*Hunter Integrated Pain Service (HIPS) and In-patient Pain Service*

# Epidural Resource Package for Nurses

## 2009

*For John Hunter Hospital and Royal Newcastle Centre*

HUNTER NEW ENGLAND

# Table of Contents

# Acknowledgements

Revised by Lyndsay Wall, Registered Nurse, Hunter Integrated Pain Service (HIPS), John Hunter Hospital and Royal Newcastle Centre.

The following documents were used as guides to the scope and content of this package, and to ensure consistency between services wherever possible:

- Epidural & PCEA Resource Package. Acute Pain Service Epidural Resource Folder. Hunter Integrated Pain Service (HIPS) 2004 (updated).
- Children's Pain Management Service, Royal Children's Hospital, Melbourne 2008 (updated). Epidural Infusions. www.rch.org.au/anaes/pain/index
- Sydney Children's Hospital 2004. Epidural Learning Resource Package. Clinical Manual, section 7.5:1-34

Thankyou to the following proof readers for their time and comments:
Dr. Susie Lord, Pain Medicine Specialist, Kaleidoscope,
Dr. Richard Burstal, Director Inpatient Pain Service, John Hunter Hospital
Caroline Phelan, Clinical Nurse Specialist, HIPS
Linda Ritchard, Clinical Nurse Consultant, HIPS

*Disclaimer: At the time of implementation, this package has been prepared for use in John Hunter Hospital and Royal Newcastle Centre only. Other facilities are advised to review the relevance to their facility prior to use.*

# Aims and Learning Objectives

The aim of this Epidural learning package is to enable registered nurses to appropriately care for the patient with epidural analgesia and patient-controlled epidural analgesia (PCEA).

It is envisaged that as a result of completing this learning package, the nurse will be able to:

- Demonstrate a knowledge of the anatomy and physiology in regards to epidural placement;
- Demonstrate an understanding of pain and it's management with reference to continual epidural infusions and PCEA;
- Demonstrate a knowledge of the management of epidural infusions;
- Identify the possible complications of epidural infusions and their management;
- Identify and correctly perform the appropriate observations for the patient receiving epidural infusions;

- Demonstrate the knowledge and expertise required to correctly remove an epidural catheter;
- Demonstrate knowledge of the policies and procedures associated with epidural infusions;
- Ensure appropriate documentation is fully completed.

### Assumed Knowledge

It is assumed you will have an understanding of the physiology of pain and the harmful effects of pain; however a brief overview is included.

### Knowledge Questions

Multiple choice knowledge questions are included at the end of some sections. If completing this package on-line you will have to provide the correct answer to progress.

## Definition of Pain

- Pain is defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" [International association for the Study of Pain (IASP) in National Guidelines - Acute Pain Management: Scientific Evidence 2nd Ed 2005 (ANZCA): 1].
- "Acute pain is of recent onset with a limited duration and usually has an identifiable relationship to injury or disease" (Ready and Edwards, 1992 ANZCA, 2005:1).
- "Pain is more than an unpleasant experience…it is an emotional experience" (Visser 2009, 29th Annual Scientific Meeting of the Australian Pain Society)

## Physiology of Pain

Pain perception is a defence mechanism that is crucial for maintaining healthy life. It warns us when our bodies are under threat from the outside (eg. pain from fire) or from the inside (eg. pain from an infected appendix). Pain grabs our attention and motivates us to do something – to avoid the threat, reduce our exposure to it, or do things that might hasten healing and recovery.

Physical, chemical and thermal threats to our tissues are detected by sensors called *nociceptors.* These sensors are free nerve endings of small diameter neurons, called *A-delta* and *C-fibres* extensively dispersed throughout our body. When sensations, or stimuli, become potentially damaging to tissue, called *noxious stimuli*, a signal is sent along the nerve fibres to the spinal cord. The messages get passed on to another nerve fibre in the spinal cord and sent up to various centres in the brain where the perception of pain takes place. Once the individual perceives pain, protective action can be initiated, thereby reducing or preventing tissue damage.

Conduction of pain impulses can be blocked at several points along the pain pathway to prevent them reaching the central nervous system. Pain perception can also be modulated within the pathway or brain.

After trauma or surgery, when a person's condition has been treated and they are receiving all the care necessary to help them recover, then their pain may no longer serve a useful warning function. Indeed, pain associated with chest and abdominal wounds may lead to reduced depth of breathing and movement and pose new threats to the patient. In this setting, pain reduction becomes our goal.

References: ANZCA 2005; Godfrey 2005; Holland, Gammill and Mackay 1990; Morgan, Michail and Murray, 2006; SCH 2007; Wallace 1992

## Consequences of Pain

Irrespective of age, pain causes autonomic and motor reflexes, and influences our thoughts and understanding of our world. This changes the way our minds think and our bodies behave. These consequences are most obvious in the short-term, but severe or persistent pain may also result in long-term changes.

Autonomic consequences of pain:

- Stress response (neuroendocrine and hormones)
- Cardiovascular consequences (vulnerability)
- Reduced GIT motility
- Impaired nutrition
- Impaired sleep

Motor consequences:

- Impaired respiratory mechanics (cough, depth of breathing)
- Impaired movement, mobility

Cognitive and psychosocial consequences:

- Possible negative associations and fear of hospital / future medical care
- Interruption to normal sleep, developmental, physical and social activities
- Strain on partners and families

References: ANZCA 2005; Anand, Aranda, Berde *et al* 2006; Pasero 2005; Bhutta and Anand 2002; Mathew and Mathew 2003; Whitfield and Eckstein 2000; Porter, Grunau and Anand 1999; Fitzgerald and Beggs 2001; Taddio and Katz 2005

## What is Epidural Analgesia?

Epidural analgesia is provided by the administration of a local anaesthetic (and/or an adjuvant agent such as clonidine or an opioid) into the epidural space for the purpose of reducing transmission of nociceptive signals. Administration may be a

single dose injected down the epidural needle, or by intermittent dosing or continuous infusion via an indwelling catheter.

Once injected into the epidural space by an anaesthetist, the local anaesthetic agent spreads longitudinally in both a caudal and cranial direction. The degree of spread can be assessed clinically using a block level assessment (see page 16) and is determined by the medication dose. When an epidural block "covers" the nerves that are transmitting the pain messages, then the patient may not experience the pain and so will not require systemic analgesics.

Other agents injected or infused into the epidural space may include opioid (usually morphine or fentanyl) and/or clonidine. These agents work on the spinal nerves and cord in different ways to enhance analgesia.

For selected patients the benefits of epidural pain relief and avoidance of systemic opioid-related adverse effects (sedation, respiratory depression, nausea, reduced GIT motility, and cognitive disturbance) may be significant.

The level at which with epidural catheter is inserted can determine the level of analgesia. Thoracic level epidurals are generally used for major thoracic and abdominal surgery and fractured ribs. Lumbar epidural infusions are used to provide analgesia for pelvic, lower limb and urological surgery.

Reference: ANZCA 2005

### Knowledge Questions

Q1. What are nociceptors?

a) Free nerve endings that can respond to any type of sensation
b) Any type of nerves in the body
c) The areas in the brain that can recognise pain
d) None of the above

Q2. What agents are usually prescribed for epidural infusions?

a) Only local anaesthetic agents
b) Local anaesthetic agents, opioids and clonidine
c) Opioids, clonidine and anti-emetics
d) Any agent prescribed

## Anatomy of the Epidural Space

The epidural space is the layer of connective tissue between the dura mater and the bones that form the spinal canal.

The spinal cord is surrounded by cerebral spinal fluid (CSF), contained within the subarachnoid space, and covered with dura matter. The space between the dura mater and the vertebral column is called the **epidural** or **extradural** space. The epidural space is actually a "potential space", that is, there is no free flowing fluid

in it (Pasero 2003:62). It is highly lipid and vascular and the spinal nerves pass through it as they exit the spinal cord. The epidural space contains fat, connective tissues, blood vessels and nerve roots. The epidural space is classified as cervical, thoracic, lumbar, and sacral according to the adjacent vertebral levels.

When local anaesthetic is injected into the epidural space it will spread both up and down the spinal canal. It will diffuse across the dura to block the spinal roots and nerves that pass through this space (figure 2 Exit of the spinal nerves).

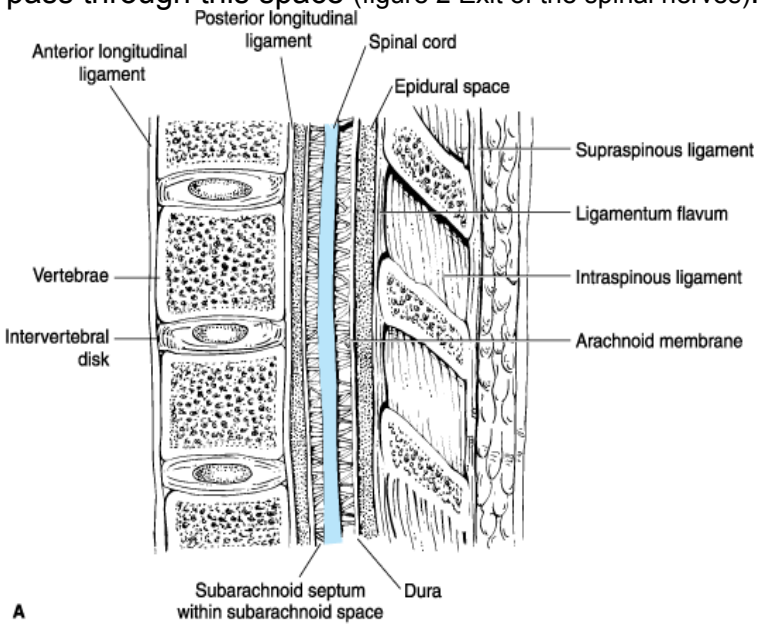


*Figure 1: Sagittal section through lumbar vertebrae*

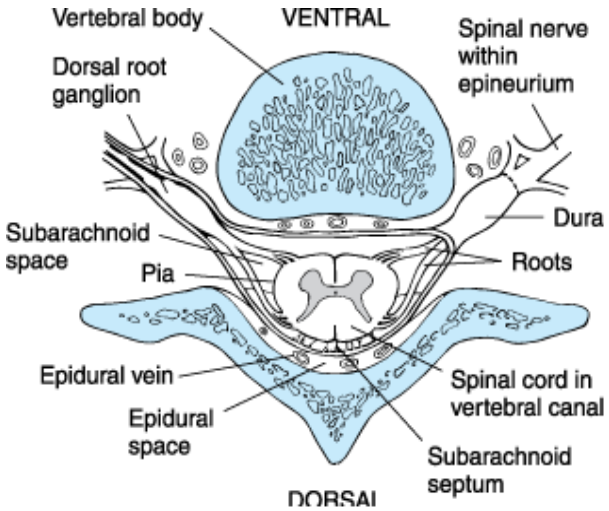


*Figure 2: Exit of the spinal nerves*


Source: Morgan GE, Mikhail MS, Murray MJ: *Clinical Anaesthesiology*, 4th Edition: http://www.accessmedicine.com

References: Naber, Jones and Halm 1994; Morgan, Michail and Murray, 2006, MIMS 2008; Pasero 2003; SCH 2004

### *What is the difference between a spinal and epidural anaesthetic?*

In a spinal anaesthetic a very fine needle is used to deliberately penetrate the **dura and arachnoid** mater so the tip reaches the CSF surrounding the spinal cord. Because the local anaesthetic is injected directly into the CSF, onset is faster and a much smaller dose is needed to achieve a block.

In contrast, an epidural needle is wider, curved at the tip, and is used to inject or infuse local anaesthetic into the epidural space, **outside** of the dura mater membrane. Because the local anaesthetic has to diffuse further (across the dura, arachnoid and CSF) to reach the spinal nerves, initial onset is slower and higher doses are needed.

## Patient Selection for Epidural Analgesia

When selecting patients suitable for epidural analgesia, anaesthetists and surgeons weigh up the contra-indications, advantages and potential adverse effects for the individual person.

### *Common Indications for Epidural Analgesia*

Patients are considered for epidural analgesia when post-operative pain is expected to be severe after the following types of surgery:

- Thoracic
- Abdominal
- Urological
- Lower limb

### *Contraindications to Epidural Analgesia*

- Local infection
- Bacteraemia
- Shock
- Coagulopathies or drugs that impair coagulation
- Spine pathology – some types of previous spinal surgery or injury, anatomical abnormality, neurological disease involving the spinal cord
- Raised intracranial pressure or head injury
- Drug allergy to local anaesthetic or other planned drug
- Patient refusal.

### *Advantages of Epidural Analgesia*

- Very good to complete pain relief can be achieved
- Minimal or no sedation
- May be used to decrease bladder spasm in urological surgery by relieving muscle spasm in smooth and skeletal muscle
- May be used in all age groups

- An alternative to intravenous pain management such as patient controlled analgesia (PCA) and opioid infusions
- May decrease opioid dose (opioid "dose-sparing" effect)
- Decreased peri-operative blood loss
- Improved pulmonary function post-operatively

### *Possible Adverse Effects of Epidural Analgesia*

- Treatment failure
- Pruritus (related to epidural opioid)
- Hypotension due to sympathetic blockade
- Respiratory depression if opioids are used
- Leg weakness
- Urinary retention
- Inadvertent puncture of the dura which may lead to CSF leak and post-dural puncture headache
- High block
- Catheter migration – resulting in intrathecal, intravenous or extradural placement.
- Local anaesthetic toxicity
- Epidural haematoma
- Epidural infection and abscess

References: SCH 2005, HIPS 2004, Morgan, Michail and Murray, 2006, ANZCA 2005, RCH 2000

## Knowledge Questions

Q3. Where is the epidural space?

a) In the spinal cord
b) Between the dura mater and the vertebral column
c) In the CSF surrounding the spinal cord
d) Between the spinal vertebrae

Q4. What is epidural analgesia?

a) The injection of a local anaesthetic
b) Analgesia administered via the epidural space
c) Analgesia administered via an intravenous PCA
d) Analgesia administered via any route

Q5. What are 3 advantages of epidural analgesia?

a) Very good to complete pain relief, minimal or no sedation, may be used in all ages
b) Alternative to PCA, decreased peri-operative blood loss, can be used on all patients
c) Improved pulmonary function post-operatively, no adverse effects, opioid sparing
d) All of the above

Q6. What are 3 contraindications to epidural analgesia?

a) Bacteraemia, older age, shock
b) Local infection, drug allergy to local anaesthetic, patient refusal
c) Patient refusal. previous epidural catheter, head injury
d) Raised intracranial pressure, coagulopathy, drug addiction

## Prescription of Epidural Infusions

Hunter New England Health and the In-patient Pain Service (IPS) have standard drug orders for epidural infusions – *The Acute Pain Service Epidural Infusion Orders* form GNS79C. The form has the following sections:

- Information regarding the insertion of the epidural catheter is recorded on the *Epidural Infusion Orders Form* by the anaesthetist placing the catheter. The information will include the level of insertion, tunnelling, catheter type/size, depth, number of attempts and name of anaesthetist.

- The prescription for the solution to be used – the standard order is Bupivacaine 0.125% or 0.25%, Ropivacaine 0.2%, or Levobupivacaine 0.125%; fentanyl, morphine or clonidine may be added to the infusion as adjuvants.

- The prescription for the dose to be given (prescribed as mL/hr) and any bolus doses permissible.

- The In-patient Pain Service contact numbers are:
  - page **2044 (RN),** 8:00am – 4:00pm, or
  - **2101 (registrar)** - may be contacted 24 hours a day.
  - These numbers are on the *Epidural Infusion Orders* form.

- A section for recording the solution and dose actually administered

- Standing orders – all patients with an epidural catheter must have continuous intravenous access, at least at a To Keep Vein Open (TKVO) rate. All patients with a lumbar or thoracic epidural should have an indwelling urinary catheter.

- Observations section

Epidural infusions are to be ordered, or altered, only by an anaesthetist or member of the IPS.

## Pharmacology

Hunter New England Health has standard drug orders for epidural infusions. The general order is for a local anaesthetic agent; an opioid or clonidine may be added to the infusion as adjuvants. Occasionally opioids may be used on their own.

# Local Anaesthetics

The standard orders for local anaesthetics used in epidural infusions are:

**Bupivacaine Hydrochloride 0.125%** or **0.25% (Marcain),**
**Ropivacaine 0.2% (Naropin)** or
**Levobupivacaine (Chirocain) 0.125%**

**PRESENTATION:**

- Bupivacaine 0.125% 200ml Polybag
- Bupivacaine 0.25% 100ml Polybag
- Ropivacaine 0.2% 200ml Polybag
- Levobupicacaine 0.125% 200ml Polybag

**ADMINISTRATION:**

Only use a dedicated epidural pump (rate limited) and epidural giving set (yellow tubing) for all continuous epidural infusions.

**ACTION:**

Bupivacaine hydrochloride, ropivacaine and levobupivacaine are long acting local anaesthetic agents. Local anaesthetics provide a block of sensory stimuli by preventing the initiation and transmission of nerve impulses. This is achieved by inhibiting the flow of sodium and potassium ions between the intra-cellular and extra-cellular fluid of the neurone. Therefore, the nociceptive impulse is blocked and the patient does not feel pain.

Fine nerve fibres are blocked before large ones and thus pain, temperature, touch, then motor function are affected in that order.

Postoperative analgesia can be maintained for between three to eight hours by epidural injection of a local anaesthetic and peak plasma levels are reached in 30 to 45 minutes.

The rate of systemic absorption of local anaesthetic agents depends on total dose and concentration of drug administered, route of administration and vascularity of the administration site. Part of any local anaesthetic dose administered via the spinal cord will absorbed into the systemic circulation. Local anaesthetics can cause vasodilation and if enough sympathetic nerve fibres are blocked as the local anaesthetic exits the spinal cord (especially at the levels of T1-L2), hypotension is possible.

Local anaesthetics are metabolised primarily in the liver and excreted by the kidneys. Less than 5% of administered local anaesthetic is excreted unchanged in the urine.

### SPECIAL NOTES:

In addition to use in an epidural infusion, **ropivacaine** may also be used for wound infiltration and regional nerve blocks.

In higher doses, **ropivacaine** causes less CNS toxicity and cardiovascular toxicity than **bupivacaine**.

**Levobupivacaine** should be used with caution for epidural anaesthesia in patients with impaired cardiovascular function such as serious cardiac arrhythmias.

In addition to use in an epidural infusion, **levobupivacaine** may also be used for wound infiltration and nerve blocks at less than 7.5mg/mL.

### ADVERSE REACTIONS:

The main **adverse effects** of these drugs are related to sympathetic and motor neuronal blockage as a result of **high plasma levels.** This can be due to overdose, excessive rapid absorption, delayed elimination or metabolism, or inadvertent intravenous injection.

High plasma levels could result in **local anaesthetic toxicity** that may involve a number of body systems, signs include:

- **Central Nervous System** - restlessness, tremor seizures, sudden loss of consciousness, blurred vision, decreased hearing, numbness of tongue
- **Cardiovascular System** – dizziness, hypotension, bradycardia, arrhythmias
- **Respiratory System** – respiratory depression

Motor blockage will result in temporary paralysis of muscle groups supplied by the affected section of the spinal cord.

References: Omoigui, 1999; MIMS online 2009, Smith 2000; Association of Paediatric Anaesthetists of Great Britain and Ireland [APA]; Acute Pain Service (APS) Epidural Infusion Order form, Hunter New England Health Service [HNEHS] 2006; HIPS 2004, SCH 2004

## Opioids

The standard orders for opioids used in epidural infusions are:

**Fentanyl ≤ 2.5 microgram/ml**
**Morphine ≤ 4mg/200ml**

The addition of an opioid to an epidural local anaesthetic provides pain relief of greater magnitude than would be achieved if either were infused alone. The dose reduction of both medications subsequently minimises the incidence and severity of side effects, especially those related to the local anaesthetic. This therapeutic

advantage may be explained by the different analgesic properties of each class of agent and their ability to block pain in two different sites in the spinal cord.

## ADMINISTRATION:

- Add prescribed amount to the local anaesthetic Polybag.
- Ensure adherence to S8 injectable drug guidelines in N.S.W. Department of Health Policy Directive PD2007_077: Medication Handling in N.S.W. Public Hospitals.

## ACTION:

When opioids are administered into the epidural space part of the dose crosses the dura and subarachnoid membranes into the cerebral spinal fluid (CSF) then transverses into the spinal cord. Here it is taken up by the opioid receptors in the dorsal horn of the spinal cord. The opioid receptors release Substance P that blocks the conduction of painful stimuli. A portion of the dose is absorbed via the epidural veins and enters the systemic circulation and the remainder binds to the epidural fat. It is a designed effect of epidural administered narcotics to provide a profound anaesthesia without locomotor and vasomotor blockage, and/or respiratory depression.

**Fentanyl** is a synthetic opioid analgesia with a rapid onset of action (5-10 minutes) and short duration (1-4 hours). This is due to the high lipid solubility of fentanyl resulting in faster removal from the receptor sites through spinal cord blood flow.

**Morphine** has a longer onset of action (30-60 minutes) and long duration of action (6-24 hours). It has low lipid solubility hence it is cleared less rapidly from the epidural space. This results in a slower uptake to tissue and blood, thereby creating a greater degree of spread spinally. Morphine is sometimes given as a bolus prior to the removal of an epidural to prolong the effects of epidural analgesia. Morphine should not be used in patients with renal failure.

Opioids are metabolised primarily in the liver and excreted by the kidneys. Less than 10% of administered dose is excreted unchanged in the urine.

## ADVERSE REACTIONS:

Rostral (upward) spread through the spinal cord means respiratory depression may occur if enough opioid remains in the CSF when it reaches the brainstem and respiratory centre. Common side effects of opioids include respiratory depression, sedation, hypotension, circulatory depression, nausea, vomiting, urinary retention or pruritis. These effects are more frequent with morphine due to its low lipid solubility, resulting in more morphine crossing from the epidural space to the CSF. As fentanyl is a highly lipid soluble opioid, it will be rapidly absorbed from the epidural space into the epidural fat, therefore a smaller amount will move into the CSF and is less likely to spread rostrally thereby reducing possible side effects.

After receiving opioids the cardiovascular system usually remains stable, but in high doses may cause hypotension and respiratory depression that may outlast the analgesic effect.

The major side effects are respiratory depression and less commonly, muscle rigidity. Respiratory depression can be rapidly reversed by Naloxone, but the dose may need to be repeated.

References: MIMS online 2009; Smith 2000; Kirkman 2000; SCH 2004; Cousins and Mather 1984 in ANZCA 2005; Walker et al in ANZCA 2005; Bernard 2004 in ANZCA 2005

## Clonidine

The standard order for clonidine used in epidural infusions is:

**Clonidine ≤ 300 microgram/200ml**

Clonidine may be added to a local anaesthetic agent as an adjuvant in epidural infusions, usually in paediatrics.

Clonidine prolongs the analgesic effect of the local anaesthetic agent in epidural infusions. The addition of clonidine to local anaesthetics can significantly reduce post-operative opioid requirements compared with either clonidine or local anaesthetics alone.

### ACTION:

Clonidine acts on alpha$_2$ adrenoreceptors in the CNS to reduce noradrenergic activity. The main site of analgesic action is thought to be the spinal cord.

Given intravenously, clonidine is effective within 5 to 15 minutes, has a maximum action within 20 to 30 minutes, and the effect lasts for several hours.

Two-thirds of an administered dose is excreted in the urine.

### ADVERSE REACTIONS:

The most common adverse reactions to clonidine are hypotension, drowsiness, dry mouth and nausea.

References: Eisenach et al, 1996; Milligan et al 2000; MIMS online 2009; Hodgson et al 1999; Australian Medicines Handbook [AMH], 2008; ANZCA 2005

## Naloxone (Narcan)

### INDICATION:

Naloxone is used for the complete or partial reversal of respiratory depression induced by opioid drugs.

**DOSE:**
Must be prescribed by a medical practitioner. Administer 100 micrograms intravenously. Repeat every minute until the respiratory depression is reversed.

**ACTION:**
Naloxone is a specific narcotic antagonist at opiate receptor sites with no agonist action. This medication reverses all the direct actions of opioid medications. These include respiratory depression, sedation, pruritus, nausea and vomiting, hypotension and urinary retention.

Naloxone has an onset of action within 1 to 2 minutes following intravenous administration. The duration of action is usually 1 hour or less. It is rapidly metabolised in the liver and is excreted in urine. The plasma half-life of Naloxone has been reported to be 60 to 90 minutes in adults. Naloxone is not effective against respiratory depression not due to opioid medications.

**ADVERSE REACTIONS:**
The following adverse events have been associated with the use of naloxone hydrochloride in postoperative patients due to abrupt reversal of opioid depression: hypotension, ventricular tachycardia and fibrillation, dyspnoea, pulmonary oedema and cardiac arrest. Death, coma and encephalopathy have been reported as sequelae of these events.
Excessive doses of naloxone hydrochloride in postoperative patients may result in significant reversal of analgesia and may cause agitation.

References: MIMS online 2009; Acute Pain Service (APS) Epidural Infusion Order form, Hunter New England Health Service [HNEHS] 2006SCH 2004

## Knowledge Questions

Q7. Who may prescribe epidural analgesia?

a) The Surgical Resident
b) Two Registered Nurses
c) The Surgeon
d) The Anaesthetist or Anaesthetic Registrar

Q8. What are the standard epidural prescription doses?

a) There are no standard epidural prescriptions; they are tailored according to the needs of the patient.
b) Bupivacaine Hydrochloride 0.125% or 0.25% (Marcain), Ropivacaine 0.2% (Naropin) or Levobupivacaine (Chirocaine) 0.125% in a Polybag 100-200mL+/- Fentanyl, Morphine or Clonidine
c) Bupivacaine or Ropivacaine added to 100ml Normal Saline bag as per order +/- Fentanyl, Morphine or Clonidine
d) It is not necessary to know as the patients arrive from recovery with the epidural infusions insitu

Q9. How are local anaesthetic agents effective when administered via an epidural?

a) Local anaesthetic agents block the initiation and transmission of nerve impulses via inhibiting the flow of sodium and potassium ions between the intra-cellular and extra-cellular fluid of the neurone
b) Local anaesthetic agents only block pain when mixed with an opiate such as Fentanyl
c) Local anaesthetic agents block the initiation and transmission of nerve impulses via inhibiting the flow of magnesium and calcium ions between the intra-cellular and extra-cellular fluid of the neurone
d) None of the above

Q10. What are some of the signs and symptoms of local anaesthetic toxicity?

a) Dizziness, hypotension, bradycardia, arrhythmias
b) Respiratory depression, hypertension, tachycardia, fever
c) Headache, pruritus, sleepiness, tachycardia
d) Numbness of tongue, hypotension, seizures, loss of consciousness

Q11. What is the indication for Naloxone?

a) To reverse any adverse effect of opiate medications
b) To reverse opioid induced respiratory depression only
c) To reverse any adverse effect of local anaesthetic agents
d) None of the above

Q12. What is the advantage of adding clonidine to an epidural infusion?

a) Clonidine prolongs the analgesic effect of the local anaesthetic agent
b) Clonidine is an analgesic agent similar to Fentanyl
c) Clonidine reduces the incidence of local anaesthetic toxicity
d) Clonidine prevents opioid related side effects

## Block Level Assessment

A Block level assessment is used to determine the degree of spread and effectiveness of an epidural anaesthetic. Both the sensory and motor block may be assessed.

It is important to assess the level of the block to ensure that is not too extensive thereby increasing the risk of complications. Local anaesthetics work by blocking nerve impulses on sensory, motor and autonomic nerve fibres. The smallest diameter fibres are most sensitive to the effects of local anaesthetics: autonomic fibres will be blocked first, then sensory fibres and then motor fibres.

References: Omoigui 1999; Children's Pain Management Service, The Royal Children's Hospital, Melbourne (RCH) 2000

## Motor Block

Motor block is defined as an impaired motor function (movement) resulting from nerve blockade by local anaesthetic.

Motor block is assessed to determine the amount of motor function, the risk and prevention of pressure areas, ensure the patient is safe to ambulate (if appropriate) and identify possible serious complications.

Motor block is a symptom of an epidural haematoma or epidural abscess, both of which can result in permanent neurological damage. The earlier these complications are identified, the better the outcome for the patient.

Moderate motor block is common immediately following surgery due to the higher doses of local anaesthetic used during surgery. This should ease over the next four hours. However, if the block denser then expected or does not abate, the epidural infusion must be turned off and IPS contacted for an urgent review.

Mild motor block is possible following this initial period especially with a lumbar epidural. While a mild motor block is possible with thoracic epidurals, they should not produce a moderate or more significant block.

Therefore, ***all moderate to dense motor block after epidural insertion must be reported to the IPS urgently*** for assessment and relevant investigation.

Please refer to “Complications Associated with Continuous Epidural Infusions and their Management – Dense Motor Block” page 25 for more information.

### Assessing Motor Block:

Assess motor block when the patient is received to the ward immediately post-operatively, on commencement of shift and every four hours.

To assess motor block first explain the procedure and purpose to the patient. Ask the patient to bend and straighten their hips, knees and ankles. The degree of motor block on both the left and right side should be assessed.

With thoracic epidural, arms and hands should also be tested to assess upper limb motor function.

Document the level of motor block on the observation chart:

| | FUNCTION | SIGNIFICANCE | NURSING ACTION |
|---|---|---|---|
| **1** | No weakness – full use of legs | No motor block | May ambulate/sit out of bed - assistance as required |
| **2** | Block above knees - can move knees but not hips | Mild - Moderate motor block | Bed rest, contact IPS |
| **3** | Block above ankles – can only move ankles | Significant motor block | Contact IPS if more than 4 hours post-op |
| **4** | No Movement | Profound motor block | Contact IPS if more than 4 hours post-op |

An alternative assessment tool of motor block is the Bromage Scale:

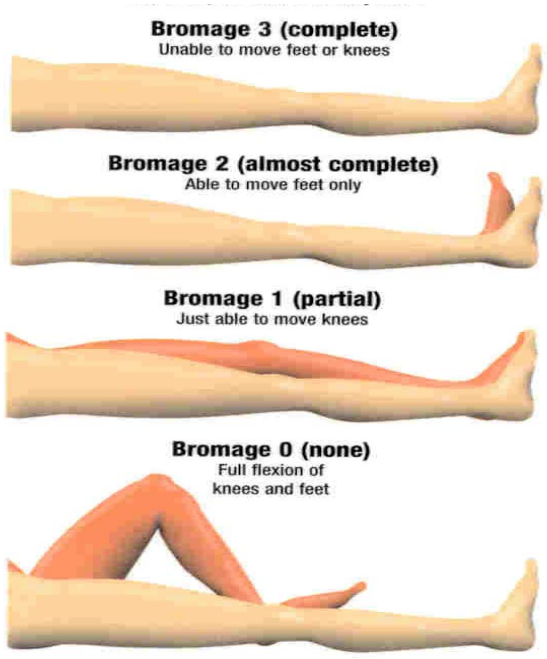


*Figure 3: Bromage Scale*

If the motor function is different in each limb, document accordingly.

References: ANZCA 2005, RCH 2000, AstraZeneca

## Sensory Block

The level of sensory block is assessed to establish the degree of spread of the local anaesthetic epidurally and therefore the effectiveness of the epidural analgesia and the likelihood of some complications. The level of sensory block is determined by assessing the area of altered response to temperature.

To assess the level of sensory block, firstly explain procedure and purpose to the patient. Put ice in a glove (be aware of any latex allergy) and place it on the patient's cheek and ask them to tell you if they recognise it as cold.

Start on the left side of the body, midway between the clavicle and nipple line. Move the ice at 4cm intervals and ask them if it feels the same cold as on their cheek. **The point at which the ice feels warmer or different is the beginning of the epidural block.**

Continue working downwards until the **ice feels cold again, indicating the end of the block.**

Repeat on the right-hand side. **The block should cover the area of the wound**.

Document the blocked dermatomes on the observation chart using the accompanying picture as a guide (see figure 4). Record both the upper and lower limits of the block on the chart:

| | | |
|---|---|---|
| Level of Sensory Block | R | T10-L3 |
| | L | T10-L2 |

Easy landmarks to remember are T4 - nipple line,
T10 - umbilicus,
L1 - groin.

Please note that not all patients are able to discriminate or feel changes in temperature using ice. In these situations, assessing pain score may be used as an alternative.

References: HIPS 2004, RCH 2000

## Dermatomes

A dermatome is the area of skin that becomes numb when a given spinal nerve is anaesthetised. Because injuries and wounds usually cut across several dermatomes, epidurals need to numb the same wide area to block the pain.

The site of insertion and location of the catheter tip determine the approximate centre of the block, and the dose of local anaesthetic determines the number of dermatomes above and below that are blocked.

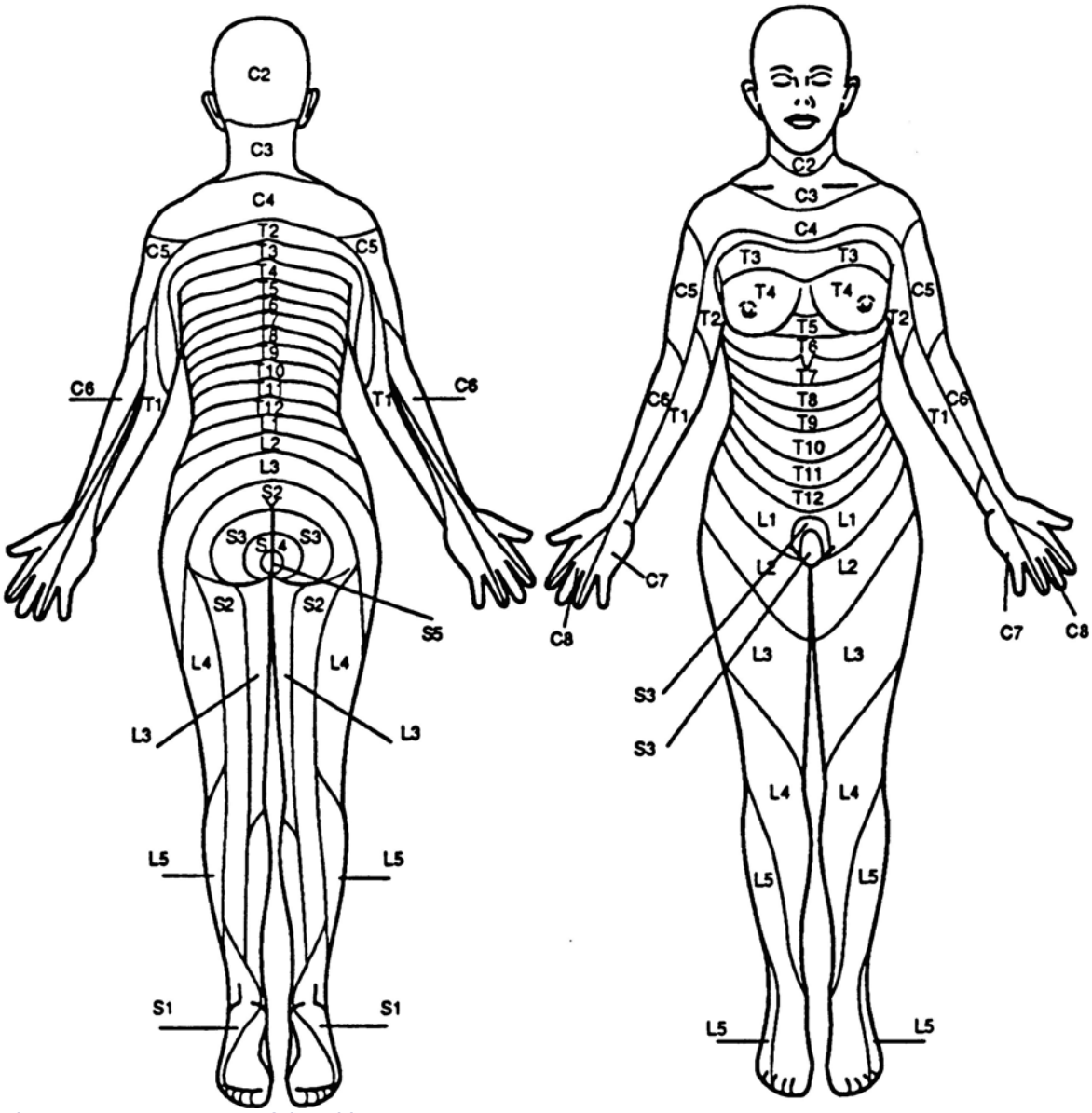


*Figure 4: Dermatomes of the skin*

## Knowledge Questions

Q13. How far should an epidural sensory block extend?

a) As high and low as possible to ensure painful areas are covered
b) The sensory block level is not important
c) The wound with a small border
d) The knees to mid chest (L3 to T4)

Q14. How often should sensory and motor block checks be attended?

a) Every time the epidural observations are attended
b) Once a day
c) Once a shift

d) Only when seen by the IPS

Q15. Why is motor block tested in patients with epidural analgesia?

a) To assess if they are safe to mobilise
b) To identify if the epidural rate is too fast
c) To identify a potential epidural haematoma or abscess
d) All of the above

# Complications Associated with Continuous Epidural Infusions and their Management

The following is a basic overview and management guide of the most serious or common complications of epidural analgesia. It is by no means an exhaustive list. If you have any concerns regarding a patient with an epidural infusion, please do not hesitate to contact the IPS.

## 1. INADEQUATE ANALGESIA

Inadequate analgesia, as evidenced by the patient complaining of pain, or being assessed as having pain may be due to:

- Epidural catheter displacement, leaking, disconnection, occlusion – kinking or compression
- Sub-therapeutic infusion rate

**MANAGEMENT:**

- Assess severity of pain using the appropriate pain scale
- Check epidural catheter and tubing for occlusion
- Check sensory block dermatomes on both sides
- Check insertion site for displacement or leakage
- Administer bolus (if prescribed)
  - Must be checked by 2 registered nurses
  - Attend observations 5 minutely for 20 minutes post dose
- If bolus dose is effective consider increasing the epidural rate as per prescription
- Consider repositioning the patient if appropriate
- Contact IPS if there is no improvement

## 2. RESPIRATORY DEPRESSION

*Early Onset* - Can be seen within one hour of the medication being given. It is the result of the drug's rapid vascular absorption and migration across the blood brain barrier.

*Latent Onset* – Occurs within 6 to 10 hours after being given. Result of the drug penetrating and mixing with the CSF then spreading to the medullary respiratory centre.

**NB: The sedation score is the initial and most important sign of impending respiratory depression.**

Sedation score of 3 and/or a respiratory rate ≤ 8/minute indicates respiratory depression.

**MANAGEMENT:**

- STOP epidural infusion
- Attempt to rouse the patient
- Administer oxygen:
  - If apnoeic: administer bag and mask ventilation with 100% oxygen
  - If breathing: maintain airway, monitor oxygen saturations and administer oxygen at 12L/min via face mask
- Administer naloxone 100mcg IV
  – repeat every minute until patient responds
- **MET call (7700)** if appropriate
- Contact IPS URGENTLY

## 3. EXCESSIVE SEDATION

Sedation may be caused by the addition of opioids or clonidine to the epidural infusion. Increasing loss of consciousness develops gradually with opioid overdose. It may provide an earlier warning of impending overdose than decreased respiratory rate.

If there are no opioids or clonidine in the solution but sedation is present other causes including a high block or local anaesthetic toxicity must be urgently excluded.

**MANAGEMENT:**

If sedation score is ≥ 2:

- STOP infusion
- Administer oxygen via face mask
- Contact IPS

| SEDATION SCORE | SYMPTOM/S |
|---|---|
| 3 | Difficult to rouse |
| 2 | Frequently drowsy but easy to rouse |
| 1 | Occasionally drowsy, easy to rouse |
| 0 | Awake/Alert |

| | |
|---|---|
| S | Sleeping, easy to rouse |

## 4. TOXICITY

Toxicity is the result of high plasma levels of the local anaesthetic agent. This may be due to overdose, excessive rapid absorption, delayed elimination or metabolism, or inadvertent intravenous injection.

Signs of local anaesthetic toxicity include:

- *Early* - oral tingling, numbness, visual disturbances, ringing in ears, altered taste
- *Middle* - twitching
- *Late* - fitting and loss of consciousness
- Intractable cardiac arrest

**MANAGEMENT:**

- **Prevention** - do not exceed recommended doses
- Monitor patient for early signs of toxicity
- Respond to early signs by stopping the infusion
- Contact IPS
- Anticipate cardiopulmonary resuscitation

References: SCH 2004, Smith 2000

## 5. HIGH BLOCK

This is defined as a level of block that is:

- Above nipple line for lumbar or caudal epidurals,
- Altered sensation in arms for thoracic epidurals
- Sedation score >2

A high block may result in bradycardia and/or respiratory distress as the local anaesthetic spreads higher and blocks the cardio-accelerator fibres at T1-4, the intercostal nerve fibres T1-12 and the diaphragm nerves C3-5.

**MANAGEMENT:**

- MET call if required
- Stop infusion
- Contact IPS

- Elevate head of bed if patient condition allows

## 6. HYPOTENSION

Sympathetic nerves are the most sensitive to local anaesthetic blockade. The level of sympathetic nerve block may be some 4 segments above and below the area with a detectable block to temperature sensation.

When sympathetic vasoconstrictor nerves are blocked, blood vessels dilate. Unless these dilated vessels are filled up by adding circulating volume, then the blood pressure will fall.

Furthermore, the sympathetic accelerator fibres that make the heart go faster arise from the T1-4 levels. If the local anaesthetic blocks these fibres, then the heart cannot accelerate when the blood pressure falls, so the patient becomes both hypotensive and bradycardic.

The reported rates of hypotension in patients with epidural infusions is 3-10.2%, however it is often due to hypovolaemia.

**MANAGEMENT:**

If systolic blood pressure is ≤ 90mmHg or falls ≥ 25% of the patient's normal systolic BP:

- Return patient to bed
- Stop the epidural infusion if the patient is compromised
- Administer oxygen if required
- Raise the foot of the bed
- Contact the Inpatient Pain Service (IPS) urgently, **page 2101**
- Consider **MET call (7700)** if patient is compromised or IPS unavailable
- Anticipate IV fluid bolus administration – normal saline
- All patients must have a patent IV cannula at all times up until 12 hours post removal of epidural catheter

Reference: ANZCA 2005

## 7. INFECTION / ABSCESS

Infection is a very serious risk that can result in meningitis or epidural abscess, which can lead to paralysis. The incidence of epidural abscess varies from 0.015 – 0.05%.

Infective organisms are either introduced into the epidural space at the time of insertion or 'seed' the epidural space from a systemic (blood stream) infection. To reduce these risks, catheters are always inserted using aseptic precautions, and are removed early in children with fevers ≥38.5˚C.

If infection occurs it may progress to

- Meningitis
    - Symptoms include: headache, photophobia, and neck stiffness
- Epidural abscess
    - Symptoms include: unexplained fever, back pain, pain at the site of catheter insertion, pain on gentle percussion of the spine, neurological deficit in a spinal nerve root or dermatomal distribution, or in a wider distribution if compressing the whole cauda equina or spinal cord.

If the patient has a temperature **>38.5$^{o}$C**, or is suspected of having sepsis with potential for bacteraemia, the epidural catheter may need to be removed. Epidural catheter removal MUST be discussed with the IPS prior to proceeding.

**PREVENTION:**

The risk of infection can be reduced with a strict aseptic technique at all times, including:

- Aseptic insertion technique
- Intact occlusive sterile dressing at the insertion site
- Immediate aseptic replacement of dressing if it lifts
- Limit disruption to the epidural line
- Use bacterial filter in epidural line at all times
- Do not reconnect filter if it becomes disconnected, cap with a sterile, occlusive dressing (eg Opsite) and call the IPS
- Frequent observation of the insertion site for signs of infection such as redness and pus
- Epidural catheters will not remain insitu greater than 5 days

**MANAGEMENT:**

- Contact the IPS if the patient's temperature is ≥ 38.5°C or signs of infection at insertion site.
- Anticipate removal of epidural catheter.
- If an abscess is suspected, an urgent MRI scan will be arranged.

Reference: ANZCA 2005

## 8. DENSE MOTOR BLOCK

Moderate motor block is common immediately following surgery due to the higher doses of local anaesthetic used during surgery. Mild motor block is common following this initial period. However, because motor block can mimic and mask the symptoms of epidural abscess and epidural haematoma, **all dense motor block after epidural insertion must be reported to the IPS.**

Motor block assessment must be attended on receiving the patient to recovery and ward, on commencement of shift, and at four hourly intervals.

**MANAGEMENT:**

**Contact IPS urgently** if any of the following occur**:**

- Moderate (or denser) motor block with a thoracic epidural
- Unexpected dense motor block, including unilateral motor block
- Marked increase in motor block during the epidural infusion
- Motor block that does not abate when an epidural infusion is stopped or rate reduced
- Recurrent unexpected motor block after restarting and epidural infusion that was stopped due to motor block.

Reference: Report and findings of the 3rd National Audit Project of the Royal College of Anaesthetists, Chapter 15: Management of Dense Motor Block

## 9. UNILATERAL BLOCK

Due to position of catheter displaced laterally within epidural space or anatomy of the space. Patient displays a unilateral block that may extend over several segments.

**MANAGEMENT:**

- Lie patient on the side with least block
- Administer bolus dose as per protocol
- Contact IPS (catheter position may need review)
- Anticipate withdrawal of catheter 1-2 cm by the IPS.

## 10. PARAESTHESIA AND PARALYSIS

Paraesthesia can result from compression of the spinal cord from haematoma or abscess, trauma to nerves at the time of insertion or, occasionally, due to inadvertent contact of the catheter with neural tissues. It may also be a result of drugs that are toxic to the spinal cord, such as alcohol, being administered into the epidural space. The symptoms are generally peripheral and transient and the risk of permanent impairment is remote. Transient paraesthesia or neuropathy following epidural analgesia is around 0.013-0.023% while permanent damage is reported at 0.005-0.05%

Be aware of signs and symptoms of neurological dysfunction:

- Motor block
- Tingling sensations in lower limbs
- Decrease in movement and feeling
- Lumbar pain
- Bladder and bowel incontinence

**PREVENTION:**

- Use dedicated yellow epidural giving set and line. Do not inject any drugs onto this line
- Clearly label dedicated line
- ***Be aware of the patient on anticoagulation therapy*** – there are serious implications regarding epidural catheter removal and anticoagulant medication. Please check all patients on anticoagulant medication with the IPS.

**MANAGEMENT:**

- Reassure patient that the symptoms may be transient
- Turn off infusion and record the time
- **Contact IPS immediately**

Reference: ANZCA 2005

## 11. URINARY RETENTION

Results from the analgesic blockade of the parasympathetic activity of the lumbar sacral spinal nerves; it is transient.

Patients with lumbar or caudal epidural infusions are at increased risk of urinary retention. The risk is increased in patients receiving epidural opioids.

All patients with a lumbar or thoracic epidural should have an indwelling catheter.

**MANAGEMENT:**

- Contact Surgical Team
- Use a bladder scan or palpate to determine if bladder is full
- Urinary bladder catheterisation, as per surgical team, if indicated
- Maintain fluid balance chart for the duration of the continuous epidural infusion

## 12. PRURITIS

Due to histamine release associated with an opioid in the epidural solution. Symptoms include redness, rash and itch.

**MANAGEMENT:**

- Contact IPS
- Antihistamines such as promethazine (Phenergan) may be useful
- An ultra-low dose naloxone infusion may decrease the symptoms without reversing the analgesic effect

## 13. NAUSEA AND VOMITING

Nausea and vomiting may be due to many reasons including GIT dysfunction, medication, or activation of the brainstem chemoreceptor trigger zone.

**MANAGEMENT:**

- Administer anti-emetics as prescribed
- Notify treating team
- Contact IPS if it continues.

## 14. ALLERGIC REACTIONS

Be alert to possible allergic reaction to the drugs used in the epidural infusion. However, allergy to local anaesthetics and other epidural drugs are rare.

**Signs of an allergic reaction include:**

- Urticaria
- Oedema
- Increased heart rate
- Increased or decreased blood pressure
- Respiratory difficulties
- Shock

**MANAGEMENT:**

- STOP infusion
- Call MET or arrest team (7700) if required
- Anticipate respiratory or cardiac resuscitation
- Anticipate administration of adrenaline/hydrocortisone/ promethazine (Phenergan)
- Contact IPS

## 15. HEADACHE

Headache is may be multifactorial (tired, dehydrated, etc), or may be a result of a dural puncture. Development of a spinal headache is indicative of a breach of the dura and resultant drop in C.S.F. pressure, thus causing traction on the meninges and blood vessels surrounding them. It is usually frontal and postural in nature – exacerbated when the patient sits upright. A dural puncture can also result in nausea and vomiting. It is more common in patients under 50 years of age and up to 90% of cases will self resolve within 10 days (ANZCA 2005).

**MANAGEMENT:**

- Lie patient flat
- Contact IPS
- Mild headache may self resolve with supine bed rest

- Encourage high oral fluid intake, if not contraindicated
- May require increased IV fluid rate
- Anticipate blood patch. (Attended in recovery by anaesthetist, blood is taken from patient sterilely by venipuncture and is administered at the site of dural puncture using epidural set-up: the injected blood clots and "plugs" the puncture hole.)

## 16. BACK PAIN

Mild back pain is common and caused by minor trauma related to epidural insertion.

However, because of the serious consequences of epidural abscess and epidural haematoma, **all back pain after epidural insertion must be reported to, then thoroughly assessed by IPS staff.**

## 17. LEAKING EPIDURAL

If the patient is **comfortable** (suggesting the epidural is providing adequate analgesia), the dressing should be reinforced and the amount of leakage monitored.

If the patient is in **pain** or the epidural dressing needs changing, IPS should be contacted.

## Knowledge Questions

Q16. What is the likely cause of facial numbness and twitching?

a) Allergy to Fentanyl
b) Local anaesthetic toxicity
c) Epidural rate too high
d) Epidural infection

Q17. What signs and symptoms would your patient exhibit if they were developing an epidural haematoma?

a) Bowel and bladder incontinence
b) Back pain
c) Motor block
d) All of the above

Q18. What would be your nursing action if your patient with an epidural infusion, was hypotensive with a systolic B.P. of 80?

a) Stop the infusion, administer oxygen, contact APS, anticipate IV fluid bolus & anticipate administration of Ephedrine.
b) Give the patient 500mls of oral fluid.
c) Have the patient reviewed by the APS.
d) Raise the foot of the bed, contact the APS, and administer oxygen.

Q19. The earlier sign of opiate toxicity is:

a) respiratory depression
b) over sedation
c) respiratory arrest
d) unconsciousness

## Bolus Administration

- Heart rate, respiratory rate, blood pressure, epidural catheter entry site and line integrity must be recorded prior to bolus dose administration.
- If analgesia is inadequate a bolus dose can be administered from the epidural solution.
- Two registered nurses must check the prescription and remain present at the bedside for bolus dose administration.
- The patient must be supine when the bolus dose is administered.
- Administer the bolus dose as per order on the Epidural Infusion Order form.
- Observations must be attended every 5 minutes for 20 minutes post bolus delivery.
- If analgesia remains inadequate contact the IPS.
- Record the bolus dose on the epidural infusion order form.

## Nursing Considerations

Settings on the epidural machine, prescription, additive label, patient observations and amount infused should be checked at beginning of each shift and/or at change over of staff.

### Observations

Observations must be attended hourly for the first 6 hours and include:

- Heart Rate (HR)
- Respiratory Rate (RR)
- Oxygen Saturation $SpO_2$
- Blood Pressure (BP)
- Temperature
- Sedation Level
- Pain Score
- Level of Sensory Block – once a shift
- Level of Motor Block – every 4 hours

Thereafter, observations must be attended 2$^{nd}$ hourly.

Temperature can be attended 4 hourly unless the patient's condition warrants

more frequent monitoring.

## Block level assessment

Adequacy and the level of the sensory block should be assessed at least once a shift and findings documented in nursing notes and epidural observation/order form.

Motor block must be assessed when the patient is received to the ward immediately post-operatively, on commencement of shift and every four hours.

## Bolus Administration

Post bolus administration, haemodynamic stability should be assessed: 5 minutely blood pressure and heart rate must be attended for 20 minutes post administration.

The sensory block must be checked prior to delivery of a bolus dose and again 20 minutes post bolus dose to avoid inadvertent high block.

## Insertion site observations

Insertion site and catheter position should be checked and documented on each shift.

## Dressing

A sterile, transparent and totally occlusive dressing to remain insitu until epidural catheter is removed. Removal is to be governed by anaesthetist or IPS.

## Filter

The bacterial filter should be secured to patient's chest wall or upper back; luer lock connections should be frequently checked to ensure they are secure. If the filter disconnects **do not reconnect,** cover with a sterile adhesive dressing (eg Opsite) **and call IPS.**

## Sleep

If the patient is experiencing no pain, or is asleep, then these are not reasons for an epidural rate to be decreased or turned off. If this were to happen, the sensory block would diminish and bolus doses would be required to regain an adequate block.

## Disconnection

Epidurals should never be disconnected to enable mobility or attend to activities of daily living.
Having an epidural insitu should not automatically preclude showering. If a patient does not demonstrate motor block and is haemodynamically stable, then they may shower if they desire.

## IV access

All patients with an epidural infusion must have a concurrent intravenous infusion in case of an adverse event. If fluids are not required, IV may be run at TKVO rate.

## Opioid Administration

No other opioids are to be administered to a patient receiving an epidural containing an opioid unless prescribed by the IPS. If a patient is prescribed a patient controlled analgesia (PCA) in addition to an epidural infusion, the opioid must be removed from the epidural solution. The purpose is to reduce the risk of inadvertent opioid overdose and subsequent respiratory depression.

## Removing an Epidural Catheter

A Registered Nurse can remove the epidural catheter only after instruction by the pain service or an anaesthetist. If the treating team wishes to remove the epidural, the pain service or anaesthetist on call **must** be contacted prior to removal.

***NB*** *If the patient is receiving* ***anti-coagulant medication****, the Inpatient Pain Service* ***must*** *be contacted for advice prior to removing the epidural catheter. Anti-coagulation medications are always withheld prior to removal of epidurals.*

**HEPARIN:** Removal of epidural catheter must not occur until 2-4 hours post suspension of Heparin, and at least 1 hour prior to commencement of heparin. APTT must be sub-therapeutic prior to removal of epidural catheter.

**CALCIPARINE:** If the patient is receiving Calciparine (low dose heparin), remove the epidural catheter at least 6 hours (TDS dosing) and 10 hours (BD dosing) after the last dose. Do not give following dose of calciparine until 2 hours after catheter removal.

**CLEXANE:** **low dose <40mg**: removal of catheter not to occur for at least 12 hours after the last dose and at least 2 hours prior to the next dose.

**high dose >40mg**: removal of catheter should take place at the time of an omitted dose of clexane.

The Inpatient Pain Service can be contacted 24 hours on page 2101.

***If there is any difficulty encountered removing the epidural catheter or if any abnormality is detected, the pain service or anaesthetist 2101 (after hours) must be called immediately.***

The procedure for removal of an epidural catheter is included at the end of this package. It is also available in the policy and procedure manual.

**INDICATIONS FOR REMOVAL:**

1. Infection
2. Ineffective analgesia
3. Catheter migration/malposition
4. Epidural no longer required
5. Contamination of epidural catheter by disconnection of filter or break in line integrity.

## Knowledge Questions

Q20. What observations/checks must be carried out prior to the administration of a bolus dose?

a) No observations or checks are required
b) Pain assessment, heart rate, respiratory rate, blood pressure, tubing and entry site check, APS approval
c) Tubing and site check, APS approval
d) Pain assessment, heart rate, respiratory rate, blood pressure, tubing and entry site check

Q21. Describe the required observations to be attended after the administration of a bolus dose?

a) 5 minutely heart rate, respiratory rate, blood pressure and pain assessment for 20 minutes
b) 30 minutely heart rate, respiratory rate, blood pressure and pain assessment for 2 hours
c) 5 minutely heart rate, respiratory rate and pain assessment for 20 minutes
d) 30 minutely heart rate, respiratory rate and pain assessment for 2 hours

Q22. What action should a nurse take if the bacterial filter becomes disconnected?

a) Cover with a sterile occlusive dressing and call IPS
b) Clean the ends with an alcohol wipe and reconnect
c) Just reconnect it a quickly as possible
d) Clean with a sterile solution and sterile gloves and reconnect

Q23. List some causes of inadequate analgesia for patients receiving a

continuous epidural infusion?

a) Infusion rate too low
b) Increased activity
c) Epidural catheter displaced, leaking, disconnected or occluded
d) a) and c)

Q24. What would be your actions if your patient receiving an epidural infusion complained of pain?

a) Tell them that pain is to be expected after surgery and they should deal with it
b) Check the epidural tubing and site, assess pain, assess sensory block, record observations, contact IPS regarding bolus administration
c) Cease the epidural and remove the catheter as it is obviously not working
d) b) and c)

Q25. What is the appropriate nursing action if the patient experiences unilateral pain whilst having a continuous infusion?

a) Give the patient a bolus
b) Give the patient passive range of motion exercises on the side which the pain is
c) Roll the patient onto the side where the pain is felt, contact the IPS and give a bolus dose
d) Remove the epidural catheter

Q26. What are some of the complications of a continuous epidural infusion?

a) Hypotension, back pain, epidural abscess
b) Respiratory depression, sedation, pruritis
c) Fever, epidural haematoma, inadequate analgesia
d) All of the above

Q27. Why would the commencement of a Heparin infusion for your patient with an epidural insitu concern you?

a) It increases the risk of an epidural haematoma on removal of the epidural catheter
b) The patient will not like having regular bloods for APPT's
c) It will mean extra work for you
d) It increases the risk of infection

## Patient Controlled Epidural Analgesia (PCEA)

PCEA is an analgesic modality, which combines the principles and benefits of both epidural analgesia and Patient Controlled Analgesia (PCA).

Only Fentanyl is used in PCEA at John Hunter Hospital. Generally much less opioid is required when administered epidurally than by the intravenous route, thus less opioid side effects are observed.

PCEA combines the potent analgesic effects of drugs delivered into the epidural space with the advantages of patient participation available with IV PCA. In general, PCEA delivers greater reduction in pain and at the same time provides greater patient control and satisfaction than typical epidural infusions or epidural

bolus doses.

PCEA is most commonly used for postoperative pain management for upper and lower abdominal surgery, gynaecological surgery and obstetrics. It may also be utilised post some thoracic and orthopaedic surgery.

Management of PCEA is the same as epidural infusions.

***Advantages:***

- At least as effective as continuous epidural infusions or nurse controlled boluses
- Lower patient anxiety
- Psychological benefit of having control over pain
- Greater patient satisfaction
- Reduced lower extremity motor block
- Reduced total volume of local anaesthetic and /or opioid used per hour with PCEA

***Disadvantages:***

- Expensive specialised equipment.

***PCEA Nursing Considerations:***

- As per epidural infusions, in addition:
- If local anaesthetic is utilised, adequacy of sensory block should be assessed at least once a shift and findings documented in nursing notes and epidural observation/prescription form.
- The patient is the only person to activate the PCEA button.
- Patients with PCEA should not mobilise outside the hospital.
- PCEA infusions should never be disconnected to enable mobility or ADL's.
- Having a PCEA insitu should not automatically preclude showering. If a patient does not demonstrate motor block and is haemodynamically stable, then they may shower if they desire.

***Modes of Administration:***

Patients requiring PCEA will generally only receive bolus opioid doses with no continuous background infusion.

Standard prescription for PCEA at John Hunter Hospital is:

**Fentanyl 10mcg/ml in sodium chloride 0.9**%. Bolus dose is 15-20 mcg, lockout period is 15-20 minutes and no background infusion.

At John Hunter Hospital, the PCEA modality is administered by way of Gemstar pump for those PCEA combining local anaesthetic and opioid.

***Complications:***

Please refer to complications associated with continuous epidural infusions.

# References


- Anand KJS, Aranda JV, Berde CB *et al* 2006. Summary Proceedings From the Neonatal Pain-Control Group. *Pediatrics* Vol 117 (3) March 2006: S9-S99
- Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine (ANZCA) 2005. National Guidelines – Acute Pain Management: Scientific Evidence 2nd Ed. Australian Government: National Health and Medical Research Council http://www.anzca.edu.au/resources/books-and-publications/acutepain.pdf
- Bernards CM 2004. Recent insights into the pharmacokinetics of spinal opioids and the relervance to opioid selection. *Curr Opin Anaesthesia* 17:441-47
- Bhutta, AT and Anand KJS 2002. Vulnerability of the developing brain: Neuronal mechanisms. *Clinics in Perinatology* Vol 29 (3) September 2002: 357-372
- Children's Pain Management Service, Royal Children's Hospital, Melbourne 2008 (updated). Epidural Infusions. www.rch.org.au/anaes/pain/index
- Cousins MJ and Mather 2004. Intrathecal and epidural administration of opioids. *Anesthesiology* 61:276-310
- Eisenach JC, De Kock M, Klimscha W 1996. Alpha 2 adrenergic agonists for regional anaesthesia: a clinical review of clonidine (1984-1995). *Anaesth Analg* 85:655-74
- Fitzgerald M, Beggs S. The neurobiology of pain: developmental aspects. Neuroscientist 2001;7:246-257
- Gibbin, S 2004 *The PIPP – Premature Infant Pain Profile* Video. Anglersthree. www.e-ducationsolutions.com
- Godfrey H. Understanding pain, part 1: physiology of pain. *British Journal of Nursing. 2005,* 14(16): 846-852
- Godfrey H. Understanding pain, part 2: pain management. *British Journal of Nursing. 2005,* 14(17): 904-909
- Hicks CL, von Baeyer CL, Spafford P, van Korlaar I, Goodenough. Faces Pain Scale - Revised. ©2001 IASP. www.painsourcebook.ca
- Hodgson PS, Neal JM, Pollock JE, Liu S 1999. The neuro toxicity of drugs given intrathecally (spinal). *Anaesth Analg* 88:797-809
- Holland MS, Gammill BG and Mackey DC. AANA Journal Course: New Technologies in Anesthesia: Update for Nurse Anesthetists Alternatives for Postoperative Pain Management. *Journal of the American Association of Nurse Anesthetists.* (1990) 58, 3: 201-210.
- Hsu, D (2007). Procedural sedation and analgesia in children**.** *Up To Date Online. 2007.* *www.uptodate.com*).
- Hunter Integrated Pain Service (HIPS) 2004 (updated). Epidural & PCEA Resource Package. Acute Pain Service Epidural Resource Folder. Hunter Area Pain Service.
- John Hunter Hospital and Royal Newcastle Centre Clinical Practice Guidelines (2007). *Pain Service: Continuous Epidural Analgesia*. Policy number 1.'
- John Hunter Hospital and Royal Newcastle Centre Clinical Practice Guidelines (2007). *Pain Service: Epidural Bolus Administration for Continuous Epidural Analgesia*. Policy Number: 2
- John Hunter Hospital and Royal Newcastle Centre Clinical Practice Guidelines (2007). *Pain Service: Epidural Catheter Removal*. Policy number: 5
- Milligan KR, Concory PN,Weir P et al 2000. The efficacy and safety of epidural infusions of levobupivacaine with and without clonidine for postoperative pain relief in patients undergoing total hip replacement. *Anaesth Analg* 91:393-97
- Morgan GE, Mikhail MS and Murray MJ. *Lange Clinical Anesthesiology* 4th Edition, Section III, Regional Anaesthesia and Pain Management, Chapter 16: Spinal, Epidural and Caudal Blocks – Complications of Neuraxial Blocks. 2006: http://www.accessmedicine.com, The McGraw-Hill Companies.
- Naber L, Jones G and Halm M. Epidural Analgesia for Effective Pain Control. *Critical Care Nurse.* Oct 1994: 69-83.
- Omoigui S. 1999. *Pain Drugs Handbook 2nd Edition*. Blackwell Science: Massachusetts USA
- Pasero C. Improving postoperative outcomes with epidural analgesia. *Journal of Perianesthesia Nursing.* Feb 2005, Vol 20, no. 1: 51-55.
- Porter FL, Grunau RE, Anand KJ. Long-term effects of pain in infants. J Developmental & Behavioral Paediatrics1999;20:253-261
- Royal College of Anaesthetists (2009). Report and findings of the 3rd National Audit Project of, Chapter 15: Management of Dense Motor Block. http://www.rcoa.ac.uk/docs/NAP3_Section2.pdf
- Schumacher MA, Baabaum AI, Way WL 2008. Opioid Analgesics and Antagonists. *Lange Pharmacology* Ch31. McGraw-Hill Companies.
- Sydney Children's Hospital 2004. Epidural Learning Resource Package. Clinical Manual, section 7.5:1-34
- Taddio A, Katz J. The effects of early pain experience on pain responses in infancy and childhood. Paediatr Drugs 2005;7:245-257
- Visser EJ. A Smorgasbord of Pain: Updates and Controversies in Current Pain Management. *29th Annual Scientific Meeting of the Australian Pain Society, Sydney* 2009

- Walker SM, Goudas LC, Cousins MJ et al 2002. Combination spinal analgesic chemotherapy: a systemic review. *Anaesth Analg* 95:674-715
- Wallace KG. The pathophysiology of Pain. *Critical Care Nursing Quarerly.* 1992, 15, 2: 1-13.


# Appendices

JOHN HUNTER HOSPITAL
OPERATIONAL POLICIES AND PROCEDURES MANUAL

SUBJECT: Acute Pain Service: Epidural Catheter Removal

POLICY NUMBER: 5
DATE OF PROCEDURE: May, 2004

*DUE DATE OF NEXT PROCEDURE: May, 2007*

OUTCOMES:
To ensure that epidural catheters are removed with optimal safety to patient and staff after the indications for removal have been checked by the Acute Pain Service (APS).

S.W.P. SAFE WORK PRACTICE

RISKS:

- Harm to patient
- Harm to staff

CONTROLS:

- Follow correct procedure as outlined below
- Wear gloves, protective apron and safety goggles during procedure
- Ensure adequate lighting
- Avoid leaning across the patient, bed or bedside furniture. Avoid stooping

PROCEDURE:

Indications for Removal:

1. Infection
2. Provision of ineffective analgesia
3. Continued catheter leakage
4. Catheter malpositioned
5. Catheter no longer required
6. Contamination of catheter by disconnection of filter or break in catheter

NB: The catheter should only be removed upon the orders of the anaesthetist/APS. The removal of the

epidural should be endorsed by signing the appropriate catheter removal box on the epidural prescription form or documenting orders in the patient's chart.

If the treating team wishes the epidural to be removed then APS must be notified to review epidural and patient prior to the removal of the epidural catheter.

EQUIPMENT

1. Dressing pack
2. Chlorhexidine and alcohol solution
3. Sterile gloves
4. Personal protective eyewear/clothing
5. Small adhesive dressing

PROCEDURE

- Verify with APS when the epidural catheter is to be removed. Check that a stat epidural morphine bolus dose has not been ordered (check patient's stat prescription form) prior to removal. (As per APS procedure No.3 "Morphine bolus pre epidural catheter removal").

NB:

- If the patient is receiving subcutaneous heparin calcium (calciparine) for DVT prophylaxis, remove the catheter at least 6 hours (TDS dosing) and 10 hours (BD dosing) after the last dose. Do not give following dose of calciparine until 2 hours after catheter removal.

- If the patient is receiving Low Molecular Weight Heparin (Enoxaprin/Clexane) < 40mg/ daily allow 12 hours after the last dose prior to catheter removal. If dose is > 40mg / daily remove after 24 hours. The next dose should not be given within 2 hours.

- If the patient is receiving a therapeutic Heparin Infusion, the APS personnel will negotiate with the AMO/Registrar re: cessation and recommencement of the heparin infusion in relation to timing of the removal of the catheter.

NB.
Please refer to APS procedure guidelines Neuraxial Blockade and Anticoagulation.

- Ensure that the patient has alternative analgesia ordered for post-epidural removal.
- Explain the procedure to the patient
- Don protective eyewear/clothing
- Position patient appropriately eg. Left lateral or sitting bent forward
- Cease infusion, clamp giving set and remove dressing over insertion site
- Request supervision of another RN
- Inspect catheter site for leakage/swelling/inflammation/discharge
- Attend insertion site swab if ordered
- Clean insertion site with Chlorhexidine solution and dry prior to removal of catheter

- Gently withdraw catheter using steady even traction. If the catheter is tunnelled apply pressure with the flat of one hand to support the skin under the tunnelled section to reduce the sensation of pulling and stinging to the patient
- Examine epidural catheter tip and confirm it is intact with the second nurse
- If tip is required for culture and sensitivities, after the catheter is withdrawn cut tip with sterile blade from below insertion site level and place in sterile yellow specimen container
- Clean the insertion site with solution, allow to dry then apply dressing
- Complete the documentation on epidural prescription chart and progress notes
- Dispose and verify disposal of any remaining opioids with second RN. Document removal of epidural and opioid disposal on epidural prescription chart.
- Ensure a patent IV cannula remains insitu for 12 hours post epidural removal

RELATED LEGISLATION, DEPARTMENT OF HEALTH CIRCULARS, AREA POLICIES:

1. N.S.W. Health Department Circular 02/45
   Infection Control Policy
   http://internal.health.nsw.gov.au/fcsd/rmc/cib/circulars/2002/
2. N.S.W. Health Department circular 01/64
   Policy on the Handling of medication in N.S.W. Public Hospitals
   http://internal.health.nsw.gov.au/fcsd/rmc/cib/circulars/2001/
3. N.S.W. Health Department Circular 01/69
   Occupational Health and Safety Policy
   http://internal.health.nsw.gov.au/fcsd/rmc/cib/circulars/2001/
4. N.S.W. Health Department Circular 98/59
   Principles for Creation, Management, Storage and disposal of Health Care Records
   http://internal.health.nsw.gov.au/fcsd/rmc/cib/circulars/1998/
5. Hunter Area Health Service Policy 02/01
   Personal Protective Equipment
   http://hal.hunter.health.nsw.gov.au/areapolicies/02_01.pdf
6. Hunter Area Health Service Policy 96/01
   Intravenous Peripheral Cannula and IV Therapy Management for Adults
   http://hal.hunter.health.nsw.gov.au/areapolicies/96_01.pdf
7. N.S.W. Department of Health Policy Directive PD2007_077
   Medication Handling in N.S.W. Public Hospitals
   http://www.health.nsw.gov.au/policies/pd/2007/pdf/PD2007_077.pdf

DISTRIBUTION:

- All wards and units in JHH

RESPONSIBLE FOR MONITORING AND REVIEW:

- Clinical Nurse Consultant, Acute Pain Service

| |
|---|
| POLICY APPROVAL:<br><br>♦ Director, Acute Pain Service |