CAA PROTOCOLS 2021

Cairns Anaesthetists Association - 2021

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:

- This Department Protocol Booklet & the APS Guidelines can be found at:
  - I:/ANA-PER-ICU\Anaesthesia\Information\PROTOCOLS & GUIDELINES\PROTOCOL BOOK DOCUMENTS\Current
  - On the Cairns Anaesthetists Association website: http://cairnsanaesthesia.org
  - On the QHEPS Procedures page https://qheps.health.qld.gov.au/cairns/html/anaesthetics-service-procedures

- ICU Clinical Practice Guidelines are available as hard copy in ICU & here:

  I:\ANA-PER-ICU\ICU\Manuals & Policies\ICU Clinical Guidelines
  ('shortcut to ICU' icon is on the desktop in ICU)

- A-Z of Policies, Manuals and Documents on the Cairns Health Service District website, at: http://qheps.health.qld.gov.au/cairns/A_Z_policies.htm

  Useful material is available under Anticoagulation Guidelines; Drug Policy Manual (Sections A and B); and Critical Care Drug Guidelines (Sections A-D)

AESTIVA 5 MACHINE CHECK

This protocol has three levels of testing:

READINESS TEST
This is performed immediately before the start of each anaesthetic.

PREOPERATIVE TEST
This test confirms that the machine is functional and free of leaks. Any doctor about to use the machine for one or a series of anaesthetics must perform this test, and it is an appropriate check for anaesthetic assistants preparing a theatre for use.

COMPREHENSIVE TEST
Make a complete check of the machine. This must be performed weekly on every anaesthetic machine, and on any occasion when a machine is being returned to use after any alterations, repairs or service.

➢ READINESS TEST

Flowmeters
- Turn oxygen flowmeter to minimum
- Ensure N_2O and Air flowmeters are set to zero.

Vaporiser
- Ensure the vaporiser is turned off
- Check the anaesthetic fluid level is adequate for the next case
- Anytime a vaporiser is changed the system must be tested using the Vaporiser and Circle System protocols on Page 3.

Breathing System
Check the circle breathing system is ready to use;

- New breathing system filter fitted
- Adjustable Pressure Limiting (APL) valve is fully open
- Ensure switch is set to “APL”.

If using a circuit other than the circle, check it using a protocol suitable for that circuit.

Suction
- Ensure the suction equipment is operational.

Other Equipment
- Ensure the equipment needed for intubation is ready for use
- Ensure any other equipment needed for the case is ready for use.

➢ PREOPERATIVE TEST

Turn on the machine master switch

Piped Gas Supply

- Check that no Bulk Gas Supply warning lights / alarms are indicating failure
- Check that piped gas supplies are correctly connected and secure
- Check the pipeline supply gauges read about 400 kPa.

Reserve oxygen supply

- Check that the cylinder is firmly secured in the yoke
- Open and then close the cylinder valve, observing the pressure gauge. A falling pressure indicates a leak from the machine's internal tubing
- Replace cylinder if less than one quarter full.

Flowmeters

- Turn on all the flowmeters and observe that the bobbins spin freely
- Attempt to create a hypoxic mixture by reducing the oxygen flow and observe that the N2O flow is reduced in proportion
- Turn off the flowmeters and observe that the bobbins return to approximately 100ml for O_2 and zero for N_2O and air.

Vaporisers

Test each vaporiser in turn:

- Check that the vaporiser is seated correctly and locked in place
- Check that the vaporiser can be turned on
- Check that only one vaporiser can be turned on at a time
- Turn the vaporiser off
- Check that the vaporiser contains enough anaesthetic agent
- Check that the vaporiser filling ports are closed.

Flow Sensor Calibration

- Open front of flow sensor cartridge
- Push up on the latch under flow sensor module
- Pull out flow sensor cartridge fractionally. When the ventilator screen shows 'No Insp Flow Sensor' and 'No Exp Flow Sensor' the calibration is complete
- Reinstall flow sensor cartridge.

Condensate Drainage

- Push drain button (Silver) located in flow sensor cartridge for ≥10 seconds to remove condensate.

Circle System

Prior to performing the leak test:

- Check that all the breathing hose connections are correct and firm
- Check the absorber-locking lever is locked and that the CO2 bypass warning is not displayed on the ventilator screen

- Check the condensate bleed plug is closed
- Set selector switch to “APL” mode
- Close the Adjustable Pressure Limiting (APL) valve
- Disconnect the reservoir bag and form a ‘circle’ by attaching the reservoir bag tubing to the patient “Y” connection (or the breathing system filter)
- Pressurise the circuit to 30 cm H2O using an O2 flow of 1 l /Min
- Turn the O2 flow down to 300 ml/min while observing the pressure gauge and ensure the pressure in the circuit continues to rise slowly
- Turn each vaporiser on and off in turn: the pressure should continue to rise
- Reconnect the reservoir bag
- Attach another 2 litre reservoir bag (as a test lung) onto the patient “Y” connection and use the oxygen flush button to inflate the reservoir bags
- Visually and audibly check the reservoir bags for leaks by squeezing the bag and increasing the circuit pressure to >30 cm/H2O
- Check proper functioning of the unidirectional valves.

The Ventilator

- Turn on the ventilator
- Fill the ventilator bellows with oxygen using the oxygen flush
- Set the oxygen flow to 300 ml/min
- Verify that during inspiration the bellows delivers the set tidal volume (ventilator in volume control mode) or set pressure (ventilator in pressure control mode) and that during exhalation the bellows fills completely
- Now set the fresh gas flow to 5 L/min
- Ensure the ventilator continues to function without sustained pressure at the end of expiration
- Remove the test lung and ensure the low airway pressure and apnoea alarms sound after 30 seconds
- Turn the ventilator off and open APL valve.

Anaesthesia Gas Scavenging System (Active AGSS)

- Verify that the flow indicator ball is in the green zone.
- Open the APL valve and occlude patient “Y” connection
- Set oxygen flow to minimum
- Ensure the pressure gauge reads about zero
- Activate O2 flush and verify that the pressure gauge does not read above 10 cm H_2O**.**

Soda Lime

- Visually check that the canister contains Soda Lime. You can only check for exhaustion of the Soda Lime during a case. At rest it may return to a normal colour but when in use it will change colour, remain cool and the inspired CO2 will be seen to rise.

Oxygen

- Verify that the low O2 alarm is enabled and functioning by setting it to above 21% and disconnect the gas-sampling line
- Reconnect the gas-sampling line to the breathing filter, flush with oxygen and ensure the monitor reads >90%.

Suction System
- Ensure the system is operational.

Intubating Equipment

Check the presence and function of:

- Two laryngoscopes and blades
- Suitable facemasks
- Suitable LMAs
- Guedel airways
- Endotracheal tubes
- Stylet and bougie
- Air syringe
- Magill forceps
- Scissors

Self-Inflating Bag
- Ensure it is present (kept behind the anaesthetic machine)
- Ensure it is properly assembled
- Ensure the one-way valve is working correctly.

CHECK LIST:

Gas Supply
Flowmeters
Vaporisers
Circle System
Leak Test
Ventilator
Scavenging System
Suction
Other Apparatus
Monitor.

When you have finished checking the anaesthetic machine you should be able to safely perform the following for a patient:

Oxygenate
Ventilate
Anaesthetise
Intubate
Suction.

➢ COMPREHENSIVE TEST

The following tests are performed in addition to the Preoperative Test:

The machine low-pressure circuit (Backbar) leak test

- With the machine power off, turn all the flow controls one and one half turns anticlockwise (on) - no gas will flow.
- Attach the suction bulb to the common gas outlet (ensure the lever is down to access common gas outlet)
- Squeeze the bulb until fully deflated. If the bulb re-inflates in 30 seconds or less there is a leak in the machine low-pressure circuit
- Turn on a vaporiser, deflate the bulb again and observe that it stays collapsed. Turn the vaporiser off
- Repeat for each vaporiser
- Flick the lever back up reconnecting the circle system
- Turn the machine back on
- Turn the N2O and air flows off
- Flush the N_2O and the inhalational agents out of the system by running oxygen at 1L/min for one minute and then turn the oxygen flowmeter to minimum**.**

Reserve gas supply and oxygen failure warning device

- Disconnect the bulk oxygen supply
- Open the oxygen cylinder and turn on the oxygen flowmeter to 2 l/min
- Check that gas is able to pass from the cylinder through the flowmeter and that the monitor reads >90% oxygen
- Close the oxygen cylinder
- Turn on the nitrous oxide flowmeter to 2 l/min
- Press the emergency oxygen button to release the oxygen pressure in the machine. The audible warning device should now operate, and the nitrous oxide should cease to flow
- Restore the bulk oxygen supply and the warning device should cease.

One Gas Test

- Ensure the oxygen cylinder is turned off
- Check that the oxygen hose is connected to the correct wall outlet and to the oxygen inlet of the machine
- Check that the gas-sampling line from the monitor is connected to the breathing system
- Turn on the oxygen and the nitrous oxide flowmeters to 2 l/min
- Disconnect the nitrous oxide supply from the wall outlet. Nitrous oxide flow should cease after a short delay. Check that only oxygen flows as detected by the oxygen analyser
- Reconnect the nitrous oxide hose to the wall outlet

- Check that nitrous oxide flows in the correct flowmeter and that the gas analyser reads 50% oxygen and 50% nitrous oxide**.**

AESPIRE VIEW MACHINE CHECK

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- Pull out flow sensor cartridge fractionally. When the ventilator screen shows 'No Insp Flow Sensor' and 'No Exp Flow Sensor' the calibration is complete
- Reinstall flow sensor cartridge.

Condensate Drainage

- Push drain button (Green with tap symbol) located beneath grey condenser for ≥10 seconds to remove condensate.

Circle System

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- Turn the O2 flow down to 300 ml/min while observing the pressure gauge and ensure the pressure in the circuit continues to rise slowly
- Turn each vaporiser on and off in turn: the pressure should continue to rise
- Release APL valve and observe pressure gauge returns to 0cm of H2O
- Reconnect the reservoir bag
- Attach another 2 litre reservoir bag (as a test lung) onto the patient “Y” connection and use the oxygen flush button to inflate the reservoir bags
- Visually and audibly check the reservoir bags for leaks by squeezing the bag and increasing the circuit pressure to >30 cm/H2O
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- Ensure the pressure gauge reads about zero
- Activate O2 flush and verify that the pressure gauge does not read above 10 cm H_2O**.**

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- Reconnect the gas-sampling line to the breathing filter, flush with oxygen and ensure the monitor reads >90%.

Suction System

- Ensure the system is operational.

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Check the presence and function of:

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One Gas Test

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- Check that the gas-sampling line from the monitor is connected to the breathing system
- Turn on the oxygen and the nitrous oxide flowmeters to 2 l/min
- Disconnect the nitrous oxide supply from the wall outlet. Nitrous oxide flow should cease after a short delay. Check that only oxygen flows as detected by the oxygen analyser
- Reconnect the nitrous oxide hose to the wall outlet

Check that nitrous oxide flows in the correct flowmeter and that the gas analyser reads 50% oxygen and 50% nitrous oxide**.**

CARESTATION 600 MACHINE CHECK

Preoperative Tests

- Turn on the Machine and Monitor
- Ensure the **Desflurane** vaporizer is turned on (if fitted)
- Check the service label is current
- Check the main pipeline pressures on the machine read 400 kpa
- Check the **gas scavenging** is turned on at the wall/pedant.

➢ FULL TEST CHECK

- **Press the FULL TEST icon to proceed through all sequenced checks.**
- Follow the on-screen instructions.
- Once the Full Test has been completed, it will list your completed checks.

❖ **Flow sensor calibrations are needed every 2 weeks. Select the 'Calibrations' icon then the 'Flow & Pressure' icon & follow the on-screen instructions.**

➢ COMPACT BREATHING SYSTEM (CBS) & VENTILATOR CHECK

- Attach a test lung to the patient circuit Y piece.
- Ensure the gas controls are turned off. A small Basal flow of O2 will remain
- Press the **Start Case** icon twice to activate the ventilator/gas screen.
- Set the APL valve to 70 and fill the breathing bag using the O2 flush
- Carry out a 2 bag test and observe the correct operation of the unidirectional valves
- Ensure the Ventilator is set to VCV with TV 500 and RR of 10
- **Switch the 'Bag / Vent' switch to Vent & fill the bellows using the O2 flush**
- **Observe the bellows rise and ensure it inflates fully against the top of the bellows cover for several breaths.**
- Unplug the machine mains plug from the wall/pendant and ensure the Ventilator remains cycling.
- Observe the "ON BATTERY" message appears on the ventilator screen
- Reconnect the mains plug
- Observe the ventilator screen Tidal volume and Respiratory Rate. Ensure the TV is within 10% (450 to 550) of the selected TV value when the RR reads 10
- Once these settings have been reached carry out an over pressure test by quickly squeezing the test lung. The machine will alarm **"P PEAK HIGH"**
- Carry out a disconnect test by removing the test lung. The machine will alarm **"UNABLE TO DRIVE BELLOWS**"
- Once complete disengage the ventilator by switching the bag/vent switch back to **bag**. Open the APL valve fully.

➢ AIRWAY GAS MODULE AND NITROUS CUTOFF CHECKS

Breathing Gas Analyzer Test

- Attach a **breathing filter** to the patient circuit Y piece.
- Ensure AIR and NITROUS are turned off
- Turn the O2 to 10 l/min flow and observe that the Fi/Et O2 readings on the monitor read 100%. Turn the O2 off
- Turn the N2O on to 3 l/min and ensure the O2 rises to 1 l/min or more.
- Set both the Nitrous and O2 flows to 5 l/min and ensure the Fi/Et O2 and N2O readings read 50% each
- Turn the O2 and N2O off and turn the Air to 10 l/min and ensure the Fi/Et O2 reading is 21%
- With Air flowing, check each vaporizer at 2% and ensure the AA reading on the monitor reads 2 %. Ensure only one vaporizer can be turned on at a time.
- Turn the vaporizers off and ensure are full. Turn the Air flow off.
- Remove the Sevoflurane from the circuit by opening the APL valve and turning the O2 flow to 10 l/min. Squeeze the bag till empty and allow to fill with O2. Turn all gas flow off.
- Check the monitor trace indicates CO2 on the Capnograph

Gas supply O2 failure alarms with N2O cutoff and anti-hypoxic device

- Ensure the emergency O2 cylinder on the back of the machine is turned OFF.
- Set the flow of oxygen, Nitrous and air to 5 litres.
- Initiate an oxygen failure by disconnecting the O2 wall supply
- Observe the gas flows within the rotameters. As the oxygen begins to fall the nitrous oxide should fall also. Air should remain at 5 litres. The flow of nitrous oxide should completely stop before the oxygen (nitrous cut off safeguard). An **O2 failure** alarm should sound.
- Go to the back of the machine and TURN ON the emergency O2 cylinder.
- Check the contents gauge reads greater than 5000kpa
- Observe that the flow of oxygen and nitrous oxide has commenced again within the rotameters and the alarm has stopped.
- **REATTACH THE O2 PIPELINE** AT THE WALL/PENDANT and turn the emergency O2 cylinder off.
- Ensure the O2 Cylinder contents pressure reading does not drop
- Turn off all gas flow
- Attach a mask to the filter

CHECK YOUR EMERGENCY AND AIRWAY EQUIPMENT
SIGN FOR YOUR MACHINE CHECK

FASCIA ILIACA CATHETER INSERTION TECHNIQUE

Single shot fascia iliaca or femoral nerve blocks provide good analgesia, however, the block can wear off long before the patient receives surgery.

Instead, a fascia iliaca catheter facilitates ongoing analgesia until the patient receives surgery. In contrast to a femoral nerve block, the fascia iliaca catheter is inserted lateral to (not on) the femoral nerve, thereby reducing the potential for femoral nerve injury.

Indications	Contraindications (when in doubt, discuss with a consultant)
Imaging-confirmed fracture of neck of femur (all subtypes except isolated acetabular fractures)	• Patients on clopidogrel (or other antiplatelets in same class) • INR > 1.5 • Previous femoral vascular bypass surgery (scar + altered anatomy) • Allergy to local anaesthetic • Local infection in groin • Systemic infection (single shot block is OK) • Very obese patients (impalpable landmarks. Ultrasound advised)

Roles and Responsibilities

Local anaesthetic safety

- Max safe dose of ropivacaine is 3mg/kg (up to max 200mg)
- Each 10mL of 0.75% ropivacaine contains 75mg ropivacaine
- Patients less than 50kg should be administered reduced concentration or volume of local anaesthetic

Equipment required

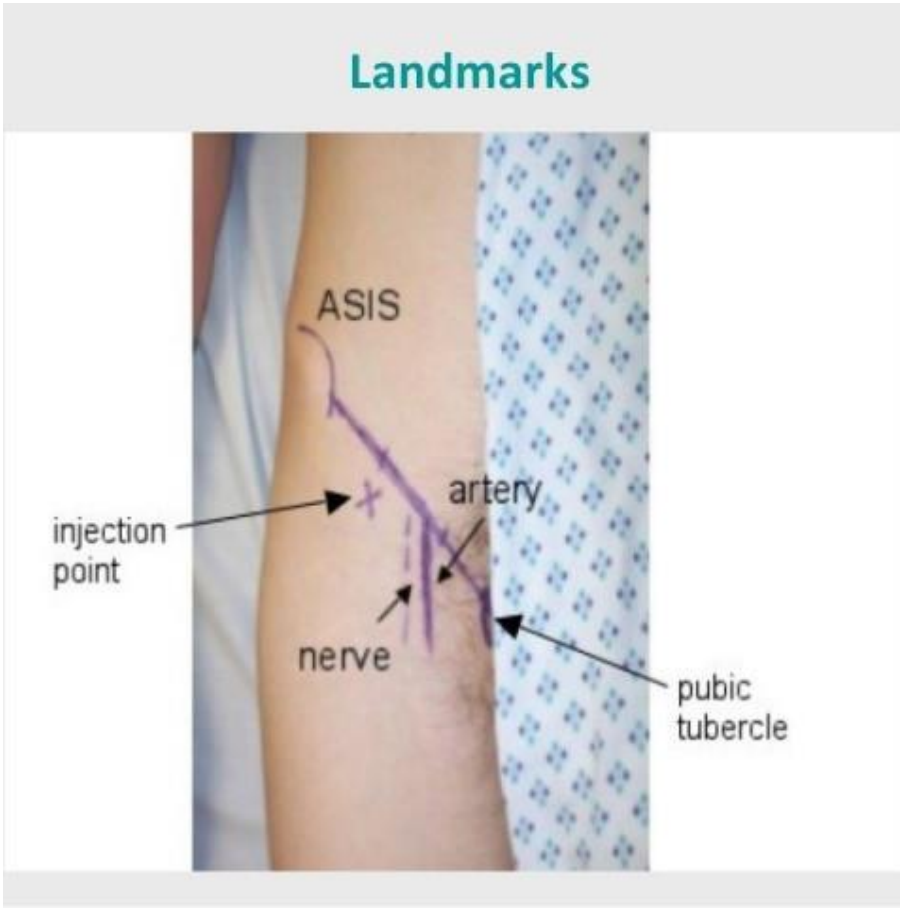
- Refer to the equipment list “drop sheet” for all the required items.

Preparing the ropivacaine solution

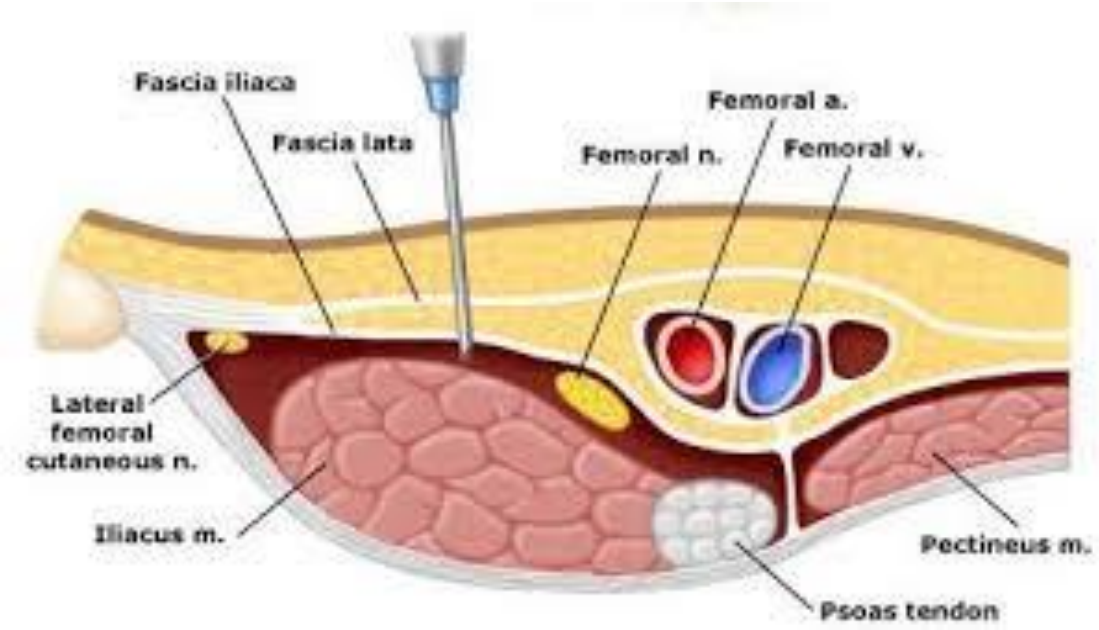
- In each 20mL syringe draw up 10mL of ropivacaine 0.75% PLUS 10mL of saline (resulting in 2 syringes, each containing 20mL of 0.375% ropivacaine).

Performing a fascia iliaca catheter insertion (aseptic procedure)

- Explain the indication, procedure and risks to patient
- Expose the patient while maintaining decency as much as possible
- Palpate landmarks (ASIS and pubic tubercle)
- Mark the insertion point: 2cm caudad to the junction between lateral and middle 1/3rd of line joining the ASIS to the pubic tubercle
- Check that the marked injection point is 1.5 – 2cm lateral to the pulsation of the femoral artery



- Prepare the skin and apply a windowed drape
- Infiltrate skin and deeper tissues with 5mL of 1% lignocaine along the expected path of the FI catheter
- Use a sharp pink needle to pierce the skin at the insertion point. This will reduce the risk of missing the first “pop” through the fascia lata, which can occur when piercing the skin with Touhy needle.
- Insert the Touhy needle through the existing hole in the skin at right angles. Once just through the skin, adjust the needle angle to about 45degrees directing the tip cranially, keep the needle in the sagittal plane.
- 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 **millimetres**
- Take note of the depth of the needle at skin ("NEEDLE DEPTH"). Black marks the 4th, 6th and 8th cms.
- Secure the needle with your non-dominant hand and remove the trocar from within the Touhy needle
- Attach the first 20mL syringe of 0.375% ropivacaine to the Touhy needle
- If aspiration is negative for blood, start injecting. **There should be very little resistance to injection.**
- Excessive resistance to injection indicates the needle tip may be within iliacus muscle. In this case, withdraw slightly until injection is easy.
- Inject 20mL slowly, aspirating every 5mL, then detach the syringe from the needle. You have now created a plane filled with local anaesthetic under the fascia iliaca. This facilitates passage of the catheter. It is normal to observe some of the injected fluid coming back through the needle during syringe change.
- Place catheter guide over needle, and thread the catheter through the Touhy needle. The catheter tip will start protruding from the tip of the Touhy needle once it passes the 10cm marker (double blue line). You may feel mild resistance at this point but push through it.
- Continue threading the catheter until you have **passed at least 15cm**. Stop when you encounter significant resistance or have reached the 20cm marker (quadruple blue line), whichever is reached first.
- Withdraw the Touhy needle, continuing to thread the catheter down the needle at the same rate that the needle is withdrawn, so that the catheter does not come out with the needle
- Check the CATHETER DEPTH at skin - **you will need to record this**
- Attach the yellow connector to the catheter, and connect the antibacterial filter to the yellow connector
- Connect the 2nd 20mL syringe of ropivacaine and aspirate before injecting

- Inject the remaining 20mL, aspirating every 5mL. Since you are using a large syringe to inject down a long, fine-bore catheter, expect significant resistance to injection. If you cannot inject at all, the catheter may be kinked or up against tissue. Withdraw the catheter slowly as you continue to inject. But remember: **the catheter should not be less than 3cm under fascia iliaca.**
- Apply a drop of SurgiSeal skin glue to the catheter entry point, allow a few minutes to dry. This will reduce catheter leak and infection risk.
- Remove the yellow connector (disengage it by inserting the tip a non-Leuer lock syringe into the connector's side hole, and lever it open)
- Attach **Epi-lock** catheter securing patch
- Optional: Trim the catheter (using sterile scissors) to around 20cm above entry point.
- Re-attach the yellow connector
- Cover the filter-connector complex with a Tegaderm "Taco" dressing
- Secure edges of Tegaderm with 4 x strips of Hypafix to avoid Tegaderm peeling away.
- Secure catheter and filter in a way to allow bed cares and reduce chance of dislodgment.

Documentation: fill out these forms

1. APS referral form (place in APS tray)
2. Yellow non-neuraxial nerve block audit form (place in APS tray)
3. Regional block catheter infusion order form (place in patient's notes – Ward/PACU nurses will initiate)

Re-dosing of local anaesthetic in the Emergency Department

- If a fascia iliaca catheter is inserted in the Emergency Department, (as long as the patient remains in the Emergency Department) they will require **manual** re-dosing by a Medical Practitioner as per the protocol in the infusion order form (re-dose using **20mL of 0.2% ropivacaine every 3 hours**).

- Infusion pumps will be established once the patient is admitted to the wards.

Useful tips

- 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 Touhy needle
- When advancing the Touhy needle, rest your wrist on the patient's thigh and "dart-grip" the needle at about the 5cm mark to avoid suddenly overshooting with the loss of resistance
- Don't impale the femoral nerve! Stay 1.5-2cm away from femoral pulsation. There should be no pain or paraesthesia on injection.
- 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 Touhy needle can result in the sharp tip of the Touhy needle cutting off the tip of the catheter, leaving foreign body within the patient.

- 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 other nerves supplying the hip are not blocked, so some opioid requirement is expected.
- [Catheter depth] - [Needle depth] = [Length of catheter under the fascia iliaca], which should be between 5 and 10cm (less than 3cm predicts block failure).
- Obese patient with apron – an assistant can retract the apron cephalad to facilitate access to the groin

FASCIA ILIACA CATHETER INSERTION

EQUIPMENT LIST DROP SHEET

- Skin marker pen
- 2x chlorhexidine-alcohol prep sticks (“pink lollipops”)
- Adhesive drape with a window
- Basic dressing pack
- Sterile gloves
- 5mL syringe
- 23G (blue) hypodermic needle
- 18G (pink) blunt drawing up needle
- 18G (pink) sharp needle
- 5mL 1% lignocaine
- 2 x 20mL syringes
- 20mL of 0.75% ropivacaine

- 2 x 10mL vials of 0.9% sodium chloride
- 16G Touhy epidural kit
- Tissue glue (SurgiSeal or DermaBond)
- Sterile scissors
- 2 x large Tegaderm
- Hypafix strips x 4
- Documentation:
- APS referral form (white single A4)
- Epidural/Regional infusion order form (white double-spread sheet)

Yellow non-neuraxial nerve block audit form

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.

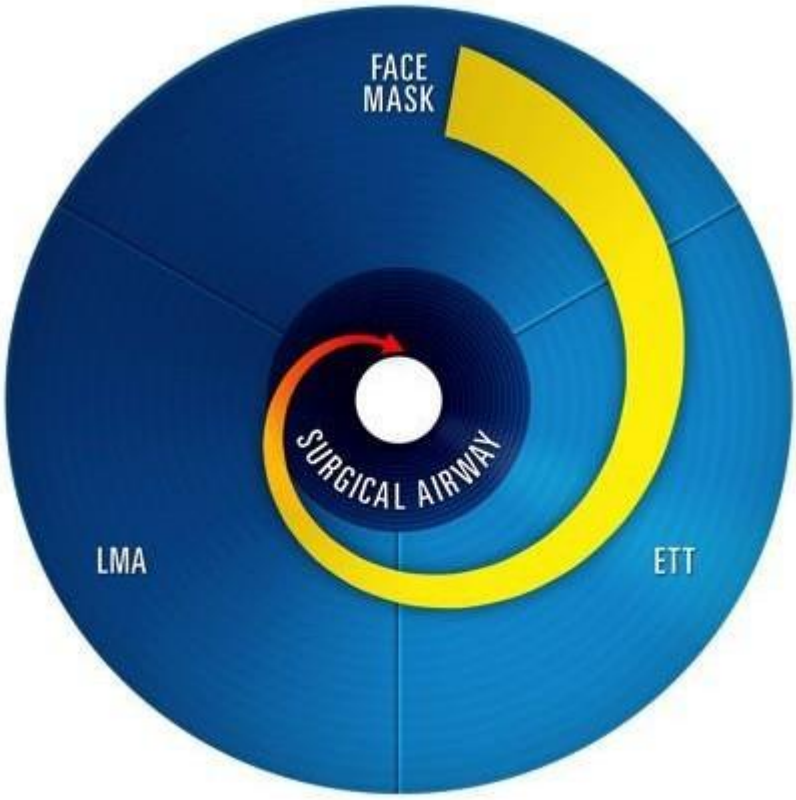
Trauma and MET calls

- 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, radiology, 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.



http://vortexapproach.com/Vortex_Approach/Vortex.html

Advanced airway equipment.

- 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.

- Can’t Intubate Can’t Oxygenate (CICO) kit
  - Found in the second drawer 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.

- 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.

- Recovery also stocks a small supply of sugammadex.
- If you use it, you must fill out the form to have it replaced.

- McCoy, Miller, Kessel, left handed and short handle laryngoscopes.
- 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.

➢ 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 at the bottom of our difficult airway trolley and contains standard equipment for managing airways in off-site locations.

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

MASSIVE HAEMORRHAGE PROTOCOL

Massive haemorrhage is defined as:

Adults: 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)

Children: 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 embolization - 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	>35 °C
Acid-base status	ph >7.2, base excess <–6, lactate <4 mmol/L
Ionised calcium (Ca)	>1.1 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 x 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:
    - o Hypotension
    - o Hypothermia
    - o any coagulation abnormality, or
    - o 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 secure viewer 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
    - Eg 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 Secure Viewer software on the desktops located within each department

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)

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 / 10 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;

- Remove cap from product vial and clean the rubber stopper with alcohol wipe, allow to dry;
- Using the transfer device transfer 50mL of **water for injection** into the product vial;
- Gently swirl the product until fully dissolved – **DO NOT SHAKE**;
- After reconstitution the product should be colourless and clear to slightly opalescent. Inspect visually– if solution is cloudy or contains particulates do not administer.
- Do not mix with any other product or intravenous solution – administer through a separate injection site.
- Administer at room temperature by slow intravenous infusion at a rate not exceeding 5mL/ minute.
- 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

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.
- 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.

MRI ANAESTHESIA CHECKLIST

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

- Aestiva Anaesthetic Machine with GE monitoring (soon to be replaced by Carestation Anaesthetic machine)
- Anaesthetic trolley
- Resuscitation trolley
- MRI compatible ECG dots, hearing protection

MRI room

- Aestiva 5 MRI compatible Anaesthetic Machine with GE monitoring
    - "Tesla Spy" to alert too close proximity to the scanner
    - Slave monitor to Radiographers workspace (no audio)
    - 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 *[1]*.
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 with a “long arterial line” so that the transducer can be secured away from the scanner.
- 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”

ANAPHYLAXIS MANAGEMENT

Roles and responsibilities

- 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

IMMEDIATE MANAGEMENT

D R	Danger & Diagnosis Response to stimulus	Unresponsive Hypotension or Bronchospasm Cease triggers including Chlorhexidine & Colloid Stop procedure. Use minimal volatile if GA	
S	Send for help & organise team	Call for Help Assign a designated leader & 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 1mg Adrenaline iv (Paed 10 µg/kg) & follow ALS protocol IV Fluid: 20 ml/kg bolus repeat PRN	
D	Drugs: Adrenaline IV Bolus repeat if needed 1-2 minutely & Prepare Infusion	IV Adrenaline Boluses Draw up 1mg in 10 ml 100 µg/ml	
	Adrenaline infusion: Adrenaline 6mg in 100ml (1ml/h = 1 µg/min) Adult 0.05-0.4 mg/kg/min Child 0.1-5 µg/kg/min	Moderate Hypotension or Bronchospasm Adult 5-20 µg Child 1-5 µg/kg	Severe Hypotension or Bronchospasm Adult 100-200 µg Child 5-10 µg/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 Chlorhex lube)
- Colloids - stop if running

- Ensure no LATEX in theatre

Consider other causes

Monitoring

- Consider IA Line & CVC

Request further help

Resistant Hypotension

- Noradrenaline 0.1 µg/kg/min (metaraminol or phenylephrine if Noradrenaline not immediately available)
- Vasopressin 1-2 unit bolus then 2 units/h infusion
- Glucagon 1.5 mg over 5min for β-blockers reversal

Resistant Bronchospasm

- Salbutamol iv bolus 100-200 µg +/- infusion 5-25 µg/min (Child 5 µg/min for then 1-2 µg/kg/min)
- Consider AutoPEEP & Tension Pneumothorax

Pregnancy

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

POST CRISIS MANAGEMENT

Consider Steroids

- Dexamethasone 0.1-0.4 mg/kg
- Hydrocortisone 2-4 mg/kg

Consider ORAL antihistamines

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

Investigations

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

LOCAL ANAESTHETIC TOXICITY

Adapted from Guidelines from The Association of Anaesthetists of Great Britain and Ireland

Endorsed by Australian & New Zealand College of Anaesthetists - www.aagbi.org

1 Recognition	**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	
2 Immediate Management	• **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	
3 Treatment	**Circulatory Arrest** • Start CPR using ALS protocols • Manage arrhythmias using ALS protocols (may be refractory to treatment) – **Lignocaine not indicated** **Administer** Intralipid[1] **(See next page for guidelines)** • Continue CPR throughout treatment • Recovery may take >1 hour	**Without Circulatory Arrest** Use conventional therapies to treat: • Hypotension • Brady or tachyarrhythmias **Consider intralipid**
4 Follow-up	• Observe until sustained recovery achieved • Regular clinical review for pancreatitis (including daily lipase for 2 days)	

[1] Propofol is not a suitable substitute for Intralipid

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

LIPID EMULSION (INTRALIPID) PROTOCOL

INTRALIPID IS STORED IN THE THEATRE ARREST TROLLEY

Immediately

- Give bolus of 20% intralipid – **1.5 ml/kg over 1 minute** AND
- Start infusion of 20% intralipid 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

Intralipid dose should not exceed a maximum cumulative dose of 12 ml/kg

LATEX SENSITIVE PATIENT

Responsibilities

- 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 allergy 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.

Identification, documentation and notification

- At the time of booking an elective case, that person booking the case should notify bookings of the allergy and request the that 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 Alert Policy.
- 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

There has been a large push in recent years to remove latex products from the perioperative areas in The Cairns Hospital.

As the majority of equipment is now latex free, there is no longer a "Latex Allergy Trolley" in theatres but instead, a "Latex Folder" kept with the Malignant Hyperthermia trolley which contains information for the management of latex allergic patients.

- 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 Latex Allergy Folder)*
- 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 required to allow the theatre to remain "dormant" as powdered gloves are not used in this department.
- 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/sleek tape 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

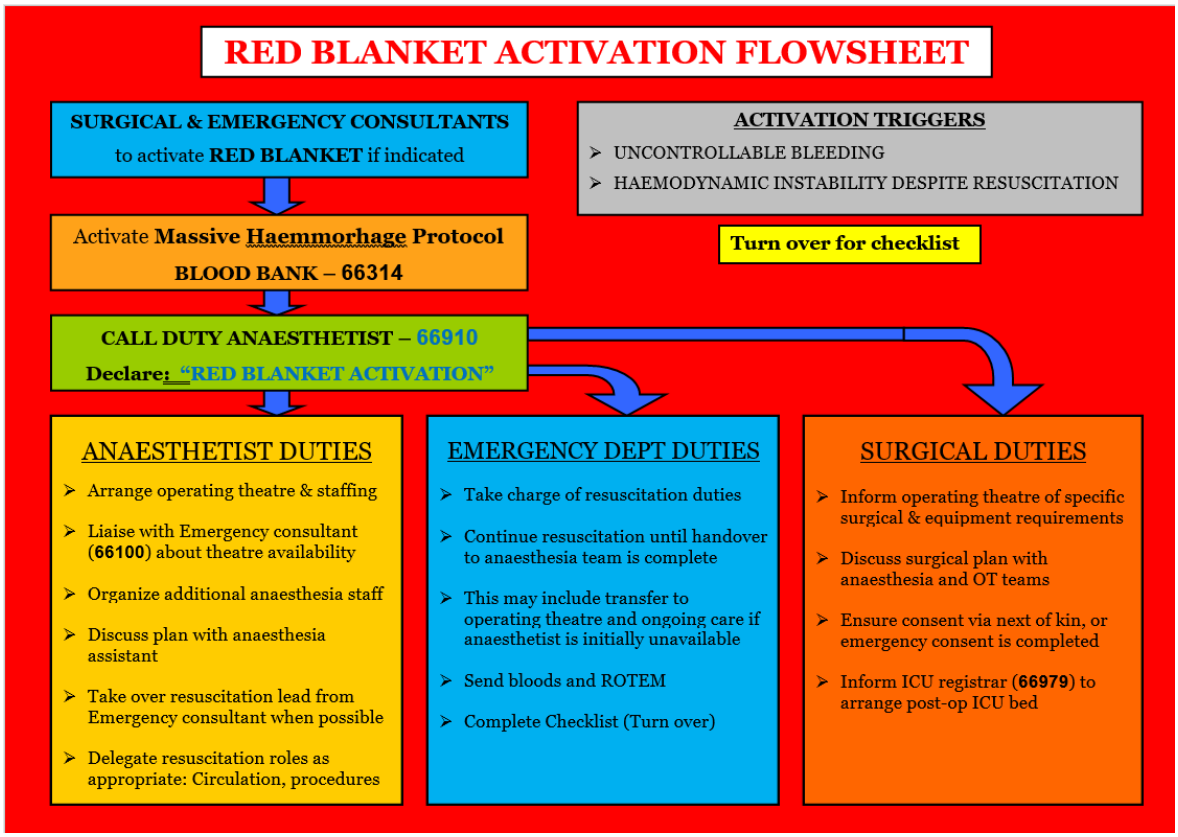
be present in a product, consult with pharmacy about alternative preparations or options for the treatment.

- 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.

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:

- Significant penetrating injuries (head, neck, chest, abdomen)
- Major head injuries (dilated pupil(s), open injury, severe facial injury)
- Systolic BP <90 mmHg
- Request by Retrieval Physician
- Discretion of 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

- 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.
- 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.
- Timely communication with Consultant Anaesthetist on-call if not already present.
- Procedures as required by ED Team Leader (e.g. vascular access)

Practical Points:

- **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.

- **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

- Provide procedural assistance to the ED Team Leader
- If skills appropriate may provide airway assistance as per Anaesthetist especially if Anaesthesia unable to attend
- Assist with advanced transfusion management (Massive Transfusion Protocol)
- Clear line of communications
    a. ICU Consultant
    b. ICU TL regarding bed management
    c. Anaesthesia as overleaf

2. Surgical Registrar

- Provide procedural assistance to the ED Team Leader
- May be required to undertake primary survey if ED skill mix reduced
- Clear line of communication with Surgical Consultant to make time critical decisions about movement to theatre

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 – 1.0mg/kg for three days preoperatively in the following asthmatic patients:
- Currently wheezy
- FEV1 <60%
- Admitted to ICU with asthma in the past
- Inpatient with asthma in the past year
- Visit to Emergency Department in the past 6 months
- 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 (ie PPIs or H2 blockers)
    - Advise patient to take their PPI/H2 blocker on the morning of surgery
    - If symptoms are poorly controlled despite treatment, prescribe sodium citrate (30ml of 0.3M solution), to be taken just before coming to

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

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

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

FASTING IN ADULT PATIENTS

Background:
Fasting is required before undergoing **general anaesthesia, sedation or regional anaesthesia** (due to the possibility of conversion from regional to general anaesthesia) in order 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 up to 2 hours before surgery in order to mitigate the negative effects of fasting.

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 minimise both the risk of aspiration and the physiological impact of fasting.

Definitions:

CLEAR FLUIDS = Water, clear cordial, clear juice (no pulp), black tea & coffee (no milk), carbohydrate drinks specifically designed for perioperative use

NON-CLEAR FLUIDS = Milk containing drinks, jelly, fluid containing particulates (eg fruit juice with pulp)

Recommendations for Patients Undergoing Elective Surgery:

- **Clear Fluids** may be consumed up to **2 hours** prior to the scheduled surgery. Up to 400ml of fluid appears safe 2 hours pre-op.
- **Solids & Non-Clear Fluids** may be consumed up to **6 hours** preoperatively
- Please note that if the patient is scheduled on a PM operating list they will be able to have a light breakfast around 0600 since their surgery will be after 1230.
- Routine medication should be taken up to 2 hours pre-op, 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 their fasting time.

- 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.

ERAS – TOTAL HIP & KNEE ARTHROPLASTY

Anaesthesia Pathway

Pre-operative

1. Multi-disciplinary assessment 2-4/52 prior to surgery
    a. Pre-anaesthetic Clinic
    b. Physiotherapy
    c. Pharmacy
    d. Nursing
2. Pre-anaesthetic Clinic 2-4/52 prior to surgery
    a. Pre-op screening as per major surgery protocols
    b. Identify contraindications to ERAS protocol
    c. Prescribe pre-medications for DSU on inpatient drug chart:
        i. Po Paracetamol 1g Pre-op in DSU
        ii. Po Tapentadol SR 100mg 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. Aim for early on lists to facilitate post-operative physiotherapy
3. Pre-medications as prescribed

Arrival Induction Bay

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

Intraoperative Plan

1. Spinal with sedation or GA
2. Spinal with sedation is the preferred technique
    a. Consider intrathecal fentanyl and/or dexmedetomidine
    b. No intrathecal morphine
3. If GA
    a. Consider IV Tramadol 3mg/kg
    b. 2nd antiemetic at end of case (Ondansetron 4mg or Droperidol 0.5-1mg)
    c. Consider TIVA to reduce risk of PONV
4. IV Tranexamic Acid 1g
5. Dexamethasone antiemetic prophylaxis 8mg unless contraindicated (T1DM)
6. IV Parecoxib 40mg 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 <12months ago
7. Local anaesthetic maximum dose 4mg/kg of Ropivacaine divided between:
    a. Surgical periarticular infiltration up to 150ml 0.2% Ropivacaine (300mg) for both TKR & THR

    b. Motor sparing adductor canal block 20ml Ropivacaine (adjust concentration to achieve total 4mg/kg including surgical infiltration) for TKR
8. No routine PU catheter
9. Minimise intraoperative fluid
    a. Aim for no more than 1000ml + 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

Post-op Plan

1. Not for iv PCA - *Will need APS referral form & PCA form for FUp & Antiemetics*
2. Continue any chronic pain medication
3. Regular Slow release opioid (adjusted for age & co-morbidities):
    a. Targin 10/5 or 20/10
    and / or
    b. Tapentadol SR 1mg/kg 12hly rounded up to nearest 50mg
4. Regular Paracetamol
5. Regular Ibuprofen unless NSAID contraindicated (see above)
6. Regular Esomeprazole 20mg daily whilst taking NSAIDs
7. APS Antiemetic Protocol
8. PRN Oral Oxycodone
    a. 5-20mg 3hly (adjusted for age & co-morbidities)
    b. Withhold if RR<10 or Sedation Score ≥2
9. PRN Tramadol unless contraindicated
    a. Po/IV 50-100mg 6hly
10. PRN IV Morphine for breakthrough (Oxycodone if Morphine intolerant)
    a. 2.5-5mg with max 15-20mg 3hly (adjusted for age & co-morbidities)
    b. Withhold if RR<10 or Sedation Score ≥2
11. 12hly Hartmann's 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 PU'd 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. SR Opioids cease by Day 10 post-op in liaison with GP
16. DVT Prophylaxis as per surgical preference

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 anticoagulants
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	If clinically indicated e.g.– cardiovascular, renal, hepatic or diabetes comorbidities	Yes
Haemostasis	Not routinely	If clinically indicated e.g.– cirrhosis, bleeding disorder, on anticoagulants	If clinically indicated e.g.– cirrhosis, bleeding disorder, on anticoagulants
Chem 20	Not routinely	If clinically indicated e.g.– cardiovascular, renal, hepatic or diabetes comorbidities	Yes
ECG	Not routinely	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 anticoagulants	If clinically indicated e.g.– cirrhosis, bleeding disorder, on anticoagulants
Chem 20	Yes	Yes	Yes
ECG	Consider for people aged over 65	Consider for people aged over 65 or with 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

IRON DEFICIENCY ANAEMIA PRE-OP

Determine cause:

- If no obvious cause found, consider gastroscopy / colonoscopy.
- Consider deferring operation.
- Treat with oral iron.

Consider IV iron transfusion pre-op:

- If a patient is anaemic (Males <130g/L, Females <120g/L)
- And iron deficient (Ferritin <30mcg/L)
- And the operation is not deferrable and has the potential for substantial blood loss (and thus transfusion) eg: Colectomy.

IV Iron therapy:

- Prescribe Ferric Carboxymaltose 1000mg (in 250ml NSaline, over 15 mins), on a fluid prescription chart
- 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.
- They will repeat the iron studies and will come to the anaesthetic clinic for another prescription if the patient would benefit from further iron transfusion.

Iron Therapy

- Oral iron in divided daily doses. Evaluate response after 1 month. Provide patient information material.
- IV iron if oral iron contraindicated, is not tolerated or effective; and consider if rapid iron repletion is clinically important (e.g. <2 months to non deferrable surgery).

NOTE: 1 mcg/L of ferritin is equivalent to 8-10 mg of storage iron. It will take approximately 165 mg of storage iron to reconstitute 10 g/L of Hb in a 70 kg adult.

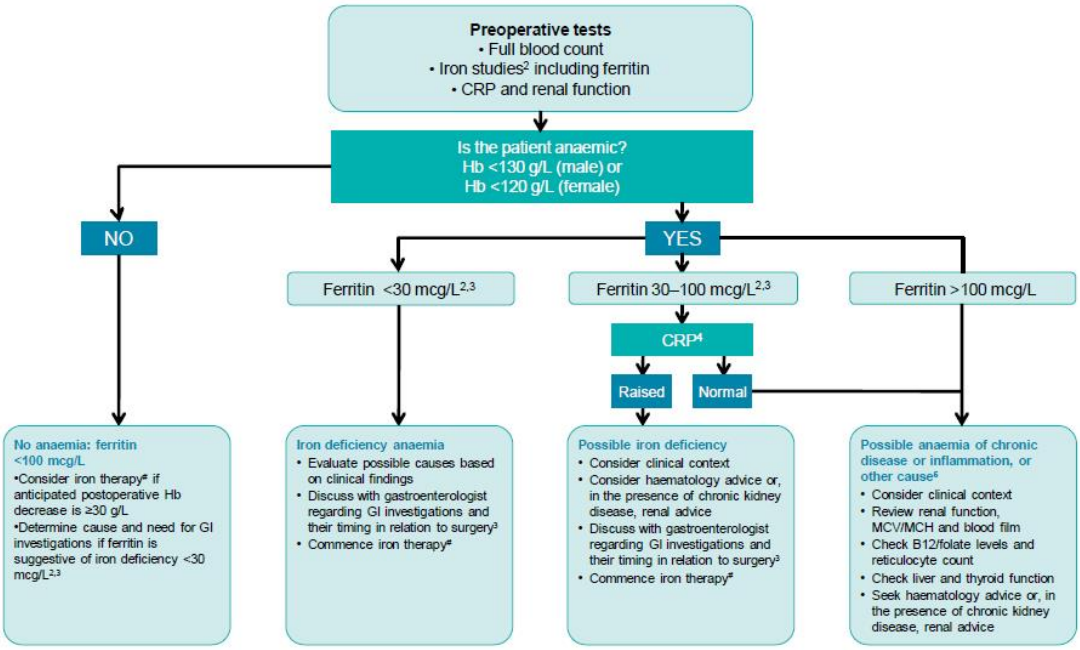
If preoperative ferritin is <100 mcg/L, blood loss resulting in a postoperative Hb drop of ≥30 g/L would deplete iron stores.

In patients not receiving preoperative iron therapy, if unanticipated blood loss is encountered, 150 mg IV iron per 10g/L Hb drop may be given to compensate for bleeding related iron loss (1 ml blood contains ~0.5 mg elemental iron)

See http://www.blood.gov.au/pbm-guidelines-preoperative-optimisation- template for more information

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.



MEDICATIONS WHEN FASTING

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:

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.

ANTIBIOTIC PROPHYLAXIS FOR ELECTIVE SURGERY

Please note:

1. Lincomycin can be used instead of Clindamycin if unavailable in OT
2. Redosing of Cephazolin is appropriate every 3 or 4 hours from last intra-op dose

PAEDIATRIC DOSING:

- Cephazolin **30mg/kg** up to 2g
- Metronidazole **12.5mg/kg** up to 500mg
- Vancomycin **15mg/kg** up to 1g

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

Drugs		Amoxycillin/ Clavulanate	Cephazolin	Clindamycin		Ciprofloxacin	Gentamicin	Metronidazole	Piperacillin/ Tazobactam	Vancomycin
Route		PO	IV	IV	PO	PO	IV	IV	IV	IV
Recommended Dose	Adult	875mg/125mg 12-hourly	2g (3g patients weighing greater than 120 kg)	600mg	450mg	500mg	3mg/kg (ideal body weight	500mg	4.5g	1g (1.5g patients weighing >80kg)
Reconstitution		NA	Reconstitute with 10mL water for injection	NA		NA	NA	NA	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
Administration		NA	Give reconstituted solution as a bolus over 5 minutes	Dilute the solution to 10mg/mL and infuse over at least 20 minutes		NA	Give the required dose undiluted over 5 minutes	Give undiluted over 20minutes	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 minutes)
Recommended intraoperative dosing interval		NA	4 hours	6 hours		NA	NA	NA	2	NA

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 + 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
		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	Prophylaxis NOT recommended	
		Clean Contaminated procedure e.g. microdochectomy, mastectomy, reconstruction (implants involved), reduction, sentinel node biopsy.	Cephazolin	Vancomycin
	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	Vancomycin + Gentamicin + Metronidazole
		Procedures not involving manipulation of viscera e.g. abdominoplasty	Cephazolin	Vancomycin
		Splenectomy (Vaccination and post-splenectomy antibiotic prophylaxis required in all cases- consult ID for advice)		

	Herniorrhaphy/ hernia repair	No mesh insert	Prophylaxis NOT recommended	
		Mesh insert	Cephazolin	Vancomycin
	Other	Insertion of infusaport/other devices		
		Clean excision procedures	Prophylaxis NOT recommended	
Gastrointestinal Surgery		Gastric/ duodenal/ oesophageal (bypass, resection, ulcer oversew, oesohagectomy etc.)	Cephazolin	Vancomycin + Gentamicin
		Biliary (open procedure or high risk laproscopic)		
		Colorectal surgery	Cephazolin + Metronidazole	Vancomycin +Gentamicin + Metronidazole
		Exploratory lapratomy/ division of adhesions		
Obstetrics/ Gynaecology		Hysterectomy, laparotomy procedures, Vaginal repair, late term termination	Cephazolin + Metronidazole	Clindamycin + Gentamicin
		Obstetric procedures (Early suction, termination, endoscopic procedures, other minor procedures)	Cephazolin	Vancomycin
		Caesarean section	Cephazolin	Clindamycin
Orthopaedic surgery- Joint replacement	Routine/ Primary joint replacement	Primary Total Hip Replacement (THR) or Total Knee Replacement (THR)	Cephazolin then continue for 24 hours post operatively	Vancomycin
		High Risk of MRSA infection	Add Vancomycin 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)	Vancomycin	
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 operatively	Vancomycin
		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 + 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, stapedectomy, septoplasty, sinus procedures)	Prophylaxis NOT recommended	
		No incision through oropharyngeal mucosa (e.g. parotid gland excision, complicated tympanoplasty, stapedectomy, septoplasty, sinus and similar procedures, neck dissection)	Cephazolin	Vancomycin
		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.
		Post operative care	Amoxycillin with Clavulanate (PO)	Clindamycin (PO)
Plastic and reconstructive surgery		Clean bone or soft tissue surgery	Prophylaxis NOT recommended	
		Open reduction and internal fixation of fractures	Cephazolin	Vancomycin
		Insertion of prosthesis, screws, plates etc.		
Vascular Surgery		Vascular reconstruction (e.g. abdominal aorta, graft/stent insertion, groin incision)	Cephazolin then continue for 24 hours post operatively	Vancomycin 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 then 12 hours post-operatively + Gentamicin + Metronidazole then 12 hours post-operatively
		AV fistula formation, striping/ligation of varicose veins	Cephazolin	Vancomycin
		All other clean procedures	Prophylaxis NOT recommended	
Urology		Ureteric stenting / lithotripsy / Rigid cystoscopy	Ceftriaxone 1g + Ampicillin 1g	Discuss with ID
		Open procedure (prostatectomy/nephrectomy)	Cephazolin	Vancomycin
		Prostate Biopsy (TRUS)	Ciprofloxacin 500mg PO pre-op	Discuss with ID

FRACTURED NECK OF FEMUR MANAGEMENT

Pre-op assessment Anaesthetics Review

All patients should be referred to APS pre-op
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)

All patients should have a pre-op anaesthetic assessment

- 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)

Check FBC, U+E's, 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 #

- **Warfarin:**
    - Check INR; if > 1.5 give vit K 3mg IV (in 100ml saline)
    - Repeat INR prior to OT the next day; consider Prothrombinex
    - Neuraxial block is OK if INR <1.5
    - Clexane 20mg sc daily, start >12 hours **post-op**

- **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 after 0200 on the day of surgery
    - No fluids after 0600 day of surgery
    - Review emergency booking at lunchtime re fasting (through APS)

- **Trauma list management**

- Ideally 2nd patient on Trauma list
- Avoid prolonged & repeated fasting if surgery delayed

➢ **Anaesthetic Choice**

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

➢ **Post-op Care**

- Hb in PACU before discharge to ward (i-STAT or formal)
- Acute Pain Service Follow-up
- Analgesia
- Fluids

ANTI-COAGULATION MANAGEMENT

Changes: Recent 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 Prothrombinex.

Pre-operative bridging therapy is no longer recommended for NOACs (New Oral Anti Coagulants), and the time of abstinence has been shortened for Dabigatran.

General Instructions

- **Make a clear plan for each patient:**
  - If possible, anticoagulated patients should be seen in Anaesthetic clinic at least 1 week before surgery.

- **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.

- **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.

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

• AF:
  o With CHADS2 Score of 5-6 (see Table 2)
  o With recent (<3 months) stroke/TIA/systemic embolus attributable to valvular heart disease

• MHVs:
  o Mitral valve
  o Older aortic valve (caged ball/tilting disc); bi-leaflet aortic valve with any CHADS2 risk factors
  o Any mechanical valve with previous stroke, TIA, or systemic embolic event

• VTE:
  o Recent (<3 months ago) DVT or Pulmonary Embolism
  o 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**

- 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
  - In the patient's notes (ieMR)
  - Give written instructions to the patient

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 Prothrombinex if INR ≥ 1.5 (see Table 5) and repeat INR to ensure < 1.5.

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) -Prothrombinex 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 Prothrombinex 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) Prothrombinex as required

Post-operative Warfarin Management – Low TE Risk Patients

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

URGENT SURGERY ON WARFARIN

- Immediate reversal required, but no active bleeding

- Give Prothrombinex-VF. This contains factor II, IX and X., with only very small amounts of factor VII. Despite this, adequate reversal of warfarin can be achieved without the need for additional FFP in most cases.
- Prothrombinex-VF can normalise the INR in 15 minutes in appropriate doses (see Table 5)
- The infused clotting factors have a half-life of about 24 hours. Therefore, vitamin K IV eg 1-3 mg will need to be given for sustained effect.
- If Prothrombinex is unavailable administer FFP 15ml/kg

Table 5. Suggested Prothrombinex Dose to achieve Target INR of < 1.5		
Initial INR		
1.5-2.5	2.6-3.5	≥3.6
25 IU/kg	35 IU/kg	50 IU/kg

- **Immediate warfarin reversal for life-threatening bleeding**

Give:
- Vitamin K 5-10mg IV
- Prothrombinex –VF 50 IU/kg
- FFP 150-300ml
- If Prothrombinex 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 60 % of Dabigatran
- Prothrombinex, 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, but is not yet commercially available in Australia)

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) Rest Day if: Child-Pugh C	Normal dose (for most) Rest Day if: 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:
    1. Prothrombinex 50 IU/kg (shows benefit in experimental studies)
    2. Tranexamic acid 1g then infusion 1mg/kg/hr
    3. Factor VIIa 50mcg/kg and repeat if critical bleeding
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:
    1. with a normal (<1.5) INR – Warfarin
    2. after the time period in Table 6 or normal TT – Dabigatran
    3. 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.

DIABETES MEDICATION MANAGEMENT

General Guidelines

- Ensure optimal glycaemic control prior to surgery – frequent monitoring of Blood Glucose Level (BGL) is the key to good control
- Poor control (HbA1c ≥ 9% or *mean* BGL ≥ 11.9 mmol/L) is associated with poor wound healing, infections, and osmotic diuresis
- Patients with diabetes, especially those requiring insulin, should be on the morning list, preferably first on the list
- Avoid insulin deficiency – patients with Type I diabetes especially, require a constant supply of background insulin to prevent ketoacidosis, however, an insulin infusion can be temporarily ceased (for example, when the BGL ≤ 7 mmol/L)
- An intravenous (IV) Glucose infusion is required for all patients normally treated with insulin, or any patient currently on an insulin infusion (if initial BGL > 15 mmol/L do not start IV Glucose until BGL has improved). A minimum of 100-150g exogenous glucose (2-3 L of 5% Glucose) per day is needed for protein sparing and to prevent ketosis
- The patient's fluid and electrolyte status should be reviewed at least daily. Additional 0.9% Saline +/- KCl is often required for optimal fluid and electrolyte balance. Electrolytes should be measured at least every 24 hours in patients on a Glucose infusion
- 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.

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.

1. Blood Glucose Monitoring
    a. 4-6 hourly pre-operatively
    b. 1-2 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
2. Pre-operative Management
    a. BGLs Well-Controlled (BGL consistently < 12 mmol/L)
        i. Minor Surgery
            - Give HALF normal morning dose of intermediate/long acting insulin and OMIT short-acting insulin; at 8am start

Glucose 5% Intravenous (IV) Infusion at 80-100 mLs/hour via infusion pump

OR

- Withhold normal insulin; commence Insulin IV Infusion and Glucose IV Infusion

ii. Major Surgery

- Withhold normal insulin; at 8am start Insulin IV Infusion and Glucose IV Infusion

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

- Will need stabilisation pre-operatively
- Commence Insulin IV Infusion and Glucose IV Infusion

3. Post-operative Management
   a. Continue Glucose IV Infusion (and Insulin IV Infusion if started pre-operatively) until eating and drinking normally
   b. If BGLs are satisfactory may revert to usual therapy, otherwise Insulin IV infusion 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 (Section 5) due to their associated risk of Diabetic Ketoacidosis (DKA). The usual dose of all other AHG should be given the day prior to surgery. *Non-insulin* injectables are managed in a similar manner to oral AHG.

1. Blood Glucose Monitoring
   a. 4-6 hourly pre-operatively (more frequently if BGLs poorly controlled)
   b. 1-2 hourly intra-operatively
   c. 1-2 hourly post-operatively until stable
2. Pre-operative Management
   a. Omit all AHG on the morning of surgery
   b. BGLs Well-Controlled (BGL consistently < 12 mmol/L)

- No Insulin IV Infusion or Glucose IV Infusion, initially (however, insulin will often be required for major surgery)

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

- More frequent BGL monitoring
- Will need stabilization pre-operatively
- Commence insulin therapy:

Insulin IV Infusion and Glucose 5% IV Infusion at 80-100 mLs/hour

OR

Insulin Subcutaneous Stat/Supplemental Order and Glucose IV infusion

3. 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

Patients treated with dietary modification alone

1. Blood Glucose Monitoring
    a. 4-6 hourly pre-operatively (more frequently if BGLs poorly controlled)
    b. 1-2 hourly intra-operatively
    c. 4 hourly post-operatively until stable
2. Pre-operative Management
    a. BGLs Well-Controlled (BGL consistently < 12 mmol/L)
        - No Insulin IV Infusion or Glucose IV Infusion required
    b. BGLs Poorly-Controlled (BGL consistently ≥ 12 mmol/L or widely fluctuating)
        - More frequent BGL monitoring
        - Will need stabilization pre-operatively
        - Commence insulin therapy:

            Insulin IV Infusion, and Glucose 5% IV Infusion at 80-100 mLs/hour

            OR

            Insulin Subcutaneous Stat/Supplemental Order and Glucose IV Infusion
3. Post-operative Management
    a. Commence or continue insulin therapy (as above) if BGL consistently ≥ 12 mmol/L
    b. Resume usual diet when able

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

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

- Pre-operative Management
    a. Minor Surgery/procedure (*not requiring bowel prep*)
        - 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. Major Surgery or High Risk (for DKA)
        - Cease SGLT2i 3 days pre-operatively (including the day of surgery)
    c. BGLs Well-Controlled (BGL consistently < 12 mmol/L)
        - No Insulin IV Infusion or Glucose IV Infusion, initially (however, insulin will often be required for major surgery)
    d. BGLs Poorly-Controlled (BGL consistently ≥ 12 mmol/L or widely fluctuating)
        - More frequent BGL monitoring
        - Will need stabilization pre-operatively
        - Commence insulin therapy:
          Insulin IV Infusion and Glucose 5% IV Infusion at 80-100 mLs/hour
          OR
          Insulin Subcutaneous Stat/Supplemental Order and Glucose IV Infusion

- 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

- Strongly consider postponing non-urgent surgery/procedures in an unwell patient. If blood ketone level is > 1.0 mmol/L. Contact anaesthetist URGENTLY to 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 according to standard Queensland Health guidelines (Management of diabetic ketoacidosis in adults (age 16 years and over))
b. Commence Insulin IV Infusion and Glucose IV Infusion
c. Monitor BGL, blood ketone level, and ABG (or VBG) 1 hourly
d. If blood ketone level does not begin to fall and pH is not restored, the rate of the Insulin IV Infusion and Glucose IV Infusion will need to be increased
e. All patients with DKA are to be reviewed by an endocrinologist (or physician on-call) and/or intensive care team

- If SGLT2i has not been ceased prior to non-urgent surgery *and the patient is clinically well*
    a. May proceed with surgery if BGLs well controlled (eg HbA1c ≤ 9%) AND blood ketone level ≤ 1.0 mmol/L AND SBE > -5 mmol/L – monitor blood ketone level 2 hourly post-operatively
        - If blood ketone level > 1.0 mmol/L *may* still proceed with surgery IF SBE > -5 mmol/L, however, will require Insulin IV Infusion and Glucose IV Infusion (to treat starvation ketosis, and to prevent progression to DKA)

Insulin Intravenous Infusion Order

An insulin-glucose infusion is the most effective means of maintaining glycaemic control during the perioperative period. Please refer to CHHHS Procedure: Insulin Administration, CHHHS Procedure: Hypoglycaemic Treatment Procedure, and CHHHS Procedure: Blood Ketone Monitoring and Blood Glucose Monitoring for further details.

- 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 ONE unit insulin per ONE mL 0.9% Saline.
    - Use standard Queensland Health: Insulin Intravenous Infusion Order and Blood Glucose Record - Adult.
- 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)
    - Use standard Queensland Health: Intravenous and Subcutaneous Fluid Order.
    - **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*
- 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
- 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

➢ Review of BGL
- Should be made by MEDICAL STAFF frequently (at least twice per day) for patient's safety and to allow review of Insulin IV Infusion Order

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

➢ Normal Regimen of Subcutaneous Insulin
- Start approximately 1 hour prior to ceasing Insulin IV Infusion

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. Should not be used as the sole treatment for patients with Type 1 diabetes, or for insulin-treated Type 2 diabetes.

- 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 6 hourly as regular or rapid-acting insulin (eg Actrapid) using standard Queensland Health: Insulin Subcutaneous Order and Blood Glucose Record - Adult.
- Initial dosing may be based on total daily dose (if previously on insulin), or patient's actual weight (if not previously on insulin)

BGL (mmol/L)	Total Daily Dose, or Weight (if not previously on insulin)			
	Less than 25 units, or less than 50 kg	25—49 units, or 50.1—75 kg	50—80 units, or 75.1—100 kg	More than 80 units, more than 100 kg
8.1—12.0	1 unit	2 units	3 units	4 units
12.1—16.0	2	4	6	8
16.1—20.0	3	6	9	12
Greater than 20.0	4	8	12	16

Modifications to Patients Normal Insulin Regimen – Examples

- Minor surgery (eg hernia repair) *on an afternoon list*
    a. Normal Insulin Regimen:
        - Before breakfast: 30 units Mixtard 30/70
        - Before dinner: 16 units Mixtard 30/70
    b. Modification on the day of surgery
        - 15 units Mixtard 30/70 before a light breakfast (prior to 6 am; then fasting) – due to the short-acting component, BGL monitoring more frequently (eg 2 hourly)

- Major Surgery (eg total thyroidectomy) *on an afternoon list*
    a. Normal Insulin Regimen:
        - Before bed: 20 units Glargine
        - Before meals: 16 units Lispro (breakfast), 12 units Lispro (lunch), 12 units Lispro (dinner)
    b. Modification on the day of surgery:
        - 8 units of Lispro before a light breakfast (prior to 6 am; then fasting) – due to the short-acting insulin, BGL monitoring more frequently (eg 2 hourly)
        - Commence Insulin IV Infusion and Glucose IV Infusion prior to induction of anaesthetic

Further examples are to be found in Peri-operative Diabetes Management Guidelines 2012, Australian Diabetes Society.

Subcutaneous Insulin Infusion Pumps

Refer to CHHHS Procedure: Insulin Pump Management - Inpatient Guidelines, or for more detail, Queensland Health Guidelines: Insulin infusion pump management - Inpatient Guidelines.

- May be continued (at usual basal insulin infusion rate) for minor surgery but is not appropriate for major surgery
    - Must be distant from the site of surgery, away from the field of diathermy, and readily accessible by the anaesthetist at all times
    - Must be discussed with patient, anaesthetist, surgeon, and diabetes medical team in advance
    - Insulin pump settings may only be changed by the patient or their diabetes medical team (referred on admission to hospital)
- If the patient is unable to manage their insulin pump independently then the pump should be disconnected and stored in a locked cupboard for safe keeping until the patient is ready and able to return to pump therapy.

ANTI-PLATELET AGENTS

PERIOPERATIVE MANAGEMENT

➢ General Guidelines

- Antiplatelet Agents (APAs) are used increasingly 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.

- Please be aware:
    - **For patients at the highest risk of thrombosis** (eg new coronary artery stent plus a recent acute coronary event**), the risk of death or further coronary events is extreme (eg>50%)**.
    - **Combinations** of anticoagulant drugs with different actions (eg 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.**

- **Considerations re 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 until after 6 months after stent placement or ACS greatly reduces the risk. Stopping DAPT within 6 weeks of stent placement should be avoided if at all possible.

- **Patient transfer**: Depending on the adjudged risk of thrombosis, possible transfer for surgery to a centre with at least daytime or even 24-hour re-stenting capacity should be considered. However, as a possible thrombosis is unpredictable in its timing, the duration of stay in that location (eg 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 (esp with a catheter) than a single shot spinal. An epidural catheter should be REMOVED at least 2 hours before potent APAs are started.

- For patients on both APAs and warfarin (eg for atherosclerosis and AF), 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.

- Multi-disciplinary consultation (and careful discussion with the patient) and clear documentation is necessary for complex patients.

- As duration of required DAPT is variable depending on patient and stent-related factors (eg branching, length), consultation with the treating cardiologist is recommended for all such patients.

➢ **Different Antiplatelet Agents**

- **Aspirin** and **ADP P2Y12 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 (7d) and shortest for Ticagrelor (3d), which is a competitive antagonist.

- **Dipyridamole** (Persantin) is used in CVA prophylaxis in combination with aspirin. Its duration of effect is only 12 hours.

- **GPIIb/IIIa inhibitors** are intravenously administered in acute coronary settings. The effect of **Abciximab** lasts 12-24 hours; **Tirofiban** lasts for only 2-4 hours.

- **Non-selective NSAIDs** have a reversible effect, with a duration of action ranging from hours (eg ibuprofen) to a couple of days (eg naproxen).

➢ **Emergency Surgery**

- For an irreversible APA (eg 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.

- The use of **platelet function tests** (PFTs) has been validated in emergency situations: >50% platelet function indicates that surgical bleeding due to platelet dysfunction is very unlikely. So, consider cessation of APAs for 48-72 hours then PFTs.

- **Platelet transfusion** may be helpful for treatment of excessive bleeding due to Aspirin and P2Y12 antagonists, as is factor VIIa. The place of prophylactic platelet transfusion is unclear.

- For the GP IIb/IIIa inhibitors, it is preferable to wait 12-24 hours after stopping Abciximab and 2-4 hours after Tirofiban, rather than transfusing platelets with a large amount of active drug present.

Table 1: Management of Aspirin and Clopidogrel in Elective Surgical Patients

1. Determine bleeding and thrombosis risk 2. Read management plan from table 3. Complex situations may need discussion with surgeon, anaesthetist, treating cardiologist and patient 4. Consult cardiologist if on DAPT#	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, urology except TURP, ERCP	**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% *DES or **BMS with 6 weeks ***ACS within 6 weeks	• Postpone surgery[1]; If impossible, • Consider transfer to centre with re-stenting capacity[2], **AND** • Stop APAs 5-7d pre-op; **AND** • substitute short-acting anti-platelet drug eg tirofiban infus'n until 4/24 preop	• Postpone surgery[1]; If impossible, • Consider transfer to centre with re-stenting capacity[2], **AND** • Continue APAs **OR** • continue aspirin, but stop other APAs 5-7d pre-op and substitute short-acting anti-platelet drug eg tirofiban until 4/24 preop	• Postpone surgery[1]; If impossible, • Continue APAs
High DES and/or ACS > 6 weeks but within 1 year still requiring DAPT#	• 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% Other DES or BMS patients Ischaemic Heart Disease (chronic); TIA/CVA (previous)	Stop APAs 7-10d pre-op	Stop APAs 5-7d pre-op (except continue single APA for carotid or peripheral vascular surgery)	Continue aspirin; Continue or stop other APAs 5d preop
Minor Death + MI/redo <1% HT/DM etc alone without proven IHD	Stop APAs 10d preop	Stop APAs 5-10d preop	Continue or stop APAs (surgical preference)

#DAPT – dual antiplatelet therapy; ##APAs – antiplatelet agents; *DES – Drug-eluting stent; **BMS – Bare metal stent; ***ACS – acute coronary syndrome;
1- see notes re postponing surgery; 2 - see notes re patient transfer Version 4.1 Dec 2014

OBSTETRIC ANTICONVULSANT THERAPY

FOR ECLAMPSIA AND SEVERE PRE-ECLAMPSIA

The drug of choice is **Magnesium Sulphate**. It is available in 5ml ampoules each containing 2.5g of magnesium. It should be given as a loading dose followed by a maintenance infusion. Magnesium Sulphate is located in the resuscitation trolleys in both theatre and PACU.

Anticonvulsant Treatment in Theatre

Loading dose: Add **5g (2 ampoules) to 90ml of normal saline** and infuse over 15 minutes (100ml at 400ml/hour). The woman should be warned that she may experience transient hot flushing. ECG monitoring is not required.

Maintenance infusion: Add **25g (10 ampoules) to 450ml of normal saline** to make 500ml of solution. Infuse at **1g/hour initially (20ml/hour)**, up to 2g/hour (40ml/hour) depending on clinical parameters and magnesium levels.

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 100ml 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 1g 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.

An additional dose of 2.5 to 5.0g of magnesium (50-100ml of solution) can be given over 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.

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” (https://qheps.health.qld.gov.au/__data/assets/pdf_file/0021/2325234/drug-mag-sulf-maternity.pdf)

This protocol utilises a premade bag of **40g 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:** 4g of Magnesium Sulphate over 20 mins (50 mL over 20 mins)
- **Maintenance:** 1g of Magnesium Sulphate per hour (12.5 mL/hr)
- **Additional Dose:** 2g of Magnesium Sulphate over 10 mins (25 mL over 10 mins)

ANALGESIA IN BIRTH SUITE

NOTE: This document is not an exhaustive guide but describes local practices and gives some trouble-shooting advice.

RESPONSIBILITY OF THE ANAESTHETIST

The epidural service is provided by the Acute Pain Service during the day, and by the anaesthetists in theatre after hours.

The anaesthetist inserting the regional 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.

LOW-DOSE 'EPIDURAL' TECHNIQUES – ADVANTAGES AND OPTIONS

Low-dose techniques are used routinely in the Birth Suite (BS). They minimise motor block and reduce the incidence of instrumental deliveries.

There are essentially two ways of achieving good analgesia using low-dose techniques:

- **EPIDURAL ONLY**

  This is the technique of choice if the woman is not too distressed with pain. The doses and dilutions are described in the document 'Epidural Drug Doses in Birth Suite'.

- **COMBINED SPINAL EPIDURAL (CSE)**

  A CSE can be used if the mother is very distressed and in severe pain, as it may be difficult to establish an epidural block using dilute epidural solutions. Its main advantage is rapid analgesia without muscle weakness.

  Establishing epidural analgesia on the BS with stronger solutions (eg 0.25%-0.5% bupivacaine) causes muscle weakness and consequently, these solutions should only be used if low-dose techniques are ineffective.

NOTE: The following apply to the use of Combined Spinal Epidurals (CSEs) in Birth Suite only - they are not intended as a guide to using CSEs in Theatre.

PREPARATION:

- The initial preparation for a CSE is the same as for any regional technique in obstetrics:
- Contraindications (eg thrombocytopenia and sepsis) must be respected, and informed consent obtained.
- An aseptic technique (mask, surgical scrub, gown and glove) must be used.
- A filter needle should be used to draw up all drugs from glass ampoules for injection into the subarachnoid space.
- The mother may be in the lateral or (preferably) sitting position.

PROCEDURE:

- A needle-through-needle technique is most commonly used.
- When the subarachnoid space is located, 1.25mg bupivacaine (0.5ml of 0.25% plain bupivacaine) plus 25µg of fentanyl (0.5ml) is injected.

- The spinal needle is withdrawn and the epidural catheter is threaded and fixed in place, but no injection of local anaesthetic is made at this stage. However, the catheter should be flushed with 2ml saline and aspirated (to ensure it is not kinked; to prevent it being occluded by a clot; and to check for IV or subarachnoid placement).
- If the mother has been sitting, she should then lie on her side as soon as the epidural catheter is taped in place.
- See Patient Controlled Epidural Analgesia (PCEA) for subsequent management of epidural analgesia.

PROBLEMS:

Mother very distressed and unable to cooperate

- Firstly, ensure the syntocinon infusion is turned off.
- Consider giving her 50-75 µg fentanyl IV prior to the block, and/or insert the spinal first (using a 24 or 25g pencil point needle) and insert the epidural under more favourable circumstances when the mother is better able to cope.

Failure to locate the CSF with the spinal needle

- In our experience this occurs in about 2% of cases. In this situation the epidural catheter should be inserted, and the block established using epidural top-ups only.

Inadequate pain relief after spinal dose

- Give first epidural dose - refer to the document ‘Epidural Drug Doses in Birth Suite’.

Pros and Cons:

- The advantages of using a CSE to establish the block (no muscle weakness) must be weighed against the potential disadvantages in each woman.
- Certain clinical circumstances make a CSE less suitable for pain relief in labour:

Infection

- As the dura is punctured during a CSE, it may be inadvisable if the mother has a systemic infection, is pyrexial or has prolonged ruptured membranes and is not on antibiotics, because of the theoretical risk of meningitis.

Foetal bradycardia

- Foetal bradycardia may occur soon after the spinal component of the CSE, possibly due to increased uterine tone. Consequently, it may not be advisable to insert a CSE for pain relief if the foetus has a non-reassuring CTG trace.
- It is also advisable to routinely stop a syntocinon infusion before doing a CSE, and to monitor the FHR as soon as possible after the spinal block is established.

Imminent Caesarean Section

- If a caesarean section is likely in the near future, it is better to establish an epidural block and ensure it is functioning properly rather than doing a CSE. The doses used subarachnoid in BS are not sufficient for a CS.

Previous CSE in the same labour

- The incidence of headache following an uncomplicated CSE is low - approximately 1:200 at CBH. However, another CSE or spinal increases the chance of a PDPH and should not be performed without good reason.

TROUBLESHOOTING EPIDURALS IN BIRTH SUITE

Failure to locate the epidural space

- If the epidural space cannot easily be located at one level, a different intervertebral space should be tried. If attempts at two interspaces are unsuccessful, more experienced assistance should be sought. It is not reasonable to subject the mother to repeated needling if more experienced help is available.

Dural tap

- In the event of an accidental dural puncture, it is usually advisable to remove the Tuohy needle and insert an epidural catheter at an adjacent interspace. The anaesthetist must then do all the top-ups through the epidural until he/she is satisfied with the position and function of the epidural catheter (an unexpectedly high block may occur from retrograde spread into the CSF).
- If the dural tap occurred after much difficulty in finding loss-of-resistance, insert the epidural catheter into the subarachnoid space and label the catheter clearly as ‘subarachnoid’. Inform the senior anaesthetist on call as well as the mother and the obstetric staff. The anaesthetic staff must do all the top-ups through this catheter for the duration of the block. The recommended dose for analgesia in labour is 1.25mg bupivacaine (0.5ml 0.25% plain bupivacaine) plus 25µg fentanyl (0.5ml), followed by 1ml NSaline as a flush to account for the dead space of the filter and catheter.

Blood in the epidural catheter

- First pull the catheter back until only 3cm remains in the epidural space, then flush the catheter with 5ml of saline. Gently aspirate and observe if blood still fills the catheter.
- If the aspirate is heavily blood-stained the catheter should be removed. If there is no aspirate or it is only slightly blood-stained, an adrenaline-containing test dose should be given, ie 2ml of 2% lignocaine with adrenaline 1:200,000.
- If there is no increase in heart rate (more than 10/min) and the patient does not develop symptoms of dizziness, tingling or dysphoria, the epidural can be used.

Inadequate pain relief

- Refer to the document ‘Epidural Drug Doses in Birth Suite’.

Patient Controlled Epidural Analgesia (PCEA)

- PCEA is the standard way of maintaining epidural analgesia on the BS at CBH.
- Compared to other techniques it is more effective, dose-sparing and gives the mother a sense of control.
- It is provided through the Go Medical mechanical device, which allows a bolus of 4ml with a fifteen-minute lockout. In addition, our protocol allows for a midwife-administered top up of 10ml.

- The solution used is 0.125% levobupivacaine with 2µg/ml fentanyl.
- It is used after initial analgesia is achieved with either an epidural or a CSE.

After epidural only

- PCEA should be commenced once the anaesthetist is happy that the epidural catheter is correctly placed and the patient is comfortable.

After CSE

- Two important issues after the spinal component of a CSE are:
    - the untested epidural catheter, and
    - the potential for recurrence of severe pain during transition to epidural analgesia.

After a straightforward CSE insertion:

- Follow the protocol on the "Epidural/Regional Analgesia Order"
    - Solution: 50 mL of 0.125% Levobupivacaine with 100 mcg of fentanyl (2 mcg/mL)
    - PCEA Protocol: 4 mL bolus with 15-minute lockout
    - Midwife top-ups can be administered as the protocol

- The midwife should set up the PCEA device and connect it to the epidural catheter as soon as possible
- The patient should start using PCEA at the first uncomfortable contraction before they become too painful
- The anaesthetist must be informed when the patient starts using PCEA, and review her
- Give additional doses as required (see 'Epidural Drug Doses in BS')

After a complicated CSE insertion (eg possible IV puncture or subarachnoid placement of epidural catheter):

- The anaesthetist must give an epidural test dose before 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 PCEA

EPIDURAL DRUG DOSES IN BIRTH SUITE

Note: This document is not an exhaustive guide but describes local practices for low dose epidural and combined spinal epidural techniques and gives some trouble-shooting advice.

Local Anaesthetics Available on Birth Suite:

- On the **Epidural Trolley:**
  - 0.25% plain bupivacaine (20 ml)
  - 0.5% plain bupivacaine (20 ml)
  - 1% Lignocaine **without** adrenaline (5 ml)

- In the **Birth Suite Drug Room:**
  - 0.125% Levobupivacaine (200 ml)
  - 2% Lignocaine **with** 1:200,000 adrenaline (20 ml)

LOW DOSE EPIDURAL ANALGESIA

- **Test Dose**

  Use 4 ml 0.25% plain bupivacaine

  OR

  Use 8 ml 0.125% levobupivacaine in divided doses

  After a bloody tap use 2 ml 2% lignocaine plus 1:200,000 adrenaline

- **Top-up**

  Use 10 ml of 0.125% plain bupivacaine plus 50-100 µg fentanyl in divided doses. (10 ml of 0.125% plain bupivacaine can be prepared by diluting 5 ml of 0.25% plain bupivacaine with 5 ml of 0.9% saline)

  OR

  Use 10 ml 0.125% levobupivacaine plus 50-100 µg fentanyl in divided doses

If block is not adequate after 15 minutes, give another 5-10 ml of 0.125% plain bupivacaine OR 5-10 ml of 0.125% levobupivacaine. **If this is not adequate see "Inadequate Analgesia Plan" section below.**

COMBINED SPINAL EPIDURAL

- **Subarachnoid (Spinal)**

  Use 0.5 ml of 0.25% plain bupivacaine (1.25mg of bupivacaine) plus 25 µg of fentanyl (0.5 ml)

- **Epidural First Dose**

  If the patient **has not started the PCEA**, use 10ml 0.125% levobupivacaine plus 2µg/ml fentanyl (PCEA solution) as two 5ml doses

OR

If patient **has started the PCEA** (which provides a 4 ml bolus dose), give a further 6ml 0.125% levobupivacaine plus 2µg/ml fentanyl

If this is not adequate see "Inadequate Analgesia Plan".

INADEQUATE ANALGESIA PLAN

- Ask site of patient's pain.
- Measure extent of the block with ice.
- Ensure epidural catheter is still in place.
- Give treatment according to the classification below:

1. **Patchy Block**

   Give a further 10-15 ml 0.125% levobupivacaine ± fentanyl in divided doses (In this situation, larger volumes of dilute solution work better than smaller volumes of stronger solutions.)

2. **One-sided Block**

   - Pull the epidural catheter back until 3cm left in the epidural space and give 10-15 ml 0.125% levobupivacaine ± fentanyl.
   - If this is not effective, or catheter is only 3cm in epidural space to start with, the epidural catheter should be replaced.

   Giving a higher concentration will only make the blocked side even more numb and weak and is unlikely to provide any analgesia on the unblocked side.

3. **Back Pain**

   Epidural fentanyl 100 µg (diluted to 5ml) often works well, if only low concentration fentanyl has been used before.

4. **Perineal Pain or Breakthrough Abdominal Pain**

   In this case, with a demonstrable block on both sides but the patient still complaining of pain, give 10 ml 0.25% levobupivacaine ± fentanyl.

If these measures are not adequate, call for senior help.

ONGOING ANALGESIA

Refer to the document 'Analgesia in Birth Suite'.

OBSTETRIC UTEROTONICS AND RELAXANTS

Note:

- This document is a reminder of doses only
- Indications, contraindications and side effects need to be understood before using these drugs
- All the drugs listed below can be found in the drug fridge of Theatres 1 and 2 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

➢ **Carbetocin** (for use in elective LSCS only)

Give one ampule (100 ug in 1 ml) IV over 1 min after delivery of the baby. There is no need for an oxytocin infusion, as this is a long-acting oxytocic.

➢ **Oxytocin** (Syntocinon)

2-5 Units IV, repeated prn (expect to need higher doses if prolonged labour/grand multip/ >4kg baby/polyhydramnios)

PLUS

infusion of 40 Units in 1000ml @ 10-80 Units/hour (or more).

➢ **Ergometrine**

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

➢ **Prostaglandins**

- **<u>Carboprost (Prostin 15M) 250ug/ml</u>**

  250 ug (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).

- **<u>Misoprostol</u>**

  400-800µg (2 to 4 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, or
- hysterectomy.

UTERINE RELAXANT DRUGS

Glyceryl Trinitrate (GTN)

- **GTN Spray** (400 µg/spray)

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

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

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

ORAL INTAKE IN LABOUR

During late pregnancy heartburn is common.

During active labour stomach emptying is slow and food is poorly absorbed. Opioid drugs (IV, IM or epidural) slow the process further.

Epidural anaesthesia or general anaesthesia may be necessary during labour (approximately 35% of women) and 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 fluid.

Clear fluids include water, cordial, and sports drinks
NOT milk or 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.

OBSTETRIC PATIENTS WITH KNOWN RHEUMATIC HEART DISEASE

MANAGEMENT OF LABOUR AND DELIVERY

Plan*:*

Assess risk according to maternal risk factors

Advise management as below

Document plan in obstetric notes

Maternal Risk factors are based on **history, current symptoms and echocardiography:**

- **History: <u>prior cardiac event</u>** (pulmonary oedema, tachyarrhythmia)
- **Current Symptoms: <u>dyspnoea with minimal exertion</u>** (NYHA III) (Dyspnoea at rest (NYHA IV) needs immediate evaluation and treatment by cardiology ± ICU)
- **LV dysfunction** (Ejection fraction < 60%)
- **Left heart obstruction** moderate or severe (mitral or aortic valve area < 1.5cm2)
- **Pulmonary hypertension** (systolic PAP >50mmHg)

Low Risk (No risk factors):

<5% chance of cardiac complications Management:

- Treat on obstetric indications only
- Epidural beneficial but not essential
- Avoid excessive IV fluids
- Antibiotic prophylaxis indicated with prosthetic valves, history of endocarditis or obstetric reasons

Moderate Risk (One risk factor):

25% chance of cardiac complications

Management:

- Needs cardiology review and collaboration between obs / anaes / paeds / possibly ICU

Delivery:

- In Cairns or other regional centre with relevant experience
- Epidural pain relief early (once labour established)
- Avoid excessive IV fluids
- Assisted vaginal delivery (Vaginal delivery preferred to CS if obstetric considerations allow)
- Anaesthetist present for delivery
- Avoid ergometrine (causes pulmonary oedema)
- Syntocinon bolus (NB not syntometrine) 5U IM or 1U slow IV
- Syntocinon infusion 10U in 100ml saline @ 50ml/hour initially
- Antibiotic prophylaxis indicated with prosthetic valves, history of endocarditis or obstetric reasons.

Post-Delivery:

- IV fluid to replace blood loss only – cease once bleeding stopped
- Consider frusemide 10-20mg IV
- Observe in obstetric HDU overnight (monitor pulse, BP, dyspnoea, SpO2 and blood loss)

High Risk (More than 1 risk factor):

50% chance of cardiac complications

Management:

As for Moderate Risk except for:

- Consider transfer eg for balloon valvotomy if severe stenosis or symptoms not medically controllable
- Consider delivery in monitored situation (OT probably best)
- Avoid bolus syntocinon (may cause ↓↓ BP) ***unless*** uterus poorly contracted despite syntocinon infusion
- Slow bolus of 1U for poor contraction (ie 10ml of solution)

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 PHO 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.	Haemorrhage 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 decision-making***

PAEDIATRIC DAY SURGERY SUITABILITY

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 post-operatively 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 ADENO-TONSILLECTOMY 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%) postoperatively
- 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

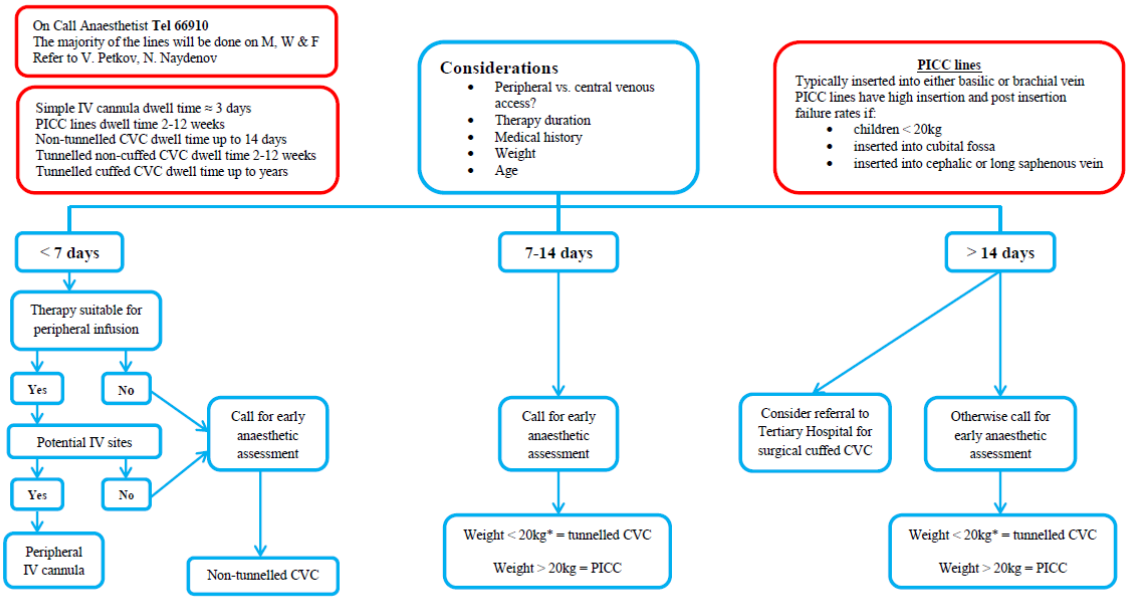
- Pain, bruising or bleeding at the insertion site afterwards
- Difficulty inserting the catheter
- Temporary nerve damage or pain
- An irregular of fast heartbeat sometimes requiring treatment
- Very rarely damage to nearby structures such as blood vessels or heart during insertion

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

FASTING FOR PAEDIATRIC PATIENTS

CHILDREN LESS THAN 6 MONTHS OF AGE:

- Last breast feed 3 hours before anaesthesia
- Last formula feed 4 hours before anaesthesia
- Clear fluids up to 1 hour before anaesthesia (max 3ml/kg/hr)

CHILDREN OVER 6 MONTHS OF AGE:

- No milk drinks, food or lollies for 6 hours before anaesthesia
- Clear fluids up to 1 hour before anaesthesia (max 3ml/kg/hr)

Definition of Terms:

Clear fluids are transparent when held to the light.

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

They **do not** include **particulate** or **milk-based** products OR **Jelly**

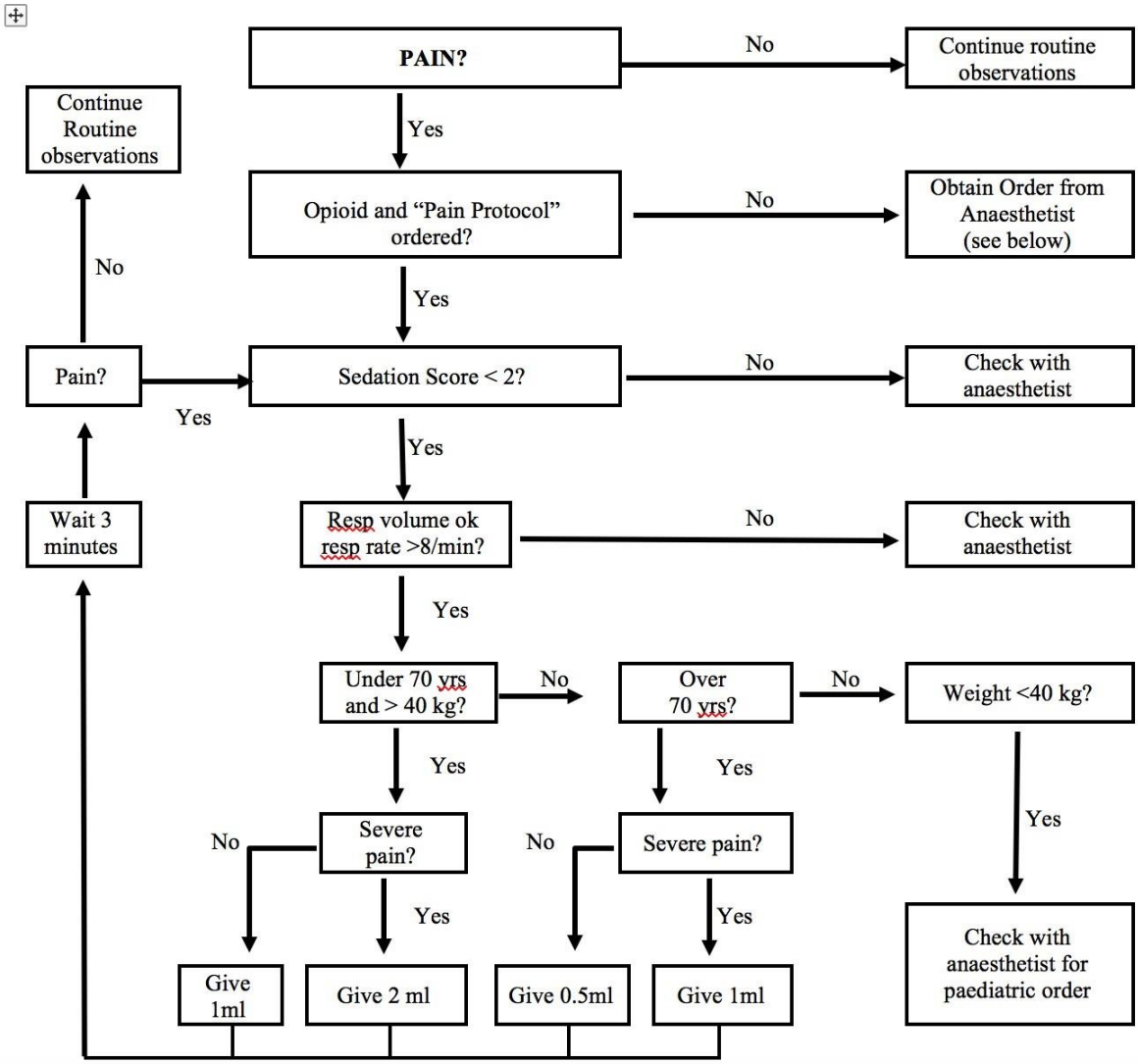
Further Points:

- One of the goals of these guidelines is to minimize fasting times for clear fluids to 1 hour.
- Parents or ward staff should time the 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-medication ordered by the Anaesthetist should be given, even within 2 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 PROTOCOL



Sedation Score

0 = Nil	Awake, alert
1 = Mild	Sometimes drowsy, easily roused
2 = Moderate	Very drowsy, easy to rouse
3 = Severe	Somnolent, difficult to rouse.
A = Asleep	Normal sleep, easy to rouse

Opioid Order as per Anaesthetist

Dilute to 10ml with saline:

Morphine 10mg,

Oxycodone 10mg,

Fentanyl 200µg,

Tramadol 100mg as ordered

Paediatric IV Pain Protocol FOR PACU (Children <40kg)

1. Ensure that patient has an Opioid Pain Protocol ordered.

2. First make up the Recovery Pain Protocol **Adult Opioid Solution**:
   - Morphine 10 mg into 10ml with saline, to make 1mg/ml, or
   - Fentanyl 200 mcg into 10ml with saline, to make 20mcg/ml, or

3. **Round off** the patient's weight to the nearest 5kg (eg 20 kg for a 22 kg child)

4. **Discard some** of the Adult Opioid Solution to leave the Residual Amount in the syringe according to the table below, then

5. **Add further saline** to make up to 10 ml (Final concentration is given in the table).

Step 3 **Round off** Patient's weight	Step 4 **Discard some** of Adult Opioid Solution	Step 5 **Add further saline** to make up to 10ml		
		Final Concentration per ml		
Approx Weight	Residual Amount	Morphine (mg)	Fentanyl (mcg)	Pethidine (mg)
10 kg	2 ml	0.2	4	2
15 kg	3 ml	0.3	6	3
20 kg	4 ml	0.4	8	4
25 kg	5 ml	0.5	10	5
30 kg	6 ml	0.6	12	6
35 kg	7 ml	0.7	14	7
40 kg	8 ml	0.8	16	8
>40 kg	10 ml	1.0	20	10

6. Give 1 or 2 ml increments according to the Recovery IV Pain Protocol, monitoring Pain and Sedation scores

PACU ANTIEMETIC STANDING ORDERS

Introduction

- Nausea in the postoperative period is common, and effective treatment often requires more than one drug.
- The Antiemetic Protocol is designed to facilitate this process, which can usually follow a standard format.
- Attention must first be paid to more critical aspects of the recovery process, specifically care of the airway, breathing and circulation.

Management (for adults 18-70 years)

- Verify that the patient has an “Antiemetic Protocol” prescription (either on Winchart or paper Anaesthetic Record).
- Give drugs in the order below until nausea is relieved.
- If nausea persists after 10 minutes, give the next drug.
- Record each drug and dose given on the Recovery record sheet.
- If all four drugs are ineffective, or nausea recurs, notify the anaesthetist.

Antiemetic Protocol Drugs	
1. Metoclopramide	10mg IV
2. Ondansetron	4mg IV
3. Droperidol#	1mg IV
4. Cyclizine	50mg IV

#Droperidol preparation: dilute 2.5mg (1 amp) into 2.5ml total with saline and give 1ml

PACU DISCHARGE CRITERIA

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

➢ 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%.

➢ 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
- <u>Systolic Blood Pressure:</u>

- 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.

➢ **Neurological**

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

➢ **Epidurals and spinals:**

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

➢ **Metabolic**

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

➢ **Renal**

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

➢ **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.

➢ **Specific Surgical Observations**

- As appropriate, such as:
  - Wound dry
  - Drains secure and functioning

- Minimal blood loss
- Limb perfusion and movement adequate

➢ **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)

➢ **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

➢ **Transportation**

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

METARAMINOL INFUSION GUIDELINE

Indications

Adjunct in the treatment of hypotension, especially from vasodilation due to epidural or spinal anaesthesia/analgesia. Other causes of hypotension (e.g. hypovolaemia, sepsis or cardiogenic) must also be considered and treated appropriately.

Administration:

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 = 0.1mg/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)

For marked hypotension: 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.

EMERGENCY 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**
    - **Fasting status**
    - **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 technician and nursing staff** in your theatre about the case.

- At the end of your shift, hand over folder and information to next anaesthetic Consultant (or night Registrar), who then **MUST divert** 66910 to their phone.

- During working hours no Orthopaedic Trauma should be booked on the Emergency List without approval by the Coordinating Anaesthetic Consultant responsible for the Emergency List (see below)

- Out of hours (including weekends) Orthopaedic Trauma are booked as per other Emergency Cases with list order determined with negotiation between all relevant surgical teams & Emergency Theatre Anaesthetist.

- **Orthopaedic Trauma** – Lists are currently operating 7 days/week. The Orthopaedic Department determines list order & priority though some negotiation

with the Trauma Theatre Anaesthetist may be necessary.

- If either the Emergency Theatre or Orthopaedic Trauma theatre is un-utilised, other brief (eg <30 min) operating time cases may be placed into the empty theatre. This must be approved by the Coordinating Anaesthetic consultant prior to arranging.

- If any concerns arise, please refer to the coordinating anaesthetist on 66910

NOTIFICATION OF THE CONSULTANT

Introduction

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

- **Trainees with less than one year's** anaesthetic experience at Registrar level, not including ICU, **must notify consultant about all cases**

- **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

- **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

For all **post-fellowship registrars**, consultation and supervision is available at all times.