EPIDURAL INFUSION - SCH

PRACTICE GUIDELINE ©

DOCUMENT SUMMARY/KEY POINTS

N.B. The "Sapphire" pump setup instructions in this document can also be used for all regional block infusions

- **Applicable to all clinical areas of SCH**
- Epidural infusions must be prescribed by a Medical Officer
- Epidural infusions must be prescribed on the approved Sydney Children's Hospital Regional Analgesia Prescription form.
- Only those Registered Nurses who have been assessed as competent in Drug Calculation and completed CSK 13109 Continuous Epidural Infusions can change or supervise the changing of an epidural bag
- Registered Nurses assessed as competent in Intravenous Drug administration may administer bolus doses and intravenous naloxone as per prescribed criteria.
- Naloxone must be available whenever an opioid infusion is in progress and must be prescribed in eMM

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1st January 2021	**Review Period**: 3 Years
Team Leader:	Clinical Nurse Consultant	**Area/Dept**: Chronic Pain Service SCH

Date of Publishing: 6 June 2023 8:07 AM Date of Printing: 6 June 2023
K:\CHW P&P\ePolicy\Jun 23\Epidural Infusions - SCH.docx

CHANGE SUMMARY

- Updated document, rescinds previous version.
  - Clarification of advice regarding unwitnessed line disconnection
  - Update of documentation guidelines for electronic medical record system
  - Addition of advice for management of Local Anaesthetic Toxicity and Hypotension
  - Now prescribed on the SCN130350_Regional Analgesia Prescription form
  - APS/Anaesthesia able to use clinician bolus in Intermittent mode
  - BTF criteria
- **6/6/23:** Minor review. Updated 5.2 Sensory block level.

READ ACKNOWLEDGEMENT

- Clinical Nurses should read and notify local manager that they have read this document.
- Other staff as determined by local manager should read this document.

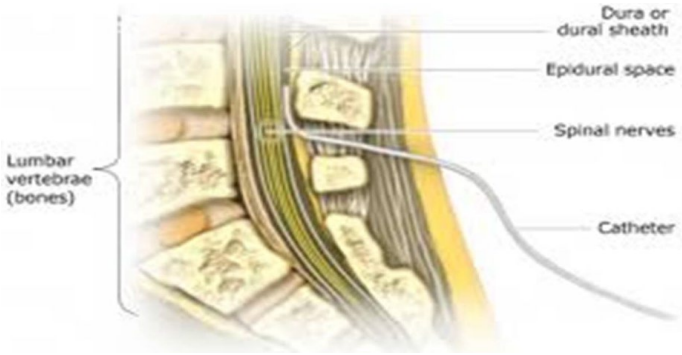
TABLE OF CONTENTS

1 Introduction

Epidural analgesia can provide good to excellent pain relief with minimal sedation and is especially useful in major surgery. Central local anaesthetic blocks allow blockade of the afferent and efferent sympathetic pathways at relatively low doses resulting in profound suppression of hemodynamic and stress responses to surgery[1]. Complications related to epidural infusions are relatively low and so it is a safe and effective method of providing analgesia to children.[2]

Epidural analgesia provides post-operative pain relief by infusing local anaesthetic and/or opioid drugs into the epidural space following lower limb, pelvic, abdominal or occasionally thoracic surgery.

The epidural space lies between the dura mater, which covers the spinal cord and the ligamentum flavum within the vertebral column. A catheter can be inserted into this space and may be placed in the thoracic, lumbar or caudal regions. Local anaesthetic or opioids injected into this space block the pain impulses travelling from the periphery to the brain.



2 Standards

- The first line managers of epidural infusions are the Acute Pain Service (APS). However the initial and overall responsibility of any given patient with an epidural infusion is the Consultant Anaesthetist who inserted or supervised the insertion of the epidural catheter. If the APS is not available and the responsible Consultant is not available, the Paediatric Anaesthetic Registrar (on call) should be contacted as required.
- Only accredited registered nurses may commence a properly prescribed epidural infusion (usually commenced in Paediatric Recovery).
- Registered nurses who have been assessed as competent may care for a patient with an epidural infusion, change epidural infusion bags or give boluses as per the prescription/guideline.
- Registered nurses who have been assessed as competent may remove epidural catheters in the presence of another registered nurse.
- Medical officers (MO) of the Department of Anaesthesia and Pain Management or Palliative Care Service can prescribe epidural infusions.
- Naloxone must be available on the ward whilst epidural infusions that contain an opioid are in progress.
- The epidural line must be clearly identified with an epidural label as per https://www1.health.nsw.gov.au/pds/ActivePDSDocuments/PD2016_058.pdf
- The epidural infusion bag must be changed at least once every 24 hours
- Verbal consent from either the patient or parents must be obtained prior to epidural insertion, by the responsible anaesthetist and documented on the anaesthetic chart or in the patient's notes.

3 Outcomes

- Continuous Epidural Infusions administered in a safe, effective manner by accredited Registered Nurses
- Patient achieves an optimal level of analgesia.

4 Guidelines

- The decision that the patient is a suitable candidate for continuous epidural infusion should be made pre-operatively in consultation with medical, nursing staff and the patient/parents.
- The patient/parents should receive pre-operative information on continuous epidural analgesia and explanation of the need for nurses to attend to specific observations at regular, selected intervals.
- All patients with epidural infusion must have intravenous access.
    - Chronic pain patients who are receiving a long term epidural infusion, after consultation with the Acute Pain Service (APS) and assuming they are stable may have their cannula removed after 2-3 days.
- It is recommended that patients receiving an epidural infusion have an indwelling urinary catheter
- Continuous Mode or Intermittent Mode may be used
    - Intermittent mode is also known as a Programed Intermittent Bolus
- In continuous infusion mode clinician initiated boluses may be given as prescribed for breakthrough pain See Section 8.5
- In intermittent mode clinician boluses are only to be given by APS/Anaesthetic staff
- No drugs except the prescribed local anaesthetic +/- opioid mixture are to be injected into the epidural catheter. In specific cases alpha receptor agonists such as clonidine may be added to the infusion.
- A manual push bolus of local anaesthetic may be administered by APS/Anaesthetic consultants- this is different to a Clinician Bolus and must be charted in eMM
- A bacterial filter is to be insitu at the end of the epidural catheter at all times.
- Clean ports using standard ANTT procedure and ensure ports are dry before reconnecting. Standard 2% chlorhexidine. in 70% alcohol wipes are satisfactory
- No other opioid is to be administered to the patient whilst they are receiving epidural opioids, except as specifically ordered for ventilated patients in the Intensive Care Unit.
- Some patients may occasionally require Oxygen be delivered via nasal prongs until the morning after surgery (to be prescribed by the Anaesthetic Consultant as required).
- All patients with continuous epidural infusions will require observations as per Section 5: Monitoring

- All prescriptions must be recorded on the SCN130350_Regional Analgesia Prescription form.
- Only standard epidural extension sets without injection ports are to be used.
- Lines and infusion bags must be labelled as per National Standard for User Applied Labelling of Injectable Medicines, Fluids and Lines
- The insertion site for the catheter must be checked once a shift and prior to bolus administration for any signs of leakage, infection or bleeding. Notify Acute Pain Service if any problems arise and document the findings in the medical record.
- Epidural dressing is to be left intact, if the dressing becomes loose the dressing should be **reinforced and not removed (unless heavily soiled in which case contact APS)**.
- Epidural analgesia is to be administered as a continuous infusion via the designated epidural infusion pump (Hospira Sapphire).

5 Monitoring

Patient monitoring and documentation will be as follows:

- Respiratory rate
- Saturations
- Pulse rate
- Pain score (appropriate tool for age)
- Sedation Score (see prescription chart)
- Rate of Infusion/Cumulative total

Every hour for the duration of the infusion

- Temperature and Blood Pressure 4 hourly
  - "*Clinically significant decreases in blood pressure are seldom seen in children younger than 8 years of age*"[3]
- Epidural insertion site should be checked each shift and whenever the patient is moved/turned in bed.

5.1 Motor Block Level

- For Bromage Score refer to Page 2 of Multi-Modal Analgesia Record (See Appendix 1)
  - Hourly for first eight (8) hours then 4th hourly if score **≥4** (Motor block must be assessed 1 hour after clinician-initiated bolus/stat bolus)
  - If score = 1: STOP INFUSION. Call for **BTF Clinical Review**
  - If score = 2: STOP INFUSION. Reassess after 1 hour. If no improvement after 1 hour, call for **BTF Clinical Review**. If Motor Block Score ≥3 after 1 hour, restart infusion.
  - If score = 3: Monitor hourly.
  - If score ≥4: Continue usual monitoring as above.

5.2 Sensory Block Level

- To assess the level of the block refer to page 2 of Multi-Modal Analgesia Infusion Record – Appendix 1
- Sensory Block Levels only need to be done under the following circumstances;
  - If the patient has an increase in pain
  - If the patient is feeling pain on one side only
  - See section 7.9 for how to manage inadequate Pain Relief

Note: Documentation of epidural delivery mode, rate, cumulative total, Bromage score, site check and block level must be on the Multimodal Analgesia Infusion Record.

Patient observations, sedation score and pain score must be documented on electronic BTF.

6 Standard Orders

(As per the epidural infusion prescription chart)

6.1 Ordering

(By a MO from the Department of Anaesthesia and Pain Management only)

The prescriber must:

- Place the patient's identification label onto the SCN130350_Regional Analgesia Prescription chart and sign
- Enter catheter insertion details and expected duration on front page of form and complete the Block Type box at the top of page 2
- Order either Intermittent Mode or Continuous Mode
- Complete the prescription for the infusion and clinician bolus if in continuous mode
- eMM place holder must be completed using the eMR SCH Pain power plan
- Ensure naloxone prescription is completed in eMM for solutions containing opioids
- Anti-emetics are to be ordered via eMM

6.2 Standard Continuous Epidural Infusion Prescription For Children

6.2.1 Ropivacaine 0.2% (2 mg/mL) WITH or WITHOUT Fentanyl 2 microg/mL [4]

Infants and Children 0 – 18 years:
Starting rate: 0.2mL/kg/hr
Maximum rate: 0.4mL/kg/hr
Bolus usually 0.2mL/kg (or current infusion rate)

Note: Neonates and Smaller children may be prescribed ropivacaine 0.1%

6.2.2 Clonidine

- May be prescribed in selected cases and added to the above solutions to a maximum concentration of 0.75 micrograms per mL.[5,6]
- Each 1 mL ampoule of clonidine contains 150 micrograms.
  - Therefore 0.5 mL or 75 micrograms should be added per 100 mL of ropivacaine or ropivacaine/fentanyl epidural infusion solution.
  - Maintain strict aseptic technique when adding clonidine to an epidural infusion bag

6.3 Adjunctive Analgesia

Patients receiving a continuous epidural infusion may also require additional analgesia:

- Ketamine infusions may be administered via the IV or Sub-Cut route with all epidural infusion solutions.
- Intravenous and enteral opioids can only be administered when the epidural infusion solution ***DOES NOT CONTAIN FENTANYL (OR ANY OTHER OPIOID).***
- Paracetamol can be administered via either the intravenous and enteral routes with all epidural infusion solutions.
- NSAIDS can be administered during an epidural infusion, but is not recommended if the patient is receiving any other anti-thrombotic therapy such as Low-Molecular Weight Heparin (enoxaparin) or warfarin. [7]

7 Complications

7.1 Respiratory Depression

A fall in respiratory rate is a late sign of respiratory depression. Strict hourly monitoring of patient as per protocol is essential to detect this sign of respiratory depression.

- Respiratory Rate breaching Low Yellow Zone on BTF

- **Action: Stop infusion**
  - Give oxygen
  - Activate BTF Clinical Review call
- Increase frequency of Observations to every 5 minutes until medically assessed and/or respiratory rate improves.
  - Respiratory rate breaching Low Red Zone on BTF
- **Action: Stop Infusion**
  - Give oxygen by mask
  - Activate Between the Flags Rapid Response call
- **If there is an Opioid in the Epidural Solution then:**
  - Consider IV naloxone as per eMM prescription on MAR
  - If no response to first dose reassess vital signs for need of CPR.
- REASSESS and REPEAT THIS DOSE EVERY 5 MINUTES UNTIL RESPIRATORY RATE is **Back in Yellow Zone or in normal range**
- Increase frequency of Observations to 5 minutely until patient has been medically assessed even if Respiratory rate improves.
- Note: *Naloxone has a relatively short half-life respiratory rate may drop again even though infusion has been ceased.*

7.2 Over Sedation

A decreasing level of consciousness develops gradually with opioid overdose and may provide earlier warning of impending overdose than the respiratory rate.

- If sedation score ≥ 4:
  - **STOP** infusion
  - Check vital signs and increase frequency of observations
  - Give oxygen
  - Activate Between the Flags Rapid Response call

7.3 Dense Motor Block

- **Motor block Score (Modified Bromage Scale)**

Refer to Page 2 of Multi-Modal Analgesia Record (See Appendix 1)

  - If score = 1: **STOP INFUSION.** Call for **BTF Clinical Review**
  - If score = 2: **STOP INFUSION.** Reassess after 1 hour. If no improvement after 1 hour, call for **BTF Clinical Review**. If Motor Block Score ≥3 after 1 hour, restart infusion.
  - If score = 3: Monitor hourly**.**
  - If score ≥4: Continue usual monitoring.

7.4 Facial Numbness or Facial Twitching

- **STOP** infusion
- Administer face mask oxygen
- Activate Between the Flags Rapid Response call
- Where possible sit the patient up
- Consider high block or local anaesthetic toxicity
- APS/Anaesthetics review

7.4.1 High Block

- Assess the level of the block (Refer to Page 2 of Multi-Modal Analgesia Infusion Record – Appendix 1)
- Pause infusion until block level returns to satisfactory level
- Sit the patient up (if possible)
- In-hours contact APS for review

- Out of hours call Activate BTF Clinical Review call
- Consider re-starting infusion at lower rate when high block has resolved

7.4.2 Local Anaesthetic Toxicity[8, 9]

- Signs of local anaesthetic toxicity include:
  - dizziness, blurred vision, decreased hearing, restlessness, tremor, hypotension,
- **Severe local anaesthetic toxicity: These symptoms require code blue activation**
  - *bradycardia, arrhythmias, numbness of tongue, seizures, sudden loss of consciousness*[1]
- If local anaesthetic toxicity suspected:
  - STOP infusion and clamp the line on the delivery set
  - Initiate rapid response as per local CERS
  - Initiate Oxygen therapy via non rebreather mask
  - In hours: Obtain SMOFlipid® 20% from pharmacy
  - Out of hours: Access SMOFlipid® 20% from Emergency Drug Room or Contact Nursing Supervisor
- ***Follow Management of Severe Local Anaesthetic Toxicity Guide*** see Appendix 2: Management of Local Anaesthetic Toxicity

7.5 Large amount of Leakage of Blood or Fluid at Insertion site

- Contact APS/ Anaesthetist on-call

7.6 Urinary Retention

- **Activate Between the Flags Clinical Review call.**

note: most patients receiving epidural infusions will need an in-dwelling urinary catheter

7.7 Nausea or Vomiting

- Give prescribed anti-emetics (as per eMM), if none prescribed or vomiting persists activate BTF Clinical Review call.

7.8 Severe Hypotension

- If blood pressure breaches Low Red Zone on BTF
- STOP Infusion

- Activate Between the Flags Rapid Response call
- Assess fluid status and consider fluid bolus 10-20mL/kg
- Attending team to contact APS/ Anaesthetist on-call

7.9 Inadequate Pain Relief

- Assess the level of the block (Refer to Page 2 of Multi-Modal Analgesia Infusion Record – Appendix 1)
- Assess motor function
- Give clinician initiated bolus dose (if prescribed- refer to Section 8.5 Clinician Initiated Bolus Dose)
    - Patients receiving Intermittent mode will need a review by APS in hours to administer any clinician boluses
- Pain score and motor block score should be reassessed 15-30 minutes post-bolus.
- Patients should be reviewed if requiring frequent clinician-initiated boluses (i.e. >3 boluses in 5 hours) or if bolus ineffective after 30mins.
- In-hours contact APS for review
- Out of hours call for Clinical Review as per CERS

7.10 Unwitnessed disconnection

- If disconnection occurs below bacterial filter (i.e. yellow infusion tubing only becomes disconnected and bacterial filter remains attached to epidural catheter):
    - Clean and cap bacterial filter using standard ANTT with 2% chlorhexidine/70% alcohol wipes
    - Notify APS or Anaesthetics
    - May require change of bacterial filter using standard ANTT
    - Replace line and infusion bag as per Section 8 Commencement of Continuous Epidural Infusion
    - Replacement lines and bacterial filters are stored in Paediatric Recovery Department
- If disconnection occurs above bacterial filter (i.e. epidural catheter is disconnected from bacterial filter)
    - Notify APS or Anaesthetics
    - Consider cessation of Epidural and removal of catheter to prevent infection
    - Alternative analgesia or optimisation of current IV/PO analgesia may be required

8 Programing Continuous Epidural Infusion

- All Epidural infusions are to be administered using the Hospira Sapphire Pump
- Position the pump in an upright position by attaching the pump to an IV pole using the lock box cradle
- Lines and infusion bags must be labelled as per National Standard for User Applied Labelling of Injectable Medicines, Fluids and Lines
- Polybag of ropivacaine 0.2% +/- fentanyl 2 microg/mL is checked by two Registered nurses and connected to the epidural giving set
    - Open the sterilized administration set package
    - Close the clamps and the Anti-Free Flow Valve to block the administration set (see picture showing AFFV in closed position)
    - Spike the administration set into the container
    - Make sure there is no leakage from the container, and that the spike is firmly attached to the container.

Turning on the Pump

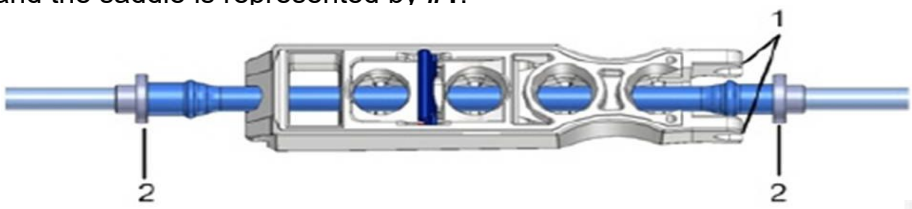
- The pump is turned on by pressing the On/Off hard key, at the lower right corner of the pump (red circle in picture to left).

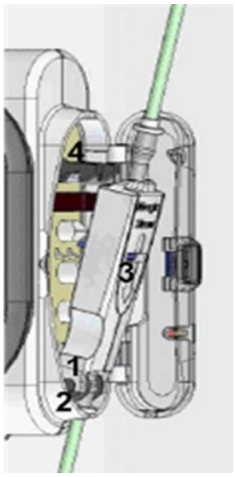
Opening the Door

- Opening the safety door involves pressing down on the gray button while simultaneously pulling the safety door open.
- Using your thumb, press the gray button inwards
- While maintaining pressure on the gray button, swing the safety door outwards.

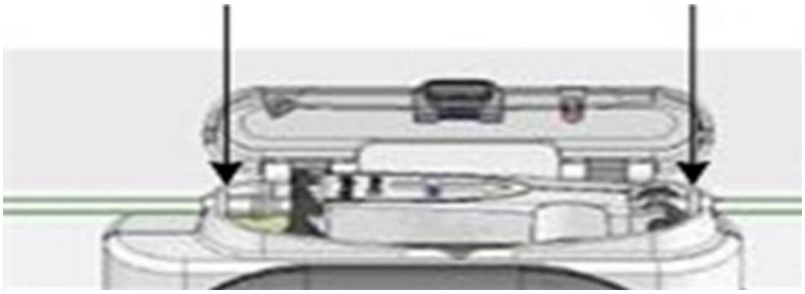
8.1 Inserting the Administration Cassette

- Inserting the administration cassette into the pump involves positioning the cassette in the proper direction, and ensuring that all portions of the cassette, including the flanges, are secured inside the administration cassette's housing.
- In the Figure below the flanges (one on either end of the cassette) are represented by **#2**, and the saddle is represented by **#1**.





- Insert the administration cassette at an angle, by placing the saddle (**#1**) on the round metal anchor (**#2**) in the cassette's housing.
- Make sure that the arrow on the cassette (**#3**) is pointing toward the bottom of the pump.
- Clip the upper end of the administration cassette into the metal locker (**#4**).
- Make sure the flanges are positioned on both sides of the administration cassette, and are inside the administration cassette housing.



- Close the safety door over the administration cassette
- Ensure that the safety door clicks upon closure.

- **<u>Before commencing infusion setup, the administration set needs to be primed</u>**
  - Priming expels all the air from the administration set, and fills it with the infusion liquid.
  - A fully primed administration set is a set filled with infusion liquid (from which all the air was removed).

8.2 Priming the set

- Priming with the pump can be initiated from the following screens
  - Start Up
  - Start
  - Paused (infusion or bolus)
  - Air in Line Alarm
- Before using the pump for priming, ensure that
  - The administration set clamp is open.
  - The Q Core administration cassette is properly connected to the pump.
  - The safety door is closed.
- **Before priming, verify that the administration set is disconnected from the patient**.
- From the toolbar of the Start Up, Start, Air in Line Alarm, or Paused screen, press **Prime**.
  - **Verify that the administration set is disconnected from the patient**
  - Then, from the Attention screen, press **OK**. Priming begins
  - While the pump is priming, a progress circle appears on the screen, with a time countdown displayed.
  - The default priming time is 2 minutes (4mL)
- During priming with the pump, air and occlusion detection alarms are inactivated
- While priming, check that the supply line is open and that there is no occlusion
- Ensure that liquid, not air, enters the administration set during priming.
- The pump automatically indicates when priming is finished
- If the liquid had not reached the end of the infusion set at the end of the prime, it may be necessary to prime again
- If required, clean ports using standard ANTT procedure and ensure ports are dry before reconnecting. Standard 2% chlorhexidine in 70% alcohol wipes are satisfactory

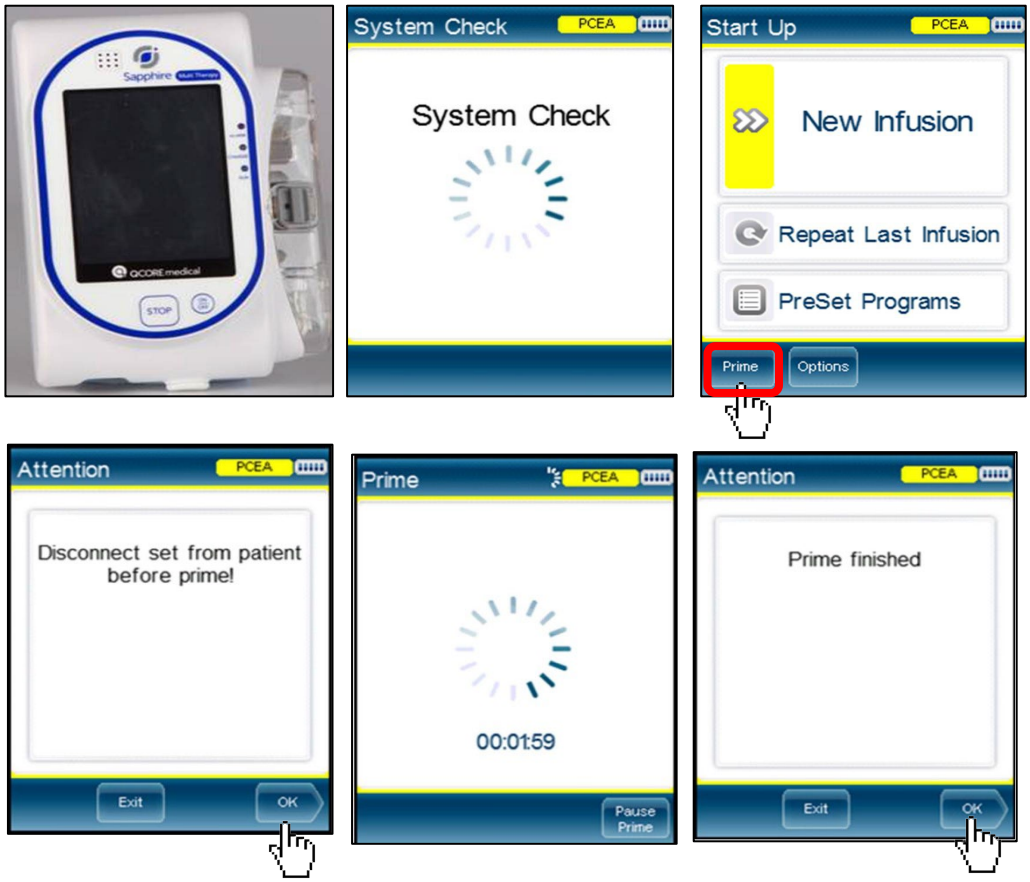


Figure 1: Priming the set

8.3 Programing the Pump

Once the pump has finished its prime:

- Select new infusion
- Enter volume to be infused (ie the size of the bag that you are hanging)
- ***Recommended VTBI=90mL this will prevent the bag fully emptying and letting air into the set***
- Select “ml” on the Drug Units Screen
- Enter infusion rate as per prescription
- Check program is correct on confirm screen
- Connect set to the epidural catheter at the filter
- Open all clamps
- Select start
- Once Start is pressed the Pump will automatically lock

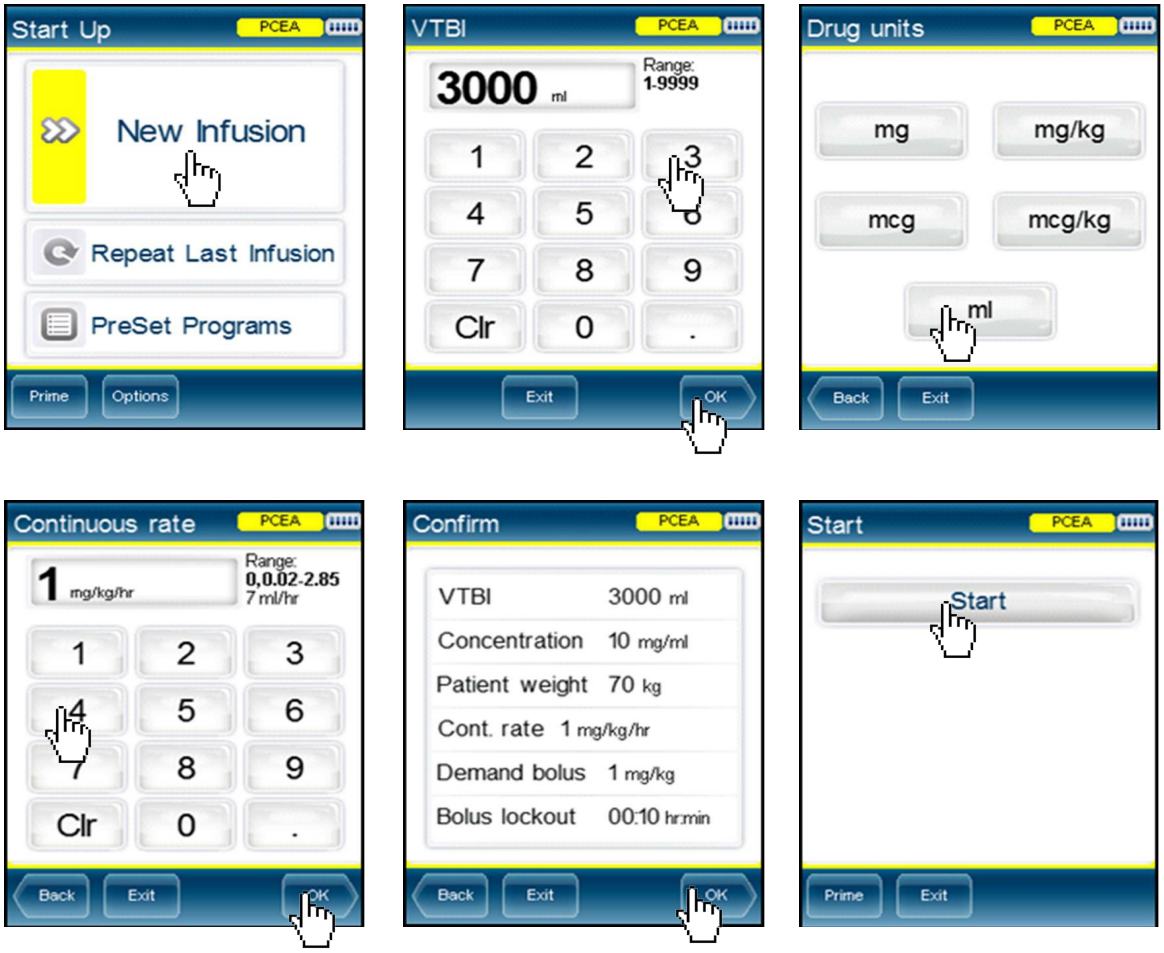


Figure 2: Programming continuous infusion

8.4 To Unlock the Pump

- The pump is automatically locked when started
- To set or change the infusion rate, an access code is required to unlock the pump

- Press to Unlock Patient
- Enter code **7770**
- OK
- Authorization set to high level- OK

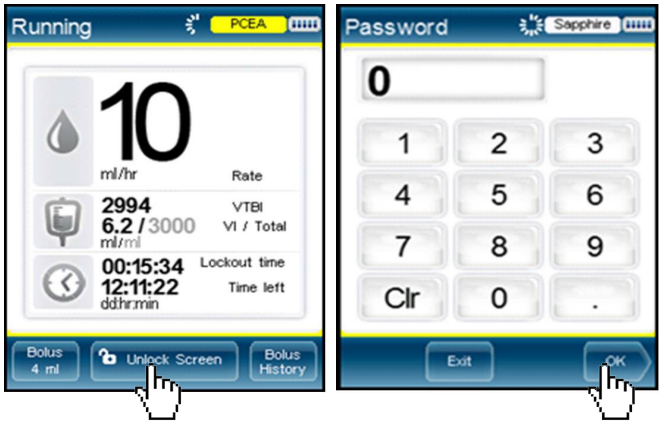


Figure 3: Unlocking the pump

8.5 Clinician Initiated Bolus Dose

If the patient's pain control is inadequate patient then appropriately trained staff can give a bolus via the epidural infusion pump

- There should be a minimum of 60 minutes between clinician-initiated boluses.
- Pain score and motor block score should be reassessed 15-30 minutes post-bolus.
- Patients should be reviewed if requiring frequent clinician-initiated boluses (i.e. >3 boluses in 5 hours) or if bolus ineffective after 30mins.
- In-hours contact APS for review
- Out of hours call for Clinical Review as per CERS

Process:

- Unlock the Pump
- From the “Running” screen select View/Edit
- Select Clinician Bolus
- Enter the password (same as for lock screen)
- Enter volume to be given as per prescription
- Press OK at confirmation screen after checking the dose is correct
- Boluses are delivered at 125mL/hr. Pump will return to the infusion program at the end of the bolus
- Please note some screenshots may vary slightly from the pump screen layout

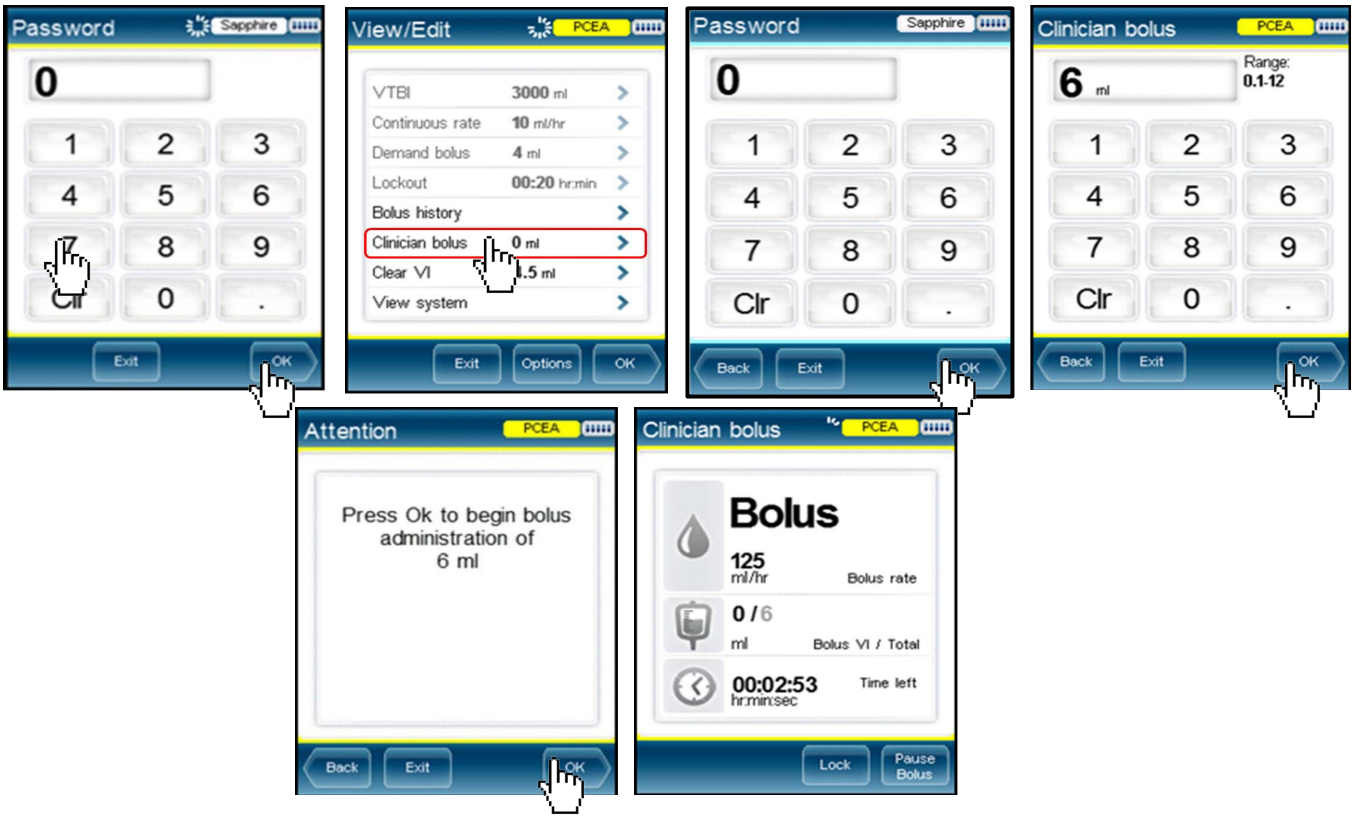


Figure 4: Clinician Initiated Bolus

8.6 Changing the Program

If the epidural rate is too low i.e. the patient has required 3 or more bolus doses in the previous 5 hours, then, after consultation with the APS or anaesthetist the rate can be increased up to a maximum of 0.4mL/kg/hr (0.2% ropivicaine). **This change requires the prescription to be altered by the prescribing doctor and should not happen as a telephone consult or order**.

- Unlock the Pump
- From running screen select Pause Button
- Press ok to pause
- Can press STOP hard key to pause
- On the pause screen touch the rate panel or select "View/Edit"
- Alter rate as per new prescription
- OK
- Continue
- Press OK to Continue

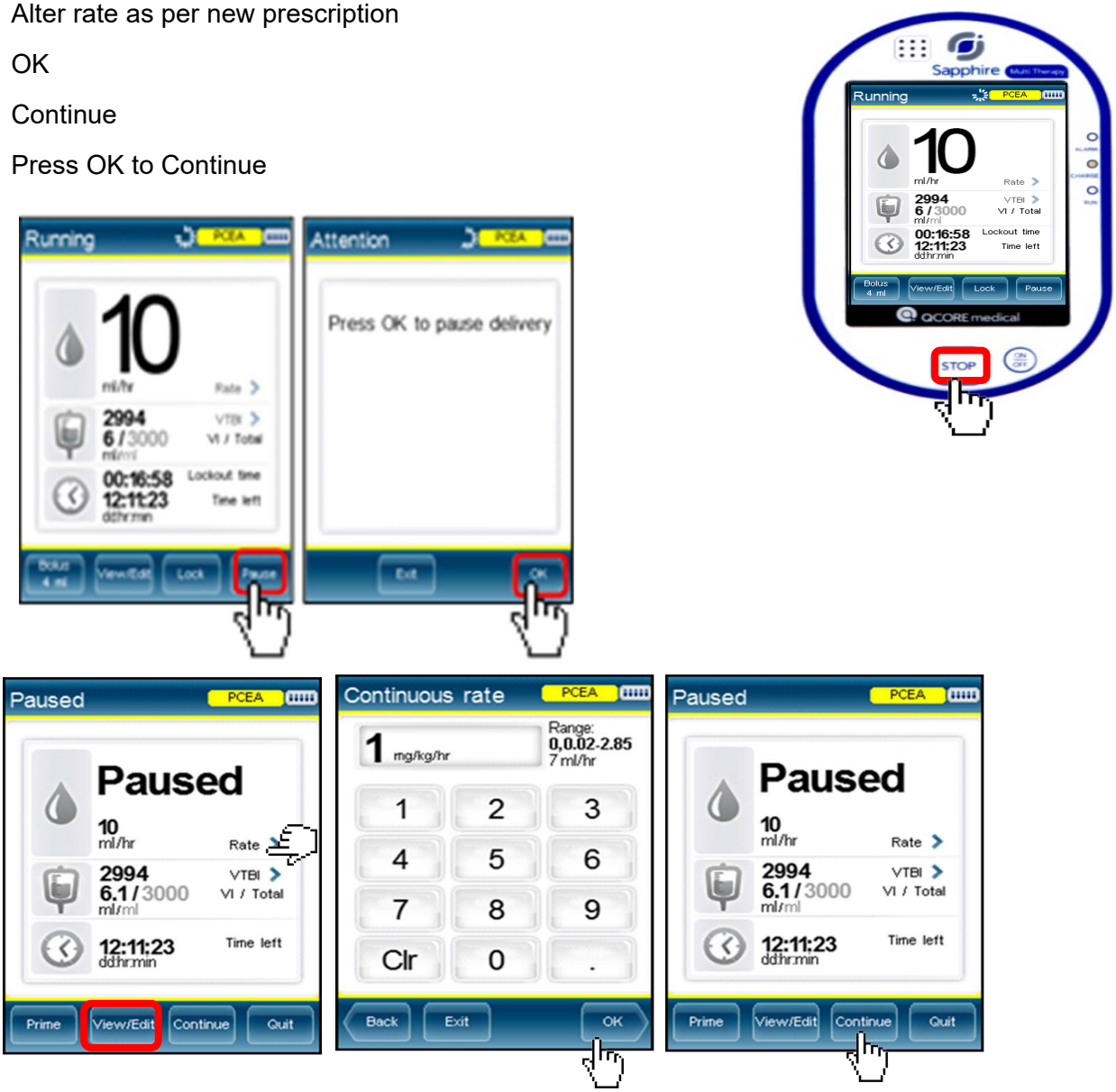


Figure 5: Changing the Program

8.7 Changing the Bag

When infusion complete (bag is empty)

- Pump will alarm 10 minutes before end of infusion (VTBI)
- Pump will alarm and stop infusing once VTBI is reached
- Press Mute
- Open Lock Box using grey handle
- Change Bag
- Close Lock Box
- Unlock Pump
- Repeat Last Infusion
- Confirm Program-OK
- Start

When 24 hours is up and VTBI has not been reached

- Unlock Pump
- Pause
- Press Ok to Pause Delivery - OK
- Quit
- Warning Screen - OK
- Repeat last infusion
- Confirm program- OK
- Start

8.8 Turning off the pump at end of use

- Unlock Pump
- Pause
- Quit
- Warning Screen - OK
- On/Off hard key
- Off
- Remove set and dispose of appropriately

9 Programming Epidural in Intermittent Mode

Intermittent mode allows for the prescriber to administer bolus doses at a set interval e.g. every 1, 2, 3 or 4 hours this can be done with or without a background or KVO rate. This is most commonly used with paravertebral or TAP blocks but can be used with epidurals as well.

9.1 Checking prescribed hourly dose rate for Ropivacaine when in Intermittent Mode

- Prescription is always in mL for boluses and mL/hr for continuous rates
- Hourly safe dosage is calculated in mL/kg/hr
- To calculate the hourly dose (no continuous rate prescribed) divide the intermittent bolus dose by the hourly interval. Divide by weight to get the rate in mL/kg/hr
    - E.g. a 10 kg child receiving a 6 mL bolus every 2 hours
    - (6 ÷ 2) ÷ 10 = 0.3 mL/kg/hr
- To calculate the hourly dose with a continuous rate prescribed divide the intermittent bolus dose by the hourly interval (as above), add the continuous rate in mL/hr, then divide by weight to get mL/kg/hr
    - E.g. a 10 kg child receiving a 4 mL bolus every 2 hours with 1 mL/hr continuous rate
    - ((4 ÷ 2) + 1) ÷ 10 = 0.3 mL/kg/hr

9.2 Intermittent Mode Setup

- Turn on pump and insert set as per Section 8.1
- Prime administration set as per Section 8.2
- Once the pump has finished its prime select Options
- Select Delivery Mode
- Enter Pass Code 7770

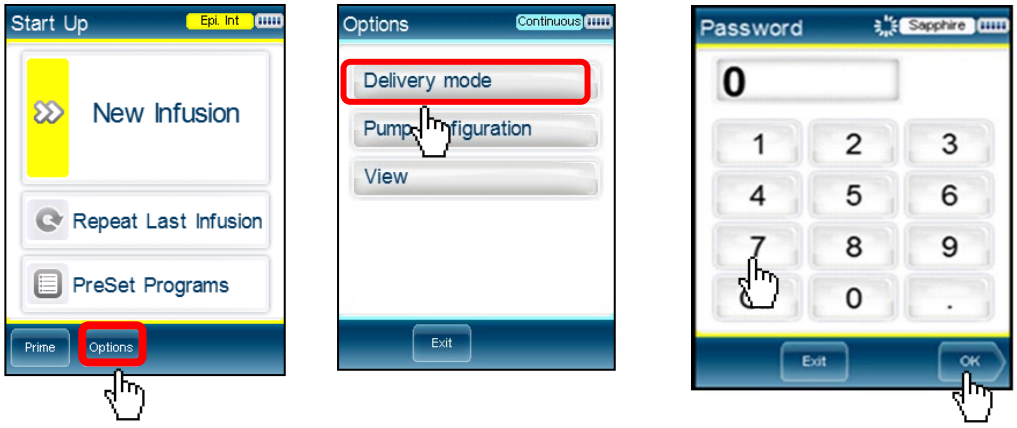


Figure 6: Setting up Intermittent Mode - Step 1

- Select Epidural Mode
- Select Intermittent Mode
- Select New Infusion

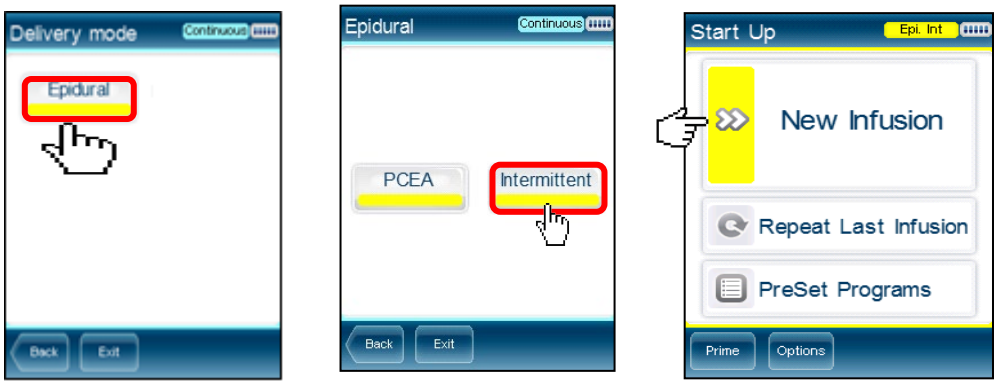


Figure 7: Setting up Intermittent Mode - Step 2

- Enter Volume to be Infused
- Program the Intermittent Dose as prescribed
- Program the Interval Duration as prescribed
    - NOTE: enter as hh:mm format, i.e. 1 hourly = 01:00
- Set Continuous rate (if any)
- Confirm program and select OK
- Select add PCEA and enter password
- Set Demand Bolus as 0.1 mL (as per default on prescription) and OK
- Set Bolus Lockout to 30 min (as per default on prescription) and OK
- Set Dose limit is NO
- Review program screen and OK if correct
    - Can press back at any point to go back and change a value.
- Press Start if ready to commence (will give first of the programed boluses)
    - If needed a delay can be programmed before first bolus but you can choose to commence any continuous infusion at this time
- If you want to put pump into standby until ready to be connected press Set Delay and choose Standby- you can end standby by using End Standby soft key.
- Note: Intermittent mode always commences with 1st Bolus dose unless a delay is programed.
- Clinician Bolus dose is not pre-prescribed and will be determined by the reviewing APS/Anaesthetic consultant based on clinical indications and documented in eMR

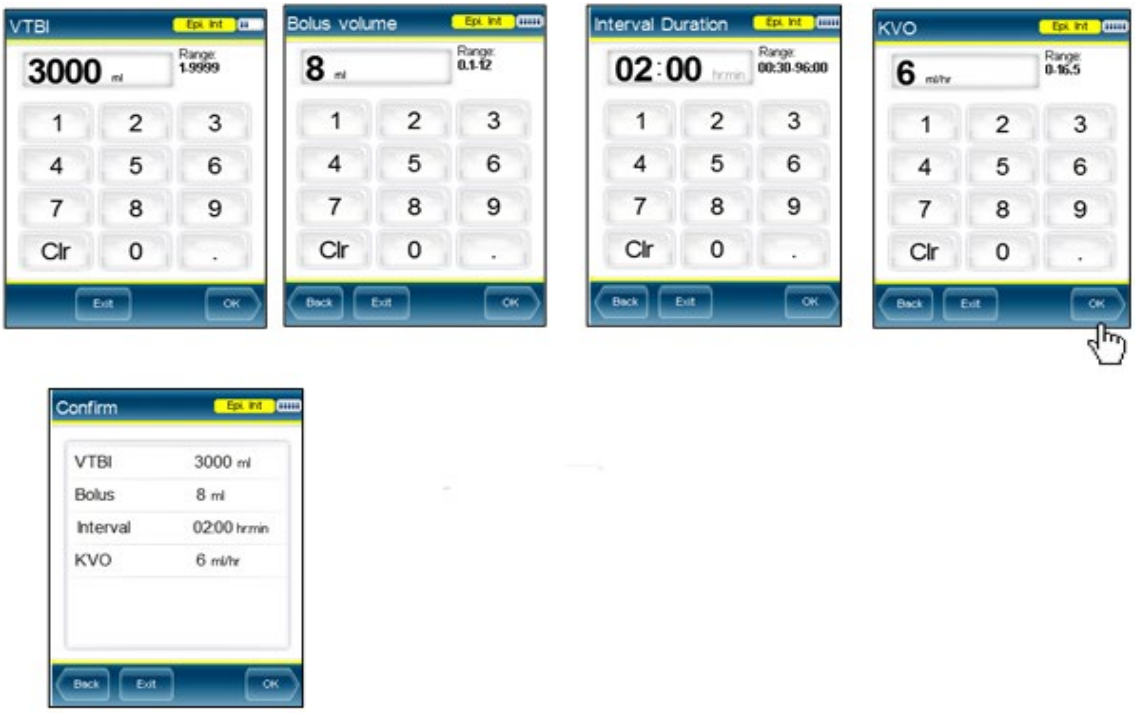


Figure 1: Setting up Intermittent Mode - Step 3

figure 2- adding PCEA settings

To change intermittent program

- Unlock pump as per Section 8.4
- Pause infusion
- Select “View/Edit”
- Select program and make changes as prescribed
- Select “OK” and “Continue” to restart infusion

To change bag or change program or end Intermittent Infusion

- To change Bag when VTBI has been reached or when 24 hours is up and VTBI has not been reached see Section 8.7
- To end infusion see Section 8.9

10 Removal of Epidural - Procedure

- If the patient has been receiving any form of anti-coagulant therapy for example: warfarin, enoxaparin (Clexane®) or heparin, the timing of epidural catheter removal is critical.
  - **Please check with the Acute Pain Service**
- The epidural can only be removed by an accredited RN after instruction by a member of the Acute Pain Service or Anaesthetics
- Identify correct patient for removal of catheter
- Give clear and relevant explanation to patient/parents
- Request assistance of another registered nurse
- Wash hands and wear non-sterile protective gloves
- Position patient on side with spine slightly flexed
- Turn epidural infusion pump off (as above)
- Remove all tape and dressings
- Inspect catheter site for leakage, infection or bleeding
- Gently withdraw epidural catheter until completely removed
- Catheter should slide out easily - any more than slight resistance **STOP** and call a member of the Acute Pain service/Anaesthetics
- Clean insertion site with an antiseptic swab if dried blood or soiled. Apply adhesive strip
- Inspect catheter tip for intactness with a second Registered nurse
  - There should be a blue tip on the catheter

- If in any doubt catheter to be kept and a member of the Acute Pain Service or Anaesthetics notified

- Dispose of catheter and dressings
- Record catheter removal and intactness on approved Hospital Continuous Epidural Chart

11 Reference / Bibliography

1. Wolf, A. R. (2012). Effects of regional analgesia on stress responses to pediatric surgery. Pediatric Anesthesia, 19-24.
2. Wong, G. K. (2013). Major complications related to epidural analgesia in children: a 15-year audit of 3,152 epidurals. Canadian Journal of Anesthesia/Journal canadien d'anesthésie, 1-9
3. Bosenberg, A. (2012). Benefits of regional anesthesia in children. Pediatric Anesthesia, 10-18.
4. Lonnqvist, P.-A. (2012). Toxicity of local anesthetic drugs: a pediatric perspective. Pediatric Anesthesia, 39-43.
5. Mossetti, V. V. (2012). Local Anesthetics and Adjuvants in Pediatric Regional Anesthesia. Current Drug Targets, 952-960.
6. Mazoit, J.-X. (2012). Local anesthetics and their adjuncts. Pediatric Anesthesia, 31-38.
7. Davies, (2012). Regional anaesthesia and antithrombotic drugs. Continuing Education in Anaesthesia, Critical Care & Pain, 11-16.
8. Sekimoto, K., Tobe, M. and Saito, S. 2017 Local anaethetic toxicity: acute and chronic management. *Acute Medicine & Surgery, 4, 152-160*
9. The Association of Anaesthetists of Great Britain and Ireland 2010. AAGBI safety guideline: management of severe local anaesthetic toxicity. URL available at: https://www.aagbi.org/sites/default/files/la_toxicity_2010_0.pdf [Accessed 01/03/2018]

12 Appendices

12.1 APPENDIX 1: Multimodal Analgesia Record Page 2

NSW GOVERNMENT Health | The Sydney children's Hospitals Network

Facility:

MULTI-MODAL ANALGESIA INFUSION RECORD

FAMILY NAME	MRN
GIVEN NAME	☐ MALE ☐ FEMALE
D.O.B. _____/_____/_____	M.O.
ADDRESS	
LOCATION / WARD	
COMPLETE ALL DETAILS OR AFFIX PATIENT LABEL HERE	

Assessing the level of the Block

1 Explain procedure and purpose to patient/parent.

2 Place ice in a glove or use tissue/ paper towel leaving part exposed if Patient has latex allergy.

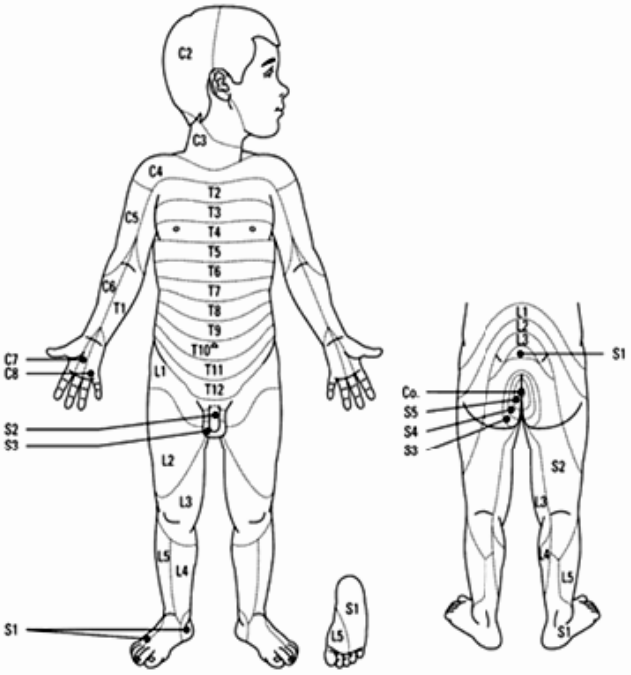
3 Place ice on an area well away from the possible dermatome cover (eg face or forearm) and ask them to tell you how cold it feels to them.

4 Apply the ice to an area likely to be blocked on the same side of the body and ask the patient "Does this feel the same cold as your face/arm or different?" Patients may report the ice feeling colder, warmer or the same.

5 Apply the ice to areas above and below this point until it's clear at which level the top and the bottom of the block is.

6 Repeat the procedure on the opposite side of the body. (Blocks may be uneven or unilateral.)

7 Document Left and right side block levels on front of chart i.e. Left T7 Right T8.



Motor Block Score (Modified Bromage Scale): For Epidural use, aim for score ≥ 3

1 = Complete block, patient is unable to move feet or knees - ***Stop infusion and call APS for urgent review***

2 = Able to move feet only - ***Continue Infusion but inform APS for review***

3 = Patient is just able to move their knees

4 = Detectable weakness with hip flexion

5 = No detectable weakness

Motor Block Level Monitoring and Responses/Actions

Hourly for first eight (8) hours then 4th hourly if score ≥4 (Motor block must be assessed 1 hour after clinician-initiated bolus/stat bolus)

If score = 1: STOP INFUSION. Call for **BTF Clinical Review**

If score = 2: STOP INFUSION. Reassess after 1 hour. If no improvement after 1 hour, call for **BTF Clinical Review**.

If Motor Block Score ≥3 after 1 hour, restart infusion.

If score = 3: Monitor hourly.

If score ≥4: Continue usual monitoring as above.

Page 2 of 2

NO WRITING

Holes Punched as per AS2828.1: 2012

BINDING MARGIN - NO WRITING

SCN130325

12.2 APPENDIX 2: Management of Severe Local Anaesthetic Toxicity

AAGBI Safety Guideline

Management of Severe Local Anaesthetic Toxicity

1 Recognition

Signs of severe toxicity:
- Sudden alteration in mental status, 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 (LA) toxicity may occur some time after an initial injection

2 Immediate management

- Stop injecting the LA
- Call for help
- Maintain the airway and, if necessary, secure it with a tracheal tube
- Give 100% oxygen and ensure adequate lung ventilation (hyperventilation may help by increasing plasma pH in the presence of metabolic acidosis)
- Confirm or establish intravenous access
- Control seizures: give a benzodiazepine, thiopental or propofol in small incremental doses
- Assess cardiovascular status throughout
- Consider drawing blood for analysis, but do not delay definitive treatment to do this

3 Treatment

IN CIRCULATORY ARREST
- Start cardiopulmonary resuscitation (CPR) using standard protocols
- Manage arrhythmias using the same protocols, recognising that arrhythmias may be very refractory to treatment
- Consider the use of cardiopulmonary bypass if available

GIVE INTRAVENOUS LIPID EMULSION
(following the regimen overleaf)
- Continue CPR throughout treatment with lipid emulsion
- Recovery from LA-induced cardiac arrest may take >1 h
- Propofol is not a suitable substitute for lipid emulsion
- Lidocaine should not be used as an anti-arrhythmic therapy

WITHOUT CIRCULATORY ARREST
Use conventional therapies to treat:
- hypotension,
- bradycardia,
- tachyarrhythmia

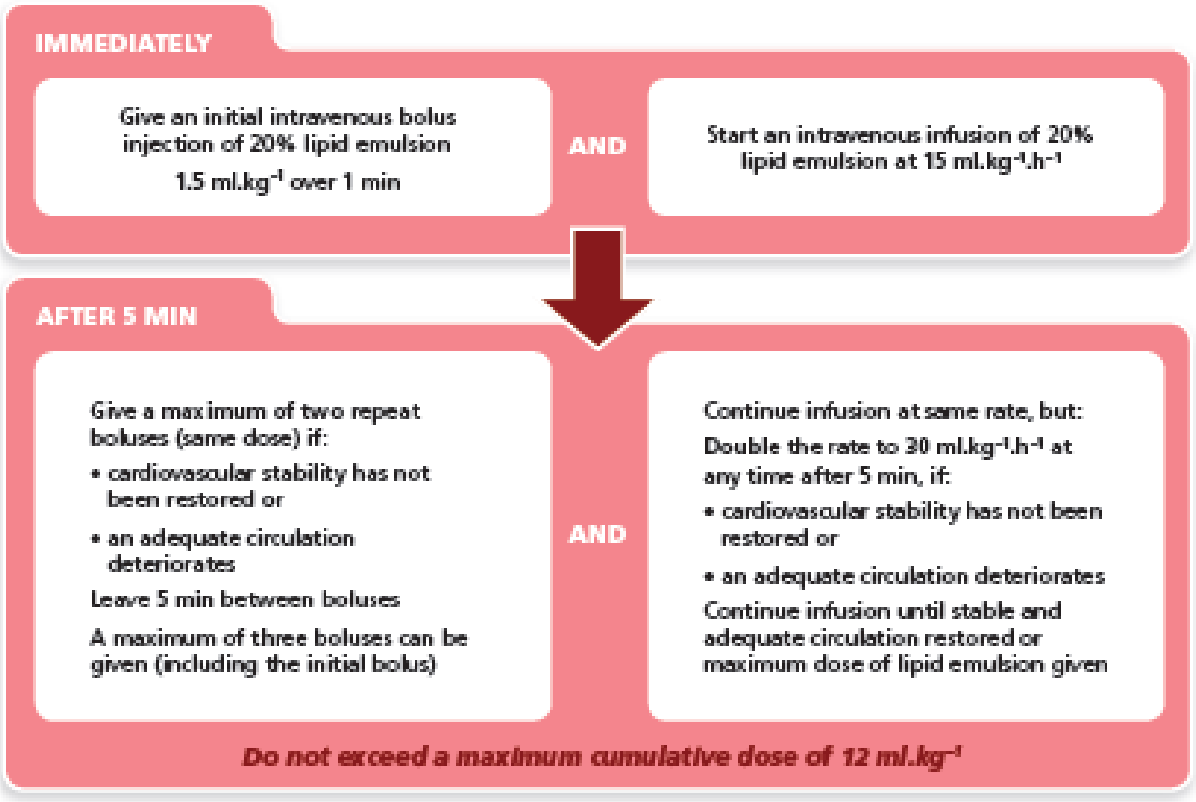
CONSIDER INTRAVENOUS LIPID EMULSION
(following the regimen overleaf)
- Propofol is not a suitable substitute for lipid emulsion
- Lidocaine should not be used as an anti-arrhythmic therapy

4 Follow-up

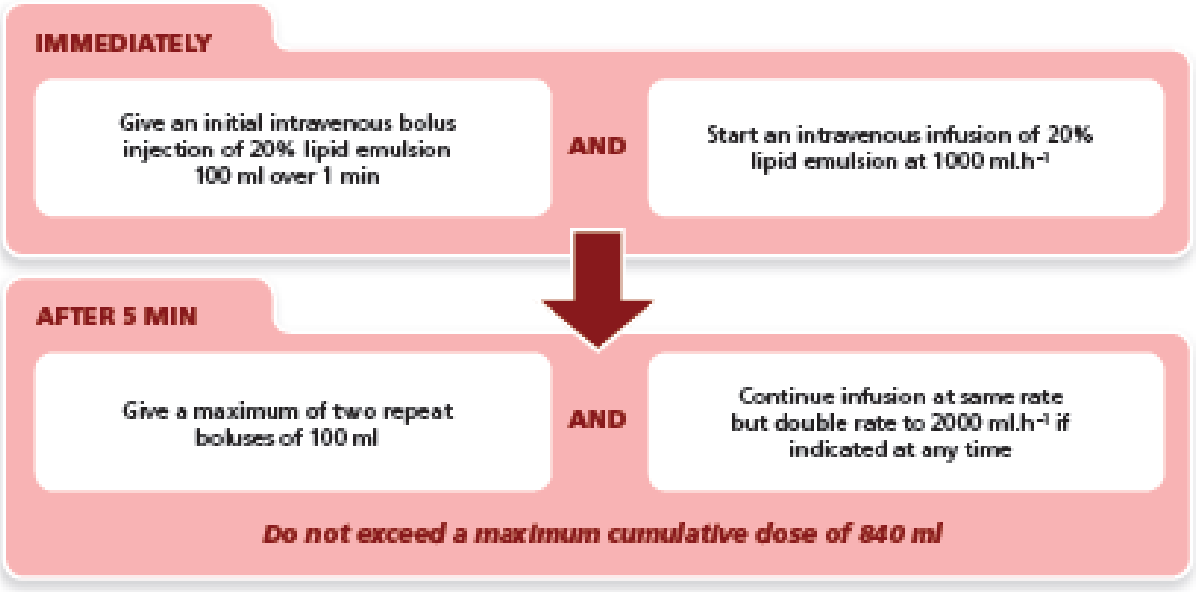
- Arrange safe transfer to a clinical area with appropriate equipment and suitable staff until sustained recovery is achieved
- Exclude pancreatitis by regular clinical review, including daily amylase or lipase assays for two days
- Report cases as follows:
  - in the United Kingdom to the National Patient Safety Agency (via **www.npsa.nhs.uk**)
  - in the Republic of Ireland to the Irish Medicines Board (via **www.imb.ie**)

If Lipid has been given, please also report its use to the international registry at **www.lipidregistry.org**. Details may also be posted at **www.lipidrescue.org**

Your nearest bag of Lipid Emulsion is kept.....



An approximate dose regimen for a 70-kg patient would be as follows:



This AAGBI Safety Guideline was produced by a Working Party that comprised:
Grant Cave, Will Harrop-Griffiths (Chair), Martyn Harvey, Tim Mask, John Picard, Tim Short and Guy Weinberg
This Safety Guideline is endorsed by the Australian and New Zealand College of Anaesthetists (ANZCA).