending on weight.

B. Blood Glucose Monitoring

- 2-4 hourly pre-operatively (more frequently if BGLs poorly controlled)
- 2 hourly intra-operatively (if not well controlled 1 hourly)
- 4 hourly post-operatively until stable

C. Post-operative Management

- Commence or continue insulin therapy (as above) if BGL consistently ≥ 12 mmol/L
- Resume usual diet when able

Patients treated with Glucagon-like peptide-1 receptor agonists (GLP-1RA)

GLP-1RA have been associated with an increased risk of retained gastric contents and delayed gastric emptying.

Common adverse effects of GLP-1RAs and dual GLP-1 and GIP receptor co-agonists are gastrointestinal, including nausea, vomiting, diarrhoea and constipation. However, the relationship between upper gastrointestinal symptoms and slowing of gastric emptying by GLP-1RAs is weak. Therefore, the presence of gastrointestinal side effects is not a reliable indicator of the degree of slowing of gastric emptying or the presence of gastroparesis.

Examples of GLP-1RA available in Australia include:

Trade Name	**Generic Name**
Ozempic	Semaglutide
Trulicity	Dulaglutide
Saxenda	Liraglutide
Byetta	Exenatide

All patients taking GLP-1RA and GLP-1/GIPRAs within 4 weeks preceding anaesthesia should be considered unfasted and anaesthesia should be administered according to local practices for a non-fasted patient.

Extending the fasting time is not recommended given the current lack of evidence that prolonged fasting reduces the risk of retained gastric contents.

Detailed management

Clinical Practice Recommendation Regarding Use Of GLP-1 Receptor Agonists and Dual GLP-1 and GIP Receptor Co-agonists Prior to **Endoscopic Procedures**

- All patients taking GLP-1RA and GLP-1/GIPRAs within 4 weeks preceding an elective upper endoscopic procedure should follow a fluid diet for 24 hours prior to endoscopy.

- If there are clinical concerns that retained gastric contents may be present, consider a topical anesthesia approach minimally sedated gastroscopy to inspect the stomach. If any solid intra-gastric contents are present, the endoscopic procedure should be abandoned.

- If retained gastric contents are present on gastroscopy, planned synchronous colonoscopy should be reconsidered or performed minimally sedated with appropriate precaution including availability of appropriate equipment for mouth suction or following rapid-sequence induction general anaesthesia to ensure airway protection.

- If an emergency or urgent endoscopic procedure is required for a patient treated with GLP-1RA and GLP-1/GIPRAs, consider the use of erythromycin (in the absence of contraindications) prior to the endoscopic procedure to accelerate gastric emptying.

Clinical Practice Recommendation Regarding Use Of GLP-1 Receptor Agonists and Dual GLP-1 and GIP Receptor Co-agonists Prior to Anaesthesia for **Non-Endoscopic Procedures**

- All patients taking GLP-1RA and GLP-1/GIPRAs within 4 weeks preceding anaesthesia should be considered nonfasted/to have a full stomach and anaesthesia should be administered according to local practices for a non-fasted patient.

- There is currently no data to support the stopping of longer-acting GLP-1RA and GLP-1/GIPRAs but it would be reasonable to stop Liraglutide (once-daily GLP-1RA) on the day of procedure.

- Bedside point-of-care gastric ultrasound a may be used for risk stratification to determine the qualitative and quantitative content of the stomach prior to anaesthesia.

- Extending the fasting time is not recommended given the current lack of evidence that prolonged fasting reduces the risk of retained gastric contents.

- It is reasonable to consider the use of iv erythromycin (in the absence of contraindications) prior to anaesthesia to accelerate gastric emptying.

Insulin Intravenous Infusion Order

An insulin-glucose infusion is an effective means of treating hyperglycaemia during the perioperative period.

A. Insulin Solution
   - Delivered by syringe driver: prepared in a 50 mL syringe by admixture of 50 units of Actrapid with 49.5 mLs of 0.9% Saline. The final concentration is 1 unit of insulin per 1 mL 0.9% Saline.

B. Glucose Solution
   - Glucose 5% IV Infusion at 80-100 mL/hour by infusion pump (if fluid restriction necessary, Glucose 10% IV infusion at 40-50 mL/hour)
   - **Both infusions must run via the same IV cannula** (Insulin should be infused at a Y-connection allowing concurrent Glucose IV infusion)
   - Post-operative fluids should be dealt with separately from the Glucose IV Infusion

C. Blood Glucose Monitoring
   - Monitor 1 HOURLY for at least the first 6 hours (or, if any alteration to Insulin or Glucose infusion rates, or if BGLs unstable). If BGLs stable and within target range, then 2 HOURLY while the patient remains on Insulin infusion

D. Recommended Initial Insulin Infusion Rates

BGL range (mmol/L)	**Initial Infusion Rate (units/hour)**
0 – 5.0	SUSPEND insulin infusion, CONTINUE glucose infusion, and notify Dr. If BGL less than 4 mmol/L give additional 30 mLs of Glucose 50% IV and recheck BGL after 15 mins
5.1 – 7.0	0.5
7.1 – 10.0	1
10.1 – 15.0	2
15.1 – 20.0	3 and notify Dr
Greater than 20.0	4 and notify Dr

- Continue Glucose IV Infusion if Insulin IV Infusion suspended (BGL ≤ 5.0) and, if BGL < 4.0 recheck BGL every 15 mins
- Recommence Insulin infusion once BGL > 7.0 mmol/L. BGLs must continue at a 1 HOURLY rate
- If BGLs consistently < 5.0 mmol/L, decrease Insulin Infusion Rate scale by 0.5-1.0 unit/hour (and/or increase Glucose IV Infusion rate)

- If BGLs consistently > 15.0 mmol/L, increase Insulin Infusion Rate scale by 0.5-1.0 unit/hour
- If unsure, seek Senior Advice or consult Endocrine Unit

E. Review of BGL
- Should be made by medical staff frequently (at least twice per day) for patient safety and to allow review of Insulin IV Infusion Order

F. Insulin Administration
- No other form or route of insulin should be given whilst on Insulin IV Infusion

G. Normal Regimen of Subcutaneous Insulin
- Start approximately 1 hour prior to ceasing Insulin IV Infusion post operatively

Insulin Subcutaneous Stat/Supplemental Order

Sliding scales of correction insulin can be problematic since they delay administration of insulin until hyperglycaemia is present (ie are reactive) and frequently cause wide fluctuations in the serum glucose. They can be a useful method in management of hyperglycaemia in shorter surgical procedures, however if BGL is above 15 or rapidly rising an insulin infusion should be considered.

- May be used peri-operatively when insulin requirements are unpredictable, but when intensive Insulin IV Infusion is not required (eg satisfactory control, minimal disruption to patient's glycaemic control) – should only be used **short term**
- In this setting, it is typically administered 3-4 hourly as rapid-acting insulin (eg Actrapid)
- Initial dosing may be based on total daily dose (if previously on insulin), or patient's actual weight (if not previously on insulin)

Weight	Insulin (if not previously on)
>100kg	6 units every 3 hours until BGL below 10
55-100kg	4 units every 3 hours until BGL below 10
<55kg	2 units every 4 hours until BGL below 10

Subcutaneous Insulin Infusion Pumps

- The general recommendation is to continue insulin infusion pumps at their usual rate. However, they are to be stopped in certain situations (i.e., MRI scan) and the patient needs to be started on a variable rate insulin infusion.

- Consider the location of the continuous glucose monitor (GCM) in addition to the pump location

- The pump should be distant from the site of surgery, away from the field of diathermy, and readily accessible by the anaesthetist at all times
- The case should be discussed with patient, anaesthetist, surgeon, and diabetes medical team in advance
- Monitor BGLs hourly.
- Insulin pump settings may only be changed by the patient or their diabetes medical team (referred on admission to hospital)

BGL	BGL trend	Insulin Infusion Rate Adjustment
< 5	Stop insulin infusion	Follow the Management of Hypoglycaemia protocol. Check BGLs every 15 minutes until >5 mmol/L, then hourly for at least next 6 hours. Once BGL >10 mmol/L recommence insulin infusion as per protocol.
5.1-7.9	BGL Falling ↓	Decrease Rate by 3 units/hour (3mL/hr) or Cease Infusion if running at ≤ 3 unit/hour in T1DM – don't cease for more than 1 hour; run at low rate if possible
	BGL Stable	Decrease Rate by 1 unit/hour or Cease Infusion if running at ≤ 1 unit/hour in T1DM – don't cease for more than 1 hour; run at low rate if possible
	BGL Rising ↑	No Change
8–9.4	BGL Falling ↓	Decrease Rate by 1 unit/hour (1 mL/hr) or Cease Infusion if running at ≤ 1 unit/hour in T1DM – don't cease for more than 1 hour; run at low rate if possible
	BGL Stable	No Change
	BGL Rising ↑	Increase Rate by 1 unit/hour (1 mL/hr)
9.5-10.9	BGL Falling ↓	Decrease rate by 1 unit/hour (1 mL/hr)
	BGL Stable	No Change
	BGL Rising ↑	Increase rate by 2 units/hour (2 mL/hr)
11–14	BGL Falling ↓	Increase rate by 1 unit/hour (1 mL/hr)
	BGL Stable	Increase rate by 2 unit/hour (2 mL/hr)
	BGL Rising ↑	Increase rate by 3 unit/hour (3 mL/hr)
> 14		Check that infusion is correctly setup

Antiplatelet Agents Perioperative Management

General Guidelines

- APAs are used to prevent ***arterial*** thrombosis. Dual antiplatelet therapy (DAPT) is usual for patients at high risk, especially after placement of coronary artery stents or after acute coronary syndromes (ACSs).
- The ***risk of thrombosis versus haemorrhage*** should be determined for each patient.
- At present, platelet function tests are not widely available for routine use. Consequently, decisions usually need to be based on drug pharmacology and the available outcome data.
- ***Table 1 provides a schema for decision making*** for APAs. Frequently, the final decision will require a judgement regarding the balance of risks.
- For patients on both APAs and warfarin (e.g. for atherosclerosis and Atrial Fibrillation), try to determine the major risk factor and manage according to the relevant perioperative protocol (APA or warfarin).
- APAs should be re-started once the risk of major bleeding is minimal. This may vary from 1 to 7 days post-op. A loading dose should be considered.

ALERT

- ***For patients at the highest risk of thrombosis*** (e.g. new coronary artery stent plus a recent acute coronary event), ***the risk of death or further coronary events is extreme (e.g. >50%)***.
- ***Combinations*** of anticoagulant drugs with different actions (e.g. combinations of APAs and/or heparin) ***greatly potentiate the anti-thrombotic effect and risk of bleeding***.
- ***For some surgical patients bleeding from continued APA therapy can result in death or severe morbidity***.

Other Considerations

- ***Postponing surgery:*** Depending on the surgical condition, surgery should be delayed until the thrombotic risk is less, preferably until DAPT (dual antiplatelet therapy) is no longer required. If this is not possible, delaying surgery (+/- perioperative cessation of DAPT) until 3 months or preferably 6 months after drug-eluting stent (DES) placement or ACS reduces the risk. Stopping DAPT within 6 weeks of stent placement should be avoided if at all possible. Bare metal stents are now rarely inserted; however at least 6 weeks and preferably 3 months DAPT is recommended.

- ***Patient transfer:*** Depending on the adjudged risk of thrombosis, consider transfer for surgery to a centre with re-stenting capacity (e.g. Cairns Hospital). However, as a possible thrombosis is unpredictable in its timing, the duration of stay in that location (e.g. for surgical recovery; 3 or 7 days) is unclear.
- ***Epidural/spinal anaesthesia and other nerve blocks:*** Neuraxial blockade is acceptable on Aspirin and other NSAIDs. However neuraxial blockade, and other blocks where control of bleeding from vascular injury is difficult, should generally NOT be performed for 5-7 days after clopidogrel, 7-10 days after prasugrel and 3-5 days after Ticagrelor. The risk is probably higher for an epidural (especially with a catheter) than a single shot spinal. An epidural catheter should be REMOVED at least 2 hours before potent APAs are started.

- **Multi-disciplinary consultation**, as well as careful discussion with the patient and clear documentation (including patient instructions), is necessary for complex patients.
- **Consultation with the treating cardiologist** is recommended for patients on DAPT after coronary artery stenting, as the optimal duration is variable, depending on patient and stent- related factors (e.g. branching, length, type). Consultation is particularly indicated when the time interval since stent insertion is less than 6 months.
- **Consultation with the vascular surgeon** regarding the perioperative plan is indicated if the patient is on multiple APAs for vascular reasons.

Antiplatelet Agents

- **Aspirin** and **ADP $P2Y_{12}$ receptor antagonists** (Clopidogrel, Prasugrel, Ticagrelor) are inhibitors of platelet function through different mechanisms. The P2Y12 antagonists are more potent than Aspirin; Prasugrel and Ticagrelor are more potent than Clopidogrel. The clinical effect is longest for Prasugrel (7 days) and shortest for Ticagrelor (3 days).
- **Dipyridamole** (Persantin®) is used in CVA prophylaxis in combination with aspirin. Its duration of effect is only 12 hours.
- **Cilostazol** is a phosphodiesterase-3 inhibitor which suppresses platelet aggregation and is a direct arterial vasodilator. It is used for improvement of claudication symptoms, often in combination with other antiplatelet agents. It undergoes hepatic metabolism with a half-life of 12 hours. The last dose should be given 3-5 days before elective surgery.
- **GPIIb/IIIa inhibitors** are intravenously administered in acute coronary settings. **Tirofiban** and **Eptifibatide** effects last for only 4 hours; **Abciximab** lasts 12-24 hours; Their possible role in bridging therapy for patients at very high risk of stent thrombosis is unclear.
- **Non-selective NSAIDs** have a reversible effect, with a duration of action ranging from hours (e.g. Ibuprofen) to a few days (e.g. Naproxen).

Emergency Surgery

- For an irreversible APA (e.g. Aspirin, Clopidogrel, Prasugrel) no obvious improvement in platelet function can be expected within 24 hours, whereas significant improvement occurs by 48-72 hours from platelet regeneration.
- ***Platelet transfusion*** may be helpful for treatment of excessive bleeding due to Aspirin and $P2Y_{12}$ antagonists. The place of prophylactic platelet transfusion is unclear. Tranexamic Acid is of benefit in some studies.
- For the GP IIb/IIIa inhibitors, it is preferable to wait 4 hours after Tirofiban or Eptifibatide and 12-24 hours after stopping Abciximab, rather than transfusing platelets with a large amount of active drug present.
- The role of platelet function tests in emergency situations is still unclear.

Table 1: Management of Antiplatelet Agents in Elective Surgical Patients

1. Determine individual risk factors and management plan from the table 2. Complex situations need collaboration with surgeon, treating cardiologist, anaesthetist and patient 3. Consult cardiologist if on DAPT[#] for cardiac reasons		**Bleeding Risk of the Procedure**		
		Major: (Risk of major bleeding >5% or life/limb threatening) Eg: Neuro/ spinal, aortic or major pelvic, major ENT, prostate surgery	**Intermediate:** (Risk of Major Bleeding 1- 5%) Eg: Abdominal, Major joint, Non-aortic vascular surgery, ERCP, urology except TURP	**Minor:** (Risk of Major Bleeding <1%) Superficial surgery eg Cataract, minor skin lesions, ECT
Risk of Thrombosis (with cessation of treatment + surgery)				
Category	**Examples**	**Management**		
Extreme Death 5-15%/ Death + MI/redo stent 25% Risk	• ***DES within 6 weeks** • ****ACS (or CABG) within 6 weeks**	• Postpone surgery[1]; If impossible, • Consider transfer to centre with re-stenting capacity[2], AND • Collaborate re APA options	• Postpone surgery[1]; If impossible, • Consider transfer to centre with re-stenting capacity[2], AND • Collaborate re APA options (Likely continue 1 or more APAs)	• Postpone surgery[1]; If impossible, • Continue APAs
High	• **DES and/or ACS > 6 weeks but within 1 year still on DAPT[#]** (consider deferral to at least 3 or preferably 6 months for more urgent surgery)[1]	• Postpone surgery[1]; If impossible, • Consider transfer to centre with re-stenting capacity[2], AND Stop APAs 5-7 d pre-op	• Postpone surgery[1]; If impossible, • Consider transfer to centre with re-stenting capacity[2], AND Continue aspirin only from 5-7 d pre-op	• Postpone surgery[1]; If impossible, • Continue APAs
Moderate Death + MI/redo stent 1-5%; CVA 0.2-1% Risk	• **DES** patients > 6 months • **Ischaemic Heart Disease** (chronic); • **TIA/CVA** (previous)	Stop APAs 7-10 d pre-op	• If DES continue aspirin if surgically acceptable; • For carotid or peripheral vascular surgery continue single APA; • Otherwise stop APAs 5-7d pre-op	• Continue aspirin if DES; • Continue or stop other APAs 5d preop (surgical preference)
Minor Death + MI/redo <1% Risk	HT/DM etc alone without proven IHD	Stop APAs 10 d preop	Stop APAs 7d preop	Continue or stop APAs (surgical preference)

[#]DAPT – dual antiplatelet therapy; [##]APAs – antiplatelet agents; *DES – Drug-eluting stent; **ACS – acute coronary syndrome;
[1]see notes re postponing surgery; [2]see notes re patient transfer

Cardiac Disease in Pregnancy

Introduction

- Pregnancy is a hypervolaemic and hypercoagulable state, which may cause exacerbation of pre-existing cardiac disease. These physiological changes are substantial by mid-pregnancy, and maximal during labour and in the early postnatal period.
- Women with any known heart disease (congenital, rheumatic, ischaemic or cardiomyopathic) or aortic disease, have an overall incidence of adverse cardiac events of 15-20%. The most common are arrhythmias (10%) or pulmonary oedema (5%); the most serious are CVA or cardiac death.
- It is important to consider heart disease in any new presentation of dyspnoea or chest pain in a pregnant or postnatal woman, particularly if risk factors are present (refer to Rheumatic Heart Disease in Pregnancy Procedure)

Antenatal

All women with cardiac conditions should have a multidisciplinary medical team approach with involvement of obstetric, obstetric medicine, cardiology, anaesthetic teams +/- Intensive Care Unit (ICU) and paediatrics. An agreed and documented pregnancy, labour and birth plan should be established ideally prior to labour. A clear management plan for any anticoagulation is essential.
The following are risk factors for adverse cardiovascular outcomes:

- Prior cardiac event (pulmonary oedema, tachyarrhythmia)
- Dyspnoea with minimal exertion New York Heart Association (NYHA) III
- Dyspnoea at rest (NYHA IV) requires immediate evaluation and treatment by cardiology ± ICU

- Left ventricular dysfunction (LV) - Ejection fraction (EF) < 55%
- Left heart obstruction – Mitral valve area (MVA) or aortic valve area (AVA) < 1.5cm^2 or significant ventricular outflow tract obstruction (hypertrophic cardiomyopathy)
- Moderate or severe mitral valve regurgitation (MR) or
- Moderate or severe aortic regurgitation (AR)
- Pulmonary hypertension - systolic pulmonary artery pressure (PAP) >50mmHg
- History of Acute Rheumatic Fever (ARF) with carditis OR mild mitral and/or aortic regurgitation
- Moderate or severe mitral stenosis
- Moderate or severe aortic stenosis
- Bioprosthetic valves or previous percutaneous balloon mitral valvuloplasty (PBMV)
- Mechanical heart valve(s).

General Antenatal Recommendations

- Thorough history taking and cardiovascular examination including cardiac auscultation
    - any 'red flags' refer for urgent cardiac review and Echocardiogram
- Low threshold for echocardiogram and cardiac referral in at risk populations
    - First Nations
    - Pacific Islander
    - Maori descent
    - Migrants and refugees from developing countries
- Full assessment and echocardiogram during every pregnancy for women with known ARF and Rheumatic Heart Disease (RHD)
- Reviewing and continuing Penicillin prophylaxis (Bicillin) antenatally.

Labour and birth

Low risk:

In the absence of specific risk factors, the incidence of adverse cardiac events is <5%, and these women generally do not require specific caution during labour or birth.

Moderate risk (one risk factor – adverse event risk 10-25%)

Or

High risk (two or more risk factors – adverse event risk 25-50%):

- Consideration should be given to location/place of birth (birth suite, operating theatre, or ICU), level of monitoring and personnel involved.
- Transfer of high-risk women to facilities with suitable resources for cardiac interventions, within or outside the CHHHS, should be considered.
- For women managed as high risk, having an anaesthetist present for birth to monitor haemodynamics and give vasoactive medication, if required, is recommended.

On admission to Birth Suite:

- Notify Obstetric registrar/PHO
- The woman should be discussed with the obstetric consultant, anaesthetist, cardiologist and other relevant specialists as planned.
- The woman's position should be semi upright, wedged, or lateral. The supine position is to be avoided.
- Intravenous (IV) access is indicated for most moderate and all high-risk women
- High risk only
    - Consider invasive monitoring (arterial line) for labour and birth, with

consideration of location outside Birth Suite

Observations

In addition to routine labour observations and assessments:

- Respirations, pulse, oxygen saturation and blood pressure half hourly
    - If continuous monitoring required, consider alternate location outside of Birth Suite.
- Relevant cardiac examination – including jugular venous pressure (JVP) and chest auscultation for pulmonary oedema
- Strict fluid balance chart: over hydration must be avoided
- Oxygen as required
- Pulse oximetry as indicated.

Fetal Heart Rate Monitoring

- The use of continuous electronic fetal heart rate monitoring is indicated on obstetric grounds only unless there is evidence of maternal compromise.

Antibiotics

Antibiotic prophylaxis is indicated for vaginal birth with prolonged labour.
Consultation is to occur between Obstetrics and Cardiology with the following conditions:

- Prosthetic cardiac valve or prosthetic material used for cardiac valve repair
- Previous infective endocarditis
- Congenital heart disease *but* only if:
    a. Unrepaired cyanotic defects, including palliative shunts and conduits
    b. Completely repaired defects with prosthetic material or devices, whether placed by surgery or catheter intervention, during the first 6 months after the procedure
    c. Repaired defects with residual defects at or adjacent to the site of a prosthetic patch or device
- Cardiac transplantation with the subsequent development of cardiac valvulopathy.

Note:

- Spontaneous vaginal birth without prolonged labour does not warrant antibiotic prophylaxis for the prevention of endocarditis
- If obstetrically indicated, antibiotics are to be used irrespective of the cardiac conditions.

Recommended regimen after careful consideration of both the cardiac and obstetric conditions for the prevention of Endocarditis:

- Amoxicillin/ampicillin 2 g IV.

For women with penicillin hypersensitivity, use:

- Vancomycin 25 mg/kg up to 1.5 g IV **or** Teicoplanin 400 mg IV.

Analgesia

- Narcotic analgesia is not contraindicated.
- Assessment by the anaesthetist should occur at least once during pregnancy to assess the woman's suitability for epidural analgesia if labour and vaginal birth is planned.
    - An early epidural may be advised dependent on risk factors
- Epidural pain relief may be used, where appropriate, after consultation has occurred between the Obstetrician on call and the Anaesthetist.

Birth

- The use of expulsive efforts should be limited during the second stage of labour for women at moderate or high risk.
- There should be a low threshold for low or lift out forceps or ventouse assisted birth.
- A modified lithotomy position is used, in that the woman remains sitting up, with attendants supporting her legs so that they remain below the level of her heart.

Third and Fourth Stages

Care should be taken to avoid vasodilatation and hypotension from bolus doses of Syntocinon when preventing excessive bleeding from uterine atony

- The third stage of labour should be actively managed with controlled cord traction
- Ergometrine, Syntometrine and Carboprost are generally contraindicated
- Where indicated, give Syntocinon by infusion
    - Use Syntocinon 10 IU in 100ml bag of Sodium Chloride 0.9% to run at 50-100ml/hour
- Syntocinon bolus 5 IU IM or 1 IU slow IV bolus is suitable for moderate risk women. Avoid bolus for high-risk women unless uterus is poorly contracted despite infusion
    - IV Syntocinon 10 IU is diluted to 10mls with Sodium Chloride 0.9% in a 10ml syringe (1IU per 1mL)
    - Administer 1ml boluses IV every five minutes as required, checking BP after each dose. An infusion alone may be preferable for high-risk women.
- IV fluids should be given to replace blood loss only, and generally stopped once blood loss has ceased
- Consider IV or oral Frusemide (e.g., 10-20mg) for higher risk women once

bleeding is controlled

    - Oral bioavailability of furosemide is 50% (20mg IV is equivalent to 40mg oral)

- Observation in HDU/ICU for 12 hours post birth should be considered, especially for high-risk women (risk of pulmonary oedema)

Postnatal

- Discussing with the woman the importance of continuing penicillin prophylaxis (Bicillin) postnatally and cardiology review if required.

Obstetric Analgesia

LOCAL ANAESTHETICS AVAILABLE ON BIRTH SUITE

Epidural Trolley:

- 1% Lignocaine (5 mL)
- 0.25% plain bupivacaine (20 mL) – for epidural loading (see CAA protocol "Neuraxial Blocks for Labour Analgesia")

Birth Suite Medication Room (accessible by midwives only)

- Ropivacaine 0.1% 200 mL bag + 2microg/ml fentanyl (400microg)
- Ropivacaine 0.2% 200 mL bag
- 2% lignocaine with adrenaline (1: 200 000)
- 0.5% bupivacaine (20mL)
- Fentanyl 100mcg/2mL

CONTENTS OF LABOUR EPIDURAL TROLLEYS

2x identical trolleys located in medication room on birth suite stocked every 2-3 days with the following items:

1x Epidural pack
1x gown

<u>Top drawer:</u>

0.9% Sodium Chloride for IV injection ampoules (10mL)
1% lignocaine ampoules (5mL)
0.25% bupivacaine ampoules (20mL)
1x 10mg/1mL metaraminol
20ml luer lock syringes
Filter needles (red cap)
1x pair sterile scissors
18g and 16g long IV cannulas
2x long 18g Tuohy needles
1x 25g pencil point spinal needle

<u>Bottom tray:</u>

2% Chlorhexidine swabsticks
10x 18g Epidural minipacks
2x 16g Epidural minipacks
Lockit epidural securement dressing (ie. Toilet seats)
Large tegaderm occlusive dressings
hyperfix strips
2x disposable scrub hats

TROUBLESHOOTING INADEQUATE REGIONAL LABOUR ANALGESIA

1) Take a history (Epidural insertion details, location of pain, character, severity, time course, PCEA use, positioning)
2) Check epidural catheter from patient to pump (dislodgement, leaks, disconnections, pump program)
3) Measure extent of the block with ice.
4) Perform troubleshooting measures below:

- **<u>Patchy Block</u>**
  - Give a further 10-15 mL 0.1% Ropivacaine ± fentanyl in divided doses (larger volumes of dilute solution are more effective than smaller volumes of stronger solutions).
  - If patch persists, discuss with patient if they are happy with level of analgesia provided by current block, if deemed unsuitable then replace the catheter.

- **<u>One-sided Block</u>**
  - Pull the epidural catheter back 0.5cm -1cm (minimum 3cm left in the epidural space) and give 5ml increments of 0.1% Ropivacaine ± fentanyl (to a max of 10-15ml)
  - If this is not effective, or catheter is only 3cm in epidural space to start with, the epidural catheter should be replaced.

- **<u>Back Pain</u>**

  Epidural fentanyl 50-100 MICROg (diluted to 5 mL) often works well, if only low concentration fentanyl has been used before.

- **<u>Perineal Pain</u>**

  In this case, with a demonstrable block on both sides but the patient still complaining of pain, give 10 mL 0.2% Ropivacaine ± fentanyl.

If these measures are inadequate, call the Duty anaesthetist or APS Consultant for advice.
Ultimately, a repeat epidural may be required to achieve adequate analgesia.

MAINTENANCE OBSTETRIC EPIDURAL PROTOCOLS

- Programmed Intermittent Epidural Bolus (PIEB) provides superior analgesia, less motor block and better patient satisfaction compared to Continuous Epidural Infusion whilst reducing the total local anaesthetic administered.

- These benefits are evident with or without the addition of PCEA (Patient Controlled Epidural Analgesia). There is a paucity of evidence regarding superiority of PIEB with PCEA over PIEB alone.
- 0.1% Ropivacaine with Fentanyl 2mcg/ml PIEB + PCEA is the primary protocol at CHHHS.
- The 0.2% Ropivacaine protocol is reserved for those women who require a block with increased density, at the anaesthetist's discretion.
- APS neuraxial audit (pink) forms can be found in the birth suite handover room.
- Prescribe by selecting Maternal/Obstetric Epidural CHHHS PowerPlan, selecting the desired Epidural protocol and relevant regional anaesthesia assessment/observations and APS review.

After epidural only

- PIEB + PCEA can be commenced once the anaesthetist is happy that the epidural catheter is correctly placed, block has been established and the patient is comfortable.

After CSE

- Two important issues after the spinal component of a CSE are:
    - the untested epidural catheter
    - the potential for recurrence of severe pain during transition to epidural analgesia.
- The anaesthetist must give an epidural test dose before PIEB + PCEA is commenced but before severe pain returns.
- The anaesthetist should give further top ups to fully establish analgesia and confirm safe epidural placement before commencing the PIEB + PCEA

APS AND POST CAESAREAN SECTION ANALGESIA

- All patients are reviewed within 24hrs of neuraxial blockade (either for labour analgesia or anaesthesia for Caesarean section) by the APS nurses.
- Post op analgesia for Caesarean section should include the following, (unless contraindicated):
    - Regular Paracetamol
    - Regular ibuprofen (for 5 days, with food)
    - PRN endone and tramadol
    - Regular BD Coloxyl and senna, prn pear juice and Movicol
    - On a case-by-case basis SR Tramadol or Oxycodone/Naloxone may be prescribed for a maximum of 3 days

Note: *Tramadol is considered safe to use in breastfeeding women (see ANZCA Obstetric SIG statement, 2017)*

NEURAXIAL MORPHINE PROTOCOL

- Informed consent is required prior to administering neuraxial morphine.
- If intrathecal or epidural morphine is administered during anaesthesia for caesarean section, the following actions must be taken:

    - Neuraxial morphine observations, oxygen and naloxone protocol must be ordered on the MAR
    - Document neuraxial morphine administration in AARK record
    - Post op analgesia to be prescribed as above (except for SR opioid)
    - SR opioids are **NOT** to be prescribed until at least 24hrs after administration.
    - Presence of neuraxial morphine included in handover between anaesthetic, PACU and midwifery staff.
    - Additionally, it is recommended that a brief note is placed in ieMR notifying staff of neuraxial morphine administration.

Neuraxial Blocks for Labour Analgesia

Responsibility of the anaesthetist

- The obstetric epidural service is provided by the Acute Pain Service during the day, and by the Emergency Theatre Anaesthetic Registrar/Duty Anaesthetist after hours.

- The anaesthetist performing the block is responsible for the management of it until it is ceased. When that anaesthetist goes off duty the patient should be 'handed over' to another.

- All reasonable attempts must be made to attend Birth Suite to perform a labour epidural within 30 mins of the phone call request. This includes calling in the "on call" consultant if required.

Epidural supervision for new registrars

- New registrars (ANZCA ITs and GPA/ED/ICU registrars) are required to comply with the following process to achieve competence for independent clinical practice for labour epidurals.

- All epidurals require a signature from the supervisor on the Labour Epidural Competency Form (Given to trainees on orientation and accessible on Cairns Anaesthetic Teams Documents).

- Performance at the final DOPS assessment will determine if trainee is competent to independently perform labour epidurals.

EPIDURAL # 1	trainee observes a Consultant, Fellow, or experienced registrar* perform a labour epidural.
EPIDURAL # 2 and 3	trainee performs double scrubbed or under close supervision with Consultant, Fellow, or experienced registrar.
EPIDURAL # 4	informal assessment by Consultant/Fellow (not registrar) with constructive feedback provided.
EPIDURAL # 5	Formal assessment as a DOPS (Obstetric SSU – Epidural for Labour) by Consultant/Fellow (not registrar)

** Experienced registrar: an ANZCA anaesthetic trainee deemed to have adequate experience by the Duty Anaesthetist or other Consultant/Fellow assigning said registrar.*

"Low-dose" labour epidural analgesia

- "Low dose" refers to labour epidurals established and maintained with low concentration local anaesthetic mixtures (ie. ≤ 0.2% bupivacaine)

- Low-dose local anaesthetic mixtures are used routinely for labour epidural analgesia at Cairns Hospital and are supported by high quality evidence in terms of efficacy and safety profiles.

Note: *Establishing labour epidural analgesia with stronger solutions (i.e. > 0.2% bupivacaine) is strongly associated with increased rates of assisted vaginal and operative delivery. Such solutions should only be used if low-dose techniques are ineffective and after discussion with an anaesthetic consultant.*

Techniques:

1) EPIDURAL

- Lumbar epidurals are the recommended labour analgesia neuraxial technique in the Cairns Anaesthetic Department.
- Procedure, loading and troubleshooting of labour epidurals are outlined in this document.
- Labour Epidural Maintenance Analgesia Protocols are described in the associated CAA protocol: 'Epidural Drug Doses in Birth Suite'.

2) COMBINED SPINAL EPIDURAL (CSE)

- A CSE can be used in situations requiring rapid analgesia.
- CSE is an advanced technique and should not be attempted until a clinician has first practiced and achieved competency under the supervision of consultant anaesthetists in theatre.

Contraindications:

- *If you have any concerns regarding a particular patient following epidural request, please contact Duty Anaesthetist or Obstetric Anaesthetic Fellow for advice.*

ABSOLUTE:

- Patient refusal
- Raised Intracranial pressure.
- Infection at the insertion site
- Severe coagulopathy or systemic anticoagulation
- Severe allergy

RELATIVE:

- Thrombocytopenia (SOAP consensus statement gives the best clinical guidance for this)
- Sepsis
  - SOMANZ guidelines recommend avoiding neuraxial techniques in cases of untreated maternal sepsis.
  - Patients can safely undergo spinal anaesthesia if treated with appropriate antimicrobial therapy and a clinically significant patient response to therapy.

- Use of epidural catheters in this patient group is controversial and would need to be very carefully considered.

- Spinal conditions (ie. Spina bifida, VP/LP shunts, lumbar spine instrumentation)
- Cardiac conditions (depending on the specific condition, labour epidural may be performed under supervision of experienced obstetric anaesthetist with multidisciplinary collaboration)

Epidural Preparation:

- Obtain focused patient history – relevant antenatal and medical history, medications, and allergies.
- Check for presence of anticoagulation and time since last dose (must be a minimum of 12hrs since last dose of prophylactic clexane and at least 24hrs since last dose for therapeutic clexane)

__Note__: although routinely performed, platelet count is __NOT__ required prior to epidural insertion in a well parturient with no known thrombocytopenia, PET, or other bleeding disorder.

- Informed consent, as clinically appropriate
- Correctly identify Tuffier's/Intercristal line (in the term parturient, 35% = L4/5 and 58% = L3/4).
- All equipment and drugs required are available on the epidural trolley, see "Epidural Drugs on Birth Suite" for more details.
- Aseptic technique (mask, surgical scrub, gown and glove) must be used.
- 18g and 16g kits for epidurals and CSE are available. (18g are recommended due to reduced incidence/severity of PDPH after accidental dural puncture)
- A filter needle must be used to draw up all drugs from glass ampoules for injection into the epidural or subarachnoid space.

Procedure:

For Epidural:

- Position the patient seated on bed. (Can perform lateral if patient unable to sit upright and competent in lateral technique)
- Use 2% chlorhexidine swabstick to prep back.
- 1% lignocaine 3-5mls injected subcutaneously to selected interspinous space.
- Loss of resistance (LOR) technique with saline is used to identify the epidural space (air can be used but carries a small risk of pneumocephalus)
- At LOR, thread epidural catheter to achieve 4-5cm of catheter inside space.
- Aspirate catheter to ensure no blood or CSF can be aspirated.
- Use dressings provided to secure catheter (toilet seat, tegaderm and hyperfix)
- Commence testing and loading of catheter (see "Establishing epidural block" below)

For CSE:

- A needle-through-needle technique is used (unless long epidural and spinal needles are required for body habitus). CSE kits are available in 16/26g and 18/27g on epidural trolley.
- On locating epidural space (as above) the spinal needle is inserted.
- 1.25 mg bupivacaine (0.5 mL of 0.25% plain bupivacaine) plus 25 MICROg of fentanyl (0.5 mL) is injected.
- The spinal needle is withdrawn, and the epidural catheter is threaded and fixed in place.
- The catheter should be aspirated and flushed with 2mL saline (to ensure it is not kinked; to prevent it being occluded by a clot; and to check for IV or subarachnoid placement).
- No injection of local anaesthetic via epidural catheter is made at this stage.
- If the woman has been sitting, she should then lie semi-recumbent as soon as the epidural catheter is taped in place.

Establishing Epidural Block:

Note: *there is no "one" way to dose a labour epidural. Below is an example of a commonly used and widely accepted method.*

The overall principles are:

1) "Test" the location of catheter prior to loading.
2) Allow time for onset of effect for each aliquot of local anaesthetic (allows for accurate dosing to desired effect and allows for additional local anaesthetic to be used for a repeat epidural if required).
3) Patient should be semi-recumbent in bed without any lateral rotation to ensure uniform spread of local anaesthetic mixture.
4) Evaluate for complications of catheter malposition and signs of successful analgesia.

Recommended Epidural Mix for testing and establishing block:

- 10mls 0.9% saline for injection
- 10mls 0.25% plain bupivacaine
- 100mcg/2ml fentanyl

Mix 0.25% bupivacaine and saline together in volumes listed above. This makes a 0.125% bupivacaine solution.

Expel 2mls of solution to 18mls and then add the fentanyl to make 20mls in total.

- Test dose = 5mls of solution (wait 5mins, assess BP and signs of LA toxicity -> perioral tingling, tinnitus, metallic taste in mouth)
- Load every 5 mins with 5mls of solution.
- Most epidurals will need 10-15mls total of this solution and approximately 10 mins

for initial onset of blockade (20 mins for peak effect)

- End point should be a comfortable patient during contractions but still aware of uterus tightening.

Note: *it is recommended that the clinician checks all connections are tight and apply a tegaderm dressing over filter and line lock connection to prevent accidental disconnections.*

Troubleshooting epidurals in birth suite:

Failure to locate the epidural space

- Optimise patient positioning.
- Try a different intervertebral space. (below L1/2 level)
- If attempts at two interspaces are unsuccessful, more experienced assistance should be sought.
- It is not reasonable to subject the woman to repeated needling if more experienced help is available. (This includes afterhours, in this case, please call your "on call" consultant).
- Neuraxial ultrasound can be used to help identify the interspinous space, interlaminar space, vertebral level, and posterior dura. However, this is a skill that requires training and experience.

Patient is unable to remain still

- Ensure oxytocin infusion is turned off, (check with obstetric colleagues first).
- Consider inserting the epidural when the woman has more adequate pain relief.

Options:

- 25-50 MICROg fentanyl IV.
- In rare circumstances, consideration may be given to performing a low dose spinal initially to provide pain relief prior to epidural insertion. This should only be done after discussion with a Consultant/Fellow. (see CSE technique above for recommended dose) (25G pencil point needles in epidural trolley)

Accidental Dural Puncture (ADP)

- Remove tuohy needle.
- Repeat epidural insertion at an adjacent interspace and insert catheter as usual.
- Careful testing and loading of the epidural (severe hypotension can result from an unexpectedly high or dense block due to spread via the dural puncture into the subdural space).
- If ADP occurs during a particularly difficult epidural insertion, consider insertion of catheter into the subarachnoid space, and label the catheter clearly as 'subarachnoid'. Ideal depth of insertion is 2-3cm into the space. (Depth of insertion should NOT exceed 4cm)

If subarachnoid catheter is placed the following actions MUST be taken:

a) Inform the senior anaesthetist on call, it is ultimately a consultant decision whether this technique is used.

b) Inform and educate patient, obstetric and midwifery staff and document clearly.

c) Label catheter at injection port AND dressing on back

d) Anaesthetist must do manual top-ups through this catheter for the duration of the block.

e) Sub-arachnoid catheters must NOT be connected to an epidural infusion pump

- Dosing subarachnoid catheters: recommended dose for analgesia in labour = 1.25 mg bupivacaine (0.5 mL 0.25% plain bupivacaine) plus 25 MICROg fentanyl, followed by 1 mL 0.9% saline flush to account for the dead space of the filter and catheter.

Note: If choosing to use intentional dural puncture techniques (ie. DP epidurals, CSE or low dose spinals), repeat procedures will significantly increase PDPH risk and associated complications and are therefore not recommended.

Blood in the epidural catheter

- Flush catheter with 5mls 0.9% saline (can sometimes flush catheter tip out of blood vessel)
- Aspirate again, if still bleeding, withdraw catheter in 0.5cm increments, aspirating each time to a minimum depth of 3cm of catheter remaining in epidural space.
- If the aspirate remains heavily blood-stained, remove the catheter.
- If there is no aspirate or it is only slightly blood-stained, a 5ml test dose of 2% lignocaine with adrenaline 1: 200 000 should be given.
- Assess for signs of intravascular injection (an increase in maternal heart rate > 10 beats/minute during uterine diastole) and signs of LAST (perioral tingling, tinnitus, dizziness, and dysphoria)

Note: 2% lignocaine with adrenaline has the safest cardiovascular toxicity profile and shortest duration of action making it the safest option to test a block that may be intravascular.

Note: *Intralipid 20% for emergency treatment of LAST is* ***NOT*** *available in birth suite. Intralipid is only located in the operating theatre emergency trolleys.*

Foetal bradycardia

- Foetal bradycardia occurs in approximately 2% of epidurals.
    - The rate is higher for CSE that include a low dose spinal.
- Pause any further dosing of epidural
- Optimise maternal blood pressure
- Position patient lateral
- Bolus of IV crystalloid
- Check local anaesthetic type and concentration to ensure no medication error.

Note: *Usually self-limiting with above steps. In rare circumstances obstetrics will book patient for emergency Caesarean section.*

Inadequate pain relief

- Refer to the CAA document “Analgesia in Birth Suite and Maternity Unit”.

Anticonvulsant Therapy for Severe Pre-Eclampsia & Eclampsia

FOR OPERATING THEATRE USE ONLY

Indications

- Eclampsia and Pre-eclampsia: for treatment and prevention of seizures as per Queensland Clinical Guidelines (QCG): Hypertensive disorders of pregnancy

NOTE: There are other indications which magnesium sulfate can be used for, please refer to CHHHS drug infusion guideline 'Magnesium Sulfate GENERAL or Magnesium Sulfate MATERNITY'.

Magnesium Infusion from Birth Suite or Labour Ward

Obstetric patients may present to theatre with a magnesium infusion already running. In this case the magnesium infusion should be continued during the procedure. The magnesium infusion protocol for the management can be found on the QHEPS under the title "Magnesium Sulphate MATERNITY"

This Drug Infusion Guideline utilises a premade bag of **40 g of Magnesium Sulphate in 500 mL of 0.9% Sodium Chloride** (equivalent to Magnesium Sulphate 8%), administered through an infusion device with Guardrails® Medication Software.
The doses described in the protocol include:

- **Loading:** 4 g of Magnesium Sulphate over 20 mins (50 mL over 20 mins)
- **Maintenance:** 1 g of Magnesium Sulphate per hour (12.5 mL/hr)
- **Additional Dose:** 2 g of Magnesium Sulphate over 10 mins (25 mL over 10 mins)

MANAGEMENT OF OBSTETRIC ANTICONVULSIVE THERAPY IN THEATRE:

- **Loading dose:**

Dose	Volume to be infused	Route	Duration of infusion
5 grams (2 ampoules) to 90 mL of normal saline	100 mL at 400 mL/hour	IV infusion	Over 15 minutes

NOTE: *The woman should be warned that she may experience transient hot flushing. ECG monitoring not required.*

- **Maintenance infusion:**

Dose	Volume to be infused	Route	Duration of infusion

25 g (10 ampoules) to 450 mL of normal saline total 500 mL solution	1 g/hour initially (20 mL/hour) up to 2 g/hour (40 mL/hour) depending on clinical parameters and magnesium level	IV infusion	Continue until clinically stable

Patient Monitoring:
Magnesium may cause muscular weakness, and levels may increase with poor urine output.

Consequently, there should be hourly evaluation of:

- **Patellar reflexes** (should be present)
- **Respiration** (should have rate >12)
- **Urine output** (should exceed 100 mL in 4 hours)

Monitoring of **serum magnesium levels** is **NOT** required if renal function is normal. Therapeutic serum magnesium levels are 1.7–3.5 mMol/L.

Calcium gluconate 1 g slowly IV can help reverse magnesium toxicity.

In the event of fitting despite magnesium therapy, the patient should be nursed in the lateral position with attention to Airway, Breathing and Circulation.

In the event of fitting an additional dose can be given:

Dose	Volume to be infused	Route	Duration of infusion
2.5 g to 5 g (1 to 2 ampoules)	50 mL-100 mL solution	IV infusion	7.5-15 minutes

Other anticonvulsants and tracheal intubation may occasionally be required.

Other features of magnesium therapy:

- Magnesium is a tocolytic so increased doses of oxytocin may be needed.
- Intrapartum CTG may show decreased variability with therapeutic magnesium levels.

Obstetric Uterotonic and Uterine Relaxant Drugs

Introduction

- This document is a reminder of doses only
- Indications, contraindications and side effects need to be understood before using these drugs
- All of the drugs listed below can be found in the drug fridge of Theatres 7 and 8 in the **"Pink" Obstetric Uterotonic and Tocolytic Drugs box.**
- In the management of postpartum haemorrhage **ALWAYS consider both pharmacological and surgical management** of the bleeding.

UTEROTONIC DRUGS

Oxytocin (Syntocinon)
2-5 units IV, repeated prn (expect to need higher doses if prolonged labour/grand multip/ >4kg baby/polyhydramnios)
PLUS
Infusion of oxytocin 40 units in 1000 mL of Normal Saline or Hartmanns - starting rate of 10 units/hour (range 10-80 units/hour).

Ergometrine
250 MICROg slow IV, repeated prn
Relatively contraindicated in pregnancy induced hypertension (PIH)/Pre-eclampsia

Prostaglandins

- **Carboprost (Prostin 15M) 250 MICROg/mL**
  250 MICROg (1 ml) via deep IM injection. If necessary, this dose can be repeated at intervals of at least 15 minutes for up to 8 total doses (2 mg).

- **Misoprostol**
  400-1000 MICROg (2 to 5 tablets) per rectum

NB: If response to uterotonic drugs and uterine massage is inadequate, alternative management strategies will be needed, including:

- balloon tamponade
- uterine packing
- B-Lynch suture
- uterine artery and internal iliac artery ligation
- pelvic arterial embolization
- hysterectomy.

UTERINE RELAXANT DRUGS

Glyceryl Trinitrate (GTN)

- **GTN Spray** (400 MICROg/spray)

Given 400 to 800 MICROg (1 to 2 sprays)
Note: prime by pressing the nozzle five times prior to first use

- **IV GTN** (50 mg in 10 mL)

Dilute 50 mg in 1000 mL to make 50 MICROg/mL
Start with 2-3 mL IV (100-150 MICROg)

Obstetric Emergency List Management – Caesarean Sections

The following categories are to be used when booking an emergency caesarean section. The obstetric team must inform both the anaesthetist and the theatre staff.

This will allow them to organise theatre appropriately.

The category may change if the maternal or fetal condition deteriorates; ongoing discussion is essential and should involve consultant staff if there are any problems or delays.

It is the responsibility of the obstetric medical staff to request the attendance of the Paediatric PHO or Registrar in Theatre.

Category	Description	Examples
Crash	Critical obstetric emergency requiring immediate access to the first available operating theatre and delivery as fast as possible.	Uncontrolled haemorrhage Severe fetal distress Cord prolapse
1	Requires access to theatre within 15 minutes and delivery within 30 minutes.	Haemorhage Fetal distress
2	Requires access to theatre within 30 minutes and delivery within 60 minutes	Maternal or fetal compromise that is urgent but not immediately life threatening
3	Requires access to theatre within 60 minutes and delivery within 90 minutes	Failure to progress with no fetal compromise
4	Requires delivery that day but no maternal or fetal compromise	Previous LSCS with ruptured membranes but not in labour
5	Desirable to do that day but can be deferred	Elective LSCS but no space on list

If the choice of Code is unclear or disputed, BOTH Consultant Obstetrician and Consultant Anaesthetist MUST be involved in the decision-making process.

Neuraxial and Obstetric Pink Audit Form

CAIRNS HOSPITAL — Department of Anaesthetics and Perioperative Medicine

NEURAXIAL AND OBSTETRIC AUDIT FORM

Please complete the **relevant section** (Non-obstetric OR Labour Analgesia OR Caesarean Section) **AND** details of the **neuraxial block** (bottom of the page)

Attach Patient Label

Patient Name: _____

UR Number: _____

Date of Birth: _____

Oral Analgesic Protocol Post LSCS

Regular Paracetamol, Ibuprofen and Aperients
SR Opioid (2-3 days only): Targin OR SR Tramadol
PRN Opioids: Oxycodone and Tramadol
PRN Antiemetics

Please DO NOT prescribe Tapentadol post LSCS

Anaesthetist (and Supervisor): _____ **Date of Procedure:** _____

NON-OBSTETRIC Spinal/Epidural/CSE

Procedure: _____

ASA (please circle): 1 2 3 4 5 ☐ Elective ☐ Emergency

OBSTETRIC — LABOUR ANALGESIA

Parity: ☐ Nulliparous ☐ Multiparous **Gestation:** ☐ > 34 weeks ☐ < 34 weeks

ASA (please circle): 1 2 3 4 **Indication:** ☐ Maternal Request ☐ Medical/Obstetric

Time of Request: _____ AM / PM **Time of Attendance:** _____ AM / PM

Analgesia Maintenance (tick relevant): ☐ PCEA ☐ Clinician Bolus ☐ Remifentanil PCA

OBSTETRIC — CAESAREAN SECTION

Parity: ☐ Nulliparous ☐ Multiparous **Gestation:** ☐ > 34 weeks ☐ < 34 weeks

ASA (please circle): 1 2 3 4 ☐ Elective LSCS ☐ Emergency LSCS (indicate category)

Time of Delivery: _____ AM / PM **Emergency Category:** ☐ Cat 1 ☐ Cat 2 ☐ Cat 3 ☐ Cat 4

Please tick relevant: ☐ PPH > 1000 mL ☐ Maternal ICU Admission ☐ Neonatal Special Care Admission

NEURAXIAL DETAILS

Technique: ☐ Spinal ☐ Lumbar Epidural ☐ Epidural Top-up ☐ CSE **Other:** _____

Needle Gauge: ☐ 24 ☐ 25 ☐ 26 ☐ 27 ☐ 16 ☐ 18 ☐ 16/26 ☐ 18/27 **Other:** _____

SPINAL Local Anaesthetic: _____ mL _____ % ☐ Heavy Bupivacaine ☐ Plain Bupivacaine

EPIDURAL Test Dose: _____ mL _____ % ☐ Bupivacaine ☐ L-bupivacaine ☐ Ropivacaine ☐ Lignocaine

EPIDURAL Loading Dose: _____ mL _____ % ☐ Bupivacaine ☐ L-bupivacaine ☐ Ropivacaine ☐ Lignocaine

Additives and Total Dose: ☐ Fentanyl: _____ mcg **Other** (and dose): _____

Immediate Complications: ☐ **Nil** ☐ Paraesthesia (Resolved Immediately) ☐ Multiple Attempts (3 or more) ☐ Blood in Needle/Catheter ☐ Accidental Dural Puncture/Intrathecal Catheter ☐ High Neuraxial Block ☐ Technique Abandoned/Failure and conversion to GA

Critical Incidents at Insertion: ☐ **Nil** ☐ Total Spinal ☐ Severe Hypotension ☐ Intravascular Local Injection ☐ Convulsions ☐ Respiratory Arrest ☐ Cardiac Arrest ☐ Allergic Reaction

Oral Intake in Labour

During late pregnancy, heartburn and delayed gastric emptying are common.

During active labour, gastric emptying is significantly slowed and food is poorly absorbed. Opioid drugs (IV/IM/epidural) exacerbate this further.

Neuraxial anaesthesia or general anaesthesia may be necessary during labour (approximately 35% of women). Food in the stomach increases the risk of aspiration.

It is wiser for a woman not to eat in labour and to choose only clear fluids.

Clear fluids **include** water, cordial, sports drinks, and clear juices.
Clear fluids **do NOT include** milk or cloudy/pulpy fruit juice.

It is CBH hospital policy to discourage eating in labour and to disallow intake of any solids when the mother is likely to need an operation.
However, if the mother is requesting food she should be informed of the following guidelines.

Latent labour / Induction of labour

- Spontaneous onset – Light diet as tolerated (tea, coffee, toast, plain biscuits)
- Prostaglandin priming – Light diet as tolerated until active labour commences then clear fluids[4] only
- ARM / Syntocinon induction – Clear fluids only

Active labour

- Women in active labour should have clear fluids only
- Women who insist on eating may have light diet if they have:
    - Spontaneous onset of labour
    - No medical or obstetric problems
    - No known risk of an instrumental or operative delivery
    - Not using nor intend to use any form of pharmacological analgesia (N2O, opioid or epidural)
    - There is an approximate 10% chance of an operation (LUSCS, retained placenta) in this patient group and eating in labour increases the chance of an adverse outcome for both mother and baby.

Paediatric Day Surgery Suitability Criteria

Clinical Requirements

1. Babies should be older than 3 months of age if they require general anaesthesia. However, ex-premature babies may still be unsuitable for same day discharge and need individual anaesthetic assessment.
2. Children should have no organic disease or only mild organic disease, which minimally interferes with their normal activities.
3. Procedures should be less than 1 hour.
4. Procedures should cause minimal blood loss.
5. Postoperative pain can be controlled with oral analgesics.
6. No special nursing care should be required postoperatively and parents must be able to carry out pre- and post-operative instructions.

Social and Logistical Requirements

1. The child can only go home by private vehicle or taxi.
2. Another responsible person (apart from the driver) must be present in the vehicle to look after the child.
3. The distance to be travelled following discharge should be less than 60km.
4. Parents advised that the child might need to be admitted overnight.

Other Procedural Factors

1. Day case patients should be given priority on the operation list sequence.

The Surgical Team responsible for the patient must be consulted if these guidelines cannot be met. They will then arrange to admit the child overnight.

Paediatric Adenotonsillectomy Discharge Planning

Day of Surgery discharge is suitable if ALL the following criteria are met:

- Age > 4 years
- History of only mild or no OSA (Obstructive Sleep Apnoea)*
- No ongoing desaturations (<95% on RA) when sleeping in Recovery or DSU
- No significant co-morbidities (including high BMI)
- 4 hours minimum observation since surgery
- Eating and drinking, good pain control
- < 1 hour travel time to hospital (in case of bleeding)
- Good family situation and carer available

ICU Admission if ANY of:

- History of severe OSA
- Marked ongoing desaturations (<80%) post-operatively
- Need for high flow nasal oxygen (eg consider if >2ml//kg)
- Major patient co-morbidities or marked obesity (eg >99th centile)

Paediatric Ward Admission:

- Patients outside of Day of Surgery and ICU categories
- Must be stable in recovery for at least 30 minutes before discharge to the ward
- Continuous oximetry and direct nursing care for at least 4 hours on the ward
- Overnight continuous oximetry if likely moderate OSA or higher risk of OSA (significant co- morbidities, high BMI or age <2 years), or if any desaturations or obstructed breathing occurs.

Obstructive Sleep Apnoea (OSA)

- 10-12% of children snore, but only 1-2% have OSA.
- Definitive diagnosis with polysomnography (sleep study) is unusual but AHI (apnoea/hypopnoea index) of 6-9/hour is moderate OSA; ≥10 hour is severe
- Nocturnal oximetry with SpO2 < 80% indicates at least moderate OSA
- STOPBANG OSA acronym checklist (modified for children):
    - Snoring
    - Tiredness (daytime) and Tonsillar enlargement
    - Observed Apnoeas
    - Posture – extended neck sleeping; mouth breathing

    - BMI increased, Breathing difficulties at night
    - Age < 3 years
    - Neuromuscular disease
    - Genetic conditions (eg 40% of Down children have OSA)
- Snoring and large Tonsils are sensitive markers, ie absence = OSA unlikely
- Apnoeas, breathing difficulties and daytime tiredness are specific markers, i.e. presence = OSA likely

Paediatric Venous Access Decision Pathway

Consent for the insertion of Central Venous Access Device (CVAD)

General considerations

- The child, the child's parent/guardian should be explained the benefits and risks associated with the CVAD insertion.
- The person inserting the line should ideally be the person gaining the consent for it and ensure the risks have been understood.
- It is inappropriate for a person unfamiliar with the risks of a CVAD to gain consent.

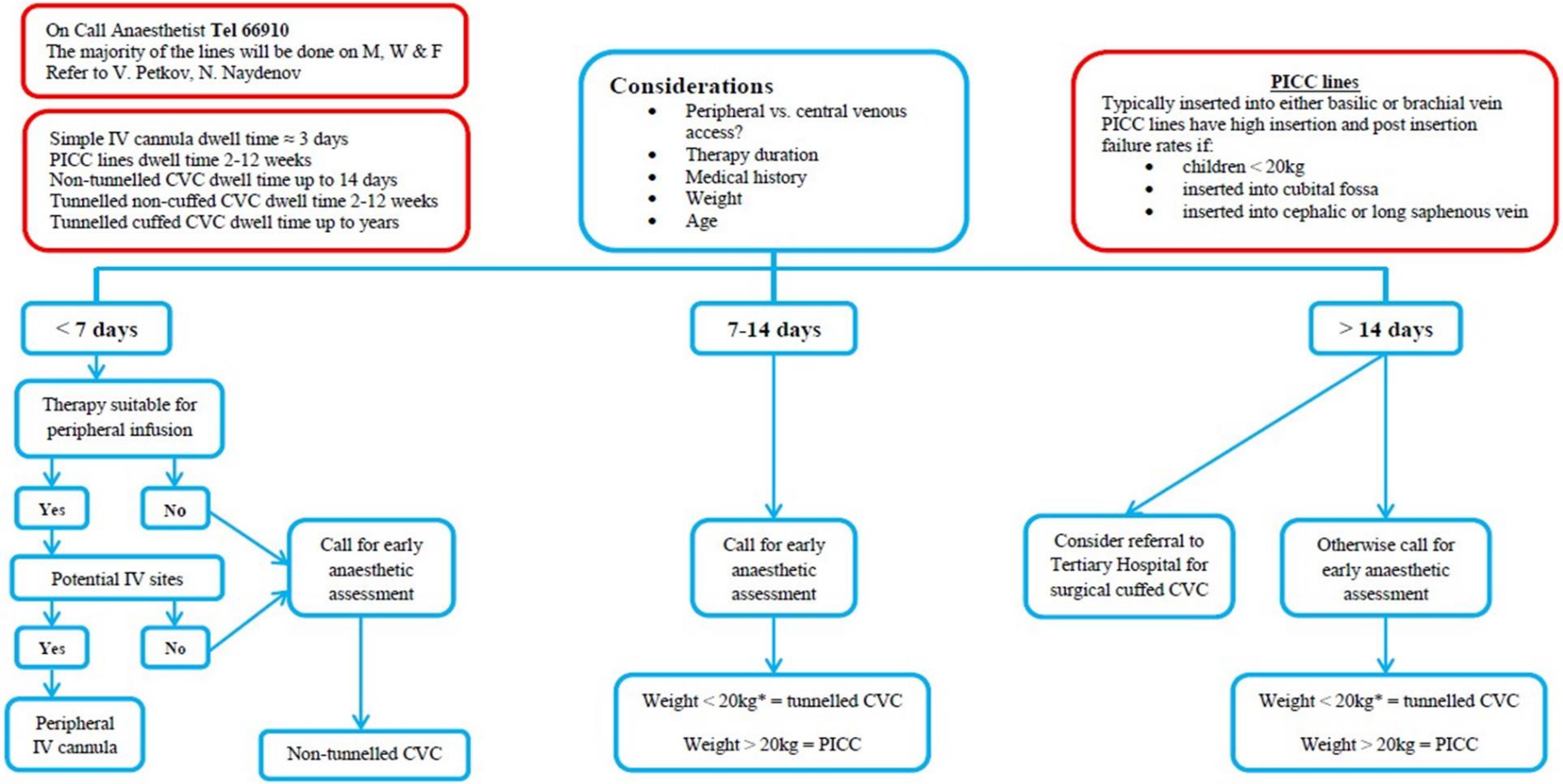
CVAD complications at the time of insertion

- Pain, bruising or bleeding at the insertion site afterwards
- Difficulty inserting the catheter
- Temporary nerve damage or pain
- An irregular or fast heart beat sometimes requiring treatment
- Very rarely damage to nearby structures such as blood vessels or heart during insertion

CVAD complications whilst the line is in situ

- <u>Life-threatening</u>
    - Tamponade
    - Pleural effusion
    - Pericardial effusion
- <u>Other</u>
    - The catheter may block, bend or move out of place, requiring treatment or removal
    - Blood clot blocking the vein requiring treatment or removal
    - Very rarely the blood clot can move out of the vein and can travel to the lungs or brain
    - Infection at the skin puncture site requiring antibiotics or further treatment
    - Infection in the catheter requiring antibiotics or removal
    - Medications leaking outside the vein causing pain, swelling or tissue damage, requiring treatment
    - Movement of the tip of the catheter requiring repositioning

PAEDIATRIC VENOUS ACCESS DECISION PATH



* As this number is only a recommendation, it is up to the anaesthetist performing the procedure to decide the most appropriate approach on a case-by-case basis

Paediatric APS Forms

Cairns & Hinterland Hospital & Health Service

Analgesia Order – Child >10kg For PCA, NCA and Regional Analgesia

Attach ADR Sticker ☐ NKDA ☐ Unknown
(See Medication Chart for details)
Sign..... Print..... Date.....

(Affix identification label here)

URN:
Family name:
Given name
Address:
Date of birth: Sex: ☐ M ☐ F ☐ I

First Prescriber to print patient name and check label correct:

.....

Weight.....kg **Height.....cm**

Prescriptions for adverse drug reactions

Naloxone Protocol

If sedation score = 3 OR sedation score =2 and respiratory rate is **less than** rates outlined below

1. Dilute naloxone 400 micrograms with sodium chloride 0.9% to total volume of 20mL (20 microg/mL).
2. Give IV naloxone **2 microg per kg** (**0.1mL per kg**) every 2 minutes until sedation score is less than 2 or a maximum dose of 400 microgram has been given.

Patient weight..... kg. Naloxone dose: ..... micrograms = ...mL of 20 microg/mL (Medical Officer to complete when ordering analgesia according to table guide below. Round up dose if weight between ranges)

Weight	10	15	20	25	30	35	40	45	50
Dose (microg)	20	30	40	50	60	70	80	90	100
Dose (mL) of 20microg/mL	1	1.5	2	2.5	3	3.5	4	4.5	5

3. Initiate MET call; ensure APS has been notified. Remain with patient and continue monitoring every 10 minutes for a further half hour, then every hour for a further 2 hours. If sedation score returns to greater than or equal to 2, repeat steps 1-3.

Any administered doses must be recorded on the front page of the patient's Medication Chart under Nurse initiated Medicines.

Respiratory Rate for Naloxone administration based on age

Age	3-11 months	1-4 years	5 years or older
Less than	15 breaths/min	10 breaths/min	8 breaths/min

Prescriber signature		Prescriber Name (Print)		Date	

Nausea Protocol:
1. Recommended doses for IV ondansetron is 0.1mg/kg (Max 8mg)
2. May be repeated after 4 hours.
3. If ineffective or nausea recurs within 4 hours, call APS.

Drug	Dose / Route	Record of drug given							
		Date / Time	Name / Sign	Date / Time	Name / Sign	Date / Time	Name / Sign	Date / Time	Name / Sign
Ondansetron (0.1mg/kg)	IV								

Prescriber Signature		Prescriber Name (Print)		Date	

Itch (pruritus) Protocol:
1. Recommended dose for oral Cetirizine is 0.25mg/kg (Max 10mg).
2. If troublesome itch persists after 30 minutes call APS.
3. Consider stopping or changing opioid, or Naloxone 1mcg/kg IV (half the dose for sedation)

Drug	Dose / Route	Record of drug given							
		Date / Time	Name / Sign	Date / Time	Name / Sign	Date / Time	Name / Sign	Date / Time	Name / Sign
Cetirizine (0.25mg/kg)	.....oral								

Prescriber Signature		Prescriber Name (Print)		Date	

Cairns & Hinterland Hospital & Health Service

Analgesia Order – Child >10kg For PCA, NCA and Regional Analgesia

Attach ADR Sticker ☐ NKDA ☐ Unknown
(See Medication Chart for details)
Sign ..... Print ..... Date .....

(Affix identification label here)

URN:
Family name:
Given name
Address:
Date of birth: Sex: ☐ M ☐ F ☐ I

Weight.....kg **Height**.....cm

Prescription directions: Medical Officer to tick PCA or NCA, enter weight and bolus dose order according to table.
Background infusion is not usually required with PCA/NCA; for ketamine starting infusion rate at 0.1mg/kg/hour = 0.05mL/hour.

Analgesia type	**PCA ☐ NCA ☐**	**PCA ☐ NCA ☐**	**Infusion**
Orders	☐	☐	☐
Drug	**Morphine**	**Oxycodone**	**Ketamine**
Amount	50 mg	50 mg	200 mg
Diluent	0.9% sodium chloride	0.9% sodium chloride	0.9% sodium chloride
Final volume (mL)	50 mL	50 mL	100 mL
Final drug concentration	1 mg/mL	1 mg/mL	2 mg/mL
Bolus dose (read from table)	..... mg	..... mg	
Background infusion rate (unit/hour)			0.1 to 0.2mg/kg Start: ....mL/hour
Lockout time (minutes)	5 min	5 min	
4-hour limit	No	No	No
Prescriber signature			
Print name			
Date	/ /	/ /	/ /
Time:	:	:	:

NB. These orders are for children > 10kg.

Approx Weight (kg)	PCA bolus Morphine or oxycodone (mg)
10	0.2
15	0.3
20	0.4
25	0.5
30	0.6
35	0.7
40	0.8
45	0.9
>50	1.0

NB: No other sedating medications including PRN analgesics should be given to patients without review by APS.

Record of Setting Changes

Details of program change (e.g. bolus dose increased)						Changed by	Checked by
Date	Time	Infusion rate	Bolus		Lockout time (minutes)		

Cairns & Hinterland Hospital & Health Service

Analgesia Order – Child >10kg For PCA, NCA and Regional Analgesia

Attach ADR Sticker ☐ NKDA ☐ Unknown
(See Medication Chart for details)
Sign Print Date

(Affix identification label here)

URN:
Family name:
Given name
Address:
Date of birth: Sex: ☐ M ☐ F ☐ I

Weight…….kg **Height……..cm**

Analgesia Solution Preparation

		Solution Check		Program Check		Discard	
Date	Time	Name:	Signature:	Name:	Signature:	Date / Time	Discarded by Witnessed by

Record of Clinician Delivered Boluses

Date	Time	Dose given	Given by	Checked by	Date	Time	Dose given	Given by	Checked by

PCA/NCA Monitoring Requirements

Refer to Management of PAEDIATRIC (>10kg) Patient Controlled Analgesia, Nurse Controlled Analgesia & Continuous Opioid Infusions policy. Where this is unavailable the following are suggested guidelines:

What	Sedation score, respiratory rate, oxygen saturation, total dose, pain scores* on **Paediatric Analgesic Infusion Monitoring Tool**. **Not necessary when Sedation score = "S" (sleep)*
When	Hourly, unless clinical condition warrants more frequently. Consider continuous oximetry initially for PCA/NCA.

A Program and Connection / Line Check must be performed on all patients:
1. At the commencement of each shift
2. Upon return from another ward / department
3. At each bag / syringe change
4. If increase in pain or sedation.

Regional Analgesia Monitoring (Prescriptions on Page 4)

Adverse effect	Assessment	Action
Local Anaesthetic Toxicity	Tingling around the mouth or strange taste, ringing in the ears, unexpected agitation, convulsions, respiratory depression/arrest, arrhythmias/cardiac arrest	- If there are a combination of symptoms, or clinical concern, INITIATE EMERGENCY CALL - Stop Infusion and remove patient bolus button - Notify APS - Consider 20% Intralipid bolus 1mL/kg and infusion (by APS).
Inadequate pain relief	Check site integrity and pump function	- Notify APS
Motor block	If Bromage is 2 or greater	- Stop infusion and remove patient bolus button - Notify APS immediately to review patient – THIS COULD BE A MEDICAL EMERGENCY
Back pain	Unexpected or new back pain, new urinary or faecal incontinence, temp >38.5°C, pain, inflammation or swelling at epidural/regional catheter insertion site, loss of dressing integrity	- Notify APS immediately to review patient – THIS COULD BE A MEDICAL EMERGENCY - Reinforce site dressing
High block	If block height is T2 or higher Motor weakness/tingling in upper limbs, respiratory difficulties/unable to cough	- Stop infusion and remove patient bolus button - Notify APS immediately to review patient – THIS COULD BE A MEDICAL EMERGENCY

Management of Hypotension (with epidurals)

If systolic blood pressure is below 80mmHg (or <70mmg for patients <5yr old), attracts a score on CEWT or ≥40mmHg drop from baseline contact the Anaesthetic Medical Officer. The RN should reduce the epidural infusion by 2mL/hour.

The Medical Officer should consider:
1. Giving 10mL/kg of 0.9% NaCl stat, and/or
2. Giving Metaraminol 10 microg/kg IV

Cairns & Hinterland Hospital & Health Service

Analgesia Order – Child >10kg For PCA, NCA and Regional Analgesia

Attach ADR Sticker ☐ NKDA ☐ Unknown
(See Medication Chart for details)
Sign ..... Print ..... Date .....

(Affix identification label here)

URN:
Family name:
Given name
Address:
Date of birth: Sex: ☐ M ☐ F ☐ I

	Weight.....kg	**Height.....cm**

Regional Block Analgesia Prescription (Medical Officer to complete bolus dose, tick and sign required order)

EPIDURAL INFUSION		
Orders	☐	
Local anaesthetic (concentration %)	Ropivacaine (0.2%)	
Total volume	210.5mL	
Opioid	Fentanyl	
Opioid amount	500micrograms (10mL)	
Additional Drug	Adrenaline (1mg/mL)	0.5mg (0.5mL)
Initial infusion rate (mL/hr)	0.2mL/kg/hr = ……mL/hr	
Background (continuous) Infusion rate range (mL/hour)	0 to 12mL/hr (may be increased hourly by up to 2mL/hr to 0.3mL/kg/hr)	
Lockout time (minutes)	20 mins	
Prescriber Signature		
Print name		
Date and Time	/ /	:

REGIONAL INTERMITTENT INFUSION		
Orders	☐	
Local anaesthetic (concentration %)	Ropivacaine (0.2%)	
Total Volume	200 mL	
Dose Volume (0.3 mL/kg up to 20mL)	…… mL	
Dose Infusion Time	5 mins	
Interval	3 hours	
KVO	No	
Start time	:	
Prescriber signature		
Print name		
Date and Time	/ /	:

Record of Setting Changes

Date	Time	Details of program change (e.g. bolus dose increased)			Changed by	Checked by
		Infusion rate	Bolus	Lockout time (minutes)		

Solution Preparation						Discard	
Date	Time	Solution Check		Program Check		Date / Time	Discarded by Witnessed by
		Name:	Signature:	Name:	Signature:		

Preoperative Fasting for Paediatric Patients (Elective Surgery)

CHILDREN LESS THAN 6 MONTHS OF AGE:

- Last breast feed 3 hours before anaesthesia
- Last formula feed 4 hours before anaesthesia
- Clear fluids until called to theatre **(max 3ml/kg/hr)**

CHILDREN OVER 6 MONTHS OF AGE:

- No milk drinks, food, or lollies for 6 hours before anaesthesia
- Last breast feed 4 hours before anaesthesia
- Last formula feed 6 hours before anaesthesia
- Clear fluids until called to theatre **(max 3ml/kg/hr)**

Definitions:

Clear fluids are transparent when held to the light.

They include glucose-based drinks, cordials, clear juices, and black tea.

They **do not** include **particulate**s, **milk-based** products, or **jelly**.

Further Points:

- One of the goals of these guidelines is to minimize fasting times for clear fluids.
- The Sip Til Send program shortens the time patients need to fast from liquids without increasing the risk of pulmonary aspiration. It allows patients to sip clear fluids (up to 3 mL/kg/hr) until called to theatre or procedure area. Most children will be eligible for Sip Til Send.
- Parents or ward staff should time the non-clears fasting period for 8.00 am surgery if the child is on a morning or all-day operating list, and 1.00 pm surgery if the child is on an afternoon list.
- If surgery is in the AFTERNOON then a light breakfast and milk fluids may be given until 7.00 am.
- Regular medications, analgesics, and pre-medications ordered by the Anaesthetist should be given even within the two hours before the procedure.

  IF THERE IS ANY UNCERTAINTY, the attending Anaesthetist (or the Anaesthetist on-call #66910) should be contacted for advice.
- Any variation to these guidelines can only be authorised by the Anaesthetist.
- FAILURE TO OBSERVE THESE GUIDELINES MAY RESULT IN THE PROCEDURE BEING DEFERRED OR CANCELLED.

PACU Intravenous Pain Management

INDICATIONS

For patients experiencing moderate to severe postoperative pain in PACU.

CONTRAINDICATIONS

- Sedation score greater than 2
- Respiratory rate less than or equal to 8 per minute or age-appropriate rate for children
- SpO2 less than 93%
- Known allergy and/or adverse reaction to the prescribed medication (must be discussed with the prescribing anaesthetist)
- Heart rate less than 60 beats per minute
- Systolic blood pressure less than 90mmHg

RISKS AND PRECAUTIONS

Patients that have higher risk of respiratory depression following administration of opioids include the following:

- Patients with pre-existing respiratory disease
- Patients with Obstructive Sleep Apnoea (OSA) (diagnosed or undiagnosed)
- The elderly and/or frail
- Bariatric patients
- Patients having received multimodal pain relief in addition to opioid pain protocol, for example: tramadol, tapentadol, paracetamol, parecoxib, or oxycodone preparations.
- Patients with an impaired ability to metabolise or excrete opioids, for example: hepatic impairment, renal impairment

MANDATORY REQUIREMENTS

- The PMP is to be prescribed on the Anaesthetic Chart by the Anaesthetic Consultant or Registrar. This order only remains valid during the patient's stay in PACU and Day Surgery Stage 2 and does not carry over to the ward once the patient is transferred out of PACU.
- Opioid Drugs are to be recorded and administered in accordance with legislative and safe practice requirements.
    - Two Registered Nurses or a Registered Nurse and a Medical Officer or EEN (DSU only) must both witness removal of the drug from the Pyxis, safely prepare and label the drug, identify the patient (using three-point identification), check the patient's known allergies, and observe the administration of the drug.
    - The administration of each dose of PMP (drug, time, and amount) must be documented in the Automated Anaesthetic Record Keeping (AARK). Doses must be documented in micrograms (microg) or milligrams (mg), NOT millilitres (mL).
- All patients receiving PMP must have the six rights checked and confirmed by two registered nurses prior to administration.
    - Right patient (check name, date of birth, URN with witnessing RN, MO or EEN)
    - Right medication (check order and allergies)

    - Right dose (adjust dose for opioid naïve, paediatric, and elderly patients)
    - Right route (PACU PMP is always intravenous)
    - Right time (can be administered in PACU only, after a thorough pain assessment)
    - Right to refuse the drug or further doses
- All patients receiving PMP are to have sedation scores, and respiratory rate, depth and quality (and all other vital signs) assessed every 5 minutes during administration of PMP.
- After the last dose of PMP, all vital signs must be assessed for at least 10 minutes until the patient meets the PACU Discharge Criteria (see 'Discharge of a Patient from the Post Anaesthesia Care Unit by the Registered Nurse' Procedure document.
- PMP is not to be initiated or witnessed by:
    - 2 novice (transition/CDP) nurses together
    - A student nurse and a registered nurse
- All patients receiving PMP must be receiving supplemental oxygen therapy and have continuous pulse-oximetry to maintain SpO_2 above 95%.
- PMP administration is to be titrated according to analgesic and haemodynamic response
- Sedation scores should be monitored and documented in all patients receiving any opioid for management of their acute pain. All opioids should be carefully titrated, but not to pain scores alone; an assessment of functional activity may be a better indicator of analgesic efficacy. Titration includes consideration of side effects. In some patients, pain may not be opioid-responsive.
- A "start low and go slow" approach should be taken with opioid naïve and elderly patients.
- Patients receiving PMP are to be nursed on a 1:1 basis until therapeutic or initial loading is completed and then remain closely observed.

PATIENT ASSESSMENT

Sedation Assessment

Table 1: SEDATION SCORE
0 = Wide awake **1 = Easy to rouse** **2 = Easy to rouse but unable to remain awake** **3 = Difficult to rouse**

- Consider is the patient able to hold their head off the pillow for greater than 5 seconds.
- Roused to voice only or light touch
- Minimal O_2 support (O_2 via nasal prongs 1-4L) to maintain
    - SpO_2 greater than 93%
- Orientated to time, person, place
- Able to maintain conversation

Pain Assessment

There are various tools that can be used to assess pain. See Appendix 1 for details.

Telephone Orders
Telephone orders should only be given when the Consultant Anaesthetist and/or the Anaesthetic Registrar is unable to attend the bedside in PACU and complete the order. These orders must be given in accordance with the 'Telephone Order of Medications' section in the CHHHS Medication Administration Procedure document.

Adult Pain Management Protocol

ADULT PREPARATION
The PMP medication must be ordered by an Anaesthetist and drawn up in accordance with Table 2 below (for adults).

Table 2: Adult PMP Solution Preparation

Drug	Dilution	Final Concentration	Dosing	Maximum Total Dose
Morphine	10 mg up to 10 mL with Sodium Chloride 0.9%	1 mg/mL	As per flowchart	20 mg
Oxycodone	10 mg up to 10 mL with Sodium Chloride 0.9%	1 mg/mL	As per flowchart	20 mg
Fentanyl	200 microg up to 10 mL with Sodium Chloride 0.9%	20 microg/mL	As per flowchart	400 microg
Tramadol	100 mg up to 10 mL with Sodium Chloride 0.9%	10 mg/mL	As per flowchart	200 mg

ADULT PROCEDURE STEPS
(See Appendix 2 for the PACU IV Pain Protocol Administration flowchart)

1. Observe and document the following baseline patient observations
    - Pain scores at rest, and on deep breathing and coughing
    - Respiratory rate (RR) and quality
    - Blood pressure (BP)
    - Heart rate (HR)
    - Sedation score

2. Complete and document pain assessment.
3. Check that the pain protocol has been ordered and, if necessary, obtain an order from the Anaesthetist or the Anaesthetic Registrar. The appropriate opioid must be ordered by the anaesthetist as “Morphine Pain Protocol”, “Fentanyl Pain Protocol”, “Oxycodone Pain Protocol”, or “Tramadol Pain Protocol”,
4. Prepare the medication as per the PACU PMP prescribed and according to the above preparation table. Do this in adherence with Standard Precautions and aseptic technique: Controlled (Schedule 8) Drug Legislation and User Applied Injectable Medicines Line Labelling Standards
5. Adhering to the 6 Rights of Medication Administration, give 1 to 2 mL of the prescribed drug
6. Document the administration of each dose given in AARK (drug, time, and amount). Doses must be documented in micrograms (microg) or milligrams (mg), NOT millilitres (mL).
7. Wait 3-5 minutes.
8. Recheck all observations as above (pain, RR, BP, HR, sedation score) including pain assessment using a variety of assessment techniques. The anaesthetist must be consulted if any of the following side effects occur:
    - Sedation score becomes greater than 2
    - Respiratory rate is less than 8 breaths per minute
    - Nausea and vomiting are increased
    - HR drops below 60 beats per minute
    - Systolic blood pressure drops below 90mmHg
9. Repeat dose if necessary and document same
10. If pain is not adequately relieved after 10 mL of PMP and further management is required, the anaesthetist is to be notified and a second syringe may be commenced. Consideration must be given to the commencement of adjunct therapies.
11. After the total MAXIMUM dose (20 mL) has been administered and the patient continues to have moderate to severe pain, a review by the anaesthetist is required and a further plan for analgesia can be developed (additional Pain Protocol and/or adjunct therapies)
12. Uncontrolled or unexpected pain requires a reassessment (and possible surgeon review) for the development of complications or the presence of neuropathic pain
13. Pain protocol will cease:
    - When the patient is comfortable, or
    - If significant side effects occur

At this time, the remaining medication should be discarded (with a witnessing RN, MO, or EEN) and the discarded amount should be documented as waste in Pyxis.

Paediatric Pain Management Protocol

PAEDIATRIC PREPARATION

1. The PMP medication must be ordered by an Anaesthetist and drawn up in accordance with Table 3 below (for paediatrics).

Table 3: Paediatric PMP Initial Opioid Solution Preparation

Step 1: Draw up the initial solution	
Drug	**Dilution**
Morphine	10 mg up to 10 mL with Sodium Chloride 0.9%
Oxycodone	10 mg up to 10 mL with Sodium Chloride 0.9%
Fentanyl	200 microg up to 10 mL with Sodium Chloride 0.9%

2. Round the patient's weight to the nearest 5 kg (e.g. 20 kg for a 22 kg child)
3. Discard some of the prepared initial opioid solution to leave residual amount in the syringe according to Table 4 below. (The solution should be discarded, with a witnessing RN, MO, or EEN and the discarded amount should be documented as waste in Pyxis).
4. Add further Sodium Chloride 0.9% to make up to 10 mL

Table 4: Paediatric PMP Final Solution Preparation

Step 2: Round the patient's weight to the nearest 5kg	**Step 3:** Discard some of the initial opioid solution	**Step 4:** Add further Sodium Chloride 0.9% to make up to 10 mL		
		Final concentration per mL		
Approximate weight:	Residual amount:	Morphine (mg)	Oxycodone (mg)	Fentanyl (microg)
5 kg	1 mL	0.1	0.1	2
10 kg	2 mL	0.2	0.2	4
15 kg	3 mL	0.3	0.3	6
20 kg	4 mL	0.4	0.4	8
25 kg	5 mL	0.5	0.5	10
30 kg	6 mL	0.6	0.6	12
35 kg	7 mL	0.7	0.7	14
40 kg	8 mL	0.8	0.8	16
Over 40 kg	10 mL	1.0	1.0	20

PAEDIATRIC PROCEDURE STEPS

1. Observe and document the following baseline patient observations:
    - Pain scores at rest, and on deep breathing and coughing
    - Respiratory rate (RR) and quality
    - Blood pressure (BP)
    - Heart rate (HR)

- Sedation score

1. Complete and document pain assessment.
2. Check that the pain protocol has been ordered and, if necessary, obtain an order from the Anaesthetist or the Anaesthetic Registrar. The appropriate opioid must be ordered by the anaesthetist as "Morphine Pain Protocol", "Fentanyl Pain Protocol", or "Oxycodone Pain Protocol".
3. Prepare the medication as per the PACU PMP prescribed and according to the above preparation table. Do this in adherence with Standard Precautions and aseptic technique: Controlled (Schedule 8) Drug Legislation and User Applied Injectable Medicines Line Labelling Standards
4. Adhering to the 6 Rights of Medication Administration, give 1 mL of the prescribed drug.
5. Document the administration of each dose given in AARK (drug, time, and amount). Doses must be documented in micrograms (microg) or milligrams (mg), NOT millilitres (mL).
6. Wait 3-5 minutes.
7. Recheck all observations as above (pain, RR, BP, HR, sedation score) including pain assessment using a variety of assessment techniques. The anaesthetist must be consulted if any of the following side effects occur:
    - Sedation score becomes greater than 2
    - Nausea and vomiting are increased
    - Observations fall outside normal paediatric values; see Table 5 below for approximate minimum values:

Table 5: Approximate minimum values for paediatric observations

	Age				
	1 month	**1 year**	**5 years**	**10 years**	**15 years**
Respiratory rate	50	30	25	15	10
Heart rate	100	90	80	70	60
Systolic BP	60	70	75	80	90

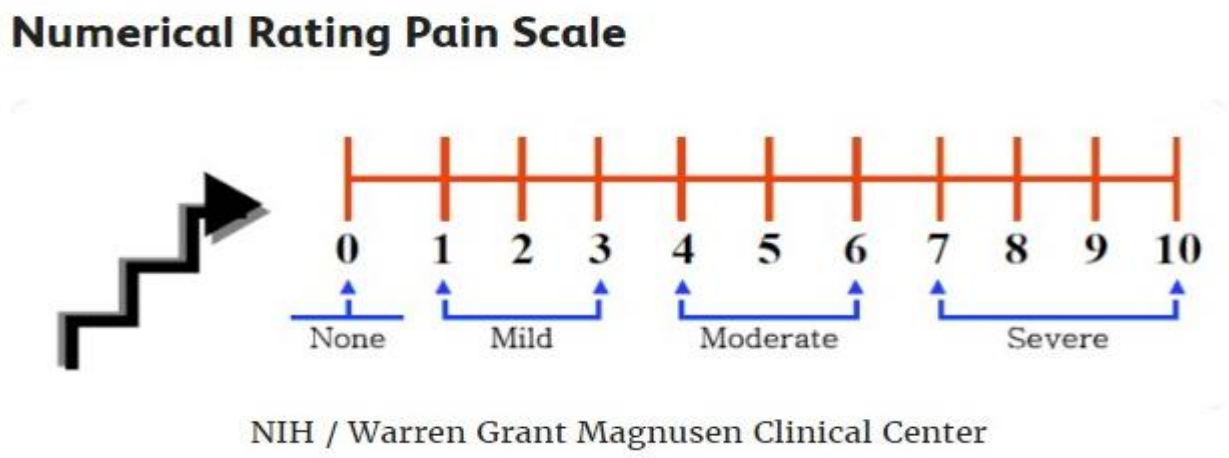
8. Repeat dose if necessary and document same
9. If pain is not adequately relieved after 10 mL of PMP and further management is required, the anaesthetist is to be notified and a second syringe may be commenced. Consideration must be given to the commencement of adjunct therapies.
10. After the total MAXIMUM dose (20 mL) has been administered and the patient continues to have moderate to severe pain, a review by the anaesthetist is required and a further plan for analgesia can be developed (additional Pain Protocol and/or adjunct therapies)
11. Uncontrolled or unexpected pain requires a reassessment (and possible surgeon review) for the development of complications or the presence of neuropathic pain
12. Pain protocol will cease:
    - When the patient is comfortable, or
    - If significant side effects occur

At this time, the remaining medication should be discarded (with a witnessing RN, MO, or EEN) and the discarded amount should be documented as waste in Pyxis.

Appendix 1

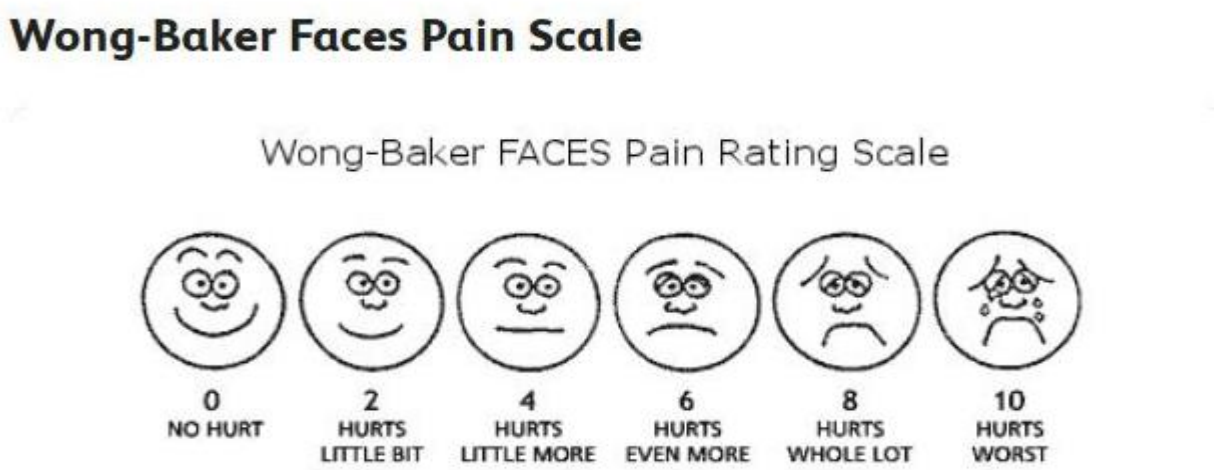
- Numerical Pain Scale

This is best used on teenagers and adults that have no prior cognitive deficit and are capable of understanding the concept.



- <u>Wong-Baker FACES Pain Scale</u>

This scale uses pictures and numbers and is suitable for children over the age of 3. The child can point to the face that represents how they feel.



- Verbal descriptor scale

The patient can be asked to describe their pain: no pain, mild pain, moderate pain, severe pain.

They can also be asked to describe the quality of their pain: burning, throbbing, stabbing, aching, shooting, sharp, crushing.

- Pain Assessment in patients with dementia or delirium

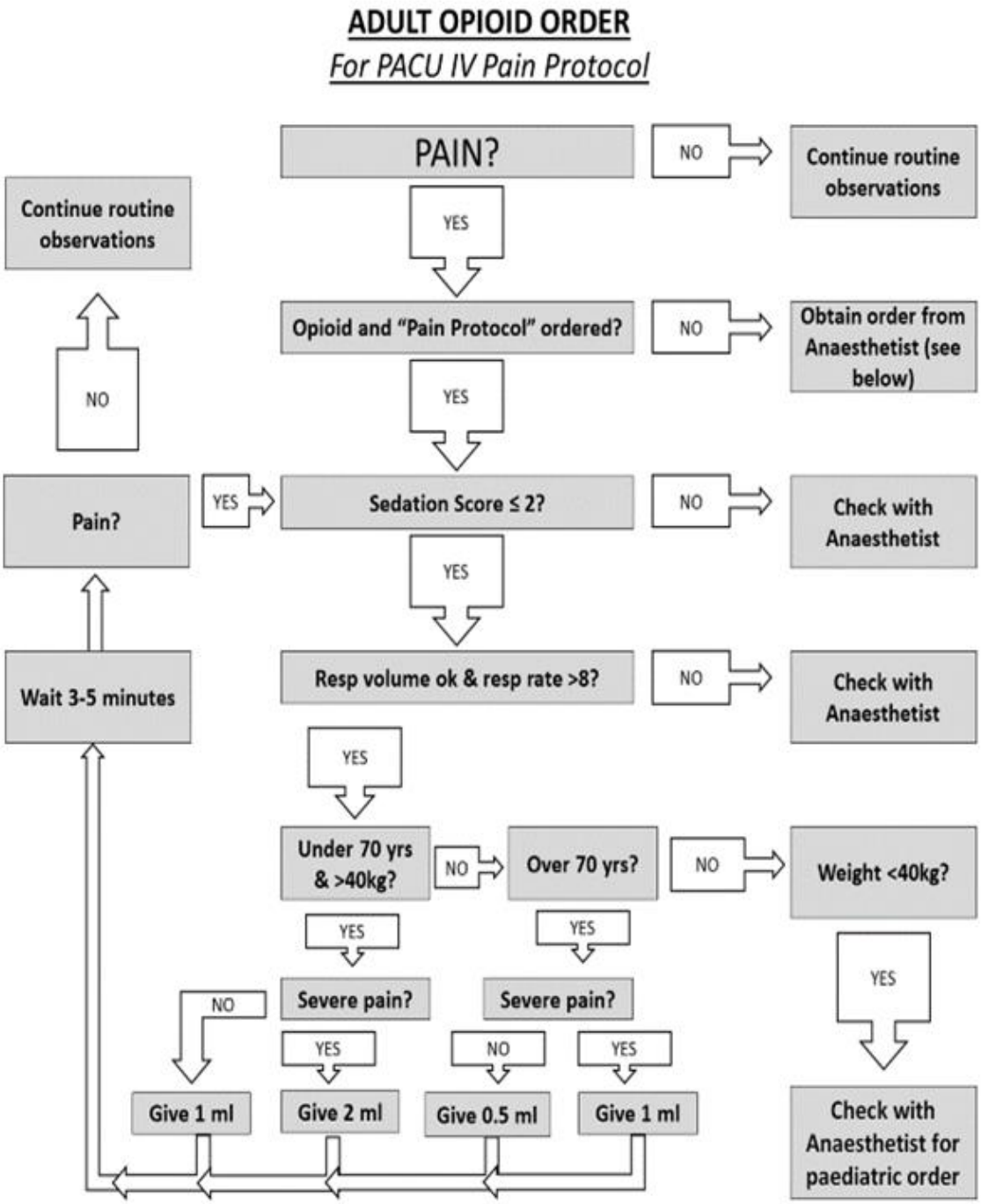
PAIN ASSESSMENT IN ADVANCED DEMENTIA (PAINAD) SCALE

Items	Score = 0	Score = 1	Score = 2	Score
Breathing (independent of vocalization)	Normal	• Occasional labored breathing • Short period of hyperventilation	• Noisy labored breathing • Long period of hyperventilation • Cheyne-Stokes respirations	
Negative vocalization	None	• Occasional moan or groan • Low level of speech with a negative or disapproving quality	• Repeated troubled calling out • Loud moaning or groaning • Crying	
Facial expression	Smiling or inexpressive	• Sad • Frightened • Frown	• Facial grimacing	
Body language	Relaxed	• Tense • Distressed pacing • Fidgeting	• Rigid • Fists clenched • Knees pulled up • Pulling or pushing away • Striking out	
Consolability	No need to console	• Distracted or reassured by voice or touch	• Unable to console, distract, or reassure	
Total				

Note. Total scores range from 0 to 10 (based on a scale of 0 to 2 for each of five items), with a higher score indicating more behaviors indicating pain (0 = no observable pain to 10 = highest observable pain).

Adapted from Warden, V., Hurley, A.C., & Volicer, L. (2003). Development and psychometric evaluation of the Pain Assessment in Advanced Dementia (PAINAD) scale. Journal of the American Medical Directors Association, 4, 9-15.

Appendix 2


ADULT OPIOID ORDER
For PACU IV Pain Protocol
PAIN?
NO
Continue routine observations
YES
Continue routine observations
Opioid and "Pain Protocol" ordered?
NO
Obtain order from Anaesthetist (see below)
YES
NO
Pain?
YES
Sedation Score ≤ 2?
NO
Check with Anaesthetist
YES
Wait 3-5 minutes
Resp volume ok & resp rate >8?
NO
Check with Anaesthetist
YES
Under 70 yrs & >40kg?
NO
Over 70 yrs?
NO
Weight <40kg?
YES
YES
YES
NO
Severe pain?
Severe pain?
YES
NO
YES
Give 1 ml
Give 2 ml
Give 0.5 ml
Give 1 ml
Check with Anaesthetist for paediatric order

PACU Discharge Criteria Guidelines

GENERAL REMARKS

- The Post-Operative Care Unit (PACU) is a Critical Care Area with a high potential for immediate life-threatening problems.
- The treating Anaesthetist is ultimately responsible for his/her patients in the PACU.
- Care may be delegated, when appropriate, to the care of nursing staff experienced and skilled in the care of unconscious and surgical patients.
- The Discharge Criteria Guidelines are intended to ensure that patients are in a safe and satisfactory condition before returning to a general postoperative ward.
- Variations from the stated parameters may be allowable for many reasons. However, patients who do not meet the guideline criteria must not be discharged from the PACU without consultation with the relevant anaesthetic medical staff.
- The PACU nurse should always contact the anaesthetist:
    - if there is doubt regarding a patient's fitness for discharge, or
    - if the anaesthetist has asked to be contacted prior to the patient's discharge.

DISCHARGE CRITERIA

1. **Airway and Breathing**
    - Airway must be clear without assistance.
    - Respiratory rate:
        - adults >8/min;
        - children:
            - <6 months >30/min;
            - 6-12months > 25/min;
            - >1 year: >20 – age/2 per minute
    - Able to deep breathe on command (adults).
    - Oxygen saturation > 95%.
2. **Circulation**
    - <u>Pulse regular (unless known pre-existing arrythmia eg AF)</u>
    - <u>Heart Rate appropriate for age:</u>
        - Adult: 50-100/min
        - Child >12 years: 60-120/min
        - Child 5-11 years: 80-130/min
        - Child 1-4 years: 90-140

- Infant (< 1 year): 100-160/min

- Systolic Blood Pressure:
  - Adult: >90 & within 30% of pre-op level
  - Child >12 years: >90 mmHg
  - Child 5-11 years: >85 mmHg
  - Child 1-4 years: >80 mmHg
  - Infant (< 1 year): >75 mmHg

- Perfusion: hands and feet should be warm and pink.

- IV cannula patent (IV fluids not running):
  If required on the ward it must be flushed in PACU.

3. Neurological

- Sedation score: 2 or higher.
- Able to lift head off pillow and/or firmly squeeze hand.

4. Epidurals and spinals:

- Spinal anaesthetic: Block receded by 2 dermatomes and below T4.
- Lumbar epidural: Block below T6.
- Thoracic epidural: Block below T4.

5. Metabolic

- Temperature on discharge > 36 0C and <38 0C.
- Diabetic patients: BGL between 5 and 10 mmol/l.

6. Renal

- Fluid input and output must be documented.
- If IDC in situ output > 1ml/kg/hour.

7. Comfort

- Pain must be adequately controlled (moderate or less).
- Nausea/vomiting must be adequately controlled.
- The patient should be clean and dry.

- Cot bumpers are required for all small children and restless patients.

8. Specific Surgical Observations

- As appropriate, such as:
    - Wound dry
    - Drains secure and functioning
    - Minimal blood loss
    - Limb perfusion and movement adequate

9. Minimum Length of Stay

A. All other discharge criteria must be met before discharge is considered

B. Many patients will therefore require a longer period in the PACU

C. Patients must not be discharged before this length of time unless signed out by an anaesthetist

    - **LA only (no sedation):** Generally no need for PACU unless requested by surgical or anaesthesia team.
    - **Minor surgery:**
      GA, Sedation, Bier's Block, major nerve blocks: 20 minutes
    - **Major surgery:** 1 hour.
    - **Carotid Endarterectomy**: 3 hours
    - **After opioid pain relief:**
      30 minutes after IM or epidural bolus; 10 minutes after IV bolus
    - **After naloxone administration**: 2 hours (unless for itch only)

10. Documentation is complete

- Most observations should be recorded on the WinChart record
- Fluids should also be recorded on the fluid balance sheet
- Orders for oxygen, fluids, analgesia and anti-emetics as appropriate

11. Transportation

- Nurse and wardsperson present
- Oxygen as clinically required
- Additional equipment as required depending on clinical state (ventilator, infusions etc)

Metaraminol Infusion Guideline

AREA/STAFF AUTHORISED TO ADMINISTER

<u>0.1mg/mL infusion</u>: **General patient areas by order from Anaesthetic or ICU Consultants. No cardiac monitoring is required**

<u>0.2mg/mL infusion</u>: **Cardiac Care Unit, Cardiac Catheter Lab and High Dependency Units**

<u>Up to 0.4 mg/mL infusion</u>: **Cardiac Care Unit, Cardiac Catheter Lab, Emergency Departments, Intensive Care Unit, Perioperative Suites**

Presentation 10 mg/mL (ampoule) *Protect ampoule from light*

ALERT: Metaraminol should ONLY be commenced on the direction of Anaesthetic *OR* Intensive Care medical staff, familiar with the use of vasopressor agents. Consider transfer to a high acuity environment, depending on the patient's circumstances and acuity.

Administration: Intravenous

- General patient areas (0.1 mg/mL)

Dilution: Add 10 mg to Sodium Chloride 0.9% to total 100 mL
(Final volume = 100 mL / Final concentration = 0.1 mg/mL)

- Ensure other fluids given into the same intravenous cannula are administered via an infusion pump or a giving set with a non-return valve to prevent reflux and inconsistent drug delivery
- Starting rate = 5 to 10 mL/hour (0.5 to 1 mg/hour)
- After each rate change, ensure 10 minutes has elapsed to ensure medication has taken effect
- Adjust the rate by 2 to 5 mL/hour, according to blood pressure.

  Target blood pressure should **always** be stipulated, for example.

  "Aim for systolic blood pressure greater than 90 mmHg"
- If a rate of 20 mL/hour is inadequate to maintain blood pressure, other treatment is required and the patient should be transferred to a cardiac monitored bed (fixed monitoring or telemetry)

<u>For marked hypotension</u>: Initial IV bolus of 0.1 to 0.25 mg can be given, repeated every 3 to 5 minutes if necessary. It is recommended that 5 or 10 mL be withdrawn from the mixed solution in the infusion bag into a separate syringe, then 1.0 mL to 2.5 mL injected as required

- **ED, CCU, CCL, HDU (0.2 mg/mL)**

Dilution: Add 20 mg to Sodium Chloride 0.9% to total 100 mL
(Final volume = 100 mL / Final concentration = 0.2 mg/mL)

Dose: Commence at 2 mg/hour or as ordered. Titrate as per medical request.

- **ED, CCU, CCL, ICU and Peri-op (0.2 or 0.4 mg/mL)**

Dilution: Add 20 mg *or* 40 mg to Sodium Chloride 0.9% to total 100 mL (Final volume = 100 mL / Final concentration = 0.2 or 0.4 mg/mL)

Dose: Commence at 2 mg/hour or as ordered. Titrate as per medical request.

Administer by an infusion device. Use Guardrails™ Medication Software

Adult General profile

Drug Name	Pump	Concentration	Doses in:	Default	Soft Min	Soft Max	Hard Max
Metaraminol	GP	10 mg in 100 mL (0.1 mg/mL)	**mL/hr**	10	5	20	20

Critical Care ADULT profile

Drug Name	Pump	Concentration	Doses in	Default	Soft Min	Soft Max	Hard Max
Metaraminol	GP	0.2 to 0.4 mg/mL	**mg/hr**	2	0.10	10	20

GP = large volume pump. GH = syringe pump. CC = paediatric syringe pump.

Antibiotic Prophylaxis in Surgery (ADULT)

This procedure lists the recommended prophylactic antibiotics for use in surgical procedures to reduce the risk of post-operative infection. It does not apply to early or empiric treatment of infection. The route of administration, timing and duration of prophylactic antibiotics should be chosen to achieve effective plasma and tissue concentrations of the drug(s) during and shortly after the surgical procedure, when bacterial contamination is maximal. The dose, administration and requirement for intraoperative repeat dosing is outlined in (Table 1).

If antibiotics are continued post-surgery for this indication, then clear documentation on the drug chart is required.

Choice of antimicrobial agent (Table 2)

- Selected drug should be active against the pathogens most commonly associated with wound infections following specific procedure and against the pathogens endogenous to the region of the body being operated.
- Selection of an appropriate agent for specific patients should consider patients' drug allergies, comparative efficacy, and adverse effects profile.
- For most procedures, cephazolin should be the agent of choice because of its proven efficacy in surgical prophylaxis.
- Routine use of vancomycin prophylaxis is discouraged unless there is demonstrated evidence of colonisation with Methicillin Resistant *Staphylococcus aureus (*MRSA).
- Modification of a surgical prophylaxis regimen may be necessary in patients with pre- existing infections prior to surgery, significant length of hospital stay prior to surgery, and previous positive cultures/colonisations. Consult Infectious Diseases (ID) for specific recommendations.
- For patients already receiving antibiotics prior to surgery, it is often not necessary to administer additional antibiotics for surgical prophylaxis provided the current antibiotics are appropriate prophylactic agent for the surgery planned and timing of administration of the current antibiotic regimen is optimised relative to incision time. Consult ID for specific recommendations.

Route

Intravenous (IV) administration is indicated in most cases. Administration of prophylaxis via the oral routes (PO) may be indicated for specific procedures.

Timing

- The optimal time for administration of preoperative doses of antibiotics is within 60 minutes (optimal 30 minutes) before surgical incision. Some agents, like vancomycin, require administration over 60 to 90minutes; therefore, the administration should begin within 120 minutes before surgical incision.

- Administration of antibiotics more than 60 minutes before skin incision reduces effectiveness.

Duration

- In general, administration of a single dose of parenteral drug is sufficient. It is unlikely that further benefit is attained by the administration of additional doses beyond wound closure and post-operative prophylaxis is not recommended
- Additional intraoperative doses may be required under following circumstances
- a delay in starting the procedure
- if procedure is prolonged eg greater than 4 hours (with exception of vancomycin, metronidazole, aminoglycosides and quinolones); see Table 2 for intraoperative dose interval
- Excessive blood loss of more than 1500mLs (with exception of vancomycin, metronidazole, aminoglycosides and quinolones)
- Consult ID/AMS regarding re-dosing in patients with pre-existing renal or hepatic dysfunction

- The continuation of prophylaxis until all catheters and drains have been removed is **NOT** appropriate
- Prophylactic antibiotics are **NOT required** for insertion or removal of a urinary catheter unless a UTI is proven
- Neither IV nor PO antibiotic prophylaxis beyond 24 hours offers benefit. Extended prophylaxis is associated with an increased risk of adverse effects, including subsequent infection with resistant pathogens or *Clostridium difficile*

Drug choice and dosage

- Refer to table 2 for specific protocols for each type of surgery. Individual patients will require assessment for contraindications or special precautions.
- For patients with an indication for vancomycin, due to history of MRSA colonisation, antibiotic allergy, or procedure type, Teicoplanin can be used in place of Vancomycin. This would be indicated in settings in which vancomycin infusions were unable to be initiated early enough to allow for therapeutic levels at time of incision. See Table 1. for dose and administration details.

Use of alternative drug choice or dosage

Departure from the specific protocols listed below requires a valid reason. The reason for using an alternative drug or dosage is to be documented in the patient's medical record.

For further advice regarding antibiotic use for individual/ complicated cases, please contact the Infectious diseases team at Cairns Hospital via the switchboard: 4226 0000

Prevention of infective endocarditis

Antibiotic prophylaxis is recommended in patients with certain cardiac conditions who are undergoing certain respiratory, genitourinary and gastrointestinal tract procedures. See **Appendix 1** for further details.

Table 1: Recommended doses, administration, and intraoperative doses interval for commonly used antimicrobials

Drugs	Ampicillin	Ceftriaxone	Cephazolin	Cefepime	Clindamycin	Lincomycin	Ciprofloxacin	Gentamicin	Meropenem	Metronidazole	Piperacillin Tazobactam	Vancomycin	Teicoplanin
Route	**IV**	**IV**	**IV**	**IV**	**IV**	**IV**	**PO**	**IV**	**IV**	**IV**	**IV**	**IV**	**IV**
Recommended Adult Dose	1g	1g	2g (3g patients w> 120 kg)	2g	600mg	600mg	750mg	3mg/kg (ideal body weight	1g	500mg	4.5g	1g (1.5g for Pts >80kg)	400mg (800mg in pts >80kg)
Reconstitution	Reconstitute with 10mL water for injection	Reconstitute with 10mL water for injection	Reconstitute with 10mL water for injection	Reconstitute with 10mL sodium chloride 0.9%	See below	See below	N/A	N/A	Reconstitute with 20mL water for injection	N/A	Reconstitute 4.5g vial with 20mL of water for injection	Reconstitute 500mg vial with 10mL of water for injection or 1g vial with 20mL of water for injection	Reconstitute the vial by injecting 3 mL water for injection.
Administration	Give reconstituted solution as a bolus over 5-10 minutes	Give reconstituted solution as a bolus over 5 minutes	Give reconstituted solution as a bolus over 5 minutes	Give reconstituted solution as a bolus over 5 minutes	Dilute the solution to 10mg/mL and infuse over at least 20 minutes	Dilute to a maximum concentration of 10 mg/mL, and infuse at a maximum rate of 1 g/hour	Give 1-2 hours prior to procedure	Give the required dose undiluted over 5 minutes	Inject over 5 minutes or dilute with 50 to 200mL and infuse over 15-30 minutes	Give undiluted over 20 minutes	Dilute the reconstituted solution to 50mL and infuse over at least 30 minutes	Dilute the reconstituted solution to 5mg/mL and infuse 1g over at least 60 minutes (1.5g over 90	Inject slowly over 5 minutes.
Recommended intraoperative dosing interval[4]	N/A	N/A	4 hours	N/A	6 hours	6 hours	N/A	N/A	N/A	N/A	2 hours	NA	N/A

Table 2: Choice of Antimicrobial agent				
		Procedure	**Recommended regimen**	**Alternative regimen in patient with β-lactam allergy**
Cardiac		**Routine angioplasty and stent insertion**	**Prophylaxis NOT recommended**	
		Permanent pacemaker/ defibrillator insertion	**Cephazolin**	**Vancomycin[1] + Gentamicin**
Endoscopic gastrointestinal procedure		**Procedures with or without biopsy e.g. endoscopy, sigmoidoscopy, colonoscopy, sclerotherapy, oesophageal dilatation**	**Prophylaxis NOT recommended**	
		Percutaneous endoscopic gastrostomy or jejunostomy (PEG or PEJ) insertion/revision	**Cephazolin**	**Vancomycin[1]**
		Endoscopic retrograde cholangiopancreatography (ERCP)- *only for patients with a high risk of infection e.g. known or suspected biliary obstruction, biliary sepsis, pancreatic pseudocyst*	**Cephazolin** or **Piperacillin/Tazobactam**	**Gentamicin + Metronidazole**
General Surgery	**Breast Procedures**	Uncomplicated Clean procedures e.g. wound revision, excision scar tissue, local excision, lumpectomy, sentinel node biopsy.	**Prophylaxis NOT recommended**	
		Clean Contaminated procedure e.g. microdochectomy, mastectomy, reconstruction (implants involved), reduction.	**Cephazolin**	**Vancomycin[1]**
	Endocrine procedures	Thyroidectomy or similar	**Prophylaxis generally NOT recommended**	
	Abdominal procedures	Procedures involving manipulation of viscera e.g. appendicectomy, division of adhesions, resection	**Cephazolin + Metronidazole**	**Gentamicin + Metronidazo**
		Procedures not involving manipulation of viscera e.g. abdominoplasty	**Cephazolin**	**Vancomycin[1]**
		Splenectomy (Vaccination and post-splenectomy antibiotic		

		prophylaxis required in all cases- consult ID for advice)		
			Cephazolin	**Vancomycin[1]**
	Herniorrhaphy/ hernia repair	Hernia repair with or without mesh insert		
	Other	Insertion of infusaport/other devices		
		Clean excision procedures	**Prophylaxis NOT recommended**	
Gastrointestinal Surgery		**Gastric/ duodenal/ oesophageal (bypass, resection, ulcer oversew, oesophagectomy etc.)**	**Cephazolin**	**Vancomycin[1] or lincomycin + Gentamicin**
		Biliary (open procedure or high risk laparoscopic)		
		Colorectal surgery	**Cephazolin + Metronidazole**	**Gentamicin + Metronidazole**
		Exploratory lapratomy/ division of adhesions		
Obstetrics/ Gynaecology		**Hysterectomy, laparotomy procedures, Vaginal repair, late term termination**	**Cephazolin + Metronidazole**	**Lincomycin + Gentamicin**
		Obstetric procedures (Early suction, termination, endoscopic procedures, other minor procedures)	**Cephazolin + STI cover if investigations pending[2]**	**Lincomycin + Gentamicin+ STI cover if investigations pending[2]**
		Caesarean section	**Cephazolin**	**Lincomycin + Gentamicin**
Orthopaedic surgery- Joint replacement	**Routine/ Primary joint replacement**	Primary Total Hip Replacement (THR) or Total Knee Replacement (TKR)	**Cephazolin** then **continue** for **24 hours post operatively**	**Vancomycin[1]**
		High Risk of MRSA infection	**Add Vancomycin[1]** to above regimen	
	Revision/ Re-operation joint replacement	For all patients requiring revision/ re-operation (if pre-operative infection is suspected seek ID advice regarding antimicrobial prophylaxis)	**Cephazolin + Vancomycin[1]**	

Orthopaedic surgery- NOT Joint replacement	**Arthroscopic procedures and other clean procedures not involving foreign material (pins, plates etc.)**	**Prophylaxis NOT recommended**	
	Internal fixation of hip fracture	**Cephazolin** then **continue** for 24 hours post	**Vancomycin[1]**
	Other internal fixation		
	Spinal procedures		
	Lower limb amputation	**Cephazolin +** **Metronidazole** then **continue Cephazolin** for 24 hours and repeat **Metronidazole** at **12 hours post-operatively**	**Vancomycin[1] +** **Metronidazole** then repeat both at **12 hours post-operatively**
Otorhinolaryngology/ Head & Neck Surgery	**Closed reduction of fractured nose or other uncomplicated or minor clean procedures (e.g tonsillectomy, adenoidectomy, tympanostomy,**	**Prophylaxis NOT recommended**	
	No incision through oropharyngeal mucosa (e.g. parotid gland excision, complicated tympanoplasty,	**Cephazolin**	**Vancomycin[1]**
	With incision through oropharyngeal mucosa	**Cephazolin +** **Metronidazole** then **continue Cephazolin for 24 hours** and repeat **Metronidazole** at **12 hours post-operatively**	**Clindamycin** then **continue Clindamycin** 12 hourly for **2 doses post-operatively.**
Plastic and reconstructive surgery	**Clean bone or soft tissue surgery**	**Prophylaxis NOT recommended**	
		Cephazolin	**Vancomycin[1]**
	Open reduction and internal fixation of fractures		
	Insertion of prosthesis, screws, plates etc.		

Trauma	**Compound fracture**	**Cephazolin**	**Vancomycin[1]**
	Water contaminated	**Cefepime**	**Ciprofloxacin and Lincomycin**
	Extensive organic contamination	**Cephazolin + Metronidazole**	**Vancomycin[1] + Metronidazole**
	NOTE: Antimicrobials to be started as soon as possible post injury. Duration depends on Gustilo classification – I & II cease post closure, III continue for 72hrs or until 24hrs post closure (whichever is shorter)		
	NOTE: If antimicrobials have been completed prior to definitive fixation then additional antimicrobials as per ORIF (see above) are required prior to fixation.		
Vascular Surgery	**Vascular reconstruction (e.g. abdominal aorta, graft/stent insertion, groin incision)**	**Cephazolin** then **continue** for 24 hours post operatively	**Vancomycin[1]** then **12 hours post-operatively** + **Gentamicin**
	Amputation of ischemic limb	**Cephazolin** then **continue** for 24 hours post operatively + **Metronidazole** then 12 hours post-operatively	**Vancomycin[1]** then **12 hours post-operatively** + **Gentamicin** + **Metronidazole** then 12 hours post-operatively
	AV fistula formation (with prosthetic material)	**Cephazolin**	**Vancomycin[1]**
	All other clean procedures	**Prophylaxis NOT recommended**	
Urology		**Aminoglycoside sparing regimen**	**Beta-lactam sparing regimen**

	Transrectal ultrasound (TRUS) guided prostate biopsy	**PO Ciprofloxacin** **OR** **Meropenem (if significant risk of ESBL)[6]**	**Gentamicin**

Urology continued		**Aminoglycoside sparing regimen**	**Beta-lactam sparing regimen**
	Transurethral resection of the prostate (TURP)	**PO Ciprofloxacin OR Ampicillin + Ceftriaxone**	**Gentamicin**
	Retention TURP (ie catheter in place for a month)	**Where possible antibiotic choice to be guided by pre-operative urine MCS results**	**Ciprofloxacin** **OR** **Gentamicin + Vancomycin[1]**
		Piperacillin-tazobactam[5] IV 4.5g minimum 3 doses starting day before procedure with change of IDC: high colonisation role with pseudomonas **OR**	
		Amoxicillin-Clavulanate[5] PO 875/175mg BD for 3 days prior **OR**	
		Ciprofloxacin[5] PO 500mg BD for 3 days prior [14 doses] after change of IDC	

	Urological endoscopy with biopsy, stent, stone treatment	**Cefazolin OR Ampicillin + Ceftriaxone**	**Gentamicin + Vancomycin[1]**
	Clean incision with/without entry into urinary tract (including radical prostatectomy, nephrectomy)	**Cefazolin**	**Gentamicin + Vancomycin[1]**
	Clean with/without entry into urinary tract involving implanted prosthesis e.g. artificial sphincter, penile prosthesis	**Piperacillin-tazobactam**	**Gentamicin + Vancomycin[1]**

Urology continued		**Aminoglycoside sparing regimen**	**Beta-lactam sparing regimen**
	Clean-contaminated (involving entry into bowel e.g. ileal conduit, bladder augmentation	**Cefazolin + Metronidazole OR Ceftriaxone + Ampicillin + Metronidazole**	**Gentamicin + Vancomycin[1] + Metronidazole**
	Cystoscopy with no intervention	**Nil recommended**	**Nil recommended**

1. **Teicoplanin can be used as an alternative for vancomycin, see Table 1. for dose and administration details.**
2. **If investigations are still pending for sexually transmitted infections (STI) add doxycycline 100 mg orally, 60 minutes before the procedure, then 200 mg orally, 90 minutes after the procedure.**
3. **Lincomycin can be used as an alternative for Clindamycin, see Table 1. For dose and administration details.**
4. **The redosing intervals in this table only apply to patients with normal kidney function.**
5. **The recommended dose for patients with normal renal function. Refer to Therapeutic Guidelines for patients with renal impairment.**
6. **If Meropenem deemed to be indicated for coverage of Multidrug Drug Resistant (MDR) pathogen, approval by Infectious Diseases/AMS required.**

Endocarditis prophylaxis for upper and lower respiratory tract procedures

Endocarditis prophylaxis is recommended only for patients with the following cardiac conditions (that are associated with an increased risk of developing infective endocarditis and the highest risk of adverse outcomes from endocarditis) who are undergoing a procedure:

- prosthetic cardiac valve, including transcatheter-implanted prosthesis or homograft
- prosthetic material used for cardiac valve repair, such as annuloplasty rings and chords
- previous infective endocarditis
- congenital heart disease but only if it involves:
    - unrepaired cyanotic defects, including palliative shunts and conduits
    - repaired defects with residual defects at or adjacent to the site of a prosthetic patch or device (which inhibit endothelialisation)
- rheumatic heart disease in high-risk patients.

Respiratory tract procedures and their requirement for endocarditis prophylaxis in patients with relevant cardiac condition are listed below:

Procedure	Recommendation
tonsillectomy and/or adenoidectomy	Endocarditis prophylaxis recommended (see table below)
respiratory tract procedure where surgical antibiotic prophylaxis **is** routinely recommended (clean–contaminated surgery) (eg laryngectomy, pharyngectomy, complex septorhinoplasty)	Routine surgical antibiotic prophylaxis is sufficient Specific endocarditis prophylaxis is not required.
respiratory tract procedure where surgical antibiotic prophylaxis **is not** routinely recommended (eg tracheostomy, endotracheal intubation, bronchoscopy *with or without* incision or biopsy, tympanoplasty)	Neither surgical nor endocarditis antibiotic prophylaxis is required.

Endocarditis prophylaxis for tonsillectomy and/or adenoidectomy:

DRUG & ROUTE	TIMING	DOSAGE	DURATION
Amoxycillin PO	1 hour before the procedure	2g (child: 50mg/kg up to 2g)	One dose
OR			
Ampicillin IV	At induction	2g (child: 50mg/kg up to 2g)	One dose
For patients with immediate hypersensitivity to penicillins, or cephalosporin hypersensitivity, replace Ampicillin with:			
Clindamycin PO	1 hour before the procedure	600mg (child: 20 mg/kg up to 600 mg)	One dose
OR			
Clindamycin IV	At induction	600mg (child: 20 mg/kg up to 600 mg)	One dose

Endocarditis prophylaxis for genitourinary and gastrointestinal tract procedures

Bacteraemia associated with genitourinary and gastrointestinal tract procedures predominantly involves enterococci, which are known to cause infective endocarditis.

In patients with a cardiac condition listed above **and** who:

- have an established genitourinary or intra-abdominal infection or
- require surgical antibiotic prophylaxis for a genitourinary or gastrointestinal tract procedure

The regimen selected should include an antibiotic active against enterococci (eg amoxycillin, amoxycillin+clavulanate, piperacillin+tazobactam or vancomycin). If the regimen does not include an antibiotic active against enterococci, **add**:

DRUG & ROUTE	TIMING	DOSAGE	DURATION
Ampicillin IV	At induction	2g (child: 50mg/kg up to	One dose
For patients with immediate hypersensitivity to penicillins, or cephalosporin hypersensitivity, replace Ampicillin with:			
Vancomycin[1] IV	Commence 120 mins before skin incision	Adult: 1g (1.5g patients weighing >80kg) Child: 30mg/kg up to 1.5g	One dose

1. Teicoplanin can be used as an alternative for vancomycin, see Table 1. for dose and administration details

ERAS – Total Hip and Knee Arthroplasty

Anaesthesia Pathway

Pre-operative

1. Pre-anaesthetic Clinic 2-4/52 prior to surgery
    a. Pre-op screening as per major surgery protocols
    b. Identify contraindications to ERAS protocol -> discuss with surgical team if identified
    c. Prescribe pre-medications for DSU on inpatient drug chart:
        i. Po Paracetamol 1 g Pre-op in DSU
        ii. Po Tapentadol SR 100 mg Pre-op in DSU
    d. Framing & consent
        i. Anaesthetic options
        ii. Post-op analgesia
        iii. Reinforce need for early mobilisation

Day of Surgery

1. Fasting as per department guidelines
2. Pre-medications as prescribed

Arrival Induction Bay

1. IV access
2. IV antibiotics with monitoring in place given slowly
    a. 2 g Cephazolin iv unless contraindicated
    b. 1 g Vancomycin if Cephazolin contraindicated

Intraoperative Plan

1. Choice of anaesthetic technique at the anaesthetist's discretion however **a spinal is the preferred technique**
    a. Suggest intrathecal fentanyl 15 MICROg
    b. No intrathecal morphine
    c. It is acceptable to do Spinal with GA or Spinal with Sedation
2. If Spinal is contraindicated
    a. Consider IV Tramadol 3 mg/kg
    b. Consider TIVA to reduce risk of PONV
3. IV Tranexamic Acid 1 g
4. Dexamethasone antiemetic prophylaxis 8 mg
5. Consider 2nd intravenous antiemetic at end of the case (Ondansetron 4 mg, Droperidol 0.5-1 mg or Cyclizine 50 mg)
6. IV Parecoxib 40 mg unless contraindicated (suggested CIs as below)
    a. NSAID allergy
    b. eGFR <60
    c. Acute Coronary Event (STEMI / NSTEMI / Coronary stent) <12 months ago
    d. Cerebrovascular event <12 months ago
7. Local anaesthetic maximum dose 4 mg/kg of Ropivacaine divided between:
    a. Surgical periarticular infiltration up to 150 mL 0.2% Ropivacaine (300 mg) for both TKR & THR. 100 mL is the routine volume

    b. If neuraxial block not used motor sparing adductor canal block 20 mL Ropivacaine (adjust concentration to achieve total 4 mg/kg including surgical infiltration) for TKR
8. No routine PU catheter
9. Minimise intraoperative fluid
    a. Aim for no more than 1000 mL + match blood loss
10. Aim for normothermia with forced air warming

PACU

1. Standard post-operative monitoring and assessment
2. Discharge to ward as per routine PACU criteria
3. PACU Pain and PONV Protocol as standard
4. Bladder scan before discharge to ward. If >800 mL in bladder for in/out urinary catheter.

Post-op Plan

1. Not for iv PCA - ***Will need APS referral form for follow-up & PCA form for Antiemetic Protocol***
2. Regular **Immediate Release Oxycodone** 5-10 mg (adjusted for age & co-morbidities) to be administered at 0600 and 1200 only
3. **No SR opioids** unless taking preoperatively (continue any chronic pain medication)
4. Regular PO Paracetamol 1 g TDS or QID
5. Regular PO Ibuprofen 400 mg TDS unless NSAID contraindicated (see above)
6. Regular PO Esomeprazole 40 mg OD whilst taking NSAID
7. APS Antiemetic Protocol
8. PRN Oral Oxycodone
    a. 5-20 mg 3hly (adjusted for age & co-morbidities)
    b. Withhold if RR<10 or Sedation Score ≥2
9. PRN Tramadol unless contraindicated
    a. Po/IV 50-100 mg 6hly
10. PRN IV Morphine for breakthrough (Oxycodone if Morphine intolerant)
    a. 2.5-5 mg with max 15-20 mg 3hly (adjusted for age & co-morbidities)
    b. Withhold if RR<10 or Sedation Score ≥2
11. 1000 mL Hartmann's over 12 hours prescribed
    a. 1 bag only
    b. Cease once eating and drinking
12. Early mobilisation with physio
    a. Aim for 4 hours post-op
13. If not passed urine by 6 hours post-op bladder scan & urinary catheter as required
14. APS review day one post-op as routine and PRN subsequently
    a. Individualise pain management as required
    b. PCA as rescue only
15. If patient requires >4 breakthrough doses of Oxycodone in 24h consider brief (<10 days) course of Targin SR
    a. Targin dose calculated as 50% of the **total** IR Oxycodone (Regular and PRN) from previous 24h in 2 divided doses 12 hourly
    b. Cease **regular** IR Oxycodone if commencing Targin SR
16. DVT Prophylaxis as per surgical preference
17. Oral Dexamethasone 8 mg Mane for 2 days only post-op

Local Anaesthetic Toxicity Management

Adapted from Guidelines from The Association of Anaesthetists of Great Britain and Ireland
Endorsed by Australian & New Zealand College of Anaesthetists - www.aagbi.org

<table>
<tr><td>1
Recognition</td><td colspan="2">Signs of severe toxicity
Sudden alteration of mental state, severe agitation or loss of consciousness, with or without tonic-clonic convulsions
Cardiovascular collapse: sinus bradycardia, conduction blocks, asystole and ventricular tachyarrhythmias may all occur
Local anaesthetic toxicity may occur sometime after the initial injection</td></tr>
<tr><td>2
Immediate Management</td><td colspan="2">Stop injecting local anaesthetic – remember infusion pumps
Call for help
Maintain the airway & intubate if necessary
Give 100% oxygen and ensure adequate lung ventilation (hyperventilation may help in increasing plasma pH in the presence of metabolic acidosis)
Confirm or establish intravenous access
Control seizure with benzodiazepine, thiopentone or propofol in small incremental doses
Assess cardiovascular status throughout</td></tr>
<tr><td>3
Treatment</td><td>Circulatory Arrest
Start CPR using ALS protocols
Manage arrhythmias using ALS protocols (may be refractory to treatment)
Lignocaine not indicated
Administer Lipid Emulsion[1,2]
(See below for administration)
Continue CPR throughout treatment
Recovery may take >1 hour</td><td>Without Circulatory Arrest
Use conventional therapies to treat:
Hypotension
Brady or tachyarrhythmias
Consider Lipid Emulsion</td></tr>
<tr><td>4
Follow-up</td><td colspan="2">Observe until sustained recovery achieved
Regular clinical review for pancreatitis (including daily lipase for 2 days)</td></tr>
</table>

[1] Propofol is not a suitable substitute for Lipid Emulsion
[2] Lipid Emulsion is also known as Fat Emulsion (iPharmacy).

At Cairns we currently stock CLINOLEIC brand, other brands include SMOFlipid and Intralipid

Educational material and up-to-date lists of relevant publications available at ***www.lipidrescue.org***

LIPID EMULSION 20% (Clinoleic) ADMINISTRATION

LIPID EMULSION IS STORED IN THE THEATRE ARREST TROLLEYS

Immediately

- Give bolus of 20% Lipid Emulsion, **1.5 mL/kg over 1 minute** AND
- Start infusion of 20% Lipid Emulsion at **15 mL/kg/hour**

After 5 minutes reassess

- Give a maximum of 2 further boluses (5 minutes between each bolus) **AND**
- Double infusion rate to **30 mL/kg/hour** if:
  - Cardiovascular stability not restored
  - Cardiovascular status deteriorates
- Continue infusion until stable and adequate circulation restored

Lipid Emulsion dose ***should not exceed*** *a maximum cumulative dose of 12 mL/kg*

Management of Anaphylaxis

- The Anaphylaxis folder can be found in the two theatre arrest trolleys.
- Adult and paediatric sections contain respective cards for immediate management, refractory management, differential diagnosis and post crisis management.
- Tryptase tubes and lab forms are in the folder.
- Detailed information on where to get drugs for refractory anaphylaxis is included on the front of the folder.

IMMEDIATE MANAGEMENT

D **R**	Danger & Diagnosis Response to stimulus	Unresponsive hypotension or bronchospasm Cease triggers including Chlorhexidine and Colloid Stop procedure. Use minimal volatile if GA	
S	Send for help and organise team	Call for help Assign a designated leader and scribe Assign a reader of Anaphylaxis Card	
A **B**	Secure Airway Breathing with 100% Oxygen	Intubate: airway oedema or compromise Confirm FiO2 is 100%	
C	Circulation: CPR if no pulse Give IV fluid bolus	If no pulse give 1 mg Adrenaline IV (Paediatrics 10 MICROg/kg) and follow ALS protocol IV Fluid: 20 mL/kg bolus repeat PRN	
D	Drugs: Adrenaline IV bolus, repeat every 1 to 2 minutes if needed and prepare Infusion	IV Adrenaline boluses: see below Dilution: 1 mg in 10 mL (100 MICROg/mL)	
	Adrenaline infusion: Adrenaline 6 mg in 100 mL (1mL/hour = 1 MICROg/minute)	Moderate hypotension or bronchospasm bolus dose	Severe hypotension or bronchospasm bolus dose
	Adult 0.05 to 0.5 MICROg/kg/minute Child 0.1 to 2 MICROg/kg/minute	**Adult**: 5 to 20 MICROg **Child**: 1 to 5 MICROg /kg	**Adult**: 100 to 200 MICROg **Child**: 5 to 10 MICROg/kg

Adapted from Guidelines from Australian & New Zealand Anaesthetic Allergy Group and ANZCA - www.anzaag.com

REFRACTORY MANAGEMENT

Ensure possible triggers removed

- Consider Chlorhexidine (impregnated CVCs / IDCs inserted with chlorhexidine lubricant)
- Colloids to stop if running
- Ensure no LATEX in theatre

Consider other causes

Monitoring

- Consider arterial line and CVC

Request further help

Resistant Hypotension - ADULTS

- **Noradrenaline Infusion** 3 – 40 MICROg/min
  (0.05 - 0.5 MICROg/kg/min) and/or

- **Vasopressin** bolus 1- 2 units then 2 units per hour

  If neither available use either **Metaraminol** or **Phenylephrine Infusion**

- **Glucagon** 1- 2 mg I.V. every 5 min until response
  Draw up and administer I.V. (Counteract β blockers)

Resistant Hypotension - PAEDIATRIC

- **Noradrenaline infusion 0.1 - 2 MICROg/kg/min**
  0.15 mg/kg in 50 mL run at 2 - 40 mL/hour

  and/or

- **Vasopressin infusion 0.02 - 0.06 units/kg/hour**
  1 unit/kg in 50 mL
  2 mL bolus then 1 - 3 mL/hour

- **Glucagon 40 MICROg/kg I.V. to max 1 mg**

Resistant Bronchospasm - ADULTS

- **Salbutamol**
  Metered Dose Inhaler 12 puffs (1200 MICROg)

  I.V. bolus 100-200 MICROg +/- infusion 5-25 MICROg/min

- **Magnesium** 2 g (8 mmol) over 20 minutes
- Consider Inhalational Anaesthetics and Ketamine
- Consider Tension Pneumothorax

Resistant Bronchospasm – PAEDIATRIC

- **Salbutamol**
  Metered Dose Inhaler (100 MICROg/puff)
  < 6 years - 6 puffs

  > 6 years - 12 puffs

  I.V. Infusion

as per local paediatric protocol

- **Magnesium sulfate 50% (500 mg/mL)**
  50 mg/kg to max 2 g over 20 minutes

  (0.1 mL/kg 50% solution= 50 mg/kg)
- **Aminophylline** 10 mg/kg over 1 hour (max 500 mg)
- **Hydrocortisone** 2 - 4 mg/kg (max 200 mg)

Pregnancy

- Lateral tilt
- Caesarean section if arrest or peri-arrest

POST CRISIS MANAGEMENT

Consider Steroids

- Dexamethasone 0.1 to 0.4 mg/kg (12 mg max for paediatrics)
- Hydrocortisone 2 to 4 mg/kg (200 mg max for paediatrics)

Consider ORAL antihistamines

- Promethazine 0.2 to 0.5 mg/kg (Parental not recommended)

Investigations

- Tryptase at 1 hour, 4 hours & >24 hours

Neuraxial Morphine Administration

Cairns & Hinterland Hospital & Health Service

Neuraxial Morphine

Single Dose - Adult

Facility:.....

(Affix identification label here)

URN:

Family name:

Given name

Address:

Date of birth: Sex: ☐ M ☐ F ☐ I

Monitoring Requirements for Neuraxial Morphine Single Dose

What: Sedation score, respiratory rate, oxygen saturation, pain scores*
*Not necessary when Sedation score = S (sleep)

When: Hourly for 8 hours then 2nd hourly for 4 hours, then normal observations.

Date Morphine administration	Time of administration	Route (Spinal Or Epidural)	Dose given (microg or mg)	Medical Officer Administering (Sign and print name)

Neuraxial Morphine Management Guidelines

- Delayed sedation and respiratory depression is possible with neuraxial opioids
- **Do not prescribe slow release opioids or other sedatives for patients who have received neuraxial opioids in the first 24 hours post administration without discussion with APS**
- Intravenous access should be maintained for 24 hours post neuraxial morphine dose unless directed by APS
- Record observations in patient chart and follow Q-ADDS score to guide response to observations
- Contact APS for concern regarding uncontrolled pain

Managing Neuraxial Morphine Adverse Effects

- Pruritus is more common when opioids are administered neuraxially. Low dose naloxone should be used as the first line of treatment. If this is ineffective, contact APS
- Antihistamines used for pruritus are generally ineffective and may contribute to sedation
- Urinary retention: Contact the patient's surgical/medical team
- Use Nausea protocol, if this is ineffective, contact APS

APS contact: In Hours: APS nurse 66938 or APS registrar via switch. Out of hours: contact 66910

Naloxone Protocol for Sedation

If sedation score = 2 and respiratory rate < 8 per minute OR if sedation score = 3 a Registered Nurse / Midwife is authorised to:

1. Dilute naloxone 400 microg to 4 mL with sodium chloride 0.9% (Final concentration = 100 micrograms/mL).
2. Give naloxone 100 microg(1 mL) every 2 minutes until sedation score is less than 2 or a maximum dose of 400 microg has been given.
3. Ensure **APS** has been notified and patient is receiving oxygen. Remain with patient and continue monitoring every 10 minutes for a further half hour, then every hour for a further 2 hours. If sedation score returns to greater than or equal to 2, repeat steps 1-3.

Any administered doses must be recorded on the front page of the patient's Medication Chart under Nurse initiated Medicines.

Prescriber Name:		Designation:	
Signature:		Date:	

Neuraxial Morphine Single Dose - Adult MR404

Cairns & Hinterland Hospital & Health Service

Neuraxial Morphine Single Dose - Adult

Cairns Hospital

(Affix identification label here)

URN:

Family name:

Given name

Address:

Date of birth: Sex: ☐ M ☐ F ☐ I

Oxygen Protocol

Oxygen flow rate at up to _____L per minute via nasal prong □ or face mask □ **if needed** to maintain SpO2 range from _____to _____%

Nausea Protocol:

1. Give drugs in the order prescribed until nausea is relieved and record below
2. If nausea persists after 15 mins give the next drug
3. If a drug works (nausea relieved for 4 hours) start with that drug next time.
4. If all 3 drugs are ineffective or nausea recurs within 4 hours, notify APS.

Drug	Dose / Route	Record of drug given									
		Date / Time	Name / Sign	Date / Time	Name / Sign	Date / Time	Name / Sign	Date / Time	Name / Sign	Date / Time	Name / Sign
1. Metoclopramide	10 mg IV/IM										
2. Ondansetron	4 mg IV/PO										
3. Droperidol#	1mg IV										

Droperidol preparation: Dilute 2.5 mg (1 amp) up to 2.5 mL in total with sodium chloride 0.9% and give 1 mL

Itch Protocol:

1. Give naloxone 100microg IV injection until itch is relieved and record doses given in table below.
2. If itch persists after 15 mins, give the next drug
3. If a drug works (itch relieved for 4 hours), start with that drug next time
4. If the above fails, consider another bolus of naloxone followed by a naloxone infusion.
   EG: Dilute 400 microg naloxone up to 100mL with 0.9% sodium chloride (4 microg/mL) and run at 40 to 160 microg/hour (10 - 40 mL/hour). This must be prescribed on an IV fluid order form and can be used in a normal ward setting for management of pruritus. Discuss with APS if required.
5. Antihistamines for neuraxial opioid induced itch are generally ineffective and may contribute to sedation

Drug	Dose / Route	Record of drug given									
		Date / Time	Name / Sign	Date / Time	Name / Sign	Date / Time	Name / Sign	Date / Time	Name / Sign	Date / Time	Name / Sign
1. Naloxone * IV injection	100 microg IV injection										
2. Ondansetron	4mg IV										
3. Naloxone IV infusion	IV infusion	Prescribe on IV fluid order form.				Date infusion commenced:					

*Naloxone IV injection preparation: Dilute 400 microg (1 amp) up to 4 mL in total with sodium chloride 0.9% and give 1 mL

Name:		Designation:	
Prescriber Signature:		Date:	

Sip Til Send – Fasting Guidelines

Preoperative Fasting

The aim of restricting solids and liquids prior to a procedure under general anaesthesia or procedural sedation is to minimise the risk of pulmonary aspiration during a period when airway protective reflexes are impaired. The duration of fasting should be sufficient to minimise gastric volume thus reducing the potential for significant regurgitation and aspiration.

However, inappropriate and/or prolonged liquid fasting can cause discomfort, dehydration, headaches, nausea and vomiting, hypoglycaemia, electrolyte imbalance, intraoperative hypotension, delirium, and make it harder to insert an intravenous cannula.

Traditional time-based restrictions on liquid consumption have been shown to lead to prolonged duration of liquid fasting.

The **Sip Til Send** program shortens the time patients need to fast from liquids without increasing the risk of pulmonary aspiration. It allows patients to sip clear liquids (as defined below) until they are called to theatre or procedure area.

Sip Til Send Fasting Pathway

The **Sip Til Send fasting pathway** is the **normal hospital-wide default** fasting pathway in patients booked for anaesthesia or sedation under the care of an anaesthetist. It applies to patients of all ages, who are having elective or urgent procedures, **UNLESS** they are unsuitable due to medical or surgical reasons, or **UNLESS** the specialist doctor or anaesthetist requests the **non-Sip Til Send fasting pathway** or **Nil by mouth**.

Patients are **offered** clear liquids to sip on, but they **don't have to** if they don't want to.

Sip Til Send - Fasting Before Anaesthesia and Procedural Sedation

Adults:

- Stop solid food and "free fluid" diets 6 hours before anaesthesia.
- After that, they can sip clear liquids, (up to 200ml per hour), *until they are called to the surgery or procedure area*.

Further advice regarding adults:

- A patient scheduled on a MORNING or ALL-DAY operating list should stop solid food at MIDNIGHT.
- A patient scheduled on an AFTERNOON operating list can have a light

breakfast, so long as it is finished by 6:30AM, since their surgery will be after 12:30PM.

- Oral medications (including regular medications, analgesics and pre-medication) should be given when they are due, with a sip of clear liquid.
- Certain patient groups (diabetics, elderly etc) are at greater risk from prolonged fasting compared to the general population. Please consider prioritizing these patients and making them 1st on the theatre list to reduce their fasting time.
- Dialysis and cardiac patients on fluid restrictions should Sip Til Send within their daily volume allowance.
- Each patient should be individually assessed to exclude co-morbidities that may necessitate variation in fasting times or the use of prokinetic or alkalinising agents. Please contact the attending anaesthetist (or the anaesthetist on call – 66910) or the proceduralist if there are patient-specific concerns regarding fasting times.

Children over 6 months old:

- Stop formula milk & solid food 6 hours before anaesthesia.
- Stop breastfeeding 4 hours before anaesthesia.
- After that, they can drink clear liquids up to 3ml per kg of their body weight each hour (maximum 200ml per hour) *until they are called to the surgery or procedure area.* See Appendix 1 for calculation table.

Children under 6 months old:

- Stop formula milk & solid food 4 hours before anaesthesia.
- Stop breastfeeding at least 3 hours before anaesthesia.
- Can drink clear liquids up to 3ml per kg of their body weight per hour *until they are called to the surgery or procedure area*. See Appendix 1 for calculation table.

<u>Further advice regarding children:</u>

- Parents or ward staff should time the fasting period for 8:00AM surgery if the child is on a MORNING or ALL-DAY operating list, and 12:30PM surgery if the child is on an AFTERNOON list.
- A child scheduled on an AFTERNOON operating list can have a light breakfast, so long as it is finished by 06:30AM, since their surgery will be after 12:30PM.
- Oral medications (including regular medications, analgesics and pre-

medication) should be given when they are due, with a sip of clear liquid.

Patients undergoing procedures with regional anaesthesia only

- "Regional anaesthesia only" procedures performed by anaesthetists often involve giving intravenous sedation, therefore there is still the risk of pulmonary aspiration.
- Follow the **same fasting rules as the Sip Til Send fasting pathway**, according to the patient's age group.

Patients undergoing procedures with local anaesthesia only

- No fasting required – patients should eat and drink until called to theatre or procedural area

Patients requiring urgent or emergency surgery

- For this group of patients, the time from booking of the case until time of surgery varies greatly, from less than 1 hour to several days.
- By default, patients booked for urgent or emergency surgery will be offered Sip Til Send, unless they meet criteria for exclusion as stated in the section "who should not be offered Sip Til Send."
- Clinical needs should be individualised and prioritised. At the time of booking a case for an emergency theatre, the doctor from the home team who makes the booking should discuss with the duty anaesthetist (DECT 66910) to confirm patient suitability for Sip Til Send.
- The home team doctor will then ensure adequate communication of fasting status with the patient and nurse/midwife team.
- Home team doctor will document fasting instructions in ieMR (see section below for documentation instructions).
- Check with the surgeon/proceduralist or anaesthetist if in doubt.

Non-Sip Til Send Fasting Pathway

Sip Til Send is not intended for patients who are nil-by-mouth for medical or surgical reasons. **Seek advice from a doctor prior to excluding a patient from Sip Til Send.** Contact a doctor from the home team, the anaesthetist who will attend the patient (if known), or the duty anaesthetist (DECT 66910 – available 24 hours).

For patients who are NOT suitable for Sip Til Send and are NOT nil-by-mouth, follow the non- Sip Til Send fasting pathway:

Adults:

- Stop solid food 6 hours before anaesthesia.
- Stop drinking 2 hours before anaesthesia.
- From 6 hours until 2 hours before, they can have clear liquids up to 200ml/hour (maximum 400ml).

Children over 6 months:

- Stop formula milk & solid food 6 hours before anaesthesia
- Stop breastfeeding 4 hours before anaesthesia
- Clear liquids up to 3ml per kg per hour (maximum 200ml per hour) & stop 1 hour before anaesthesia. See Appendix 1 for calculation table.

Children under 6 months:

- Stop formula milk & solid food 4 hours before anaesthesia
- Stop breastfeeding 3 hours before anaesthesia
- Clear liquids up to 3ml/kg/hour, and stop 1 hour before anaesthesia See Appendix 1 for calculation table.

Inclusion and Exclusion Criteria for Sip Til Send

Who can be offered Sip Til Send?

- Emergency and electively booked procedures/investigations, where an anaesthetist will be involved in care.
- Inpatients as well as patients admitted from home for their surgery (Sip Til Send begins once they reach hospital).
- Women having elective Caesarean sections and non-labouring emergency Caesarean sections.
- Patients undergoing endoscopy, cardiology and radiology procedures **WITH** an anaesthetist present. These patients may have specific requirements, see relevant sections below.

Who should not be offered Sip Til Send?

- Patients who shouldn't eat or drink because of medical conditions (like after a stroke or needing special diets).
- Patients who shouldn't eat or drink before surgery (like those with an obstruction in their gastro-intestinal system).
- Any patient considered unsuitable by an anaesthetist or doctor performing the surgery or procedure. This decision will be communicated clearly by the doctor to nurses/midwives and the patient, and documented in ieMR.
- Patients undergoing endoscopy, cardiology and radiology procedures **WITHOUT** an anaesthetist present.
- **ALL THE ABOVE PATIENTS are still allowed to moisten their lips and mouth with water.**

Questions and Escalation Pathway Regarding Fasting

If there is uncertainty about a patient's fasting, check with a doctor on the patient's home team, or an anaesthetist (preferably the one who will anaesthetise the patient if known, otherwise call the duty anaesthetist – DECT 66910).

Any variation to these guidelines can only be authorised by an anaesthetist.

FAILURE TO OBSERVE THESE GUIDELINES MAY RESULT IN THE PROCEDURE BEING DEFERRED OR CANCELLED

Documentation

All non-electively booked patients should have documentation in ieMR specifying which fasting pathway to follow. As part of the home team's written plan in ieMR, a fasting plan will be included, **using an Autotext expansion preset**.

For electively booked patients, the default is for the Sip Til Send fasting pathway. Elective patients deemed unsuitable for Sip Til Send will be flagged on the Elective Operation Request form (MR73C) by staff in Pre-Admissions Clinic or Antenatal Clinic. Day Surgery Unit staff or maternity ward staff will look for this and transfer the non-Sip Til Send status to the perioperative case tracking board.

Nurses and midwives should document fasting status on the preoperative checklist in ieMR. Document the time the patient last had clear liquid intake. If the patient has correctly followed either the Sip Til Send fasting pathway, the non-Sip Til Send fasting pathway or nil by mouth pathway, tick YES for the

patient being "fasted". Otherwise tick NO.

In addition to documentation, every effort must be undertaken to verbally communicate the fasting pathway to all relevant parties.

Clear Liquids allowed for Sip Til Send

Preoperative liquids under the Sip Til Send protocol must **exclude** all liquids containing fat, protein and insoluble fibre. Please note: clear soups, thickened fluids and jelly that are normally included in a hospital "clear fluid" diet are NOT suitable for preoperative liquids.

Allowed	Not Allowed
"**CLEAR**" DRINKS that you can "**SEE THROUGH**" without pulp/solid material • Water • Black tea and coffee (no milk) • Clear icy poles (pulp free) • Clear cordials • Clear (pulp free) juices e.g. apple • Isotonic sports drinks e.g. Gatorade and Powerade • Oral rehydration solutions e.g. Hydralyte, Gastrolyte NOTE: Diabetic patients may require the diet version of the allowed clear liquids when available. Note: Endoscopy patients are allowed water only	• All **"NON-CLEAR"** liquids • Fizzy/carbonated drinks including clear fizzy drinks e.g. lemonade • Jelly, due to being solid • Cloudy liquids containing pulp or solid material e.g. orange and pear juice • Clear protein drinks • Thickened liquids • Any dairy and non-dairy milk products • Bone broth, beef extract or beef tea

Specific Instructions According to Substance

ORAL INTAKE	FASTING INSTRUCTIONS
Clear liquids under Sip Til Send protocol (Refer to appropriate Sip Til Send Clear liquids table)	Adults are allowed to sip 200ml per hour until taken to attend procedure. Children are allowed up to 3mls per kg per hour (max 200mls/hour) until taken to attend procedure.

Thickened clear liquids	Can be consumed up until 2 hours before procedure
Solids, "free fluid diets" & non- clear liquids (Including enteral nutrition)	May be consumed up to 6 hours before procedure
Chewing gum	Must be discarded before procedure due to its risk as a foreign body rather than increasing gastric contents
Lollies	Sucking lollies is not permitted
Enteral feeding	Enteral feeds can be provided up to 6 hours before procedure. Water flushes with a total volume of 200mL per hour (3ml per kg per hour for paediatric patients) can be provided until the patient is taken to attend procedure
Medications	Should not be withheld purely for fasting purposes. Follow the medical officer's instruction for individual medication plans. Escalate concerns and seek clarification when unclear. Document appropriately when medication administered or the rationale if withheld. Refer to Perioperative Medication in Fasting Patients Clinical Guideline

Endoscopy Procedures

Patients scheduled for an endoscopy procedure involving an anaesthetist should be offered **water- only Sip Til Send** protocol. This applies to cases done in theatre complex and in the endoscopy suite.

Inpatients:

- Water-only Sip Til Send while on the ward, adults 200ml/hr of water and children 3ml/kg/hour (max 200ml/hr). Stop sipping when leaving the ward to transfer to theatre or endoscopy suite.

Outpatients:

- Water-only Sip Til Send after admission, when sitting in the waiting chairs. Stop sipping when leaving the chairs to come across to a bed in holding bay. Adults 200ml/hour of water.
- If patient receives anti-froth solution (Infacol / simeticone) while waiting for the procedure, ensure that the total volume of water plus Infacol does not exceed 200ml per hour for an adult and 3ml/kg/hour (max 200ml) for children up to 16 years of age.

- Examples:
    - If an adult drinks 50ml of Infacol solution on admission to the endoscopy suite, offer an additional 150ml water for that hour.

    - If a child weighing 25kg drinks 20ml Infacol solution, offer an additional 55ml water for that hour. Calculation: allowed volume per hour is 3 x 25 = 75ml. 20ml Infacol + 55ml water = 75ml total volume per hour.

Cardiology Procedures

Inpatients scheduled for a cardiology procedure in the Cardiac Investigation Unit involving an anaesthetist should be offered the Sip Til Send liquid fasting protocol (outlined above), unless they meet exclusion criteria listed under the section “who cannot use Sip Til Send.”

- For inpatients, stop sipping clear liquids when called to leave the ward of origin and transported to the Cardiac Investigation Unit.
- The Cardiac Investigation Unit holding bay and recovery does not offer Sip Til Send liquids.
- Sip Til Send protocol only applies to patients who are in the hospital. Therefore, elective patients coming from home on day of procedure will not be offered Sip Til Send.
- Patients on fluid volume restrictions should Sip Til Send within the daily allowed volumes.

Radiology Procedures

Radiology procedures involving an anaesthetist will be flagged as Sip Til Send candidates during booking. Pre-Admissions Clinic staff will deem patients "suitable" or "not suitable." For any patient who is not reviewed by Pre-Admissions Clinic, contact either the attending anaesthetist or the anaesthetist on call (DECT 66910).

Emergency Department

Patients in the emergency department (ED) who are fasting for an operation or procedure where an anaesthetist will be involved, should be offered the Sip Til Send Liquid Fasting Protocol, **but only once ALL the following conditions are met**:

1. Confirmation of suitability with a doctor on the surgical/procedural team or the on-call anaesthetist (DECT 66910).
2. The patient meets the criteria for Sip Til Send fasting and no

exclusion criteria (outlined above).

3. The patient is **also** charted for intravenous fluids as would usually be indicated for a fasting patient.
    a. Sip Til Send is a method to ensure that fluid-deficient patients are adequately "topped up" in case the prescribed IV fluids are insufficient. Sip Til Send is not a replacement for IV fluid therapy.
4. It is emphasised to the patient that they can sip but don't have to if they don't want to.

Intravenous Fluid Hydration

Sip Til Send is to be offered at the same time as, and not a substitute for, intravenous fluid hydration. All patients expected to require a prolonged period of fasting prior to surgery should be considered for placement of an intravenous cannula and commenced on preoperative intravenous fluid hydration. Seek advice from the treating team. Sip Til Send should be viewed as a security measure against patients receiving insufficient liquid intake despite the intention to provide adequate intravenous hydration during long periods of fasting.

Roles and Responsibilities

Role	Responsibility
Anaesthetics	• Provision of clear and evidence-based instructions of fasting times to patients and nursing staff. • Identify any patients who are unsuitable for Sip Til Send, communicate this to relevant parties including ward nursing staff and identify alternative fasting plan. • Prescribe intravenous fluid if required. • Prescription of insulin regimens for diabetic patients, in consultation with endocrine, where appropriate. • Review of medications required preoperatively and providing administration instructions as required.

Doctors who book procedures	• Electively booked cases that pass through the anaesthesia preadmissions clinic will be assessed by clinic staff for Sip Til Send suitability. • For non-elective bookings, identify any patients who are unsuitable for Sip Til Send and communicate this to relevant parties including anaesthetist and ward nursing staff. • For non-elective bookings, document in ieMR using the Sip Til Send auto-text expansion. • Prescribe intravenous fluid if required. • Review of medications required preoperatively and providing administration instructions as required.
Ward Nursing Staff	Patient Communication • Nursing to inform patients and carers of fasting instructions and upcoming procedure/surgery • Fasting instructions to be updated on patient's communication board in room Diet code prescription (Sip Til Send patients) • Patients are to be assigned "NIL BY MOUTH" Diet code on Trendcare 6 hours prior to planned procedure, with Nursing Staff to document Sip Til Send in Nursing Staff Diet Notes Sip Til Send Clear Liquid Provision • Sip Til Send clear liquids are only to be provided and monitored by the ward Nursing Staff • Documentation of liquid intake (volume and time) is to be completed via the fluid intake record (adult or paediatric version) Escalation • Communicate any preoperative fasting concerns to anaesthetist and/or surgeon • Escalate patient deterioration or concerns Diabetic patients • Monitoring of BGL's • Management of diabetic medications and the administration of glucose as ordered

Theatre Nursing Staff	• When sending for a patient, check which fasting pathway was assigned to the patient. If any deviation from that protocol, inform anaesthetist prior to calling for the patient. • Document fasting status in preoperative checklist

Ward Supply of Sip Til Send Clear Liquids

- Wards are responsible for ordering and maintaining supply of Sip Til Send clear liquids.
- Sip Til Send clear liquids are to be ordered from Foodservice and stored in the ward pantry.
- Poster of Sip Til Send clear liquids is to be hung in ward pantry to help advise Nursing Staff of appropriate stock to provide to patients.

Patient Information

Patient information sheets are to be provided to all elective patients preoperatively outlining the fasting requirements prior to surgery. Patients requiring emergency surgery are to have their fasting status communicated to them by the treating team and/or anaesthetist and nursing staff. This is to be documented on the patient communication board.

Appendix 1

Paediatric Sip Til Send Liquid Volumes

Based on 3mls per kg per hour

Weight	**Volume per hour**	**Weight**	**Volume per hour**
5kg	15mls	35kg	105mls
10kg	30mls	40kg	120mls
15kg	45mls	45kg	135mls
20kg	60mls	50kg	150mls
25kg	75mls	55kg	165mls
30kg	90mls	60kg	180mls

Airway Management

Airway assessment

Look for suspected problems with:

1. Pre- oxygenating
    - Difficult mask seal or cooperation
    - Reduced size of FRC
    - Increased oxygen consumption
2. BMV
    - BMI > 30
    - Edentulous
    - Facial hair
    - OSA or history of snoring
    - Mallampati III or IV
3. Laryngoscopy
    - History
    - Mallampati III or IV
    - Reduced thyromental distance
    - Limited neck extension
    - Restricted mouth opening (and unfavourable dentition)
    - Gross face or neck abnormalities
4. LMA placement
    - Male
    - Poor dentition
    - BMI > 30
5. Anterior neck anatomy

Communication

- If you are in any doubt about your airway plan or your ability to execute it, you should communicate with your consultant.
- You are not expected to manage situations that are beyond your level of experience or expertise.
- You will not be criticised if you ask for help.

Trauma and MET calls

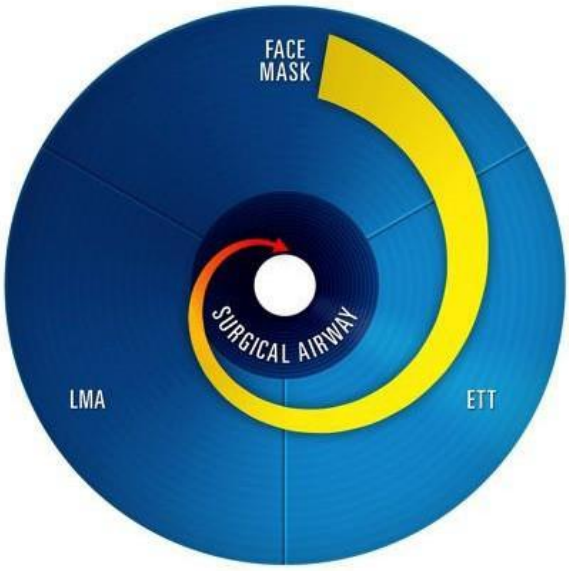
- As the duty anaesthetic registrar, you will not be included in MET calls.

- The duty anaesthetist is included in Trauma Team Activation calls. Primarily your role in Airway Management for Trauma is supportive to the Emergency Department staff as described in the Trauma Team Activation document.
- If there is an anticipated need for anaesthetic airway assistance you will be phoned directly.
- You may occasionally be asked to provide airway assistance in ICU, ED, radiolology, cath lab, or the ward. If you are able to do so, you should attend as requested.
- Your primary responsibility is always with the patient you are currently looking after. If you get asked to assist somewhere else in the hospital while you are busy in theatre, you simply can't go.
- If you can't attend or are out of your depth, the other options for help are the ICU registrar or the consultant on for ICU or anaesthetics.
- For more detail access the Medical Emergency Response procedure for Cairns Hospital.

Unexpected airway emergencies.

- Ultimately there are only four ways to oxygenate a patient:
  1. Through the face – BMV.
  2. Supraglottic – LMA.
  3. Infraglottic from above – ETT.
  4. Infraglottic through the neck.
     - Have an initial attempt, optimise, have another go, then abandon – you must move on.
     - 1, 2 and 3 can be done in any order.
     - Have no more than three attempts at each of 1, 2 and 3 (preferably only two).
     - Don't keep repeating unsuccessful things.
     - If necessary, the patient ends up with a hole in their neck, and you should do this BEFORE they die.
- A useful model for emergencies is the Airway Vortex (Nicholas Chrimes 2013).

Imagine you are looking down into a funnel and rolling a marble around the edge. You can start in any of the three regions and go in either direction, but if they all fail you put a hole in the patient's neck.



https://www.vortexapproach.org/

Advanced airway equipment.

1. Video-laryngoscopes
    - Each operating theatre has a video-laryngoscope with size 3 and 4 Macintosh shaped blades, as well as "difficult" blades.
    - The blades are cheap and disposable, so there are no restrictions on their use.

2. Can't Intubate Can't Oxygenate (CICO) kit
    - Found in a red folder attached to the side of every anaesthetic trolley.
    - Consists of a laminated flow chart, and two bags of equipment (bag 1 for cannula approach, and bag 2 for scalpel/bougie approach).
    - Contains everything that you need for front of neck access in the setting of CICO.

3. Difficult airway trolley
    - This lives in the technician storage area.
    - Items found on this trolley include:
        - Drugs and equipment for airway topicalization.
        - Adjuncts for awake intubation.
        - Sugammadex 8 x 200mg ampoules for reversal of rocuronium (and vecuronium)
            - Doses are 2, 4 and 16 mg/kg for standard, deep and immediate reversal respectively.

- Cricothyroidotomy/tracheostomy gear (Melker universal emergency cricothyroidotomy catheter set with size 5 cuffed tube).
- Manujet jet ventilator.
- Airway exchange catheter, Aintree catheter, staged extubation kit, endobronchial blocker and bougies.
- CICO kit.

4. Bronchoscopes

- All our bronchoscopes are the disposable "AMBU-scope" video- bronchoscope system.
- The "Ambu-scopes" connect to a small rechargeable monitor that is attached to a drip pole. This system is compact, cheap and mobile (doesn't require electricity).

Airway grab bag

This bag lives on our difficult airway trolley and contains standard equipment for managing airways in off-site locations. There is a video-laryngoscope to grab as well.

Difficult airway documentation

- If a patient requires specialized equipment or advanced airway techniques to safely manage their airway, you are required to clearly document and communicate this information.
- Complete the Difficult Airway Alert SW884 Form
- Copies should go to the patient, their general practitioner and scanned into the notes
- An alert needs to be entered into ieMR and AARK systems

Arterial Catheter Insertion and Management during the Provision of Anaesthesia

Anaesthetists / Medical Staff

- Obtain Consent
- Ensure appropriate medical personnel available
- Patient assessment, including those at higher risk for bleeding or an ischaemic complication (eg: diabetic, peripheral vascular disease).
- Choice of most appropriate insertion site
- Performing the procedure
- Ensure appropriate documentation

Anaesthetic Assistants – Anaesthetic Technicians (HPs) and Registered Nurses

- Prepare equipment for the arterial line insertion
- Assist medical staff with procedure as required
- Label line as arterial
- Perform blood sampling as required
- Ongoing monitoring including flushing, zeroing and maintaining patency
- Performing line and dressing changes intraoperatively as directed by Anaesthetists
- **Compliance with this guideline is mandatory.**

Overview:
A pressure transducer converts the mechanical impulse of a pressure wave into an electrical signal thereby giving a direct measurement of blood pressure.
Arterial blood samples may be collected via a side port for blood gas analysis and multiple other blood tests as required.

Indications

The indications for intra-arterial pressure monitoring include:

- Any major medical or surgical condition that compromises cardiac output (CO), tissue perfusion or fluid volume status
- Clinical conditions that require frequent arterial blood sampling
- Monitoring of vasoactive pharmacologic support

Considerations

The considerations prior to insertion should include:

- Vascular integrity – consider whether to perform a modified Allen Test. **Refer to** Appendix 1

- An arterial puncture should not be performed through a lesion or through / distal to a surgical shunt
- Evidence of infection or peripheral vascular disease in the selected limb
- Potential bleeding risks (an INR ≥3 or APTT ≥100 seconds and a platelet count ≤20,000)
- Is the patient receiving thrombolytic therapy and/or anticoagulant applications (eg: warfarin or heparin)?

Preparation for Insertion of Arterial Catheter

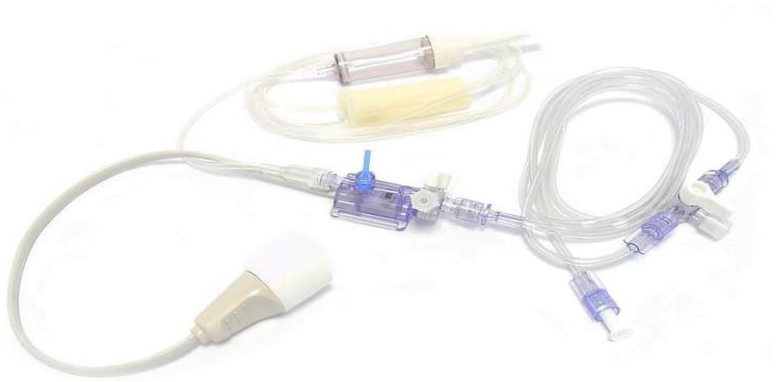
Equipment: can be either:

1) **Anaesthetic Transducer Kit** 2) **ICU/ED Transducer kit**

- ultrasound machine positioned by bedside
- sterile dressing pack
- 1 x 3M SoluPrep Tinted Antiseptic Swab 2% Chlorhexidine gluconate 70% isopropyl alcohol
- Catheter of choice:
    - 3Fr radial Vygon™ arterial catheter- or available alternative
    - 20 GA 1.88in insyte – or available alternative
    - ARROW 20 gauge SAC 0052 variable lengths available

Part 1: Anaesthetic Arterial Line /Transducer Preparation – management

TruWave™ 3cc/72 in (180cm) Ref: PX27in (180 cm)



Anaesthetic Kit :

- TruWave™ Edwards Pressure Transducer Kit Ref PX272 – no adaptor cable required
- Pressure Transducer cable- GE Healthcare
- 1 x 5ml amp Lignocaine 1%

- Syringes: 1x 5ml syringe. 1 x 10ml syringe
- 2 Tegaderm® Advance sterile dressing
- 1 large Tegaderm sterile dressing
- 1 x 500 mL 0.9% Sodium Chloride IV
- 500mL inflatable pressure bag
- Needles: 1 x blunt drawing-up needle, 1 x 25g needle
- Sterile green gauze & 0.9% Normal Saline 10ml ampoules available
- Arrow Spring-wire guide available for a difficult cannulation
- Small rolled towel or gel support may assist with patient's wrist access.

Insertion Procedure:

(Part 1 Anaesthetics) Preparation of the arterial blood sampling system

1. Open Edwards TruWave™ Pressure Transducer Kit. Tighten the two connections next to the transducer and distally.

2. Label and date the 500mL bag of 0.9% Sodium Chloride (attached the label to the spare access port). Label and date the administration set below the drip chamber.

3. Spike the bag with the Pressure Transducer set and squeeze the drip chamber to 3/4 full. Ensure the roller clamp is open and use the blue toggle to prime the line.

4. **Prime the Transducer:** Turn the Stopcock 1 (transducer) OFF to the patient end of the transducer and prime the transducer. The fluid will exit through a hole in the priming cap. Remove the priming cap and replace with a solid white cap.

5. **Prime the Patient Line:** Continue priming the rest of the arterial line to the patient end, ensuring there are no bubbles. Repeat if required until no bubbles are present. Ensure fluid is clearly visible running out at the distal patient end.

6. Place the fluid bag inside the inflatable pressure bag and inflate to 300 mmHg (3 mL per/hr infusion rate) and flush the system. (Steps 7-9 may be done before or after insertion and securing of arterial cannula)

7. Connect the pressure transducer cable (Edwards Lifesciences™) to the monitor and to the ITL adapter cable, then connect the ITL adapter cable to the transducer.

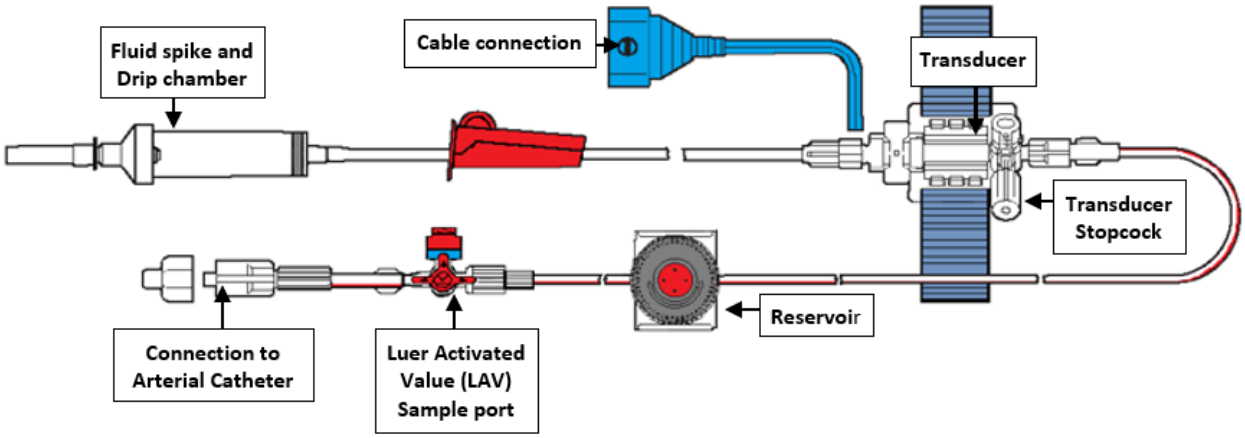
8. Select the label **Art** on the GE monitor.

9. Access via touchscreen and label.

Insertion & dressing

1. Open and prepare the dressing pack.
2. Insert the intra-arterial catheter preferably with ultrasound guidance.
3. As a final check, flush the transducer line to clear any air and ensure saline flows readily from the tip - then connect to intra-arterial catheter and tighten.
4. The Anaesthetic Assistant witnesses guide wire removal from the arterial line by the medical officer.
5. Apply tape and Tegaderm - Ensure adhering the catheter and connector does not apply pressure to the underlying skin causing a device pressure injury.
6. The transducer line may pass between the patient's thumb and forefinger and secured with Hypafix.

Part 2: ICU /ED Vedette Arterial Line /Transducer Preparation - management

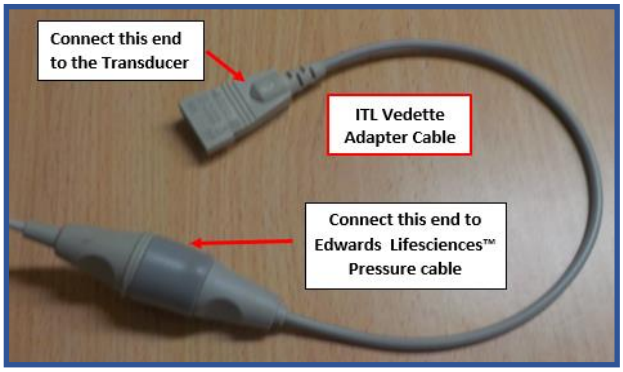


Components: ITL BioMedical™ Vedette Pressure Transducer Kit

ICU Kit

- **ITL BioMedical™** Vedette Pressure Transducer Kit Ref LS-436

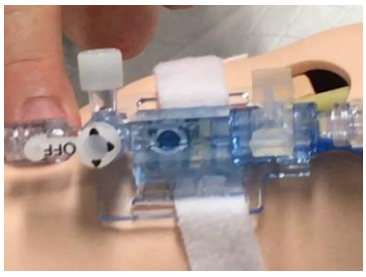
- Pressure Transducer cable (Edwards Lifesciences™) and ITL adapter cable.
- Pressure Transducer cable- GE Healthcare
- 1 x 5ml amp Lignocaine 1%
- Syringes: 1x 5ml syringe. 1 x 10ml syringe
- 2 Tegaderm® Advance sterile dressing
- 1 large Tegaderm sterile dressing
- 1 x 500 mL 0.9% Sodium Chloride IV
- 500mL inflatable pressure bag
- Needles: 1 x blunt drawing-up needle, 1 x 25g (orange) needle
- Sterile green gauze & 0.9% Normal Saline 10ml ampoules available
- Arrow Spring-wire guide available for a difficult cannulation



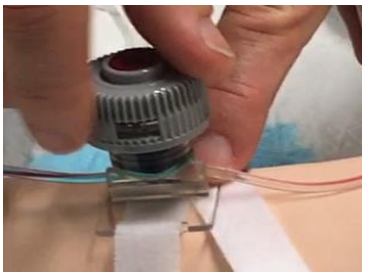
Insertion Procedure:
Preparation of the arterial blood sampling system (Part 2 - ICU)

1. Open the ITL BioMedical™ Vedette Pressure Transducer Kit. Tighten the connections on both sides of the transducer and ensure the reservoir's piston has been screwed downward until it is seated on the reservoir floor.
2. Label and date the 500mL bag of 0.9% Sodium Chloride (attached the label to the spare access port). Label and date the administration set below the drip chamber.

3. Spike the bag with the Pressure Transducer set and squeeze the d full. Ensure the roller clamp is open and use the toggle to prime the line to the patient end.



4. **Prime the Transducer:** Turn the Stopcock 1 (transducer) OFF to the patient end at the transducer and prime the transducer port. The fluid will exit through a hole in the priming cap). Remove the priming cap and replace with a solid white cap.



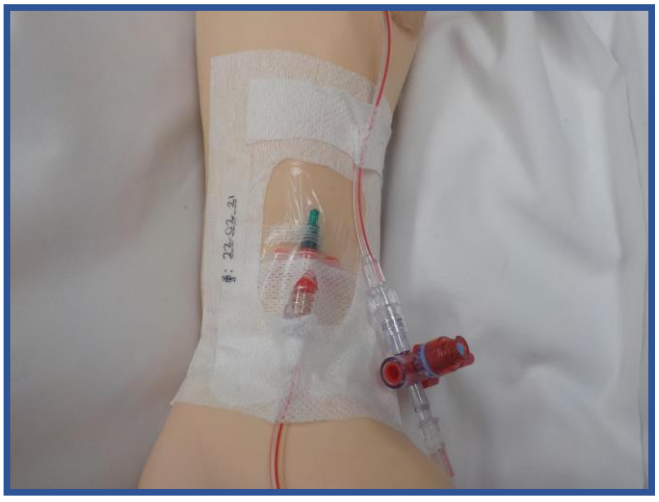
5. **Prime the Transducer:** Turn the Stopcock 1 (transducer) OFF to the patient end at the transducer and prime the transducer port. The fluid will exit through a hole in the priming cap). Remove the priming cap and replace with a solid white cap.

6. **Prime the Luer Activated Valve (LAV)**.
   OPEN the luer activated valve (LAV) to the flush position. Turn the long arm of the stopcock 2, to point away from the (LAV) port **- flush position.**

7. Continue priming the rest of the arterial line to the patient end - ensuring there are no bubbles in the line – repeat if required.
8. Place the fluid bag inside the inflatable pressure bag and inflate to 300 mmHg (for an adult = 3 mL per hour infusion rate) and flush the system. (Steps 9-11 may be done before or after insertion and securing of arterial cannula.)
9. Connect the pressure transducer cable (Edwards Lifesciences™) to the monitor and to the ITL adapter cable, then connect the ITL adapter cable to the transducer.
10. Select the label **Art** on the GE monitor.
11. Access via touchscreen and label.

Insertion & dressing

1. Open and prepare the dressing pack.
2. Insert the intra-arterial catheter preferably with ultrasound guidance.
3. As a final check, flush the transducer line to clear any air and ensure saline flows readily from the tip – then connect to intra arterial catheter and tighten.
4. The Anaesthetic Assistant witnesses guide wire removal from the arterial line by the medical officer.
5. Removes excess blood (to aid adhesion of dressing)
6. Apply tape and Tegaderm - Ensure adhering the catheter and connector does not apply pressure to the underlying skin causing a device pressure injury.
7. The transducer line may pass between the patient's thumb and forefinger and secured with Hypafix.



8. Calibrate (zero) the transducer on the monitor.

Clinical Management of IAL: Shift Review

- Anaesthesia staff systematically assess the arterial line covering the following elements:
  - Insertion site
    - fixation device security
  - Dressing integrity
- Arterial Catheter Insertion and Management, During the Provision of Anaesthesia.
  - Arterial line integrity - accuracy & patency
  - Clear labelling of both the 0.9% Sodium Chloride flush bag and administration set.
  - Replacement of IV flush bag and arterial line

- **No medication or fluid is to be injected into an arterial line at any time.**
- The Arterial insertion site should be visualised at all times where possible throughout surgery.
- At no point should alarms be turned off for arterial lines.
- At no point should the drip chamber of the arterial line be inverted to prevent air entering the system.

Insertion Site

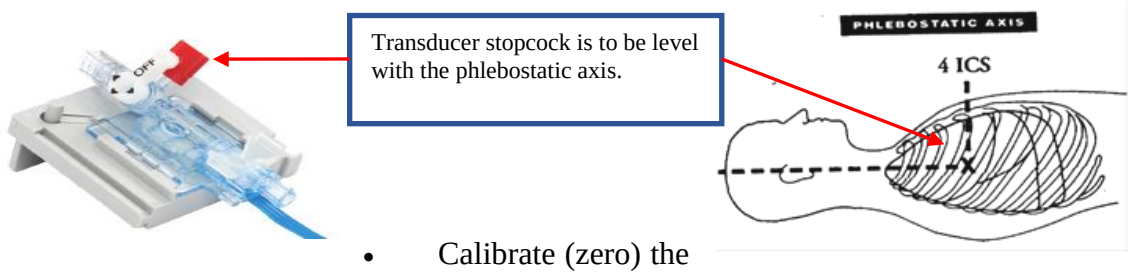
The arterial insertion site to be examined each shift during prolonged surgical periods where access is possible

Dressing Integrity

- Transparent catheter site dressings should be changed when:
  - dressing is not intact i.e. there is no longer a seal.
  - there is excessive accumulation of blood and or moisture under the dressing.

Arterial line integrity accuracy & patency

- Ensure the transducer is secured to the upper arm. The transducer stopcock is used as the refence point to level the transducer with the phlebostatic axis. This is located at the intersection of the fourth intercostal space and the mid axillary line.



- Calibrate (zero) the transducer on the monitor. This is a quality control measure that calibrates the transducer to negate atmospheric pressure from the pressure measurement.
- Anaesthetic staff to complete this process:
  - At insertion, after the transducer is connected to the monitor
  - When required for troubleshooting a poor arterial waveform
- Check the flush bag has enough fluid, is within date, labelled correctly and pressure remains at 300mmHg.
- Analyse the waveform and adjust the monitor using "optimal scale" to ensure best waveform representation is displayed. Apply an arm board if necessary.
  - Inspect IAL (free of air) and perform a *fast-flush square waveform test*, checking for the dynamic response of the IAL (under or over damping). **Refer to Appendix 2**
  - Pull on the fast-flush toggle and observe the waveform. It should rise, flatten out then rapidly return to the baseline with minimal zigzagging / oscillations at the baseline.
- Check the accuracy of the reading against a non-invasive blood pressure (NIBP). Allow for a MAP disparity of between 5-10mmHg.
- Set appropriate alarm limits on the monitor. The alarms on the monitors are never to be permanently suspended unless ordered by the Consultant Anaesthetist
- Check the insertion site for signs of inflammation, swelling or ooze. Report to Anaesthetist as required.

Appendix 1: Modified Allen's Test

Modified Allen's Test

Performed to assess for collateral circulation prior to cannulating of the radial artery by:

- Simultaneously occluding the radial and ulnar arteries and asking the patient to open and close his or her fist (A); The pumping action should force blood from the hand through the venous circulation, so the hand appears white or blanched (B).
- Release the ulnar artery and blood should return to the hand (C), which indicates a **positive** Allen test and confirms adequate collateral circulation
- If blood flow does not return this indicates a **negative** Allen test and alternative artery should be considered

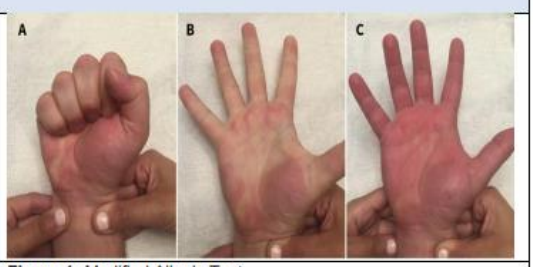


Figure 1: Modified Allen's Test

Appendix 2: Fast Flush Square Waveform Test

Fast-Flush Square Waveform Test:
The monitoring system's dynamic response can be verified for accuracy at the bedside by the *fast-flush square waveform test*, also called the *dynamic frequency response test.*

Normally the arterial line infuses around 3mL/hr; however flushing the line is actually not only acceptable, it is one way to assist with determining if there is trouble with the line. Lough & Thompson (2014) advise that when flushing the line, use the manual or fast flush system on the transducer. The 'fast flush' creates a rapid increase in pressure and this is displayed on the monitor. You are looking to see a square waveform associated with the fast flush. [9]

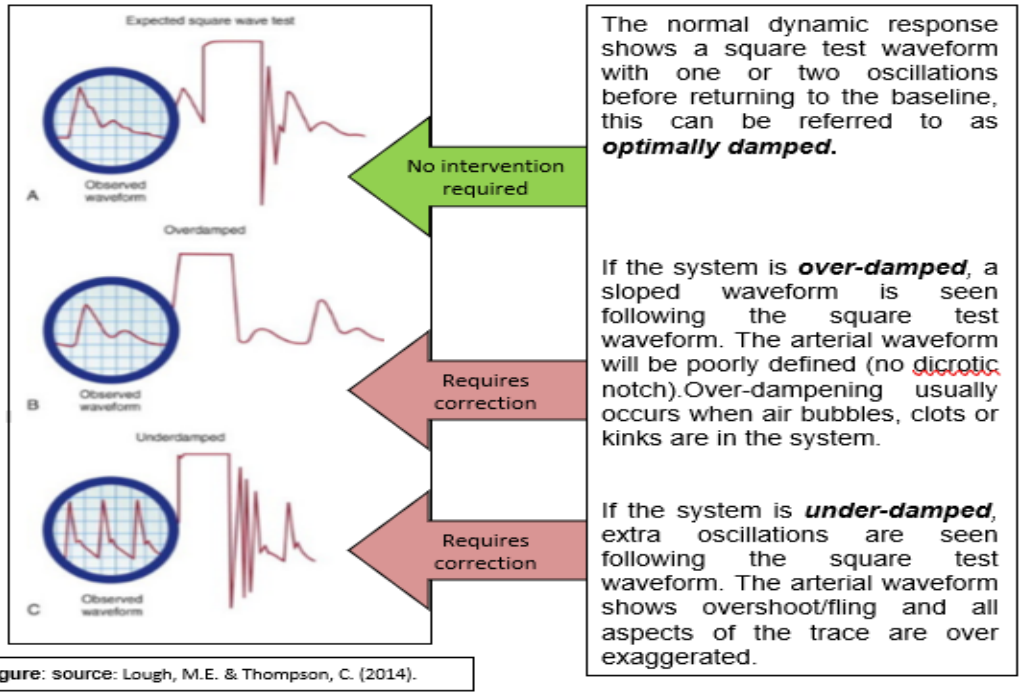


Figure: source: Lough, M.E. & Thompson, C. (2014).

Appendix 3: Troubleshooting

Problem	Outcome	Reason	Troubleshooting / Prevention
Over-damped waveform	It leads to underestimation of the systolic pressure and falsely high diastolic as well as poorly defined components of the pressure trace (no dicrotic notch)	▪ Air bubbles ▪ Clots ▪ Cannula or line kinked ▪ Loose connection/s ▪ Empty flush bag ▪ Pressure bag deflated. ▪ Patient position	▪ Check for discrepancy - do NIBP - allow 5-20mmHg. ▪ Completely flush and prime the line *prior* to insertion. ▪ Aspirate air bubbles or clots, then **flush thoroughly.** ▪ Check & tighten connections. ▪ Replace flush bag if needed. ▪ Re-inflate pressure bag to 300mmHg if deflated. ▪ Ensure roller clamp on IAL giving set is open (particularly post transport) ▪ Gentle traction on the line to check if it is against a vessel wall. ▪ Secure wrist in extended position
Underdamped waveform (overshoot or fling)	The result is artefact with an overestimation of the systolic pressure and the diastolic may be underestimated. There is no alteration to the MAP	▪ The use of non-rigid tubing between arterial cannula and transducer ▪ Excess length in tubing ▪ Air bubbles in the transducer	▪ Ensure supplied **rigid** tubing is in use between transducer and arterial cannula. ▪ Level and zero ▪ Check against NIBP. ▪ Fast flush line ▪ Reduce/remove any excess tubing / 3-way taps in the line.
Unable to aspirate blood	Associated with an over-damped waveform	▪ Cannula is clotted or kinked. ▪ Cannula is against vessel wall. ▪ Patient/wrist position ▪ Vasospasm ▪ 3-way tap is not positioned correctly.	▪ Check cannula and lines for kinks. A kinked cannula will not give accurate readings and will most likely need replacing. ▪ Manipulate the 3-way tap to ensure correct position for blood sampling. ▪ Check connections are firmly tightened. ▪ Gently extend wrist/gentle traction to move cannula away from vessel wall. ▪ Secure the wrist in an extended position. (A flexed wrist prevents the saline infusing to keep the line open.) ▪ Try to aspirate blood slower.

Problem		Reason	Troubleshooting / Prevention
Haemorrhage	Document estimated blood loss especially if significant	▪ Loose connections ▪ Accidental removal ▪ Arterial oozing at insertion site	▪ Tighten connections prior to insertion to prevent disconnection. ▪ Check all connection are firm. ▪ Apply dressing and secure site. ▪ Use arm board to help prevent accidental removal. ▪ **Keep arterial line in view.** ▪ Support line when moving patient to prevent inadvertent traction on the line. ▪ Ensure the 3way tap is 'OFF to PORT' unless taking blood. ▪ If bleeding around insertion site after insertion continues, take old dressing down and put small absorbent dressing around insertion site and cover with occlusive transparent dressing. ▪ If line is removed (accidentally or planned) keep pressure on the site for approx. 10 minutes.
Normal waveform with abnormal high or low-pressure readings		▪ Transducer is above or below phlebostatic axis. ▪ Check patient status: awake /anxious /pain /sedated. ▪ Consider side effects of medications	▪ Reposition the transducer and zero the line. ▪ Check the monitor that the waveform returns to zero on the scale. ▪ Assess patient – treat accordingly (give pain relief, reposition, sedate etc) ▪ Check medication infusions for any accidental bolus / errors / disconnections.
Loss of waveform		▪ Loose connections. ▪ Cable not connected.	▪ Is the transducer monitoring cable is connected to monitor? ▪ Check all connections are firmly tightened.

		▪ Stopcock is off to the patient. ▪ Monitor not set up correctly. ▪ Clot ▪ Low bag pressure ▪ Cannula against vessel wall	▪ Ensure art line is secured appropriately and not kinked. ▪ Check that the 3-way tap on the transducer is: ‘Open to Patient - Open to the transducer’. ▪ Check roller clamp is open and pressure bag inflated. ▪ Check pressure bag inflated to correct pressure (300mmHg). ▪ Apply gentle traction to the cannula and fast-flush the line. ▪ Attempt aspiration of blood

Fascia Iliaca Catheter Insertion

Indications and contraindications for fascia iliaca catheter

Indications	Contraindications (discuss with Acute Pain Service)

Fracture of neck of femur (all subtypes except isolated acetabular fractures)
 	
Proximal femoral shaft fracture
	• Very obese patients (impalpable landmarks, ultrasound advised)
	• Local infection in groin
	• Previous femoral vascular bypass surgery (scar + altered anatomy)
	• True allergy to local anaesthetic
	• Relative contraindications:
	  • Anticoagulant therapy, INR >1.5, bleeding disorder, antiplatelets other than aspirin
	  • Systemic infection

Local anaesthetic safety

- Ropivacaine is a long-acting local anaesthetic
- Maximum safe dose of ropivacaine is 3mg/kg (up to max 200mg).
  For this calculation in children, use ideal body weight or actual body weight, **whichever value is lower**
- Lignocaine 1% (up to 5mL for adults, less for children) for numbing the skin can safely be added to 3mg/kg of ropivacaine
- The key to an effective and safe block is to use an adequately large volume of ropivacaine, to maximise its spread beneath the fascia iliaca, while never exceeding the calculated maximal dose of ropivacaine
- Tip: there is little benefit of using ropivacaine in concentrations above 0.375% for a fascia iliaca block

Initial loading dose of ropivacaine for Adults
(at least 16years old AND at least 50kg actual body weight)

- Initial loading dose is **40mL** of 0.375% ropivacaine (=150mg)
- Preparation:
  - **Total dose to be divided into two syringes**

- Draw up 2 syringes, each containing **20mL** of 0.375% ropivacaine (=75mg)
- Achieve this by drawing up 10mL of ropivacaine 0.75% AND 10mL of sodium chloride 0.9% into each of the syringes

Initial loading dose of ropivacaine for Adults (at least 16years old AND less than 50kg actual body weight)

- Initial loading dose is **0.8mL/kg** of 0.375% ropivacaine (=3mg/kg)
- Preparation:
  - **Total dose to be divided into two syringes**
  - Draw up 2 syringes, each containing 20mL of 0.375% ropivacaine (=75mg)
  - Achieve this by drawing up 10mL of ropivacaine 0.75% AND 10mL of normal saline into each of the syringes
  - Discard from each syringe the portion of unrequired drug, such that 0.4mL/kg remains in each syringe. (2 x 0.4mL/kg syringes = total dose of 0.8mL/kg)
- Example: Adult patient weighing 40kg
  - Initial loading dose = 0.8 x 40 = **32mL** 0.375% ropivacaine
  - **Total dose to be divided into two syringes, 32/2= 16mL syringes**
  - Draw up two 20mL syringes as above, each containing 20mL of 0.375% ropivacaine
  - Discard **4mL** from each syringe, so that each syringe now contains **16mL** of 0.375% ropivacaine. The syringes are now ready to inject.

Initial loading dose of ropivacaine for Children (less than 16years old)

The risk here is over-dosing ropivacaine due to mis-calculation error or due to the child being significantly obese or underweight

Step 1: Use the table below to determine child's ideal body weight (IBW) based on their age, and **if ideal body weight is less than actual body weight (measured using scales)**, use the loading volume indicated in the table below, then skip to step 3.

If ideal body weight is MORE than actual body weight, ignore the table below and go to step 2

Age (years)	Ideal body weight (IBW)	Initial loading volume (mL) of 0.375% ropivacaine (0.8mL/kg IBW up to max 40mL) Rounded to nearest mL
1	12	10
2	14	11
3	16	13
4	18	14
5	20	16
6	24	19
7	28	22
8	32	26
9	36	29
10	40	32
11	44	35
12	48	38
13	52	**40**
14	56	**40**
15	60	**40**

Best guess method for calculating IBW. 1-5 years old: IBW = 2 x (age + 5), 6-16 years old: IBW = 4 x age

Step 2: If ideal body weight is MORE than actual body weight then use the actual body weight to calculate initial loading dose 0.8mL/kg actual body weight.

Step 3: Use the calculated initial loading volume from either step 1 or 2 to prepare the syringes of ropivacaine as per below:

- Draw up 2 syringes, each containing 20mL of 0.375% ropivacaine (=75mg)
- Achieve this by drawing up 10mL of ropivacaine 0.75% AND 10mL of sodium chloride 0.9% into each of the syringes
- Discard from each syringe the portion of unrequired drug, such that 0.4mL/kg remains in each syringe. (2 x 0.4mL/kg syringes = total dose of 0.8mL/kg)

- Example:
    - Child aged 5 years, actual body weight 25kg
    - Step 1: Ideal body weight (20kg, from table above) is less than actual body weight, therefore use ideal body weight for calculate dose.
    - Initial total loading dose = 0.8 x 20 = **16mL** of 0.375% ropivacaine
    - Draw up 2 syringes, each containing 20mL of 0.375% ropivacaine.
    - **Total dose to be divided into two syringes, 16/2= 8mL syringes**

- Discard **12mL** from each syringe, so that each syringe now contains **8mL** of 0.375% ropivacaine. The syringes are now ready to inject.

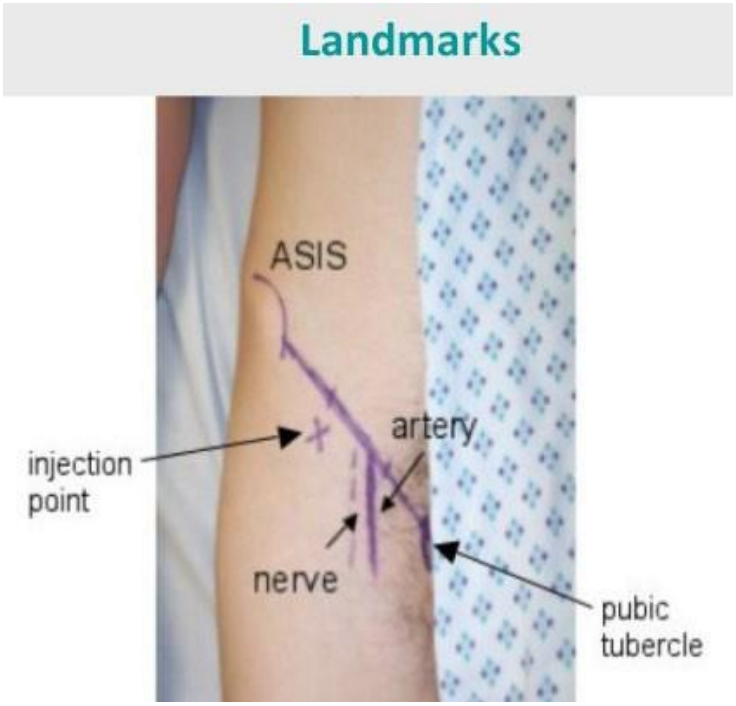
Equipment required

- See equipment list drop-sheet (Appendix 1)

Performing a fascia iliaca catheter insertion

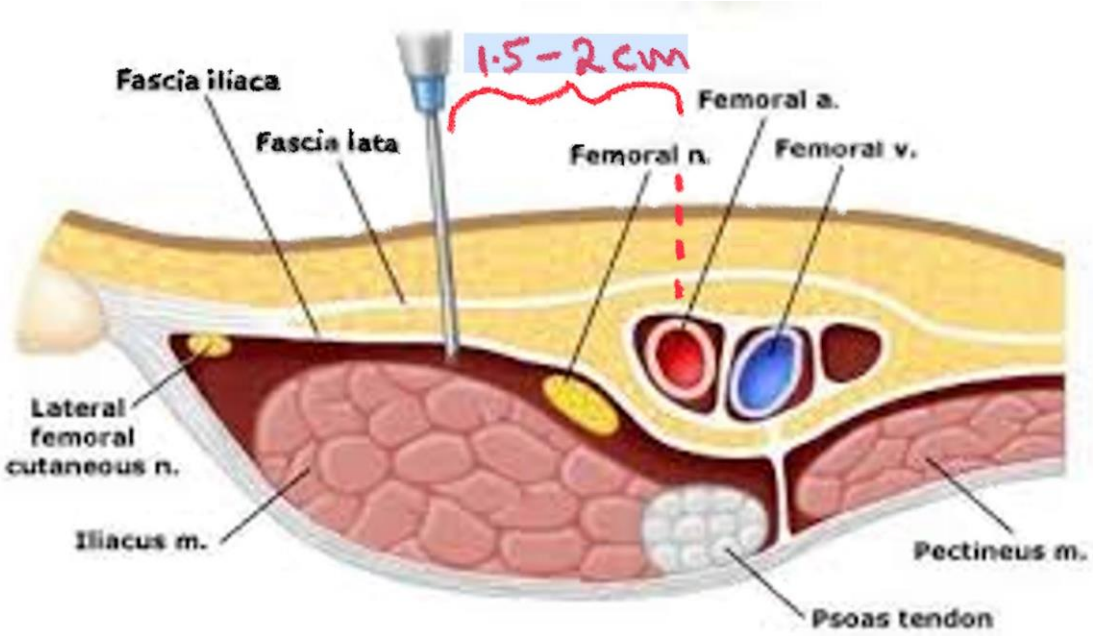
The following description is suitable only for typical adult patients at least 16 years old and 50kg body weight. For children and adults < 50kg, or for the very obese, the landmarks for needle insertion, catheter depth, and local anaesthetic doses should be modified and it is strongly advised to discuss this with an anaesthetist or the acute pain service (APS) prior to performing the procedure. In some cases the procedure is best supervised or performed by an anaesthetist, and with ultrasound-guidance rather than using landmarks alone.

- Explain the indication, procedure and risks to patient
- Minimum monitoring required during procedure: SpO2, heart rate and blood pressure
- Expose the groin area while maintaining patient decency
- Palpate landmarks: Anterior superior iliac spine (ASIS) and pubic tubercle
- Mark insertion point: 2cm below (caudad to) the junction between lateral and middle 1/3rd of a line joining the ASIS to the pubic tubercle
- Check that the marked insertion point is 1.5 – 2cm lateral to the pulsation of the femoral artery



- Clean the skin with antiseptic solution and apply a windowed drape
- Infiltrate skin and deeper tissues with up to 5mL of 1% lignocaine along the expected path of the fascia iliaca catheter

- Puncture the skin with the Tuohy needle at a right angle. Once the tip has passed through the skin, adjust the needle angle to about 45degrees, directing the tip towards the patients head (**not medially towards the nerve and artery!**)
- Advance the needle through 2 distinct "pops" as it perforates first the fascia lata, then the fascia iliaca



- Flatten the angle of the needle and skin to about 30degrees and advance the needle a further 1-2 **millimeters**
- Note the depth of the needle at skin ("NEEDLE DEPTH"). The black markers on the side of the Tuohy needle indicate alternating centimetres. Note the total needle length of the needle prior to inserting it, as this varies depending on Brand
- Secure the Tuohy needle with your non-dominant hand and pull the trocar out of the Tuohy needle
- Attach the first syringe of 0.375% ropivacaine to the Tuohy needle (this represents half of the initial loading dose that was calculated earlier. It is used to expand the space under the fascia iliaca, thereby creating room into which the nerve catheter will soon be passed)
- If aspiration is negative for blood, start injecting slowly down the Tuohy needle, aspirating every few millilitres. **There should be very little resistance to injection**
- **Excessive resistance to injection or patient discomfort during injection indicates the needle tip is in the incorrect plane**
- Detach the syringe from the needle. It is normal to observe some of the injected fluid coming back through the needle during syringe change.
- Place catheter guide over the open hub of the Tuohy needle and thread the catheter through it the guide. The Tuohy needle is about 10cm long from its sharp tip to the open end of the plastic hub (length may vary, check before using). Knowing needle length allows you to predict when to expect the tip of the catheter to protrude out of the Tuohy needle. You may feel mild resistance at this point, but push through that.
- Continue threading the catheter until 5 to 10cm of catheter is protruding beyond the tip of the Tuohy needle. Stop threading if you encounter significant resistance.

- Simultaneously withdraw the Tuohy needle while threading the catheter inwards at the same rate that the needle is withdrawn, so that the catheter does not come out with the needle
- Once Tuohy needle is out, check the CATHETER DEPTH at skin and adjust if necessary so that only 5-10cm is lying under the FASCIA ILIACA
- Important: **aim for 5 to 10cm of catheter length under the fascia iliaca**
- **CATHETER DEPTH = NEEDLE DEPTH plus CATHETER UNDER FASCIA ILIACA.**
- **Less than 5cm increases risk of dislodgement out from the fascia iliaca plane. More than 10cm of catheter increases risk of catheter kinking or causing trauma to tissues during insertion**
- Attach the adaptor and anti-bacterial filter to the catheter. Hint: catheter inserts into one end of the adaptor, while the other end of the adaptor screws into the anti-bacterial filter via a Leur-lock
- Connect the second syringe of 0.375% ropivacaine and gently aspirate to check for blood
- If aspiration is negative, inject the contents of the second syringe, aspirating every few millilitres. This serves to check that the catheter is patent and further spreads ropivacaine around the nerves
- Since you are injecting down a long, fine-bore catheter, expect to encounter lots of resistance to injection. However, if you cannot inject at all, the catheter may be kinked or its tip is up against hard tissue. Withdraw the catheter slowly while applying sustained pressure on the syringe plunger, until it is possible to inject
- Apply 1 or 2 drops of skin glue directly where to the catheter enters skin.

  Tip: allow one minute for glue to dry before applying any dressings onto it
- Remove the adaptor from the catheter
- Thread the free end of the catheter through an Epi-lock/ Lockit-PLUS catheter-securing patch (Appendix 1, item D) and stick the Epi-lock/ Lockit-PLUS to skin.
- Tip: check that the catheter and Epi-lock/ Lockit-PLUS are of the same size
- Using sterile scissors, cut the catheter so that about 30cm remains outside of skin. This reduces entanglement and injection resistance
- Re-attach the adaptor to the catheter
- Secure the 4 sides of the Tegaderm with strips of Hypafix to prevent Tegaderm edges peeling off
- Sandwich the adaptor-filter complex inside a folded large Tegaderm dressing, to prevent inadvertent disconnections
- Secure catheter and adaptor-filter in a way that allows easy access for subsequent injections, but also facilitating bed cares and reducing the chance of dislodgment. Avoid hard bony areas, to reduce pressure areas

Post-procedure monitoring

Monitor and record SpO2, HR and BP every 5 minutes for 20 minutes post injection of local anaesthetic bolus

Documentation requirements

(place completed forms in patient's chart)

1. APS referral form
2. Yellow nerve block audit form
3. Epidural/Regional Analgesia Order form (place in patient's notes – ward nurse uses this to initiate infusion once patient reaches ward). For children <16 years, use "Analgesia Order – Child >10kg, for PCA, NCA and Regional Analgesia"
4. A note in ieMR detailing the procedure performed, informed consent, time of nerve catheter insertion, ropivacaine dose, any difficulties encountered

Manual re-dosing of ropivacaine in the Emergency Department (0.2% ropivacaine)

- All patients who are in the Emergency Department will require **manual re-dosing into their fascia iliaca catheter by a doctor**
- Same applies for patients transferred to Cairns Hospital emergency department from another institution with fascia iliaca catheter in-situ
- Re-dosing is achieved with a lower concentration of ropivacaine than was used in initial loading (0.2% rather than 0.375%)
- Re-dose at intervals no shorter than 3 hours. Monitor SpO2, HR and BP for 20 minutes following each dose

How to prepare 0.2% ropivacaine:

- If 0.2% ropivacaine is unavailable, please follow instructions below on how to prepare
- How to dilute ropivacaine to get 0.2%:
    - **add 5.5mL 0.75% ropivacaine to 14.5mL sodium chloride 0.9% = 20mL 0.2% ropivacaine**

      OR
    - **add 4mL 1% ropivacaine to 16mL sodium chloride 0.9% = 20mL 0.2% ropivacaine**
- Then **discard** what you don't intend to use, **PRIOR to** connecting to the patient
- See below for what volume of 0.2% ropivacaine to give according to patient age and weight

Re-dosing of ropivacaine for Adults
(at least 16years old AND at least 50kg actual body weight)

20mL of 0.2% ropivacaine

Re-dosing of ropivacaine for Adults
(at least 16years old AND less than 50kg actual body weight)

0.4mL/kg of 0.2% ropivacaine (up to maximum 20mL)

Re-dosing of ropivacaine for Children (less than 16years old)

Step 1: Use the table below to determine child's ideal body weight (IBW) based on their age, and **if ideal body weight is less than actual body weight (measured using scales)**, use the re-dosing volume indicated in the table below.
If ideal body weight is MORE than actual body weight, ignore the table below and go to step 2.

Age (years)	Ideal body weight (IBW)	Re-loading volume (mL) of 0.2% ropivacaine (0.4mL/kg IBW up to max 20mL) Rounded to nearest mL
1	12	5
2	14	6
3	16	6
4	18	7
5	20	8
6	24	10
7	28	11
8	32	12
9	36	14
10	40	16
11	44	18
12	48	19
13	52	**20**
14	56	**20**
15	60	**20**

Best guess method for calculating IBW. 1-5 years old: IBW = 2 x (age + 5), 6-16 years old: IBW = 4 x age

Step 2: If ideal body weight is MORE than actual body weight, then use the actual body weight to calculate initial loading dose 0.4mL/kg actual body weight.

Starting catheter infusion via a pump (Sapphire pump) on the ward

- Infusions are NOT to be set up nor started while patient is in Emergency Department
- Infusions will be established once the patient has reached a ward
    - Some wards regularly manage nerve catheters and have received adequate training to set up and run nerve catheters infusions
    - All other wards, including Paediatrics and Adolescent, please contact APS doctor or APS nurse, who will facilitate the safe initiation of an infusion

Useful Do's

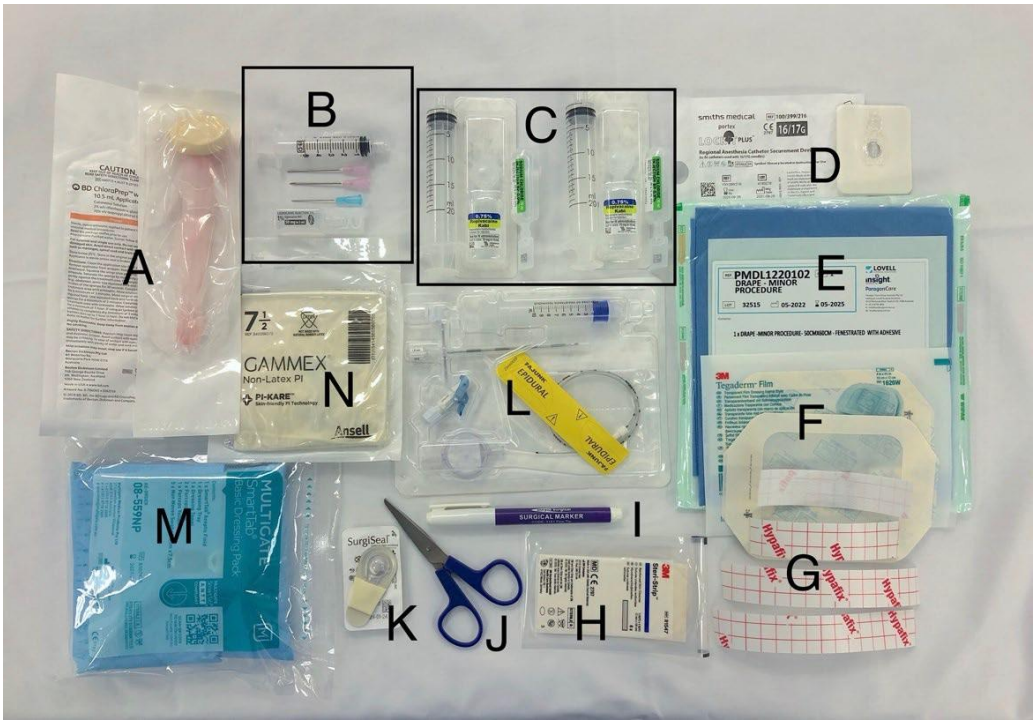
- Remember the anatomy: Lateral to medial NAVL (nerve, artery, vein, lymphatics)
- Create a superficial dermis-level weal of 1% lignocaine at the insertion point to reduce the pain of subsequent skin entry with the larger Tuohy needle
- Success of the block relies on a high volume of local anaesthetic spreading under the fascia iliaca, to bathe the femoral nerve and other nerves. Note that some nerves supplying the hip are unable to be blocked, so some parenteral analgesia requirement is to be expected.
- Leave 5 to 10cm of catheter under fascia iliaca. Adjust accordingly for smaller or larger patients
- OPTIONAL: When the thick Tuohy needle passes through the tough dermis layer of skin, the skin first gets indented by the needle then once the skin is penetrated it rebounds back with a jolt. It can be unclear whether during this jolt, this needle has also passed through fascia lata. This creates uncertainty as to which plane the needle tip is lying in. To reduce this uncertainty, first pierce a hole through the dermis with a sharp 18G needle then remove it. The dermal layer defect thus created will allow the Tuohy needle to enter through skin more easily.
- [Length of catheter under the fascia iliaca] = [Catheter depth] - [Needle depth]
- If an obese patient has an apron covering the groin, get an assistant to retract the apron cephalad.

Important Dont's

- Don't impale the femoral nerve! Stay 1.5-2cm away from femoral arterial pulsation. There should be no pain or paraesthesia on injection.
- Don't over-shoot the mark: when advancing the Tuohy needle, rest your wrist on the patient's thigh and "dart- grip" the needle at about the 5cm mark to avoid suddenly overshooting
- Don't shear off the catheter tip! If the catheter has been threaded more than 10cm but less than 13cm before you encounter significant resistance, YOU MUST remove the needle and catheter as one unit and start again. Withdrawing the catheter from the needle once it has already passed beyond the tip of the Tuohy needle can result in the sharp tip of the Tuohy needle cutting off the tip of the catheter, leaving foreign body within the patient.

Appendix 1 FASCIA ILIACA CATHETER INSERTION

EQUIPMENT LIST DROP-SHEET



A) 2x chlorhexidine-alcohol prep sticks
B) 5mL syringe
23G (blue)
hypodermic needle
18G (pink) blunt
drawing up needle
18G (pink) sharp needle (optional, not
pictured above) 5mL 1% lignocaine
C) 2 x 20mL syringes
20mL (2x10mL) of
0.75% ropivacaine 2 x
10mL vials of 0.9%
sodium chloride
D) EPI-LOCK or LOCKIT-PLUS catheter dressing
E) Adhesive drape with a window
F) 2 x large Tegaderm
G) Hypafix strips x 4
H) Steri-strips
I) Skin marker pen
J) Sterile scissors
K) Tissue glue (SurgiSeal or DermaBond)
L) 16G epidural kit with Tuohy needle
M) Basic dressing pac
N) Sterile Gloves

Documentation:

- APS referral form (white single A4)
- Yellow non-neuraxial nerve block audit form
- Epidural/Regional infusion order form (white double-spread sheet)

Paediatric version if younger than 16 years old

Latex Sensitive Patient Management

- Patients accessing Cairns Hospital Health Services will be asked their allergy status in relation to latex sensitivity (see definitions) which is then documented on the Alert Sheet and in the Alerts and Problems section of ieMR. Questions should be aimed at identifying risks.
- All patients identified as having a latex sensitivity will have their environment managed and care implemented to minimise the risk of an allergic/anaphylactic reaction.
- All services/units must provide appropriate latex free equipment and supplies to manage a patient with a latex sensitivity. Latex free equipment will be made available where possible. Staff must read manufacturers information.
- Items should be identified as latex free at the point of storage in supply. All items should be checked each time new stock and products arrive.
- Future product evaluation should consider latex free items a priority.
- If sterile gloves are required and a patient or staff member has a latex sensitivity, then sterile non- latex gloves must be used.

Considerations

- Latex sensitivity varies from person to person (see definitions) and therefore it is difficult to prepare a definitive management procedure.
- For some persons, this procedure will be excessively cautious. Whilst for others, it may not prevent a reaction.
- The procedure is designed to manage the most sensitive patient. It is important to be prepared to treat an anaphylactic reaction for all patients.

- At the time of booking an elective case, that person booking the case should notify bookings of the allergy and request that the patient is first on the list
- At point of entry to day surgery, latex sensitivity status must be assessed. See flow chart Appendix 1 as a guide.
- Latex sensitivity must be documented according to the Procedure ‘allergies and Adverse Drug reactions, recording and reporting of.
- Patient is placed on latex sensitivity precautions.
- Notification of a latex sensitivity must be included in all admission, referral, transfer, clinical handovers, and discharge planning documentation, including BOSS, prescriptions and diagnostic requests.
- Signage (at bedside and into OT) to be displayed to indicate latex allergy status
- A red arm band should be worn to indicate an allergy

ALERT

All patients identified as “Latex Allergic” must have a red armband in place Documentation in ieMR and the medication chart is mandatory

High Risk Groups

- Health care workers – particularly doctors, nurses and dentists
- Patients with chronic urological disease requiring repeated urethral catheterisation
- History of frequent exposure to latex during invasive procedures – eg. Spina Bifida

- Individual with existing allergies to banana, avocados, kiwi fruit, potatoes, tomatoes, chestnuts, peaches or papayas.
- Individuals with a history of atopy such as hay fever, rhinitis, asthma or eczema

Preparation of a Latex safe environment

The majority of equipment used in the Cairns Hospital Perioperative Unit is latex free. Refer to this Procedure and product packaging when preparing for a patient with a Latex sensitivity. Consider the following:

- Patients with latex allergy should be first on theatre list in the morning
- Ensure operating suite is latex free (including tapes) with access to appropriate latex free equipment – *see below for latex containing products to avoid*
- Where latex precautions are required for a subsequent case, latex precautions should be used for all preceding patients
- Ensure team aware of latex allergy including appropriate clinical handover and signage on all theatre doors and immediate patient care areas – *"CAUTION: Latex Free Area" (found in the PPE trolley See Appendix 3)*
- Theatres are damp dusted each morning. The damp dust should be repeated if latex products have been used in the theatre during the day. It is not requirement to rest the theatre as powdered gloves are not used in this department.
- Operating room tables and arm board shall be covered entirely with linen.
- The patient's limb shall be covered before applying a tourniquet
- In the event of an emergency, team should consider the risks of a latex reaction versus delaying the procedure. This is a clinical decision and should be made on a case-by-case basis.
- Remove all non-essential items, including general waste, to ensure there are not latex products in the environment.

The following is a list of products in the Cairns Hospital Perioperative Suite that have been identified as ***containing latex*** *(see Appendix 2)**:***

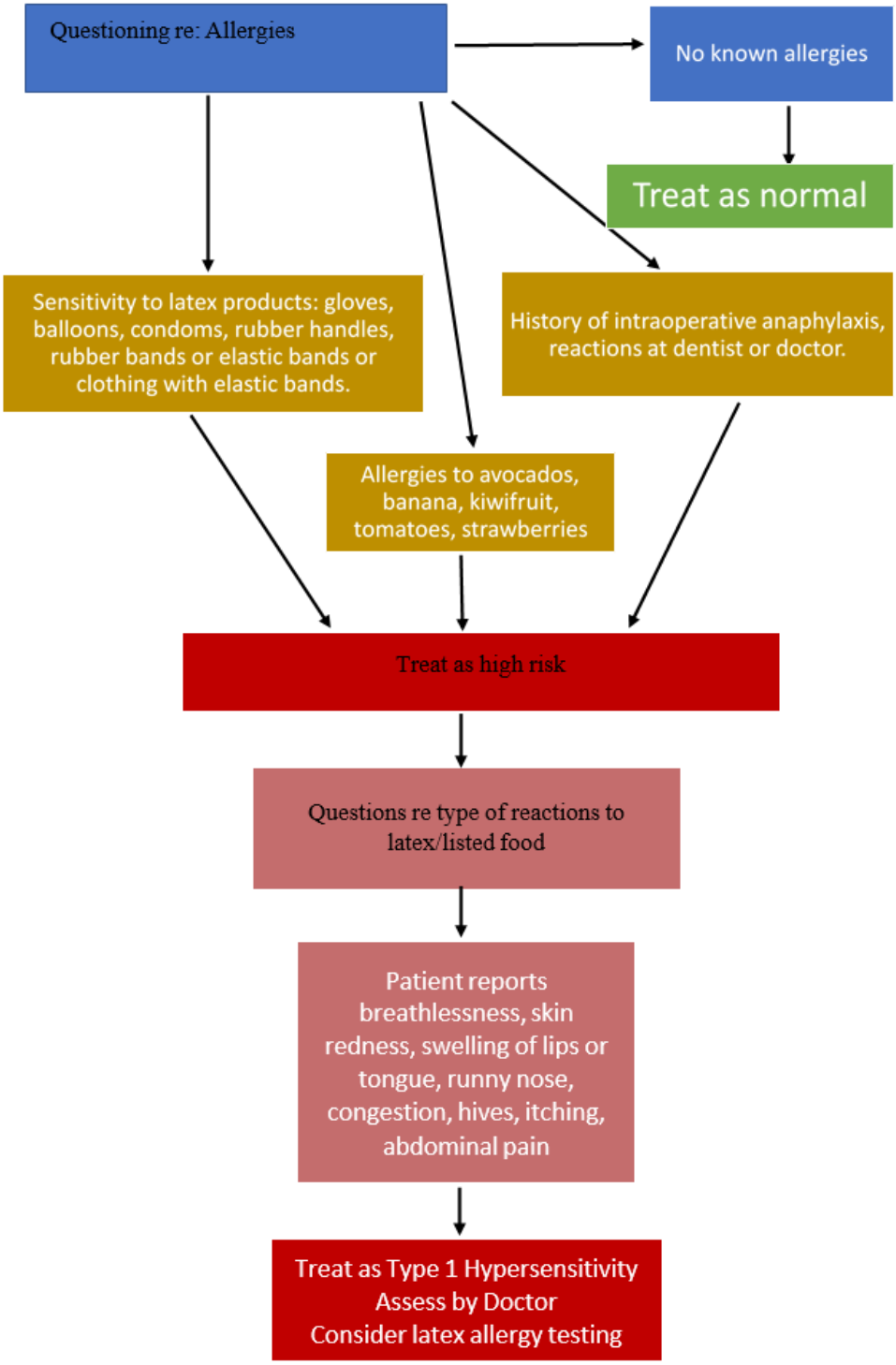
- Gammex gloves (Latex gloves are used in areas for interventional cardiology and orthopaedics)
- Limb exsanguinator (Eschmann Bandage)
- Urinary In-dwelling catheters - BARD
- T-tubes for biliary drains
- Nasal bolster dressing
- Tubigrip
- Rubber bands – most are latex, check packaging to ensure latex free product)
- Leukoplast/Elastoplast/tensoplast/are known to contain latex.
- Check any parenteral medication presented in a vial with a bung for the presence of latex on a case-by-case basis with the product manufacturer. Where latex is found to be present in a product, consult with pharmacy about alternative preparations or options for the treatment.
    - If the decision is made to use the medication, the rubber stopper should be removed prior to medication withdrawal from vial
    - See Appendix 3 for current list of medication vials which contain rubber stoppers/plungers

Note: Be aware of pre-packed kits that may contain latex gloves.

ALERT

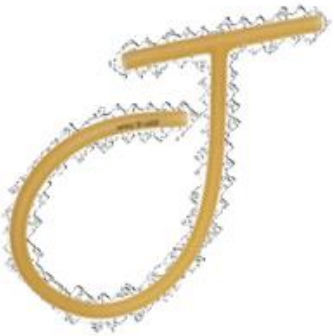
Always read the manufacturers packaging to confirm if the content contains latex. If a product contains latex, signs should be used to highlight the latex product.

Appendix 1 – Latex Safety Questioning Flowchart



Appendix 2: Products Containing Latex in the Cairns Hospital Operating Suite

Please note that this list is subject to change based on product ordering or availability. If in doubt, always check the packaging.



Appendix 3: Current medication stocked with rubber stoppers (in RED)

Drug	Strength	Brand	Manufacturer	Material
Acetazolamide	500mg	Glaumox	Phebra	Dry natural rubber content 0%
Ampicillin	500mg	Ibimycin	Juno	Rubber (red)
Ampicillin	1g	Mylan	Mylan	No latex
Ampicillin	1g	Austrapen	Alphapharm	Rubber (red)
Amoxy/Clav	1000mg/200mg	Juno	Juno	Chlorobutyl Rubber
Benztropine	2mg/2mL	Phebra	Phebra	Chlorobutyl Rubber
Benzylpenicillin	600mg	BenPen	CSL	No Latex
Benzylpenicillin	1.2g	BenPen	CSL	No Latex
Calcium Gluconate	2.2mmol/10 mL	Phebra	Phebra	Chlorobutyl Rubber
Calcium Chloride	0.68mmol/m L	Phebra	Phebra	Chlorobutyl Rubber
Ceftazadime	1g	Sandoz	Sandoz	No Natural Rubber
Cefalothin	1g	Hospira/DBL	Pfizer	Latex Free
Ceftriaxone	1g	AFT	AFT	?
Cefazolin	1g	AFT	AFT	?
Ciprofloxacin	200mg/100 mL	Aspen	Aspen Pharma	Latex free
Dantrolene	200mg	Dantrium (Norgine)	Pfizer	?
Dexamethasone	4mg/mL	Mylan	Alphapharm	No latex
Erythromycin	1g	Erythrocin	Amdipharm Mercury	Latex free
Esmolol	100mg	Bevibloc	Phebra	Chlorobutyl Rubber
Flucloxacillin	1g	DBL	Pfizer	Latex Free
Glucose	50%	Phebra	Phebra	Chlorobutyl Rubber
Hydrocortisone	100mg	Solu-Cortef	Pfizer	Latex Free
Magnesium Sulf Bag	8% 500mL	Baxter	Baxter	Non Latex

Magnesium Sulf Vial	50% 10mL	Pharmalab	Phebra	Chlorobutyl Rubber
Metaraminol	10mg/mL	Aramine	Phebra	Chlorobutyl Rubber
Methylene Blue	1%	Phebra	Phebra	Chlorobutyl Rubber
Methylprednisolone Acetate	40mg/mL	Depo-Nisolone	Pfizer	Latex free
Metronidazole Bag	500mg	Baxter	Baxter	Non Latex
Meropenem	500mg	Ranbaxy	Ranbaxy	Rubber (red)
Pantoprazole	40mg	Somac	Takeda Pharm	Butyl rubber
Paracetamol	1000mg	Kabi	Fresenius Kabi	Latex free
Propofol	200mg/20ml	Provive 1%	Baxter	Butyl rubber
Propofol	1000mg/100ml	Provive 1%	Baxter	Butyl rubber
Propofol	1000mg/100ml	Fresofol 1%	Fresenius Kabi	Halobutyl rubber
Parecoxib	40mg	JPL	Juno	Lyophilizing rubber
Prilocaine	0.50%	Citanest	Aspen	Latex/natural
Pip Taz	400mg/200 mg	AFT	AFT	Latex Free
Rocuronium	50mg/5mL	DBL	Pfizer	Latex Free
Sodium Bicarb	8.4% 100mL	Phebra	Phebra	Chlorobutyl Rubber
Sugammadex	200mg/2mL	Bridion	Merch Sharpe Dohme	Chlorobutyl rubber
Thiamine	300mg/3mL	Biological Therapies	Biological Therapies	Rubber (red)
Thiopental	500mg	PanPharma	PanPharma	No natural rubber latex
Vancomycin	500mg	Alphapharm	Alphapharm	No latex
Vancomycin	1g	DBL/Hospira	Pfizer	Latex Free
Vecuronium	10mg	Vecure	Alphapharm	No latex
Voriconazole	1g	Wockhardt	Wockhardt Bio	?
Tryptophan Blue	0.6mg/0.5m L	Vision Blue	D.O.R.C	Rubber plunger (red)
Bupivacaine/Adrenaline	0.25%	Marcaine	Aspen	Latex free
Bupivacaine/Adrenaline	0.50%	Marcaine	Aspen	Latex free
Lignocaine/Adrenaline	2% 1:80000	Lignospan Special	Specialities Septodont	Latex free

Lignocaine/Adrenali	1:200000	Xylocaine	Aspen	Latex free
Lignocaine/Adrenali ne	1:200000 2%	Xylocaine	Aspen	Latex free
Ropivacaine	2% 100mL	Ropibam	Boucher & Muir	Polypropylene
Ropivacaine	2% 200mL	Ropibam	Boucher & Muir	Polypropylene
Ropivacaine	2% 200mL	Kabi	Fresenius Kabi	Polypropylene
Sodium Chloride	0.9% 100mL	BBraun Ecoflac	BBraun	BBraun

**Please note that this is a guideline only and subject to change depending upon product availability. If you have any concerns, please contact pharmacy directly.

Massive Haemorrhage Procedure

Massive haemorrhage is defined as:

<u>Adults</u>:
Blood loss of greater than 50% of blood volume in 4 hours, or one blood volume in 24 hours (adult blood volume is approximately 70 ml/kg)

<u>Children:</u>

Blood loss of greater than 40mls/kg = 50% blood volume in 4 hours (child blood volume is approximately 80 ml/kg)

The management of critical bleeding must include:

- Aggressive control of bleeding
- Restoring / maintenance of normal coagulation parameters
- Minimisation of crystalloid use
- Avoidance of hypothermia

General Principles

- Massive haemorrhage occurs in settings such as severe trauma, ruptured aortic aneurysm, gastrointestinal haemorrhage, major surgery and obstetrics.
- In patients with critical bleeding the Massive Haemorrhage Protocol (MHP) should be activated if large volume of transfusion is occurring or anticipated.
- Blood loss can be challenging to estimate so if in doubt it is preferable to utilise the MHP.
- The activation of the MHP allows for rapid provision of blood and blood products in critical resuscitation environment.

Permissive hypotension and minimal volume resuscitation

Permissive hypotension (toleration of systolic blood pressures of 80-100 mm Hg) and minimal volume resuscitation are generally preferable to aggressive volume resuscitation while active bleeding is being controlled.

Permissive hypotension is contraindicated in patients with traumatic brain injury, because reduced perfusion pressure and oxygenation can lead to secondary brain injury.

Haemorrhage control

It is essential to stop the bleeding as soon as possible

- **Prehospital**: pelvic binder, splinting, compression, tourniquet, Tranexamic Acid
- **Emergency Department:** Tranexamic Acid, ROTEM, prevent hypothermia (warming bloods via warmer is preferred), damage control resus.

- Damage control surgery includes embolisation - Damage control surgery may be indicated for patients with severe haemorrhagic shock. The decision to switch over to damage control mode should be made early.

Clinical Parameters

The parameters in the table below should be measured early and frequently (30 minutes to 1 hour, or after blood component transfusion).

Parameters in Massive Haemorrhage Investigation & Monitoring

Parameters	Values to aim for
Temperature	>36°C
Acid-base status	ph >7.2, base excess <–6, lactate <4 mmol/L
Ionised calcium (Ca)	>1 mmol/L
Haemoglobin (Hb)	This should not be used alone as transfusion trigger; and, should be interpreted in context with haemodynamic status, organ & tissue perfusion.
Platelet (Plt)	$>75 \times 10^9$ /L
PT/APTT	<1.5x of normal
INR	≤ 1.5
Fibrinogen	>1.5 g/L (>2.5g/L obstetrics)

Triggers for Massive Haemorrhage Protocol (MHP) activation

In patients with critical bleeding the MHP should be activated if large volume transfusion is occurring or anticipated.

- Unstable haemodynamics and ongoing bleeding
    - Signs of shock that should highlight the potential need for the MHP include:
        - Hypotension
        - Hypothermia
        - any coagulation abnormality, or
        - metabolic acidosis
- >4 (units) issued to one patient in <4 hours.
- Severe thoracic, abdominal, pelvic or long bone trauma.
- Major obstetric, gastrointestinal or surgical bleeding.

Activation process

A **medical team leader** must be identified to lead the trauma/treating team. Only a medical team leader can activate the MHP. Someone else can make the phone call on their behalf, and inform the transfusion department in pathology of the name of the team leader and it

is important that only one person in each department (ED/Theatre) communicates with the Pathology Transfusion Service throughout the MHP.
The medical team leader is responsible to:

- Communicate appropriately with the Pathology Transfusion Service and other members of the team;

Specify **ROTEM** or **non ROTEM guided** on activation of MHP

- Handover to appropriate team if patient is relocated through-out MHP;
- Initiation of full response trauma call and / or activation of rapid transfer to the operating theatre in accordance with CHHHS procedure Rapid (Red Blanket) transfer of Patients from the Emergency Department to Operating theatres;
- **Activation** and **deactivation** of the MHP in a timely manner by notifying the team and the Pathology Transfusion Service. Activation and deactivation is a clinical decision based on the patient clinical picture and outcomes;
- Continually assess the ongoing need for transfusion: when bleeding is controlled and deactivation targets are met immediately deactivate the MHP.
- Any unused blood and blood products must be returned to the Pathology Transfusion Service once the MHP has been deactivated.

Deactivation of protocol

As early as possible, once bleeding is controlled, notify Pathology Transfusion Service in order to conserve available blood products. This is critical not to waste Blood Products.

ROTEM (Rotational thromboelastometry) and Fibrinogen Concentrate

The ROTEM® system is a point-of-care, whole-blood clotting analyser that provides real time measurement of visco-elastic properties of clot kinetics. It provides information on clot quality, stability and the cause of bleeding in the coagulopathic patient; allowing differentiation between surgical and coagulopathic bleeding. This allows a targeted approach to blood product usage, thereby potentially achieving reductions in blood product usage and facilitating optimal patient outcomes.

Specimen collection: Citrated whole blood—blue top tube, fill to line and mix well.
Hand deliver to ICU TL/Registrar with a completed request form.
Viewing ROTEM® results: The ROTEM Live software enables real-time transfer of the ROTEM® screens to a remote computer. Measurements can be viewed at another location.
Results should be evaluated in conjunction with the patient's medical history, clinical picture and coagulation tests and should not be the sole basis for patient diagnosis.

Indications for ROTEM

The results of a ROTEM® assay guide transfusion of blood products.

ROTEM is an expensive test to run. It is only of value in the setting where a patient has ongoing significant and life threatening bleeding.

Outside of the automatic criteria, a ROTEM may only be performed after discussion about suitability with the Intensivist.

Automatic Criteria

The automatic criteria for ROTEM analysis to be performed on request:

- Any patient with a Massive Haemorrhage Protocol activated
  - ROTEM results will guide product use according to the ROTEM-guided MHP
- Trauma patient:
  - If a request to perform a ROTEM comes from OT or ED AND it is stated that the patient has critical bleeding
- Obstetrics patient:
  - If a request to perform a ROTEM comes from OT or ED or Maternity ward AND it is stated that the patient is bleeding excessively
- Actively bleeding patients if:
  - Anticipated to need >3 units of blood in the next hour, or
  - Haemodynamically unstable due to active bleeding requiring blood transfusion
    - E.g., PPH, variceal bleeding, hepatic failure with active bleeding

If a patient meeting these criteria is identified the treating team should:

- contact the ICU registrar on duty (66979)
- arrange collection of a citrate blood tube (blue top) – 5ml
- arrange for the sample to be delivered by hand to the ICU Nursing Team Leader (66976)
- two patient identification labels are to be sent with the sample
- monitor sample results via the ROTEM Live Viewer software on the desktops located within each department
- Time of collection should be recorded in ICU book with patient details

All Other Patients

On occasion, the haematologists or other teams may request a ROTEM test. This should only occur if the test will provide information additional to routine laboratory tests or in a more timely fashion. This may include conditions like ITP or liver disease.

Any patients who do not meet the automatic criteria to run a ROTEM must first be discussed with the Intensivist to determine suitability to run a ROTEM. In general, the patient will need to be critically bleeding for a ROTEM to be run.

Note: Sample tubes must not to be sent through the Lamson tube.

ROTEM results do not replace laboratory based coagulation tests and whilst these laboratory results will take up to 60 minutes, formal coagulation tests must still be requested.

Fibrinogen Concentrate (RiaSTAP)

Product Information, Consumer Information

Critically low fibrinogen in a bleeding patient can be rapidly replaced with fibrinogen concentrate (RiaSTAP). This may be a quicker and more readily accessible alternative than cryoprecipitate.

The dose is 1 vial for each 25kg

body weight. For a 75kg person this

is:

- 3 vials of fibrinogen concentrate OR 20 units of whole blood cryoprecipitate / 8 units of apheresis cryoprecipitate.

The ICU registrar will be responsible for assessing the criteria for fibrinogen concentrate then arranging approval and dispensing.

Approval requires two consultants' approval:

- One should be an ICU consultant
- The other may be an Emergency, Anaesthetic, Haematology or a 2nd ICU consultant

The ICU registrar must contact each of the authorising consultants with the ROTEM result and the clinical state of the patient. The registrar must assure that the fibrinogen concentrate is delivered to the patient's bedside for urgent administration (as slow IV push).

Administration

Reconstitute RiaSTAP at room temperature;

1. Remove cap from the product vial to expose the central portion of the rubber stopper. Clean the surface of the rubber stopper with an antiseptic solution and allow it dry.
2. Remove the safety cap from one end of the provided transfer set and pierce the stopper of the RiaSTAP vial
3. Remove the safety cap from the other end of the transfer set. Invert the

WFI vial, apply gentle pressure to pierce the stopper and transfer the contents into the RiaSTAP vial. Discard the WFI vial and remove the transfer set from the RiaSTAP vial.

4. Gently swirl the product vial to ensure the product is fully dissolved. Avoid shaking which causes formation of foam. The powder should be completely reconstituted within 15 minutes (generally 5 to 10 minutes).
5. Remove dispensing pin from its packaging. Take the provided dispensing pin and insert into stopper of the vial with the reconstituted RiaSTAP. After the dispensing pin is inserted, remove the cap. After the cap is removed, do not touch the exposed surface.
6. Remove syringe filter from its packaging. Screw the syringe (not supplied) onto the filter.
7. Screw the syringe with the mounted filter onto the dispensing pin.
8. Draw the reconstituted RiaSTAP into the syringe.
    - After reconstitution, the RiaSTAP solution should be colourless and clear to slightly opalescent. Inspect visually for particulate matter and discolouration prior to administration.
    - Do not use if the solution is cloudy or contains particulates. If it is not administered immediately, it must be stored below 25°C and used within 6 hours of reconstitution. The reconstituted solution should not be stored in the refrigerator.
    - Administer at room temperature as a slow IV push
    - Record the product name and batch number in the patient clinical record.
    - RiaSTAP does not contain an antimicrobial preservative therefore should be used as soon as possible after reconstitution or within 6 hours. Do not reconstitute unless it is going to be administered to reduce waste. Once reconstituted do not store in a refrigerator but keep at temperature below 25°C.

Medevac Blood (Group O Rh (D) Positive and Negative)

Medevac Blood may be used in an **extreme** emergency where cross-matched blood is unavailable and it is life threatening to wait.

Note: A sample from the patient, that is appropriately labelled, accompanied by a request form that has been signed by the collector or an ieMR request, should be provided as soon as possible, so the laboratory can provide units compatible with the patient's group and minimize emergency red cell use.

O Rh (D) POSITIVE red cells are a safe, tested and recommended alternative for most emergency transfusions where the patient blood group is unknown:

- There is no difference in risk of acute transfusion reaction between O Rh (D) Positive and O Rh (D) Negative red cells.

- Rh (D) Negative blood is not universally compatible and results in alloimmunisation in some patient blood groups.

Rh (D) Positive red cells will be issued from outset of transfusion support for all males over 16yrs and for females over 50yrs.

O Rh (D) NEGATIVE	**O Rh (D) POSITIVE**
Female less than 50 years	Female older than 50 years
Child less than 16 years	Adult male

ED Clinicians

Check patients' age group and gender before remove Medevac units from Blood Fridge

Team responsibilities

- Communicate appropriately with the Team leader and other members of the team.
- As soon as possible collect and deliver all appropriate pathology samples and forms (inclusive of correct identification, ward/unit, requesting practitioner and consultant, tests required, indication, urgency of sample, collectors' signature, date and time collected.
- Cairns Hospital ED Red, ED Orange, ICU and Theatre - Send Lamson request form in Pink Pneumatic Tube System (Transfusion PTS) for delivery of Red cells and Plasma products (not Platelets).
- Clinical areas without a dedicated Transfusion PTS, once the Pathology Transfusion Service notifies the Team Leader they are ready, ward to organise transport and collect all blood and blood products from pathology.
- The blood products must be checked by 2 qualified staff members (Medical Officer, or Nurse/Midwife).
- Document all blood products, fluids and medications administered.
- Return all unused blood products and required forms to the Pathology Transfusion Service as soon as possible.

Cross-match (CXM) Requirements for MHP

- Group-specific blood is preferable to Medevac blood, and is available within ten to fifteen (10-
  15) minutes of receipt of a suitable specimen in the laboratory.
- The Pneumatic Tube System (PTS) will be used for the transportation of blood samples from the clinical area, ED red, OT and ICU to the Pathology after the MHP has been activated.
- Pathology is to be notified on **66314** (Cairns) by the Team member who is

sending the specimen of the patient's details and that the blood sample is in PTS transit to enable staff to wait and watch for specimen.

- **Intraosseous samples cannot be used for Laboratory transfusion testing (incl. CXM) or for ROTEM Full Blood Count and Coagulation testing.**

ALERT

- **Accurately labelled samples (including date, time and collector's signature) and the Transfusion Request Form must be provided to Pathology Transfusion Service as soon as possible to avoid sample rejection and delays in supply and treatment of group specific blood components.**
- **It is suitable for Rh(D) Positive red cells to be given to an Rh(D) Negative patient, with the exception of Rh(D) Negative females of child bearing age and children <16yr who should NOT receive Rh(D) Positive red cells without Haematologist consultation.**

Massive Haemorrhage Protocol

MASSIVE HAEMORRHAGE PROTOCOL

2023 V4.1

CRITICAL BLEEDING ALGORITHM FOR PATIENTS WITH HAEMORRHAGE AND HAEMODYNAMIC INSTABILITY

CAIRNS HOSPITAL

STOP THE BLEEDING
Identify source
Control external bleeding
Pelvic binder/splint fractures
Specialty involvement ASAP
Consider Red Blanket Protocol

FLUID RESUSCITATE
Actively warm patient and fluid
Avoid excessive crystalloid
Tolerate SBP 80-100mmHg (unless traumatic brain injury)

SEND BASELINE BLOODS
VBG
ICU: ROTEM (blue top – citrate)
PATHOLOGY/BLOOD BANK: GPH, FBC, coags, EUC/LFTs, lipase

MONITOR:
ROTEM – 10 mins post blood components
FBC, coagulation, blood gas – every 30-60 minutes

CHECK SPECIAL SITUATIONS:
Warfarin
Vitamin K 5-10mg iv
Prothrombinex 25-50 IU/kg
Dabigatran/rivaroxaban
Discuss with haematologist
Obstetrics Haemorrhage
Target fibrinogen >2.5g/L
Head Injury:
Target platelets >100
Target SBP >100mmHg

PHONE NUMBERS:
ED Consultant 66101, 66102
Surgical Registrar 67670
ICU Registrar 66979
ICU Team Leader 66976
Duty Anaesthetist 66910
Blood Bank 66314
Coagulation Lab 66631
Wardsman 66411 or 66412

RING BLOOD BANK 66314
Inform of patients condition, approx. age & sex
Request 2-4 units group O RBC
Collect & Send XMATCH specimen URGENTLY to Pathology Blood Bank
Inform if using ROTEM
RING ICU REG 66979
Request **ROTEM**
Send runner to ICU with labelled citrate tube (blue top) for ROTEM

Transfuse **2-4 units group O RBC** (10ml/kg if paeds)

O NEG
Female < 50 years
Child <16 years

O POS
Adult males
Female > 50 years

TRANEXAMIC ACID - if within 3 hours of injury
1g over 10 min, 1g over 8 hours (15mg/kg if paeds)

CALCIUM GLUCONATE 10% 3 x 10 mL every **4 RBC** (0.5mL/kg if paeds)

If continuing uncontrolled bleeding or haemodynamic instability
ACTIVATE MASSIVE HAEMORRHAGE PROTOCOL
Call Blood Bank 66314. Inform if using ROTEM
Ring ICU Reg 66979 for ongoing ROTEM

Pack 1 **Blood Bank prepares first MHP pack 4 RBC**

OR

Pack 2 onwards
MHP ROTEM

4 RBC
Blood components as per **ROTEM** algorithm

Pack 2 onwards
MHP Non-ROTEM
(Only If No ROTEM Available)

4 RBC (20ml/kg paeds)
20 U (8U apheresis) cryoprecipitate (5ml/kg paeds)
4 FFP (15ml/kg paeds)

1 dose platelets in every 2nd pack (10 mL/kg Paeds)

COMMUNICATE
Lab staff MUST be notified which products per ROTEM required or if additional products required
Cryoprecipitate takes 20 mins to thaw
When bleeding controlled notify Blood Bank 66314
STOP MASSIVE HAEMORRHAGE PROTOCOL
Return unused products

TARGETS:

Temp > 36 C, pH > 7.2, iCa >1mmol/L, Hb >70g/L, platelets >75, fibrinogen >1.5g/L (>2.5g/L obstetrics)

ROTEM Algorithm

CAIRNS HOSPITAL ROTEM ALGORITHM

CONTINUE TRANSFUSING PACKED CELLS BASED ON CLINICAL NEED

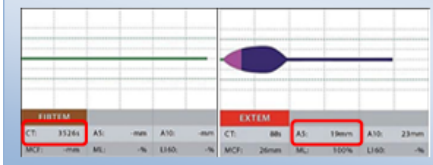
INDICATIONS:
MHP activation
Actively bleeding & anticipated to need >3 units of blood in next hour or haemodynamically unstable

HOW TO ORDER:
CALL ICU Reg 66979 & NOTIFY Blood Bank 66314
Runner takes citrate tube to ICU
Open desktop icon to see real-time results

Do not perform ROTEM unless clinically significant bleeding

Physiological targets: temp ≥ 36 pH ≥ 7.2 iCa ≥ 1mmolL Hb >70g/L

STEP 1: FIBRINOLYSIS – FIBTEM/EXTEM



FIBTEM green flat line 5mins AND
EXTEM A5 ≤35mm
→ TXA 1g + Fib Conc 4g *(2 consultant approval, including 1 ICU consultant)*

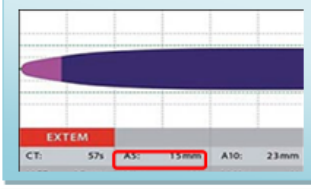
EXTEM or FIBTEM ML>5%
(late diagnosis)
→ TXA 1g

STEP 2: FIBRINOGEN - FIBTEM

FIBTEM A5 ≤ 10mm (obstetrics ≤ 12mm) → Low fibrinogen → Cryoprecipitate 20 U (paeds: 5ml/kg)

FIBTEM A5 <8mm (Obstetrics < 10mm) → Critically low fibrinogen → Cryoprecipitate 20 U OR Fibrinogen Concentrate 1g/25kg *(Fib conc only if critical – 2 consultant approval required including 1 ICU consultant)*

STEP 3: PLATELETS – FIBTEM/EXTEM



FIBTEM A5 > 10mm
AND
EXTEM A5 ≤35mm
→ Poor platelet contribution → Platelets 1 pooled bag (paeds: 10ml/kg)

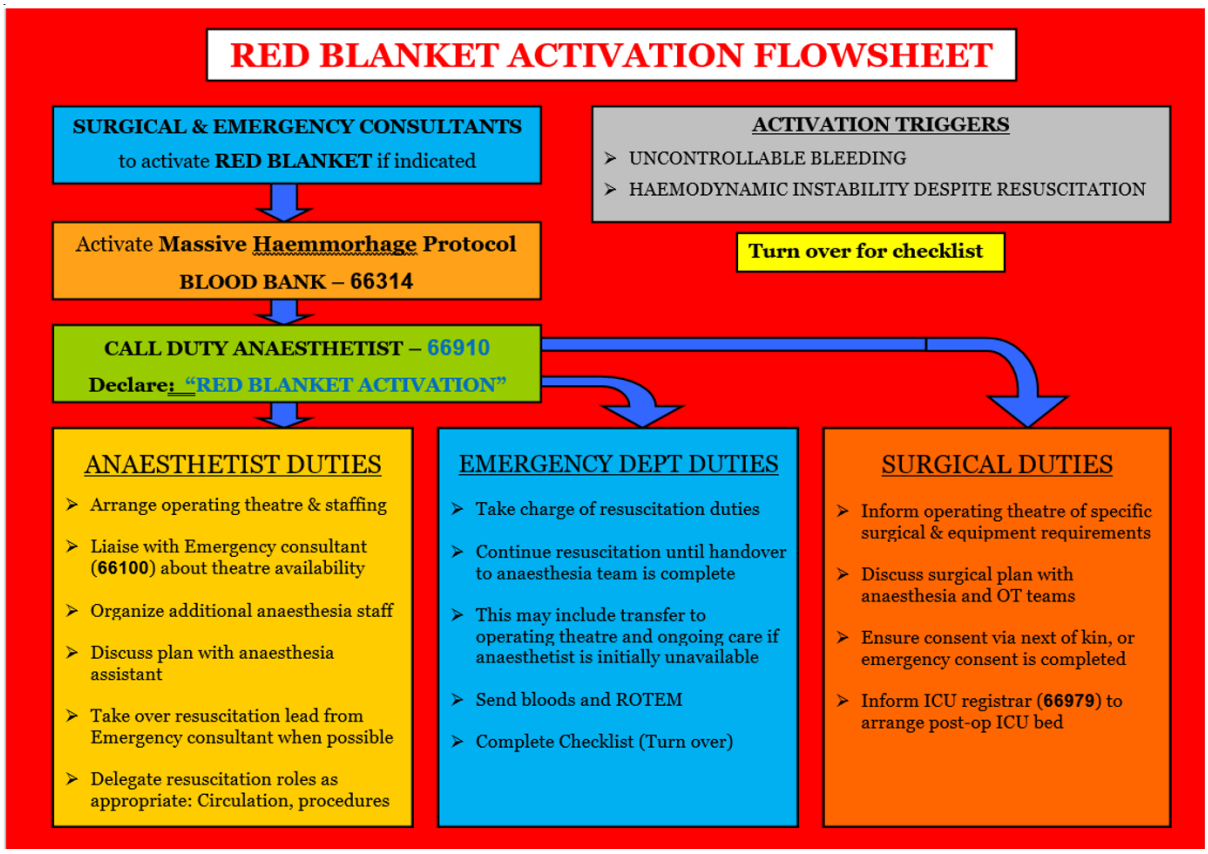
STEP 4: FACTORS – FIBTEM/EXTEM

FIBTEM A5 > 10mm
AND
EXTEM CT ≥ 90 sec
→ Low coagulation factors → FFP 4U (paeds: 15ml/kg) OR Beriplex 25U/kg

Repeat ROTEM test 10 minutes after therapy OR after every 4 units packed cells OR if ongoing bleeding

Special situations: Warfarin – Beriplex 25-50U/kg, Vitamin K 5-10mg iv
Heparin – protamine
ROTEM is not used to detect or monitor direct thrombin inhibitors, warfarin, LMWH, von Willebrands disease, GpIIb/IIIa or other platelet inhibitors (e.g. aspirin) due to low sensitivity to these agents – discuss with haematologist
NB: cryoprecipitate 20U is equivalent to apheresis cryoprecipitate 8 U

Red Blanket Protocol



RED BLANKET CHECKLIST

Procedure Confirmed	
Consultant Surgeon Ready	
Consultant Anaesthetist Ready	
Theatre available	
Blood taken for Cross match and ROTEM	
MHP activated	

ADDITIONAL INFORMATION

PMH:

ALLERGIES:

LOGROLL PERFORMED? Yes No

TXA 1g GIVEN? Yes No

BLOOD PRODUCTS GIVEN:

KNOWN INJURIES:

Proceed to theatre only when checklist is complete

Trauma Team Activation

Criteria for Trauma Team Activation

Trauma Teams are activated by ED when a patient presents or is expected (QAS or Lifeflight) with:

- Intubated trauma patient
- Significant penetrating injuries (head, neck, chest, abdomen)
- Major head injuries (dilated pupil(s), open injury, severe facial injury)
- Systolic BP <90 mmHg in adult
- Amputated/crushed limb or major degloving
- Request by Retrieval Physician or ED Team Leader

Trauma Team Members (Medical)

1. ED
    a. Team Leader
    b. Airway
    c. Circulation & Procedure
    d. Primary Survey
2. Duty Anaesthetist
3. ICU Registrar
4. Surgical Registrar

Role of Duty Anaesthetist

1. Provide airway assistance as required by the ED Team Leader. Usually airway management will be undertaken by ED Airway Doc in the first instance. The anaesthetist provides assistance and oversight. Out-of- hours the anaesthetist may be asked to be the primary airway doctor if ED skill mix reduced.
2. Facilitate movement to OT if required expediently. The anaesthetist will liaise with the Team Leader in theatre - 66924 and the Emergency OT Anaesthetic Technician – 67162. The Anaesthetist will transfer the patient from ED to OT.
3. Timely communication with Consultant Anaesthetist on-call if not already present.
4. Procedures as required by ED Team Leader (e.g. vascular access)

Practical Points:

1. **Unable to attend**
   If you are unable to attend ED immediately contact the ICU access Registrar - 66979 to inform them you are indisposed. A line of communication should be then maintained between ICU & Anaesthetics and Anaesthetics should make every effort to attend ED as soon as possible. **DO NOT Call the ED Consultant**.

2. **Attending ED** Make sure you introduce yourself to the ED Team Leader on arrival. Await their instructions before entering the Trauma Bay. Remain behind the Red Line until asked to cross.

Roles of other Team Members:

1. ICU Registrar

A. Provide procedural assistance to the ED Team Leader

B. If skills appropriate may provide airway assistance as per Anaesthetist especially if Anaesthesia unable to attend

C. Assist with advanced transfusion management (Massive Transfusion Protocol)

D. Clear line of communications
   a. ICU Consultant
   b. ICU TL regarding bed management
   c. Anaesthesia as overleaf

2. Surgical Registrar

A. Provide procedural assistance to the ED Team Leader

B. May be required to undertake primary survey if ED skill mix reduced

C. Clear line of communication with Surgical Consultant to make time critical decisions about movement to theatre

Anaesthetic MRI Checklist

Setup

The MRI in Cairns Hospital is a 3 Tesla Siemens VIDA.

Minimum Staff for an anaesthetic list:

- MRI Radiographer(s)
- Anaesthetic Assistant
- Recovery nurse
- Anaesthetic Consultant / Provisional Fellow

Entering the MRI room

Access to the MRI area (control room, induction/recovery room etc.) is controlled by the MRI radiographer – lift the phone at the door or knock.
Every time before entering the MRI scanner room liaise with the MRI radiographer and perform the "MRI-dance" (checking that you don't have anything in your pockets). Before moving the patient into the scanner room, a thorough check of the patient, trolley etc. must be performed.

Equipment

Induction/Recovery room

- Anaesthetic Machine with GE monitoring (not MRI compatible)
- Anaesthetic trolley
- Resuscitation trolley
- MRI compatible ECG dots, hearing protection

MRI room

- Aestiva 5 MRI compatible Anaesthetic Machine with GE monitoring
  - O "Tesla Spy" to alert too close proximity to the scanner
  - o Slave monitor to Radiographers workspace (no audio)
  - o MRI compatible NIBP, SaO2, ECG cable

MRI Safety: Staff

A staff safety questionnaire must be filled out by staff before they enter the MRI room the first time (see appendix). The questionnaire is reviewed by the radiographer.

Any ferromagnetic material (e.g. phones, keys, ID-badge, hairpins etc.) must be left in the locker provided opposite the radiographer's workspace. They key to the locker is to be left in the locker door or with the radiographer. Credit Cards don't do well in this environment….

If in doubt (e.g. glasses, firmly attached jewellery) – ask the Radiographer.

If it is necessary to remain in the MRI room during the scan ear protection must be worn.

MRI Safety: Patient

The radiographer will review the patient's MRI safety screening (see appendix) and determine the suitability of the patient. Any implants (e.g. PPM, clips, prosthesis, ports) are diligently checked by the radiographer to determine if the device is MRI safe, MRI conditional or MRI unsafe. The potential

effect of the magnetic field on the device needs to be considered (e.g. PPM misprogramming, heating of implant) and settings of the device might need to be checked after the scan. For a more in–depth discussion about implants and devices refer to RANZCOR MRI Safety Guidelines 2.0.

Other risks during the scan for an anaesthetised patient include:

- Noise (65-120dB) - ear protection needs to be worn
- Pressure injury, burns from contact point with core
- Remote anaesthesia
- Inaccessibility of the patient during the scan

Pre-Procedure "Time Out"

Before each patient enters the MRI suite, please perform a "Time out" check with the whole team (Anaesthetist(s), Anaesthetic Technician, MRI Radiographer and Recovery Nurse) in order to outline the steps, processes and any specific requirements for the procedure including location of induction of anaesthesia, transfer into scanner room, any specific intra-procedure requirements and plans for recovery from the anaesthetic. This is a good time to also ensure that everyone involved has completed an MRI safety questionnaire (including the patient). Any concerns/issues from the team members can be addressed during this time out stage.

Sequence of a "standard" GA for MRI

Induction is performed in the induction room on the MRI trolley. After induction (i.v./gas) and securing of i.v. access and airway eyes are taped, and ear protection applied. Then ventilator and monitoring are disconnected, and the patient wheeled into the MRI room on the MRI trolley or carried in. The MRI ventilator and monitoring are connected, pressure points checked, and patient covered with a blanket. All monitoring cables need to be kept off the skin and loops need to be avoided. Monitoring cables and ventilator tubing are secured with sandbags and plastic clamps. A "dry run moving" the patient in and out of the scanner to ensure cables and tubing are secure.

During the scan the Anaesthetist monitors the patient on the slave monitor in the control room. Note that this does not display ventilator setting/measurements. If the patient or ventilator needs to be accessed this is done ideally between scanning sequences as opening the door during a sequence interrupts the sequence and the sequence needs to be restarted from the beginning. Coordinate this with the radiographer.

Once the scan is completed the MRI ventilator and monitoring are disconnected from the patient who subsequently is transferred back into the anaesthetic room and handed over to the Recovery Nurse in the MRI recovery area during elective MRI lists (Wednesdays) or transferred to PACU.

In general, the patient needs to have a secure airway due limited access during the scan. This means either no or minimal sedation (which usually does not involve the Anaesthetist) or formal airway management (LMA or ETT). Many Anaesthetists prefer an ETT for patients < 1 year respectively <10kg. If the LMA/ETT has a metal spring in the pilot balloon this must be securely taped to avoid artefact and movement. LMAs without spring in the pilot balloon are preferable, e.g. iGel or classic LMA (the pilot balloon bevel does not contain a spring).

Record keeping

The Anaesthetic Machine in the induction area is connected to AARK as is the monitor of the recovery area. During the scan an appropriate paper-based record needs to be kept (forms available in the control room).

Monitoring

Standard ANZCA monitoring (PS18) during GA is required. This usually consist of SaO2, NIBP, etCO2 and anaesthetic gases being displayed in the control room. One needs to be aware that alarms from the anaesthetic machine (disconnection alarm, high pressure alarm) will not be heard in the control room and extra vigilance etCO2 trace monitoring is necessary.

- ECG is commonly not used due to ECG artefacts commonly being produced by the scan (T-wave elevation and R-wave reduction).
- Invasive ABP monitoring is possible.
- EEG, temperature and neuromuscular monitoring is not possible inside the MRI environment.

Temperature Control

Active warming during the scan is not possible and the MRI environment is at normal room temperature. This is offset by heating of tissues from the scan. Diligent covering of the patient with a blanket usually suffices.

Infusions

At Cairns Hospital the syringe drivers and infusion pumps cannot be taken into the MRI scanner room. If an infusion is absolutely necessary, a long extension line needs to be fed through a channel in the wall between the MRI scanner room and the induction area. This has the increased risk of unrecognised disconnections and increased resistance (i.e. high infusion pressure).

Emergency whilst patient in the scanner room

Minor adjustments that do not require equipment to be brought in are possible between sequences, e.g. adjusting the LMA. For any emergency the patient needs to be transferred from the MRI environment to the induction area.

Emergency Quench

The superconductor in the MRI is kept at close to 0 deg Kelvin by being kept in liquid Helium. In the event of an emergency shutdown, known as “quench”, the liquid helium expands to a gas and is vented to the outside of the building via quench pipes. If this fails, the Helium will fill the MRI room rendering it an asphyxiating environment. An emergency quench is exceedingly rare and only to be used in a life-threatening emergency.

Gadolinium

Some MRI scans require Gadolinium based i.v. contrast. Severe anaphylactoid reactions have been reported, however they are very rare (incidence <0.01%). The currently used Gadolinium based i.v. contrast have a lower risk of nephrogenic systemic fibrosis, however in patients with an eGFR<30ml/min the risk/benefit needs to be weighed. The safety of Gadolinium based i.v. contrast in children <2 years and pregnant women is not established.

ICU patients

ICU patients who need an MRI scan are transferred by ICU staff according to their Clinical Practice Guideline “Transport of Patients to Magnetic Resonance Imaging (MRI) in the Intensive Care Unit”.

Checking anaesthesia delivery systems

Please refer to the ANZCA PG 31A

Emergency Operating Theatre Booking Procedure

- **AM COORDINATOR:** Receive handover from night reg and divert 66910 to personal dect phone using phone at secretary's desk.

- **PM COORDINATOR** – Receive handover from AM coordinator, divert 66910 to personal dect phone.

- **NIGHT REG** – Divert 66910 to personal dect phone when on call consultant leaves the hospital.

BOOKINGS PROCESS:

- Receive call on 66910 – write down in the Emergency List Red Book all relevant clinical and patient details
  - **Patient name**
  - **URN**
  - **Ward location o Fasting status**
  - **Sip Til Send Suitability**
  - **Urgency code**
  - **Expected duration of surgery**
  - **Surgeon details**
  - **Your name and booking time**

- Advise surgeon of expected start time and remind them to call the nursing staff booking phone **66940**, or transfer the call from your DECT phone:

Transferring from DECT Handsets:

Press 66940 **then the green dial button**– wait for ringing tone

Press centre **OK button** to complete transfer

Press **red phone button** to end your call

- Notify anaesthetic staff (anaesthetists and technician/RN) and nursing staff in the relevant theatre about the case.

- The proposed order of cases in the emergency operating theatre should be recorded electronically on the ieMR **Perioperative Tracking Board.**

- The order of emergency cases is determined by several factors, including clinical urgency, the order of booking and the risk of time 'breaching', the need to optimise the patient, the availability of operating theatres/staff/resources, and list efficiency.

- Other operating theatres may be utilised, taking into consideration all the above factors. See also the **'Opening an Additional Emergency Theatre'** CHHHS Perioperative Procedure.

- At the end of the shift, the Anaesthetic Coordinator should hand over the folder and information to the next anaesthetic Consultant (or night Registrar), who then **MUST divert** 66910 to their phone.

- **Orthopaedic Trauma** – Lists are currently operating 7 days/week. The Orthopaedic Department determines the list order/priority, though some negotiation with the Trauma Theatre Anaesthetist may be necessary.

- Orthopaedic Trauma should generally NOT be booked on the Emergency List. However, if there are cases of high urgency and the Trauma List is unavailable/overloaded, trauma cases may be booked on the Emergency List, with the same list order criteria as other Emergency Cases, with the agreement of the Coordinating Anaesthetic Consultant.

- If either the Emergency Theatre or Orthopaedic Trauma theatre are un-utilised, other brief (eg <30 min) operating time cases may be placed into the empty theatre with the prior agreement of the Coordinating Anaesthetic consultant.

- If the Anaesthetic Coordinator is unable to satisfactorily resolve matters by negotiation, they should involve the Anaesthetic Director (or delegate) and/or the relevant surgical/obstetric Director at a clinically appropriate time.

EMERGENCY SURGERY PRIORITY CODES

CAT	Description
A	**IMMEDIATE** First Available Operating Theatre (Time frame < 1 hour) Patient at immediate risk of loss of life or limb
B	**CRITICAL** Next reasonably available theatre (Time frame < 4 hours) Patient stable currently but imminent risk of deterioration or organ survival
C	**PRIORITY** Same day (Time frame < 24h; may need to be done after hours) Surgical problem at substantial risk of deterioration if untreated
D	**DESIRABLE NON-CRITICAL** Time frame < 10 days - Inpatient. Do if time within reasonable hours, plan to finish by 10 pm
E	**ELECTIVE NON-CRITICAL** Time frame < 10 days - Outpatient. Plan to finish 10 pm
If the choice of Code is **unclear or disputed,** both **Consultant Surgeon / Obstetrician and Consultant Anaesthetist** must **be contacted**	

Notification of the Consultant

As a registrar you are never expected to administer and anaesthetic without consultation, supervision and assistance from your consultant in a timely manner whenever you require it.

The decision as to when to call will vary according to the experience of the registrar and / or the level of complexity of the case.

If you are unsure it is always better to call than not.

As a rule of thumb **– if you think "Should I call the consultant?" call your consultant.**

The following protocol details which cases, as a minimum, should be discussed with the supervising consultant.

Roles and responsibilities

1. **Trainees with less than one year's** anaesthetic experience at Registrar level, not including ICU, **must notify consultant about all cases**

2. **Trainees with less than two year's** anaesthetic experience at Registrar level, must notify the consultant about all:
    a. Children under 10-years-old
    b. All seriously ill patients (e.g. ASA 3-5, multi-trauma)
    c. All unfamiliar situations
    d. All GA LSCSs

3. **ALL trainees must notify the consultant about:**
    a. Children less than 5-years-old
    b. All seriously ill patients (e.g. ASA 3-5, multi-trauma, massive haemorrhage)
    c. Any medico-legal or political concerns
    d. Any compromised airway
    e. Any complications of the anaesthetic
    f. Any patients requiring ICU admission
    g. Patients requiring the presence of 2 anaesthetists
    h. Potential or actual death of the patient

4. For all **post-fellowship registrars**, consultation and supervision is available at all times.