SESLHD PROCEDURE COVER SHEET

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KEY TERMS	Regional Analgesia, Continuous Peripheral Nerve Block, Extrapleural/Paravertebral infusion, Wound site infusion
SUMMARY	This document refers to Regional Analgesia, excluding epidural and intrathecal analgesia. Continuous Peripheral Nerve Block is administered for pain control including post-operative pain management.

Regional Analgesia – Continuous Peripheral Nerve Infusion

SESLHDPR/372

1. POLICY STATEMENT

This document outlines the management of all patients receiving Continuous Infusion for Regional Analgesia (except Epidural / Intrathecal Analgesia).

It aims to enable the patient to receive safe and effective administration of continuous local anaesthetic drug for pain control.

2. BACKGROUND

Continuous Peripheral Nerve Block (CPNB) refers to a technique where a catheter is inserted percutaneously adjacent to a peripheral nerve or plexus. Local anaesthetic is delivered through the catheter to provide analgesic effects.

Indications for CPNB include treatment of acute postoperative pain, vascular insufficiency, chronic pain conditions and cancer related pain.

Continuous peripheral nerve blocks extend the duration of postoperative analgesia beyond the finite period that single injection techniques provide

Compared with opioid analgesia, a CPNB provides better pain control, with the added benefit of reducing opioid use and opioid-related side-effects.

Categories of CPNB include but are not limited to:

- **Extrapleural / Paravertebral -** block over the intercostal nerves as they exit the vertebral column, often used after thoracotomy. The block can be unilateral or bilateral. It is similar to epidural analgesia but does not have the same risk of hypotensive side effects and motor block is very rare.
- **Upper limb -** where a catheter is placed near the brachial plexus e.g. interscalene, supraclavicular, infraclavicular and axillary block.
- **Lower limb -** e.g. femoral, sciatic, adductor canal.
- **Wound site infusion -** including use of disposable elastomeric infusion device e.g. ‘PainBuster’.

3. DEFINITIONS

Local Anaesthetic - an agent which blocks the conduction of impulses in nerve tissues through sodium channel deactivation

Nerve Block - application of local anaesthetic to a nerve or nerve plexus, to block the transmission of impulses for the purpose of pain relief.

4. RESPONSIBILITIES

Registered Nurses will:

- Competent with equipment used
- Prepare, administer, and discard prescribed solution of local anaesthetic
- Observations, management of adverse effects, appropriate escalation of care if required and documentation.

Medical staff:

- Patient selection
- Prescribing
- Catheter insertion
- Management of adverse effects
- Documentation.

Pain Management Service: (If no Pain Management Service available, may be undertaken by RMO/Anaesthetist)

- Daily review of patients
- Regular auditing of regional analgesia charts
- Review relevant IIMS.

Pharmacist will:

- Review patient's medications and medication charts.

Line Managers will:

- Supervise adherence to policy and take action when required
- Review relevant IIMS.

5. PROCEDURE

5.1 Catheter insertion

- Continuous Peripheral Nerve Infusion catheter must be inserted in the operating room or in an area that provides the use of full surgical-type aseptic technique i.e. gown, gloves, mask, cap, sterile sets.
- Catheter insertion success is higher using ultrasound guidance compared with electrical stimulation for most insertion sites, yet requires less time for placement, induces less procedure-related discomfort and carries a lower risk of vascular penetration.
- Using electric current to supplement ultrasound guidance for difficult to visualise (e.g. deep) or ambiguous neural targets may prove beneficial in challenging cases.4
- Dermabond (2-octyl cyanoacrylate glue) can decrease leakage at the catheter site by a factor of 10.

- To prevent displacement of the catheter, firm fixation of the catheter to skin is recommended.

5.2 Prescribing

- The infusion must be prescribed on the approved Peripheral Nerve Infusion (Adult) chart SMR130.023, in accordance with NSW Ministry of Health Policy - PD2013_043 Medication Handling in NSW Public Health Facilities and clearly identified as Regional Analgesia.

- Infusion Prescription Options:
  Continuous Infusion (CI) +/- Rescue Bolus Dose
  - A continuous infusion (CI) program delivers a slow continuous infusion of local anaesthetic solution across the entire hour.
  - A rescue bolus dose should be administered only when a patient is experiencing inadequate analgesia (refer to section 5.4.2 Administration of a Rescue Bolus Dose).
  - The rate of the continuous infusion can be increased by 1 to 2 mL/hr within prescription limits if frequent bolus doses are required to maintain analgesia.

  Programmed Intermittent Bolus (PIB)
  - A Programmed Intermittent Bolus (PIB) program delivers the hourly background dose through one or more mandatory bolus doses, rather than a slow continuous infusion across the entire hour. For example, a 5 mL bolus once every 30 minutes will deliver 10 mL/hr.
  - A hourly limit or 4 hourly limit must be set to ensure safety from local anaesthetic toxicity.

  Patient Controlled Regional Analgesia (PCRA) with Background Infusion
  - A background continuous infusion is delivered with the addition of intermittent bolus doses being delivered by the patient upon demand. For example, a 5mL/hr background infusion with a 5 mL bolus every 20 minutes on a PRN basis.
  - A hourly limit or 4 hourly limit must be set to ensure safety from local anaesthetic toxicity.

- Settings and limits:
  - Ropivacaine 0.2% is used for peripheral nerve catheter infusions.
  - PIB dose can be prescribed at 1 to 20 mL.
  - Lockout range between bolus doses can be prescribed from 10 to 240 minutes between doses.
  - Hourly limit can be averaged over 4 hours in the case of intermittent boluses. Staying below the limit of Ropivacaine 0.4mg/kg/hour ensures safety from local anaesthetic systemic toxicity. Over 4 hours, the dose limit of Ropivacaine is

1.6mg/kg/4 hours. For example a 60 kg female's maximum dose is 96mg in 4 hours. This is equivalent to 48 mL of ropivacaine 0.2% in 4 hours.

Programmed Intermittent Bolus (PIB)

Solution	*PIB dose*	*Lockout range*	*4 hourly limit*
Ropivacaine 0.2%	**Per anaesthetist**	**10 to 240 minutes**	**1.6mg/kg**

Patient Controlled Regional Analgesia (PCRA) with Background Infusion

Solution	*Background infusion*	*PCRA bolus and lockout interval*	*4 hourly limit*
Ropivacaine 0.2%	**Per anaesthetist**	**Per anaesthetist**	**1.6mg/kg**

- Please note this is a total body dose limit. Should 2 or more regional catheters be running, this dose must be divided between all catheters. i.e. 0.4mg/kg/hour for both catheters combined.
- Please use lean body weight in high BMI patients. (BMI > 35).
- Consider a reduced dose of local anaesthetic in patients with impaired hepatic function as increased free ropivacaine levels may result. Also consider a reduction of dose by 10 to 20% in uraemic patients, elderly patients, severe heart failure, those with a severe metabolic disturbance and patients using CYP1A2 inhibitors (e.g. fluvoxamine, cimetidine, ciprofloxacin, verapamil).
- Prolonged ropivacaine infusions, even at relatively high doses >40mg/hr, have an extraordinarily low incidence of inducing toxicity signs, symptoms, or plasma levels.
- There is no evidence-based 'ideal' delivery regimen. Virtually all randomised controlled trials providing patient-controlled boluses report a lower local anaesthetic requirement.

5.3 Equipment

- All Continuous Peripheral Nerve Infusions must be clearly labelled according to National Recommendations for User-applied Labelling of Injectable Medicines, Fluids and Lines.

5.3.1 Infusion via **electronic pump / delivery device**

- Only use designated infusion pumps that are easily distinguishable from those used for intravenous and other types of infusions within individual hospitals.
- The infusion can only be commenced and managed by Registered Nurses who are competent in using the specific pump / delivery device
- Two Registered Nurses must program the pump according to the parameters prescribed on the Peripheral Nerve Infusion (Adult) chart.

5.3.2 Infusion delivered via **disposable elastomeric device**, e.g. PainBuster

- The infusion is usually set at a fixed rate
- The reservoir should not be refilled once empty
- The manufacturer's directions must be followed for each individual device.

5.4 Observations:

- The observations are intended for concurrent use with the Between the Flags (BTF) Observation Chart in eMR or Standardised Adult General Observation (SAGO) chart or other approved speciality observation charts.

OBSERVATIONS	FREQUENCY
Pain Score at rest and with relevant movement	Hourly for the first six hours and 2nd hourly thereafter or more frequently if patients clinical condition warrants
Infusion rate and total volume infused	Hourly for six hours, then 2nd hourly
Pump check	Commencement of each shift, on patient transfer and when bag is changed
Catheter site check	Every eight hours - preferably at shift change check for integrity of dressing, signs of leakage and signs of inflammation
Check for early signs and symptoms of local anaesthetic toxicity such as: light-headedness, numbness of mouth and tongue, tinnitus, visual disturbance, and late signs and symptoms such as muscular twitching, convulsions and cardiovascular collapse.	Hourly for the first six hours and 2nd hourly thereafter or more frequently if patients clinical condition warrants

SPECIFIC OBSERVATIONS FOR DIFFERENT BLOCKS	FREQUENCY
Upper limb block Check if the patient can raise the shoulder, move arm, flex arm and perform hand grip	Every four hours and document in progress notes
Lower limb block Use Bromage scale to check motor block (Refer to Appendix A)	Every four hours and prior to mobilisation
Paravertebral block Thoracic – Use sensory dermatome assessment (Refer to 5.4.1 and Appendix B) Lumbar – Use Bromage scale to check for motor block	Every four hours and prior to administration of a rescue bolus dose or more frequently if specified by Anaesthetist/APS. See 5.4.1 for sensory testing instructions Every four hours

- In the event of any other acute changes refer to NSW Ministry of Health Policy - PD2013_049 Recognition and Management of Patients who are Clinically Deteriorating

5.4.1 Sensory Testing (Dermatome Level Check):

- Place ice on an area well away from the possible dermatome cover (e.g. face or forearm) and ask the patient to tell you how cold it feels to them
- Apply ice to an area likely to be blocked on the same side of the body and ask the patient "does this feel as cold as your face / arm or different?"
- Apply ice to areas above and below this point until it's clear at which level the top and the bottom of the block is
- Repeat the procedure on the opposite side of the body (note: blocks may be uneven or unilateral)
- Document the blocked dermatomes on the NSW Health Peripheral Nerve Infusion Adult form SMR130.023 on the Sensory Dermatome Assessment section. Record both the upper and lower limits of the block on the relevant area: e.g. R T5- T9.

5.4.2 Administration of a Rescue Bolus Dose:

- A rescue bolus dose should be administered, as prescribed, when a patient is experiencing inadequate analgesia
- Prior to administration check the peripheral infusion delivery device and administration set for faults, kinks or disconnection and perform a full set of observations including motor and sensory level of block assessments
- Check catheter insertion site for catheter position or signs of leakage
- Identify a prescription for RESCUE BOLUS DOSE on the NSW Health Peripheral Nerve Infusion Adult form SMR130.023
- An RN who has been assessed as competent in this procedure can administer a rescue bolus dose and increase the rate. The dose must be checked and witnessed by a second RN
- Give prescribed rescue bolus dose and increase rate by 1 to 2 mL/ hour within prescription limits. For any other drug concentration contact Anaesthetist / Anaesthetic Registrar / APS or other relevant doctors for advice of rate increase
- The RN and witnessing RN must record and initial any clinician rescue bolus dose in the ‘Infusion Delivery’ section on the NSW Health Peripheral Nerve Infusion Chart Adult form SMR130.023
- Perform observations after the rescue bolus dose - as per section 5.4.2. If pain persists and observations are stable give another rescue bolus dose if at the minimum interval between rescue doses (hours or minutes) as charted on the approved NSW Health Peripheral Nerve Infusion Adult form SMR130.023
- Increase the infusion rate in accordance with the prescription if the maximum rate has not been reached and if not contra-indicated
- Continue to monitor as per section 5.4
- If pain continues to persist contact the APS or if after hours page the on-call Anaesthetic Registrar / Anaesthetist

- If complications occur see section 5.4.3.

5.4.3 Management of complications

COMPLICATION	ACTION / MANAGEMENT
Pain score 7 and above	• Check the delivery device and connections • Check site for excessive leaking and / or displacement of catheter • Consider giving bolus dose / rate increase if prescribed • Give systemic analgesia if prescribed • Contact surgical RMO or Acute Pain Service if above strategies ineffective • Document in patient's notes.
Sensory and Motor block	• If numbness occurs, take care with positioning of the numb limb to avoid pressure areas and nerve compression. Take precautions to avoid patient injury e.g. touching hot items • Increasing Motor block or any developing leg weakness – contact the Acute Pain Service / Anaesthetist • Document in patient's notes.
Leakage of blood or fluid, haematoma, abscess or oedema at insertion site	• Contact surgical RMO or Acute Pain Service • Document in patient's notes.
Local anaesthetic toxicity **Yellow zone** (early signs): Numbness and tingling around mouth and tongue Metallic taste Tinnitus Dizziness	• Stop infusion immediately • Apply oxygen • Activate **PACE Tier 1** • Contact surgical team and Acute Pain Service immediately • Document in patient's notes.
Red zone (late signs): Muscular twitching Convulsions Cardiovascular collapse	• Stop infusion immediately • Apply oxygen • Activate **CODE BLUE** • Contact surgical team and Acute Pain Service immediately • Document in patient's notes.
Horner's Syndrome (ptosis and unequal pupils)	• It is commonly seen with extrapleural block and is not cause for concern (it may disappear if the patient sits up for a period of time) – if concerned contact Acute Pain Service • Document in patient's notes.

5. Removal of catheter

- The order to remove the catheter must be documented by the relevant medical officer
- To prevent bleeding[9] the catheter should be removed if:
  - The patient has NOT RECEIVED unfractionated heparin within the previous six hours
  - The patient has NOT RECEIVED a low molecular weight heparin (LMWH) e.g. dalteparin or enoxaparin within the previous 12 hours
  - The patient has NOT RECEIVED rivaroxaban, dabigatran or apixaban within the previous 24 hours
  - The patient on warfarin has a documented INR of <1.5
- The anaesthetist must leave clear instructions about catheter removal and administration of any anticoagulants that are not discussed in this document
- No prophylactic doses of anticoagulants are to be administered for at least six hours following the removal of a peripheral nerve block catheter.

Procedure

- Wash hands and organise equipment
- Remove the dressing covering the catheter site
- Observe entry site - you may need to dislodge a clot or scab with gauze soaked in sterile saline solution
- Grasp the catheter close to the skin and gently pull the catheter, it should be easy to remove and not painful
- Do not apply additional tension if the catheter begins to stretch. Do not cut or forcibly remove the catheter. If resistance is encountered, stop and advise Pain Team / Anaesthetist / RMO immediately
- Examine catheter after removal and confirm with a second RN that the catheter tip is intact
- Cover the puncture site with an occlusive dressing
- Document in the patient's notes.

6. DOCUMENTATION

Peripheral Nerve Infusion (Adult) chart SMR130.023
Patient medical records (including eMR)

7. AUDIT

Patients receiving CPNB will be regularly reviewed by Pain Management / Anaesthetic / RMO clinicians.
IIMS

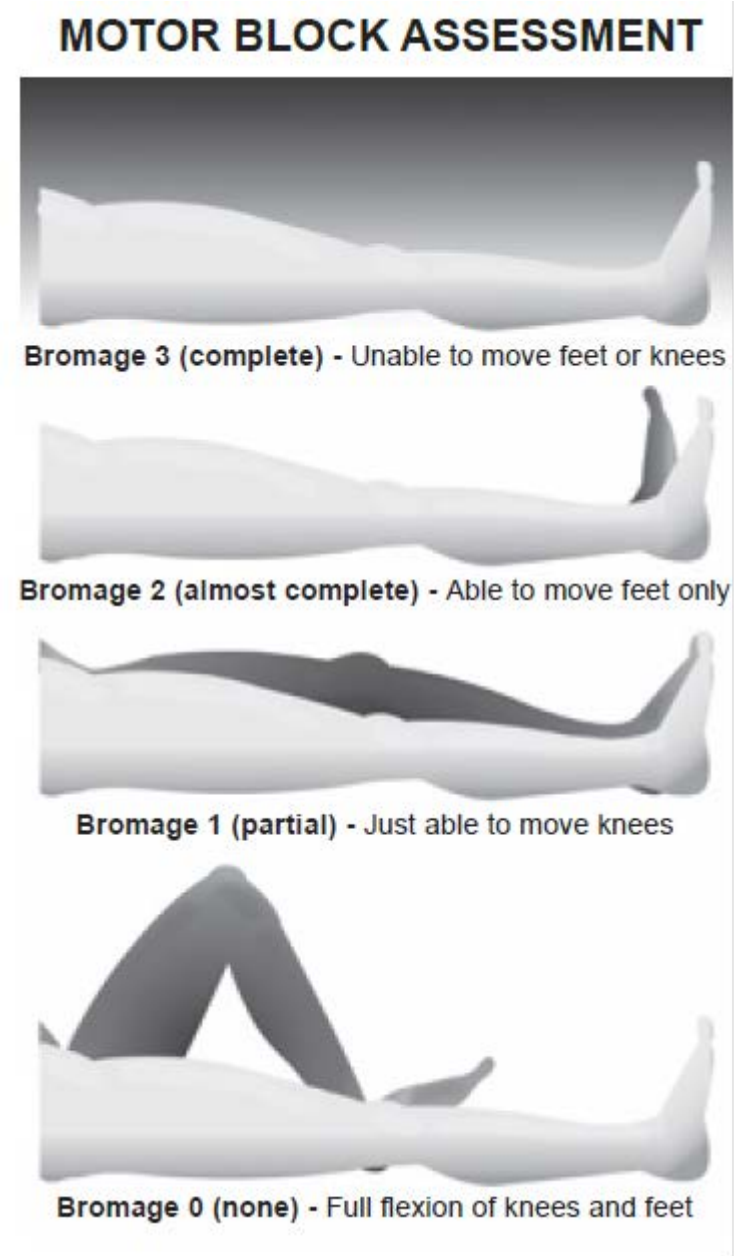
8. REFERENCES

	Reference	Level of Evidence
1	Ilfield,,B.,(2011). *Continuous peripheral nerve blocks: A review of the published evidence.* Anaestheia and Analgesia **113*(4)***904-25	I
2	Cowlishaw,P.,Scott,D and Barrington,M (2012) *The role of regional anaesthesia techniques in* the *management of acute pain.* Anaesthesia and Intensive Care **40**(1),33-45	I
3	Harrop-Griffths,W ,Cook,T,Gill,H. et al (2013). *Regional anaesthesia and patients with abnormalities of coagulation.* Anaesthesia **68** (9): 966-72	IV
4	Horlocker TT, Wedel DJ, Rowlingson JC et al (2010) Regional anaesthesia patients receiving antithrombotic or thrombolytic therapy: American Society of Regional Anaesthesia and Pain Medicine evidence –based guidelines. Reg Anasth Pain Med 35(1):64-101.	IV
5	NSW Ministry of Health Policy - PD2013_043 Medication Handling in NSW Public Health Facilities	
6	NSW Ministry of Health Policy - PD2016_058 User-applied Labelling of Injectable Medicines, Fluids and Lines	
7	NSW Ministry of Health Policy - PD2013_049 Recognition and Management of Patients who are Clinically Deteriorating	
8	NSW Health Peripheral Nerve Infusion (Adult) chart SMR130.023	
9	SESLHDPR/324 Pain Management - Epidural Analgesia - Continuous Infusion (Adult)	
10	Schug SA, Palmer GM, Scott DA, Halliwell R, Trinca J. APM:SE Working Group of the Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine (2015), Acute Pain Management: Scientific Evidence (4th edition), ANZCA & FPM, Melbourne.	
11	Warren L, Pak A. Local anesthetic systemic toxicity. In: Maniker R editor. UpToDate. Waltham, MA: UpToDate; 2018.	
12	Rosenberg PH, Veering BT, Urmey WF. Maximum recommended doses of local anaesthetics: a multifactorial concept. RAPM 2004; 29:564-575.	
13	Ilfield B. Continuous Peripheral Nerve Blocks: An Update of the Published Evidence and Comparison With Novel Alternative Analgesic Modalities. Anesthesia and Analgesia 2017; 124(1):308-335.	

9. REVISION AND APPROVAL HISTORY

Date	Revision No.	Author and Approval
December 2014	0	Grazyna Jastrzab, Nurse Manager, Department of Pain Management, POWH
May 2018	1	Minor review approved by Executive Sponsor
June 2018	1	Endorsed by SESLHD Quality Use of Medicine Committee
February 2019	2	Minor review approved by Executive Sponsor. Review was in line with the NSW Peripheral Nerve Infusion (Adult) Chart SMR130.0223, Programmed Intermittent Bolus (PIB) and Patient Controlled Regional Analgesia (PCRA) modalities have been added.
February 2019	2	Processed by Executive Services and progressed to SESLHD Quality Use of Medicine Committee for approval prior to publishing.
March 2019	2	Approved by SESLHD Quality Use of Medicine Committee.

Appendix A - Motor Block Assessment (Bromage Scale)



Appendix B - Dermatomes