1. POLICY STATEMENT
This document details the management of patients receiving epidural analgesia via a continuous infusion enabling the patient to receive optimum pain relief safely and effectively via the epidural route. Epidural analgesia is used selectively for certain surgical, medical and trauma patients and in obstetrics to relieve the pain of labour and delivery.

2. BACKGROUND
Epidural analgesia is an effective modality of pain management that provides pain relief by continuous administration of pharmacological agents, usually local anaesthetic + an opioid, into the epidural space via an indwelling catheter.

3. DEFINITIONS
APS – Acute Pain Service
Coagulopathy – any disorder of blood coagulation
PCEA – Patient controlled epidural analgesia
PACE - Patient with Acute Condition for Escalation

4. RESPONSIBILITIES
Registered Nurses (RNs) / Registered Midwives (RMs)
Medical Staff

5. PROCEDURE
5.1 Education:
All staff involved with epidural infusions must have received adequate training, and have the necessary work competencies to undertake their duties safely.

Patients with epidural infusions should only be managed in wards where the nursing staff have received training and are familiar with epidural analgesia management.

Additional epidural bolus doses may be administered only by RNs / RMs who have been assessed as competent in their individual hospitals.

5.2 Patient Selection:
The decision that the patient is a suitable candidate for continuous epidural infusion should be made by the anaesthetist in consultation with the patient and their admitting medical officer.

The risk-benefit ratio must be determined for each patient and informed consent must be obtained.

5.3 Prescription
Epidural infusions must be prescribed on the approved SESIAHS Epidural /Intrathecal (Spinal) / Regional Infusions/PCEA form (AMR140.070), in accordance with NSW Health Policy PD2007_077, Medication Handling in New South Wales Public Hospitals and clearly labelled as ‘Epidural’ infusion.
The order must include:

- Drug/s and concentration for the epidural infusion, rate as mL per hour in a range from minimum to maximum and the infusion volume.

- Prescribing the epidural infusion rate / dose prescription may only be attended by an anaesthetist, anaesthetic registrar or pain specialist, or in consultation with them.

- No opioids or sedatives are to be administered by any other route except as ordered by an anaesthetist, anaesthetic registrar or pain specialist, or in consultation with them.

- Refer to individual hospitals APS or learning package for further detail and information on the drugs used for epidural infusion.

- PACE call criteria adjustments must be documented by the anaesthetist on the ‘Prescribed Modifications to Adult PACE Calling Criteria’ form.

**Note:**

All patients with continuous epidural infusions must have intravenous access at all times and continued for a minimum of six hours post epidural catheter removal.

Naloxone, Ephedrine, Atropine and Plasma volume expanders eg. Gelofusine must be readily available on the ward for management of potential side effects.

### 5.4 Preparation of Epidural Infusion

Use pre-loaded epidural infusion flasks to help reduce medication error whenever possible.

Refer to individual hospitals APS or learning package for further detail on preparation of the infusion, setting-up and programming of the epidural pump.

Dedicated epidural administration sets must have an anti-syphon valve and must be clearly labelled ‘Epidural’.

Do not inject any other drugs into the epidural line.

### 5.5 Programming of Epidural Pump

Only use infusion pumps for epidural infusions that are easily distinguishable from those used for intravenous and other types of infusions within individual hospitals.

A pump used for epidural infusion must be programmed by two Registered Nurses / Registered Midwives who have been assessed as competent in this procedure.

A pump used for epidural infusions must be programmed according to the parameters set by the prescriber on the approved SESIAHS Epidural / Intrathecal (Spinal) / Regional Infusions/PCEA form (AMR140.070).

The epidural pump settings should be checked at commencement of each shift and on patient transfer.
5.6 Administration of a Bolus Dose

A Bolus dose of the same infusion should be administered, as prescribed, when a patient is experiencing inadequate analgesia.

Prior to administration check the epidural infusion delivery device and administration set for faults, kinks or disconnection and perform a full set of observations, including catheter insertion site, motor block, wound check and urine output.

An RN / RM who has been assessed as competent in this procedure can administer a bolus dose and increase the rate. The dose must be checked and witnessed by a 2nd RN.

Give prescribed bolus dose and increase rate by 1 to 2 mL/ hour within prescription limits.

The RN / RM must then record the bolus dose in the ‘bolus dose’ section and sign in the Bolus Checked: RN1 space and the witness must also initial in the box RN2 on the SESIAHS Epidural /Intrathecal (Spinal) / Regional Infusions/PCEA form (AMR140.070).

RHW LOP all patients with epidural continuous infusion– contrary to directions on the SESIAHS Epidural /Intrathecal (Spinal) / Regional Infusions/PCEA form (AMR140.070).

Observations after a bolus dose of any solution containing local anaesthetic

Monitor the patients BP and HR each 5 minutes x 4 and at 30 minutes post bolus dose.

If patient in delivery suite and on Continuous epidural infusion (Not PCEA)

- Record rate and observations on Delivery Suite epidural record form plus partogram – not area epidural observation chart
- Record motor block comment section of partogram
- Document pressure area assessment on partogram and describe in integrated clinical notes.
- Remove intravenous (IV) cannula after 4 hours if voiding and ambulant - not 6 hours required area policy.
- Lie woman flat but on one side if managing blood pressure - (prevent compression aorta and venous return)
- Do not allow head to be down
- Observe for motor or sensory defect once per shift for 24 hours post removal of epidural

If pain persists after 30 minutes and observations are stable give another bolus dose and increase the infusion rate if the maximum rate has not been reached and if not contra-indicated by height of block and motor block.

If pain continues to persist contact the APS or if after hours page the on call Anaesthetic Registrar /Anaesthetist.

If complications occur see section on Possible Complications and their Management.
5.7 Changing the Infusion Bag
An infusion bag must be checked by two RNs / RMs and changed by an RN / RM who has been assessed as competent in this procedure. It must be recorded on SESIAHS Epidural /Intrathecal (Spinal) / Regional Infusions/PCEA form (AMR140.070) in the record of bags/ syringes and signed by both RNs / RMs. Both RNs / RMs must witness the discarded amount and record in ‘Volume Discard (mL)’ and sign.

Wash hands before changing the infusion bag. A no-touch aseptic technique must be used when changing bags. Routine changing of the giving set is not required.

5.8 Observations
The RN / RM assigned to the patient receiving an epidural infusion is responsible for ensuring the following observations are carried out and documented on the SESIAHS Epidural /Intrathecal (Spinal) / Regional Infusions/PCEA form (AMR140.070).

<table>
<thead>
<tr>
<th>OBSERVATIONS</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>SpO2 Respiratory Rate Blood Pressure Pulse Pain</td>
<td>Hourly for the first six (6) hours and while the patient is unstable, 2nd</td>
</tr>
<tr>
<td>Score Sedation Score</td>
<td>hourly thereafter Before any bolus dose and every fifteen (15) minutes for</td>
</tr>
<tr>
<td></td>
<td>one (1) hour after a bolus dose.</td>
</tr>
<tr>
<td>Infusion rate and Total Volume infused</td>
<td>Hourly for the first six (6) hours, then 2nd hourly.</td>
</tr>
<tr>
<td>Temperature</td>
<td>Every four (4) hours.</td>
</tr>
<tr>
<td>Motor Block (Use Bromage scale)</td>
<td>Every two (2) – four (4) hours and prior to mobilisation.</td>
</tr>
<tr>
<td>Sensory Block (for epidurals with local anaesthetic)</td>
<td>Check height and distribution of block with ice bilaterally and record dermatome levels every four (4) hours, prior to mobilisation and one (1) hour after a bolus dose.</td>
</tr>
<tr>
<td>Epidural catheter insertion site</td>
<td>Once per shift - preferably at shift change Check for: Catheter position, signs of leakage, infection or bleeding.</td>
</tr>
<tr>
<td>Bladder function check</td>
<td>Once per shift patient should have indwelling urinary catheter if local anaesthetic infused via epidural.</td>
</tr>
</tbody>
</table>
5.9.1 Possible Complications and their Management

5.9.2 Respiratory Depression / Oversedation.
Concurrent use of parenteral opioids and sedatives increase the risk of respiratory depression.

If respiratory rate < 8 and/or SpO2 < 90% and/or increased O2 requirements:
- Stop infusion.
- Give oxygen at 15 litres/minute and support airway if necessary.
- Encourage patient to breathe deeply.
- Activate a PACE Tier 1 call or call cardiac arrest team / Code Blue if respiratory arrest appears likely.
- Contact APS/ anaesthetist.

If respiratory rate < 5 or patient is unrousable:
- Stop infusion.
- Give oxygen at 15 litre/minute and support airway if necessary.
- Encourage patient to breathe deeply.
- Activate a PACE Tier 2 call or call cardiac arrest if respiratory arrest appears likely.
- Give IV Naloxone 100 microg IVI every 3 –5 minutes until patient rouses or respiratory rate >10 (refer to RHW Naloxone policy).

5.9.3 Hypotension
Sympathetic blockade may lead to hypotension. With low concentrations of anaesthetic drugs used for continuous epidural infusions, hypotension may be the result of hypovolemia rather than the epidural infusion. Other causes of hypotension must always be investigated such as bleeding, sepsis and myocardial infarction.

If systolic is < 90mmHg or as adjusted on the ‘Prescribed Modifications to Adult PACE Calling Criteria’ form.
- Stop the infusion
- Lie patient flat with legs elevated.
- Contact APS / anaesthetist.
- Activate a PACE Tier 1 call.
- Give 250ml IV fluid bolus (ordered by doctor).
- Give IV Ephedrine 6mg IV 5 minutely – maximum 30mg (ordered by doctor).

5.9.4 Bradycardia
- Stop epidural infusion.
- Activate PACE Tier 1 call if heart rate < 45 or as adjusted on Prescribed Modifications to Adult PACE Calling Criteria form.
- Contact APS / anaesthetist.
- Atropine 0.6 mg must be available in the clinical area.
5.9.4 Motor Block
- If Bromage scale 1, 2 or 3 DO NOT ambulate.
- Observe for signs of spinal cord compression: Back Pain, Increasing motor block, Bladder / Bowel Incontinence, Numbness / Tingling in lower limbs.
- Notify on call anaesthetist / anaesthetic registrar for Bromage >1.
- Contact on call anaesthetist / anaesthetic registrar urgently if there are any signs of spinal cord compression.

5.9.5 Inadequate Analgesia
- Give prescribed epidural bolus and increase rate by 1-2mL/hour within prescription limits – refer to 5.6
- If required, repeat after 30 minutes. If analgesia is inadequate after 2nd bolus, notify APS / Anaesthetic Registrar / Anaesthetist.

5.9.6 Nausea and Vomiting
- Administer antiemetics as prescribed.
- Contact APS if antiemetic is not effective.

5.9.7 Urinary Retention
- Contact patient’s primary care team for assessment ± catheterisation.

5.9.8 Pruritus
- Notify APS or on call Anaesthetic registrar / Anaesthetist.
- Consider low dose Naloxone.
- Use sedative antihistamines with caution.

5.9.9 Catheter Disconnection
- If catheter is disconnected at the filter, do not reconnect.
- Stop the infusion.
- Cover the catheter end with sterile gauze.
- Contact APS/ Anaesthetist.

5.9.10 Dressing detaching / lifting
- Reinforce only if catheter insertion site is not exposed.
- If insertion site exposed contact APS/ Anaesthetist.

Potential Serious epidural complications

5.9.11 Post Dural Puncture Headache
If the dura is inadvertently punctured during epidural insertion, leakage of cerebrospinal fluid (CSF) can occur. This decrease in CSF pressure can cause traction on the meningeal vessels and nerves that can result in headache, which is often exacerbated when patient is in an upright position and relieved when lying flat.
- Contact APS / Anaesthetist.
- Treatment includes lying flat, bed rest, analgesia (simple or opioid), high fluid intake (unless contraindicated) and caffeine.
5.9.12 Epidural haematoma
The puncture of epidural blood vessels during catheter insertion or removal may result in the formation of an epidural haematoma particularly in the presence of coagulopathy.

Signs & symptoms:
- back pain
- lower limb weakness and / or numbness
- bowel or bladder dysfunction

Patient needs immediate neurological assessment / may need urgent MRI / urgent surgical decompression if neurological changes develop due to nerve or spinal cord compression

5.9.13 Epidural Space Infection
May be prevented by using strict aseptic technique during insertion, preparation and administration of solutions. Always connect epidural line to a bacterial filter, ensure all connections are luer locked and maintain an occlusive dressing over site.

If patient has temperature spikes > 38.5, notify APS and consider removal of epidural catheter.

If signs of inflammation / infection at insertion site, notify APS, consider removal of epidural catheter.

The presence of severe or increasing back pain, may indicate epidural space infection and should be investigated promptly (even in the absence of fever) (see 5.9.12 epidural hematoma).

As epidural space infection can present up to 6 weeks post epidural catheter removal patients should be educated re signs and symptoms a post epidural information sheet

5.9.14 Neurological Injury
Direct damage to the spinal cord or peripheral nerves due to the epidural needle or catheter is extremely rare.

Signs and symptoms: weakness, numbness, tingling sensation in lower limbs, bowel or bladder incontinence.

Stop infusion, call APS / medical team for immediate neurological assessment
5.9.15 Catheter Migration
Rarely a catheter placed in the epidural space may migrate into the intrathecal space or an epidural blood vessel.

- Signs and symptoms: migration into the intrathecal space will usually result in a rapidly increasing block with a sudden onset of complications. Migration into a blood vessel usually results in increasing pain +/- signs of local anaesthetic toxicity (perioral numbness, tinnitus, dizziness, facial twitching, seizures).

- Stop infusion, notify APS / medical team and activate PACE Tier 1 or 2 call according to symptoms of complications, anticipate catheter removal or replacement.

5.10 Removal of Epidural catheter
An epidural catheter may be removed when:

- APS / anaesthetist has instructed its removal.
- The patient has NOT RECEIVED unfractionated heparin within the last six hours.
- The patient has NOT RECEIVED a low molecular weight heparin (LMWH) eg fragmin or clexane within the previous 12 hours.
- The patient has NOT RECEIVED rivaroxaban within the previous 18 hours.
- No anticoagulants to be administered for at least 2 hours following the removal of an epidural catheter. Rivaroxaban not to be administered for at least 6 hours post epidural catheter removal.

The following procedure is to be followed when removing an epidural catheter:

- Explain the procedure to the patient.
- Position patient lying on side or sitting with spine slightly flexed.
- Wash hands and organise equipment.
- Stop infusion.
- Remove epidural catheter dressing.
- Wash hands and put on sterile gloves.
- Gently withdraw catheter. Do not forcefully pull out catheter.
- Contact the APS
  - if too much resistance is felt when trying to remove catheter.
  - If signs of infection (purulent drainage, redness or swelling) are present send the epidural catheter tip for culture and notify APS.
- Cover site with an occlusive dressing.
- Confirm that epidural catheter tip is intact with 2nd RN and document and sign on the front of the SESIAHS Epidural /Intrathecal (Spinal) / Regional Infusions/PCEA form (AMR140.070).
- Monitor patients sensory and motor function every two (2) hours for first six (6) hours then every four (4) hours for next eighteen hours post epidural catheter removal.
6. CONCURRENT ANTI COAGULANT MEDICATIONS

Anticoagulation is the most important risk factor for the development of epidural haematoma following insertion of epidural needle / catheter. It is vital that adequate time delays exist between the administration of anticoagulants and the insertion and removal of epidural catheters.

- Each individual patient's risk / benefit assessment needs to be considered by the individual anaesthetist.

6.1 Anti platelet medications

Non-steroidal anti-inflammatory drugs (NSAIDs) and low dose aspirin alone do not significantly increase the risk of spinal haematoma, but are registered as a risk factor if combined with other classes of anticoagulants.

Recommended time interval between discontinuation of antiplatelet medications and neuraxial blockade are:

- 4–8 hours for eptifibatide and tirofiban
- 24 hours for rivaroxaban
- 24–48 hours for abciximab
- 7 days for clopidogrel
- 14 days for ticlopidine

6.2 Unfractionated IV and SC heparin

For patients who have had more than 4 days of heparin therapy, a platelet count should be done prior to removal of an epidural catheter to identify heparin-induced Thrombocytopenia.

Intraoperative anticoagulation with IV heparin should start no sooner than 1 hour after placement of the epidural or spinal needle.

Epidural catheters should be removed 6 hours after the last heparin dose or following an evaluation of the patient's coagulation status.

6.3 Low molecular weight heparin (LMWH)

Epidural catheter placement should occur at least 12 hours after standard prophylactic LMWH doses.

The first postoperative dose of LMWH dose should be given 6–8 hours after surgery and subsequent doses every 24 hours after that.

Low Molecular Weight Heparin for prophylaxis should be prescribed as a single daily dose and administered in the evening (e.g. at 1800 hrs) to allow safe "time window" for removal of neuraxial catheter during daytime.

The epidural catheter should be removed at least 12 hours after the last dose of LMWH and the next dose should not be given until at least 2 hours after removal
6.4 Oral anticoagulants (Warfarin)
Established warfarin therapy should be discontinued at least 4–5 days prior to neuraxial blockade and the International Normalised Ratio (INR) measured.

Preoperative initiation of warfarin therapy requires an INR check prior to neuraxial blockade.

An INR < 1.5 is a value estimated to be safe for removal of catheter.

6.5 Fibrinolysis and thrombolysis
Insertion of epidural catheters in patients receiving fibrinolytic or thrombolytic is contraindicated except in exceptional circumstances.

6.6 New anticoagulants
The situation with regard to the newer anticoagulants remains unclear.

The anaesthetist must leave clear instructions about catheter removal and administration of any anticoagulants that are not discussed in this document.

7. DOCUMENTATION
SESIAHS Epidural /Intrathecal (Spinal) / Regional Infusions/PCEA form (AMR140.070)
Medication Chart MR70
Patient clinical notes

8. AUDIT
Patients receiving Epidural Analgesia as a Continuous Infusion will be regularly reviewed at least daily by Pain Management clinicians.

9. REFERENCES
1. NSW Health Policy PD2007_077, Medication Handling in New South Wales Public Hospitals