

Learning Package



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Children, Young People & Families



Health
Hunter New England
Local Health District

Paediatric Epidurals

Sites where the Learning package applies

John Hunter Children's Hospital, ICU and sites who care for paediatric patients with epidurals

Description

This package covers the care and management of paediatric epidurals. Pharmacology, complications and removal are described.

Target audience

Clinicians caring for a paediatric patients with an epidural

Learning Outcomes,

On completion of this package you will be better able to:

- Understand the principles of epidural analgesia
- Discuss the assessments required to care for a child with epidural analgesia
- Demonstrate knowledge of the potential adverse effects of epidural analgesia.
- Care for a child with an epidural

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Yes

Related Legislation, Australian Standard, NSW Ministry of Health Policy Directive or Guideline, National Safety and Quality Health Service Standard (NSQHSS) and/or other, HNE Health Document, Professional Guideline, Code of Practice or Ethics:

HNELHD local procedure JHH_JHCH_BH_0058 [Epidural/spinal Positioning Device](#)

HNELHD Local procedure JHH_JHCH_BH_0024 [Positioning patients for Spinal/Epidural insertion](#)

HNELHD Local procedure JHH_JHCH_BH_0227 [Epidural insertion set-up and patient care](#)

NSW Health Policy Directive PD2007_036 [Infection Prevention and Control Policy](#)

NSW Health Policy Directive PD2016_058 [User Applied Labelling of Injectable Medicines, Fluids and Lines](#)

NSW Health Policy Directive PD2009_060 [Clinical Handover - Standard Key Principles](#)

NSW Health Policy Directive PD2005_406 [Consent to Medical Treatment - Patient Information](#)

NSW Health [Paediatric Sepsis Pathway](#)

NSW Health Policy Directive PD2010_034 Children and Adolescents - [Guidelines for Care in Acute Care Settings](#)

JHCH Policy Compliance Procedure JHCH PCP 3.19 [Recognition of the Deteriorating Paediatric Patient](#)

GNAH Local Procedure JHH_JHCH_BH_0193 [Standard Aseptic Technique](#)

JHCH Local Procedure 15.1 [Urinary Catheter Management – Acute Care 0-18 years](#)

JHCH Local Guideline and procedure JHCH 13.3 [Safe Administration of Medications in JHCH](#)

Is this package recorded in MHL?

Paediatric: Epidural Management (177110873)

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Paediatrics: Paediatric Epidural

Learning Package

2017



Health
Hunter New England
Local Health District

Learning Package Overview

Purpose: This learning package provides the learner with the underpinning knowledge to care for a child with an epidural. This package describes the pharmacology, patient assessments required to safely care for a child with an epidural, adverse events and removal.

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INTRODUCTION

This package covers the care and management of paediatric epidurals. Pharmacology, complications and removal are described. This package contains multiple choice questions, and a case study for the learner to work through.

DISCLAIMER

This learning package has been prepared by health professionals employed in Hunter New England Local Health District in the John Hunter Children's Hospital. While all care has been taken to ensure that the information is accurate at the time of development, the authors recommend that all information is thoroughly checked before use if utilised by another unit, context or organisation.

AIM

To enable the nurse to optimally care for the paediatric patient receiving epidural analgesia and facilitate their recovery while maintaining the patient's comfort, incorporating partnership in care principles and preventing, detecting and diminishing complications.

LEARNING OUTCOMES OR LEARNING OBJECTIVES

Completion of this learning package will allow the Registered or enrolled nurse to demonstrate an understanding of the following:

- How epidurals work and the benefits of epidural analgesia (swap with point 2 below)
- Indications and contraindications of paediatric epidurals
- The actions and side effects of the common medications used in paediatric epidurals.
- Complications of epidurals and how to manage them
- Removal of an epidural

PRE-REQUISITES

In order to complete this package the registered nurse must have met the following requirement:

My Health Learning

Invasive Devices - 42364545

Hand Hygiene - 42063430

Aseptic Technique - 40027445

LEARNING PACKAGE OUTLINE

The package is designed to be a self-directed learning experience that will guide you through the literature and clinical issues related to the care and management of epidurals in the paediatric population.

This package is developed within an adult learning framework so not all activities need to be documented but it is expected that you will complete them in order to facilitate your learning.

PROBLEM BASED LEARNING

This program is based on a problem-based approach to learning. This approach has been chosen to enhance critical thinking, and to create a body of knowledge that the RN can apply to practice. Problem based learning (PBL) is characterised by the use of patient specific problems or situations as a context for developing problem-solving skills and for acquiring clinical knowledge.

HOW TO USE THIS RESOURCE OR INSTRUCTIONS FOR PARTICIPANTS

Some possible items might include:

- Completion of this package is equivalent to 5 Continuing Professional Development (CPD) hours which is a requirement for National Registration. Evidence of CPD can be generated using the Reflection on learning page at the end of the template.
- This package can be used as an introduction for nurses wishing to further their knowledge and skills in this area.
- At the completion of this learning package you are asked to complete questions or a problem based scenario related to the topic.
- There is a suggested reference list and it is by no means complete. Please read widely to facilitate your learning.
- This resource has been written from a Hunter New England Area Local Health District perspective so it is not specific to any one health facility. Throughout the package procedures from the John Hunter Children's Hospital have been mentioned as an example of practice only.

ASSESSMENT PROCESS

When completed, you can return the package to your relevant nurse educator/ CNS/CNC who will discuss it with you.

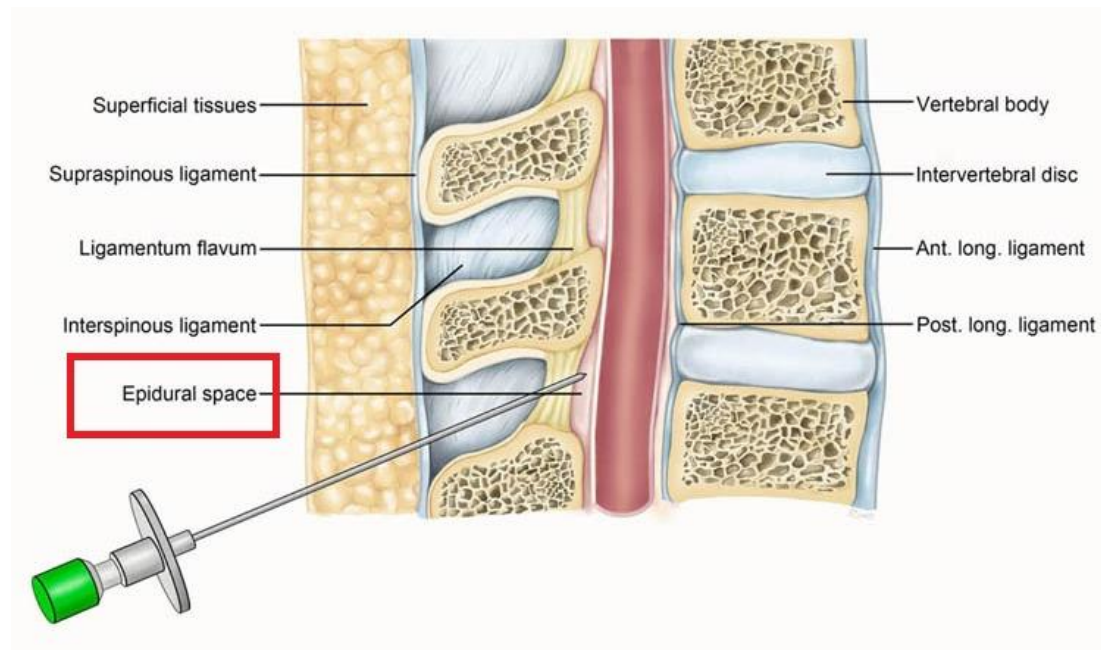
WHAT IS PAIN?

The International Association for Study of Pain (IASP) (2014) define pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage”. Research states that unrelieved pain in children results in negative consequences, both psychological and physiological (Ismail, 2016).

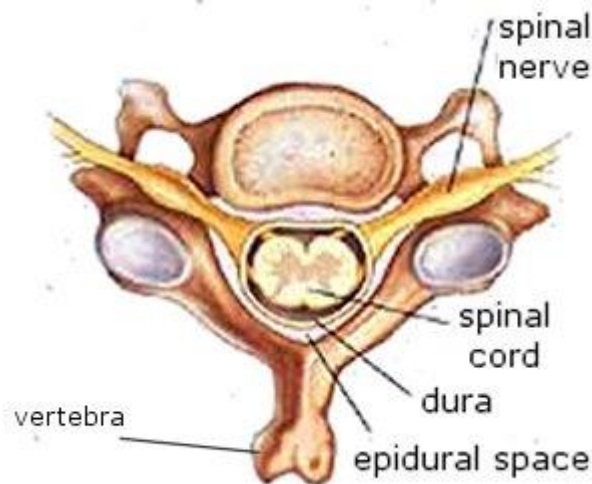
WHAT IS EPIDURAL ANALGESIA?

Epidural analgesia is a specialised analgesia and is managed at the John Hunter Children’s Hospital by the Acute Pain Service. Epidural analgesia can provide good to excellent pain relief with minimal sedation and is especially useful in major surgery and managing moderate to severe pain (Royal Children’s Hospital, 2017). It is a well-recognised and valuable technique for post-operative pain control, and when working effectively, lumbar and thoracic epidurals are considered the gold standard in pain relief for children (Same, 2016). Central local anaesthetic blocks allow blockade of the afferent and efferent sympathetic pathways at relatively low doses resulting in profound suppression of haemodynamic and stress responses to surgery. Complications related to epidural infusions are relatively low making it a safe and effective method of providing analgesia to children (Wong, 2013).

Epidural analgesia provides post-operative pain relief by infusing local anaesthetic and/or opioid drugs into the epidural space following lower limb, pelvic, abdominal, or occasionally, thoracic surgery. Epidurals provide optimal analgesia whilst avoiding opioid related side effects. Research demonstrates fewer reported episodes of respiratory depression or hypoxia. In addition, there is greater haemodynamic stability and better gastrointestinal function (Same, 2016).



Epidural Anatomy (Advanced Spine Care Pain Management, 2014)



Spine and Sports Injury Centre, 2009

WHAT IS THE EPIDURAL SPACE?

The epidural space lies between the dura mater, which covers the spinal cord, and the ligamentum flavum within the vertebral column. The space is located just outside the dural sac which surrounds the nerve roots and is filled with CSF. The epidural space contains lymphatics, spinal nerve roots, loose connective tissue, fatty tissue and small arteries. When local anaesthetic or opioid is injected into the epidural space it will spread both up and down the spinal canal to block the nerve impulses travelling from the peripheries to the brain (Sydney Children's Hospital, 2017).

WHAT IS A CAUDAL EPIDURAL?

A caudal epidural is one inserted into the sacral epidural space via the sacral hiatus. Like any epidural, drugs can be injected as a single dose via the needle, or a catheter can be threaded cranially into the space for some distance to reach higher spinal segments.

Caudal anaesthesia is commonly used in paediatric patients in combination with general anaesthesia for intra and post-operative analgesia for pain below thoracic vertebral level 9 (T9). It is frequently used for surgery below the diaphragm including lower abdomen, perineum and lower limbs. It is the preferred method of pain relief in children of all ages undergoing these types of surgery (Beyaz, Tokgoz and Tufek, 2011).

Advantages of Epidural Analgesia

- Very good to complete pain relief can be achieved
- Minimal or no sedation
- Haemodynamic stability (Same, 2016)
- May be used to decrease bladder spasm in urological surgery by relieving muscle spasm in smooth and skeletal muscle

- May be used for very young patients including premature neonates
- 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
- Indications for an epidural
- Epidural infusions are for the management of moderate to severe pain in children (Royal Children’s Hospital, 2017)
- Children undergoing thoracic, abdominal, urological and lower limb surgery may be considered for post-operative epidural analgesia (Same, 2016).
- Patients where a general anaesthesia should be avoided (patients with cystic fibrosis, history of apneas (Same, 2016))

Contraindications to Epidural Analgesia

- Local infection at the site of insertion
- Lack of parental consent
- 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/ parental refusal. (Same, 2016)

WHO IS SUITABLE FOR AN EPIDURAL?

A paediatric anaesthetist will decide who may be a suitable candidate. The decision that the patient is a suitable candidate for continuous epidural infusion should be made pre-operatively in consultation with medical, nursing staff and the patient/parents.

The patient/parents should receive pre-operative information on continuous epidural analgesia and explanation of the need for nurses to attend to specific observations at regular, selected intervals.

All patients with continuous epidural infusion must have intravenous access.

DURATION OF EPIDURAL INFUSION

- Epidural infusions may run up to 5 days at the discretion of the anaesthetist.
- Neonates infusions may run up to 36 hours (to reduce the risk of local anaesthetic toxicity)

Knowledge Questions

Where is the epidural space?

- a) In the outermost part of the spinal canal
- b) Between the dura mater and the ligamentum flavum
- c) In the brain
- d) Between the spinal vertebrae

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

What are 3 advantages of epidural analgesia?

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

What are 3 contraindications to epidural analgesia?

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

PHARMACOLOGY

The JHH Acute Pain Service has standard drug orders for epidural infusions. The general order is for a local anaesthetic; an opioid or clonidine may be added to the infusion as adjuvants. Occasionally opioids may be used on their own.

Local Anaesthetic Agents

The standard local anaesthetic agent prescribed for paediatric epidurals at John Hunter Children's Hospital is Ropivacaine Hydrochloride 0.2% (Naropin™). However, Bupivacaine Hydrochloride 0.1% or 0.125% (Marcain™) or Levobupivacaine 0.125% (Chirocaine™) may be ordered instead.

Action

Local anaesthetics provide a block of sensory stimuli by reversibly preventing the initiation and transmission of peripheral nerve impulses (Australian Medicines Handbook, 2017). Fine nerve fibres are blocked before large ones and thus pain, temperature, touch, then motor function are affected in that order.

Post-operative analgesia can be maintained for up to three to four hours by epidural injection of bupivacaine and peak plasma levels are reached in 30 to 45 minutes (MIMs Online, 2017).

Part of any local anaesthetic dose administered via the spinal cord will be absorbed into the systemic circulation from the epidural blood vessels. Local anaesthetics can cause vasodilation which can in turn cause hypotension (Great Ormond Street Hospital, 2014).

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

Special Notes

In addition to use in an epidural infusion, ropivacaine may also be used for peripheral regional analgesia (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.

Adverse Reactions:

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, irritability

Cardiovascular System – dizziness, hypotension, bradycardia, arrhythmias

Musculoskeletal – loss of motion, joint stiffness (MIMs Online, 2017)

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

Fentanyl

Indication:

The addition of fentanyl to a local anaesthetic will combine the desirable analgesic properties of local anaesthetics with those provided by epidural opioids. The combination of these analgesics provides pain relief of greater magnitude than would be achieved if either were infused alone.

Action:

Opioid analgesics act on opioid receptors in the CNS and GIT producing analgesia, respiratory depression, sedation and constipation. They act mainly at mu-opioid receptors in the CNS, reducing transmission of the pain impulse, and by modulating the descending inhibitory pathways from the brain. Cough suppression occurs in the medullary centre of the brain (Australian Medicine Handbook, 2017).

Adverse Reactions:

Rostral (upward) spread in the CSF through the spinal cord means respiratory depression may occur if enough opioid remains in the CSF when it reaches the brainstem and respiratory centre. As fentanyl is a highly lipid soluble opioid, it will move rapidly from the CSF into the lipids of the epidural space and spinal cord. Therefore, it is less likely to spread rostrally through the spinal cord and cause side effects such as respiratory depression, nausea, or pruritis common with morphine.

Respiratory depression

Nausea and vomiting

Constipation

Itch and rash

Bradycardia (Australian Medicines Handbook, 2017).

Clonidine

Indication:

Clonidine may be added to bupivacaine as an adjuvant in paediatric epidural infusions. Clonidine prolongs the analgesic effect of the local anaesthetic agent in epidural infusions. The addition of clonidine to bupivacaine can significantly reduce post-operative opioid requirements compared with either clonidine or bupivacaine alone.

Action:

Has sedative, anxiolytic, analgesic and haemodynamic-stabilising effects. Act on α_2 adrenoreceptors in the CNS to reduce noradrenergic activity, and also on receptors in other tissues. The main site of analgesic action is thought to be the spinal cord (Australian Medicines Handbook, 2017).

Adverse Reactions:

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

There may be an increased risk of hypotension following epidural use in children with severe cerebral palsy.

Naloxone**Indication:**

Opioid overdose or intoxication

Reversal of opioid sedation

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.

Dose

- Reversal of opioid sedation: 1-5 micrograms/kg
- Reversal opioid overdose: 10 micrograms/kg

Adverse Reactions:

- Hypotension
- dyspnoea
- nausea, vomiting
- sweating
- tachycardia (MIMs Online, 2017; Australian Medicines Handbook, 2017)

Knowledge Questions**What is the indication for Naloxone?**

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

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

MANAGEMENT OF EPIDURALS AT JHCH

- The first line managers of epidural infusions are the Acute Pain Service (APS).
- Patients with an epidural infusion MUST have a patent IVC. This is so any complications can be treated efficiently.
- Epidural infusion is to run through a dedicated epidural giving set which has a yellow stripe and has no injection ports. The giving set must be clearly identified with a yellow and black epidural 'flag' label. The infusion solution must be clearly labelled with a yellow and black epidural infusion label. If possible, the epidural infusion should be on the opposite side of the bed to the IV fluids to minimise potential errors.
- Patients receiving epidural infusion should be nursed close to the nurses' station to ensure close supervision. The ward should be sufficiently staffed to care for the patient, and staffing should include nurses with the training and skills in caring for a child with an epidural. (Faculty of Pain Medicine, 2015).
- There should be 24-hour access to senior anaesthetic advice and a resuscitation team (Faculty of Pain Medicine, 2015).
- A bacterial filter is to be insitu at the end of the epidural catheter at all times. If this become disconnected the APS must be contacted.
- Naloxone must be available on the ward whilst epidural infusions that contain an opioid are in progress.
- The epidural line must be clearly identified with an epidural label as per http://www0.health.nsw.gov.au/policies/pd/2012/pdf/PD2012_007.pdf
- The epidural infusion bag must be changed at least once every 24 hours/when the bag is empty.
- No other opioid is to be administered to the patient if the epidural infusion contains opioid (Sydney Children's Hospital, 2017)

Observations

The following observations are to be recorded on the SPOC and the Epidural Infusion Order form:

- For the first six hours of the epidural infusion, a FULL set of observations must be attended hourly.
- Following the first 6 hours, the following frequency of observations are to be followed.

Hourly	2 nd Hourly	4 th Hourly	Before bolus	After bolus	After a rate increase (hourly for 4 hours)	Once a shift
Resp rate	Pressure area	BP	Heart rate	BP(every 5mins for 20mins)	Heart Rate	Insertion site
Heart rate		Temp	Resp rate	Heart rate(every 5 mins for 20mins)	Resp rate	Catheter position
Pain score		SaO2	BP	Resp rate (every 5 mins for 20mins)	BP	Dressing
		Sensory and Motor Assessment	Entry site	Pain Score (every 5mins for 20mins)		
		Vomiting score	Line integrity	Sensory block (20mins post bolus)		
		Level of consciousness	Pain score			
		Resp distress				
		O2 requirements				
		Capillary refill				

Royal Children's Hospital, 2017

ASSESSMENT: PAIN

Pain assessment is an important part of caring for any surgical or trauma patient. Children who are unable to communicate or to self-report pain add an additional challenge to pain assessment. These children are at increased risk of not receiving adequate pain relief (Anderson, Langius-Eklof, nakstad, Bernklev & Jylli, 2017). There are several pain assessment tools used widely in paediatrics, including the revised faces pain scale, the FLACC pain score and the numerical pain score.

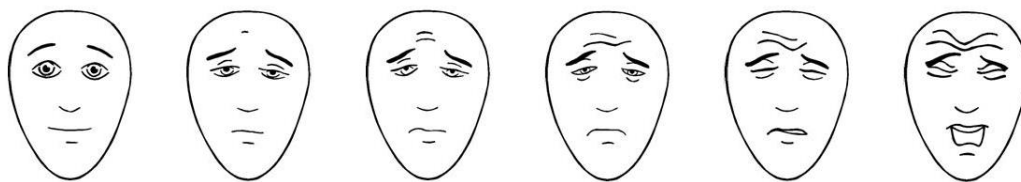
Revised Faces Pain Scale

Is a self-report measure of pain intensity developed for children? It is easy to administer, and is suitable for children aged 4-16 years. It is particularly recommended for young children.

In the following instructions, say "Hurt" or "Pain," whichever seems right for a particular child:

"These faces show how much something can hurt. This face [point to left-most face] shows no pain. The faces show more and more pain [point to each from left to right] up to this one. [point to right-most face] It shows very much pain. Point to the face that shows how much you hurt [right now]."

Score the chosen face 0, 2, 4, 6, 8, or 10, counting left to right, so "0" equals "No pain" and "10" equals "Very much pain." Do not use words like "happy" and "sad." This scale is intended to measure how children feel inside, not how their face looks.



International Study for the Study of Pain, 2017

FLACC Pain Scale

Face, legs, activity, cry, consolability scale, or FLACC, can be used to assess pain in young children or children who are non-verbal and unable to self-report pain. It is suitable for children aged 2 months – 10 years.

Instructions

Patients who are awake:

- Observe for at least 2-5 minutes.
- Observe legs and body uncovered.
- Reposition patient or observe activity; assess body for tenseness and tone.
- Initiate consoling interventions if needed.

Patients who are asleep:

- Observe for at least 5 minutes or longer.
- Observe body and legs uncovered.
- If possible reposition the patient.
- Touch the body and assess for tenseness and tone.

Each category is scored on the 0-2 scale which results in a total score of 0-10.

Assessment of Behavioural Score

0 = Relaxed and comfortable

1-3 = Mild discomfort

4-6 = Moderate pain

7-10 = Severe discomfort/pain

The following table provides the criteria for the FLACC Behavioural pain scale.

Behaviour	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant quivering chin, clenched jaw
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting, back and forth, tense	Arched, rigid or jerking
Cry	No cry (awake or asleep)	Moans or whimpers; occasional complaint	Crying steadily, screams, sobs, frequent complaints
Consolability	Content, relaxed	Reassured by touching, hugging or being talked to, distractible	Difficult to console or comfort

Reference: Merkel S, Voepel-Lewis T, Shayevitz JR, et al: *The GLACC: A behavioural scale for scoring postoperative pain in young children*. Pediatric Nursing 1997; 23:293-797.

ASSESSMENT: SENSORY BLOCK

The area of skin that is supplied by a single spinal nerve is called a *dermatome*.

Local anaesthetics work by blocking nerve impulses on sensory, motor and autonomic nerve fibres. The smallest diameter fibres are the most sensitive to the effects of local anaesthetics: autonomic fibres will be blocked first, sensory fibres second and motor fibres last.

Sensory fibres respond to pain, temperature, touch and pressure. Pain and nerve fibres are affected by local anaesthetics in similar ways, therefore changes in temperature perception indicate the area where the epidural is working.

The area of sensory block should be assessed using cold sensation (ice) to establish which dermatome levels are covered. Left and right sides must be assessed (Royal Children's Hospital, 2017). Non-verbal children and infants can be assessed by carefully observing flinching and facial expression in response to ice. This can be coupled with observation of the child's response to movement and gentle palpation of the operative sites where appropriate (Royal Children's Hospital, 2017)

It is important to assess sensory block to ensure:

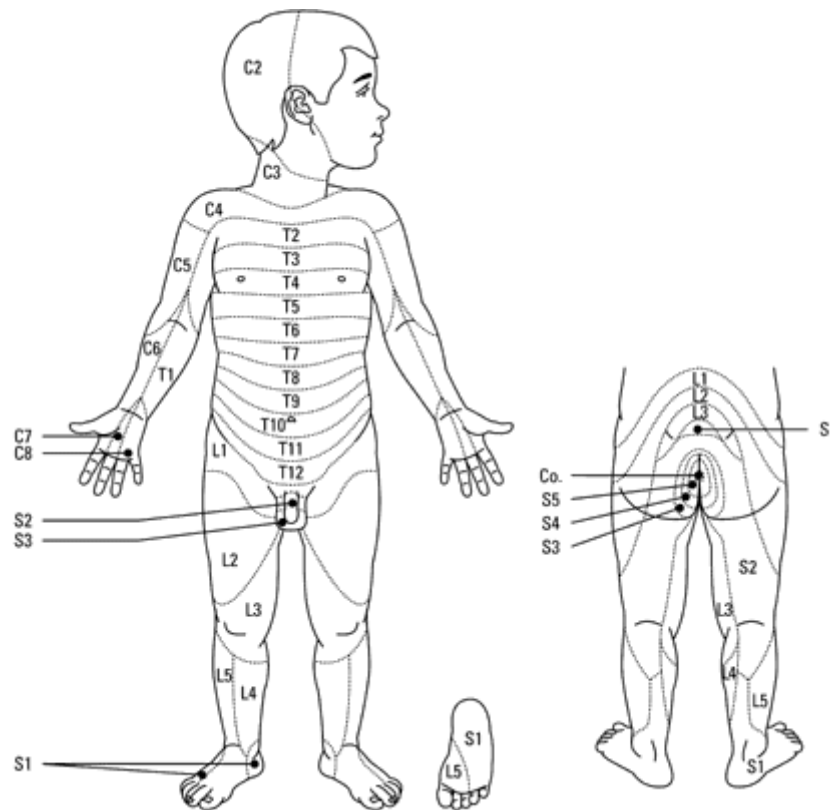
- The epidural infusion is covering the patient's area of pain
- The block is not too dense
- The block is not too high
- To decrease and prevent the risk of complications related to epidural analgesia
- Dermatome/sensory assessment should be done fourth hourly.

When should the sensory block be assessed?

- When the ward nurse is accepting the patient from recovery
- On return to the ward from recovery
- At the commencement of each nursing shift during handover
- If the patient complains of pain
- 1 hour after a bolus or increase in the rate of the epidural infusion (Royal Children's Hospital, 2017).

The APS must be contacted when:

- The epidural block is higher than T4
- There is no evidence of a block
- The block is insufficient to relieve the pain
- There is no improvement from a bolus after 15 minutes



Children's Pain Management Service, 2015.

• Procedure

- Explain the procedure to the parent and patient where appropriate
- Place an ice cube in a non-sterile glove
- Place ice in an area away from a dermatome such as the face or forearm and ask the patient to tell you how this feels
- Apply the ice to an area on the same side of the body that is likely to be blocked and ask the patient if it feels the same cold as the face/forearm or different?
- Apply ice to the areas above and below this point until it is clear where the top and bottom levels of the block are
- Repeat on the opposite side of the body (the block may be uneven)
- Document the blocked dermatomes on the Epidural prescription chart. Record the upper and lower limits of the block

Example: T7-L1 L=R or R) T7-L1 and L) T10- L2

ASSESSMENT: MOTOR BLOCK

The Bromage scale is the standard tool for measuring motor block (Anaesthesia UK, 2017). The intensity of the motor block is assessed by the patient's ability to move their lower limbs. It is important to assess motor block to:

Determine the amount of motor function

Prevent pressure areas

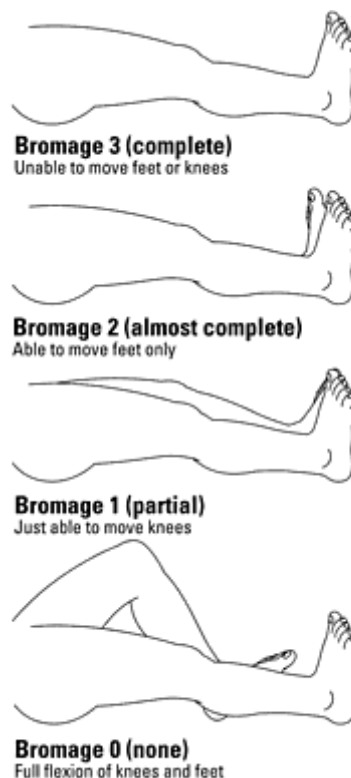
Detect the onset of possible epidural associated complications such as epidural haematoma and abscess

When should motor block assessment be done?

- Motor block assessment should be done every 4 hours. It must also be done when: The ward nurse is accepting the patient from recovery
- On return to the ward from recovery
- Before the patient attempts to walk
- 1 hour after a bolus or increase in the rate of the epidural infusion

The APS must be contacted when:

- Major changes in motor function (especially if sudden)
- Almost or complete motor block in legs (Bromage score of 2-3)
- Changes in the neurovascular observations of children in plasters and hip spicas
- Reduced hand or finger motor function with thoracic epidurals

Bromage Score

Royal Children's Hospital, 2017

Procedure

- Explain the procedure to the parent and patient where appropriate
- Ask the patient to move their toes, flex their ankles, flex their knees (whichever is the most appropriate)
- For younger children who cannot follow commands, try to elicit movement by tickling toes or lower limb
- The degree of motor block should be assessed for each side of the body
- Rate the movement according to the Bromage Score
- Document the score on the Epidural Infusion Order (Appendix 1)

Example Bromage 2 L=R or R) Bromage 2 and L) Bromage 1

THORACIC EPIDURALS

Upper limb motor function should be assessed by testing bilateral hand and finger extension and flexion.

Bolus Administration

- Bolus administration may only be administered in paediatric patients after contacting the Acute Pain Service
- 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 child must be supine when the bolus dose is administered.
- Administer the bolus dose as per order on the Paediatric Epidural Infusion Order form.
- Observations must be attended every 5 minutes for 20 minutes post bolus delivery.
- If analgesia remains inadequate contact the APS.
- Record the bolus dose on the paediatric epidural infusion order form.

Anti-coagulant medication

- If a patient is prescribed anti-coagulant medication and will be having epidural analgesia, the first dose must not be administered until after the epidural catheter is inserted.
- If a patient is on subcutaneous anti-coagulant medication the epidural catheter must not be removed until 12 hours after the last subcutaneous dose is administered.
- If the anti-coagulant medication is being administered by infusion, the time between ceasing the anti-coagulant infusion and removing the epidural must be discussed with APS (Royal Children's Hospital, 2017).
- The Acute Pain Service should be contacted for specific instructions regarding the administration of anti-platelet or anti-coagulation medication while a patient has an epidural in situ.
- Dressing

- A sterile, transparent and totally occlusive dressing is to remain in situ until epidural catheter is removed. Removal is to be governed by anaesthetist or Acute Pain Service. When checking the dressing, the following things should be noted:
 - Ooze
 - Redness
 - Inflammation
 - Dislodgement
 - Dressing integrity

Pressure Area Care

Significant motor block and decreased sensation produced by epidural infusion removes the usual warning signs that prompt patients to move. Often children with an epidural will be in plaster, which further limits movement. Patients with epidural infusions need 2nd hourly pressure care, and any alteration in their Glamorgan score needs to be updated in the patients care plan and progress notes.

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. Be aware that the bacterial filter has potential to cause a pressure injury.

Knowledge Questions**How often should sensory and motor block checks be attended?**

- a) Every time the epidural observations are attended
- b) Every 4 hours
- c) Once a shift
- d) Only when seen by the APS

Why is motor block tested in patients with epidural analgesia?

- a) To assess the level motor function
- b) To identify if the epidural rate is too fast
- c) To identify a potential epidural haematoma or abscess
- d) All of the above

Is it possible to assess the degree of motor block in an unco-operative 2 year old child?

- a) Yes, just bribe them with lollies
- b) Yes, tickle their feet or gently move their limbs
- c) Yes, get the child out of bed and watch how well they walk
- d) No, motor block cannot be assessed unless the child co-operates and is not important in this age group

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

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, sensory assessment at 20 mins
- 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, sensory assessment at 30 mins
- d) 30 minutely heart rate, respiratory rate and pain assessment for 2 hours

Why must all children receiving continuous epidural analgesia have intravenous access?

- a) For the administration of antibiotics
- b) To reduce the incidence of infection
- c) To manage hypotension or local anaesthetic toxicity
- d) To administer antihistamines if pruritis occurs

List some causes of inadequate analgesia for children 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)

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 APS regarding bolus administration
- c) Distract the child with the ipad, bubbles, or games
- d) b) and c)

COMPLICATIONS

	Why does this happen?	How do I manage it:
HYPOTENSION	Local anaesthetic can cause peripheral vasodilation. Consider other medications added to local anaesthetic e.g. Clonidine	Assess BP and record on SPOC Ensure patient is hydrated Pain Service/Anaesthetics to r/v
LEAKING	Introducer needle used at time of insertion is larger than the catheter left in the back. A little leakage is OK as long as the patient is comfortable.	4 th hourly dressing/filter/lines check If the patient is comfortable, the dressing should be reinforced and the amount of leakage monitored. excessive leaking and/or discomfort contact APS or Anaesthetics
DISCONNECTION	Epidural should NEVER be intentionally disconnected Disconnection may occur if the infusion line is pulled on the connectors are loose.	DO NOT reconnect the epidural Contact APS immediately Wrap the two ends in sterile gauze Turn off the infusion
UNILATERAL OR PATCHY BLOCK	Unilateral block may indicate that the catheter tip is close to the motor nerves on one side. Sometimes an epidural may provide uneven analgesia e.g. Left leg is comfortable but the right is painful.	2nd hourly repositioning prevents pooling of the local anaesthetic Assess dermatomes to determine area and level of block If this doesn't help contact the Pain Service/Anaesthetics, who may withdraw the catheter slightly or give a bolus
INADEQUATE ANALGESIA	When the entire wound/pain source may not be covered by the block The level of the block can be assessed using ice	Assess pain using age appropriate pain scale Assess dermatomes on both sides Check prescribed rate Is the line disconnected, leaking or kinked Check insertion site Pain Service/Anaesthetics may give a bolus and/or increase rate

UNINTENDED DENSE MOTOR BLOCK (Bromage Score >2)	<p>More likely in lumbar epidurals as they effect the nerves to the legs</p> <p>Cognitive impairment, young age of patient and pain may make accurate assessment of block difficult.</p>	<p>Assess motor block using Bromage Score Pain Service/Anaesthetics may decrease/stop rate until the block regresses, then re-start at a lower rate.</p> <p>NOTE: Bilateral motor block may indicate epidural complication</p> <p><u>Sudden loss</u> of movement should be reported immediately due to risk of catheter migration, overdose and spinal catastrophe – stop infusion.</p> <p>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 APS</p>
RESPIRATORY DEPRESSION	<p>Opioid overdose Level of the block is too high >T3</p>	<p>Cease the epidural infusion Call for clinical review or Rapid Response as per JHCH CERS policy Give high flow oxygen Increase frequency of Observations to every 5 minutes until medically assessed and/or respiratory rate improves. Check and document vital signs on the SPOC Attempt to rouse the patient If patient is not breathing, commence Basic Life Support If there is an Opioid in the Epidural Solution then: Administer IV Naloxone 5 micrograms/ kg to a maximum of 4 doses If no response to first dose reassess vital signs for need of CPR. REASSESS and REPEAT THIS DOSE EVERY 5 MINUTES UNTIL RESPIRATORY RATE GREATER THAN 10.</p>

OVERSEDATION	A decreasing level of consciousness develops gradually with opioid overdose and may provide earlier warning of impending overdose than the respiratory rate.	If sedation score VPU on SPOC: Stop infusion Check and record vital signs and increase frequency of observations Give high flow oxygen Activate JHCH CERS response Contact APS
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, dizziness Middle – twitching, diaphoresis, confusion Late - seizures and loss of consciousness, hypotension Intractable cardiac arrest	Prevention - do not exceed recommended doses Monitor patient for early signs of toxicity Administer face mask oxygen Respond to early signs by stopping the infusion Escalate as per JHCH CERS policy Contact APS Anticipate cardiopulmonary resuscitation
NAUSEA OR VOMITING		Give prescribed anti-emetics If none prescribed or vomiting persists activate Clinical Review call. If vomiting, ensure airway remain patent by turning patient on side
URINARY RETENTION		Most patients with an epidural will have an in dwelling catheter.

Royal Children's Hospital, 2017; Same, 2016; Sydney Children's Hospital, 2017, Great Ormond Street Hospital, 2014.

INFECTION/ABSCCESS

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 $\geq 38.5^{\circ}\text{C}$.

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 $>38.5^{\circ}\text{C}$, 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 APS prior to proceeding.

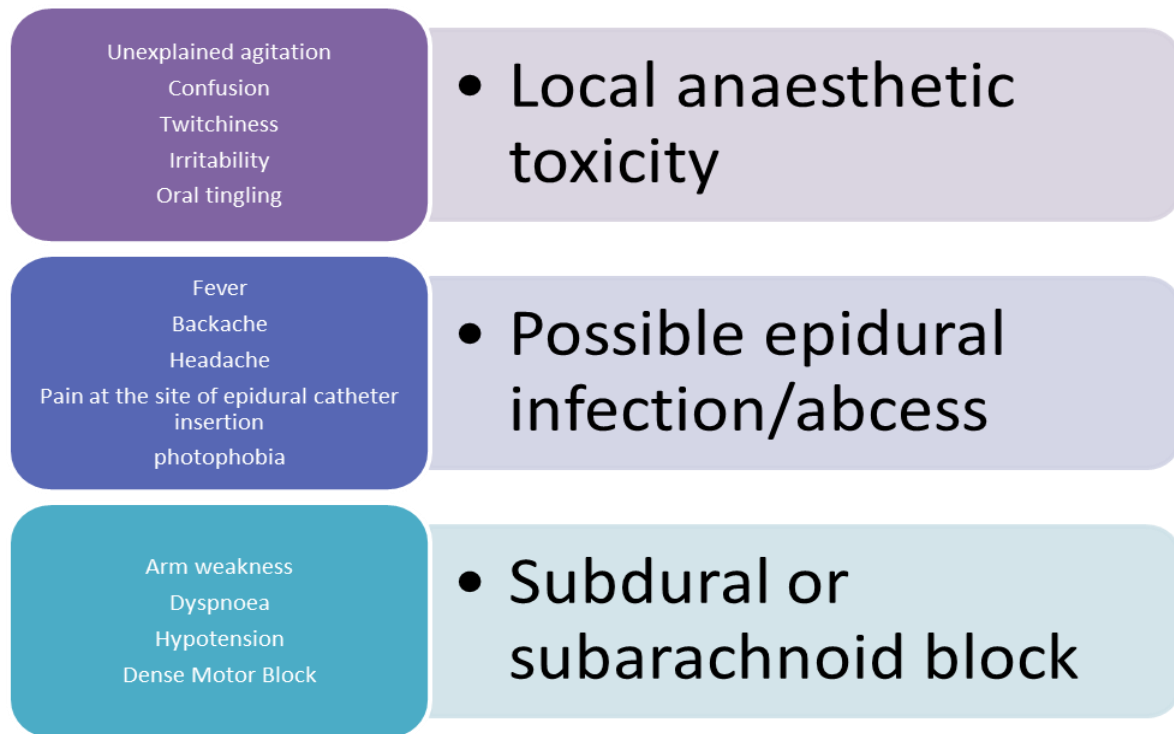
Prevention

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 APS
- Frequent observation of the insertion site for signs of infection such as redness and pus.

Management:

- Contact the APS if the child's temperature is $\geq 38.5^{\circ}\text{C}$ or signs of infection at insertion site.
- Consider initiating Inpatient Sepsis Pathway
- Anticipate removal of epidural catheter.
- If an abscess is suspected, an urgent MRI scan will be arranged.



Knowledge Questions

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, pruritis, sleepiness, tachycardia
- d) Numbness of tongue, hypotension, seizures, loss of consciousness

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

What signs and symptoms would your patient exhibit if they were developing an epidural abcess?

- a) Back pain
- b) Dense motor block
- c) Fever
- d) All of the above

REMOVING THE EPIDURAL

Indication for Removal of Epidural Catheter:

- Epidural no longer required and removal ordered by Pain Service
- Infection
- Provision of insufficient analgesia according to Pain Service
- Continued catheter leakage
- Contamination of epidural catheter through disconnection or dressing removal.
- Epidural catheter is malpositioned

Equipment Requirements

- Alcohol hand gel
- Personal Protective Equipment: protective eyewear, impervious gloves
- Dressing trolley
- Dressing pack
- Sterile scissors and specimen container if catheter tip is to be sent for culture
- Sterile occlusive dressing prn
- If infection suspected: sterile saline and wound swab
- Waste receptacles

The Procedure

- HAIDET/PPE/five moments of Hand Hygiene
- Explain the procedure to the child and parent and gain verbal consent.
- Verify the correct patient identification by asking patient or carer to state full name, date of birth and checking MRN.
- Locate and gather appropriate equipment, and prepare trolley BEFORE starting the procedure.
- Ensure other staff who are assisting are ready.
- Perform hand hygiene.
- Position the patient on their side or in a sitting position, bending forward. This will spread the laminae of the vertebrae apart, making removal easier.

Removal of catheter when tip does not need to be sent for culture

- Cease infusion and clamp giving set
- Don personal protective eyewear
- Perform hand hygiene and don impervious gloves
- Remove tape and dressing and dispose
- Inspect catheter site for swelling/ leakage/ inflammation / discharge
- Ensure the patient positioned to allow maximum intervertebral space (as described above) prior to gentle traction
- Remove gloves, perform hand hygiene and don new impervious gloves
- Using aseptic non-touch technique remove catheter with steady, gentle traction. If the epidural does not come out easily, notify APS.

- Examine the blue catheter tip and confirm it is intact with another nurse.
- If the catheter site is leaking apply pressure for 1-2 mins.
- Place a small occlusive dressing, i.e., Band-Aid on the site. Remove dressing within 12 hours. Document in health care record. Notify medical officer if abnormal signs observed. Record vital sign observations.
- Dispose of the waste and epidural catheter in appropriate waste stream.
- Remove and dispose gloves and perform hand hygiene
- Dispose remaining infusion and giving set in accordance with S8 drug policy if applicable e.g. for Fentanyl infusions.
- Perform hand hygiene and clean trolley. Remove PPE.
- Document removal and confirmation that tip is intact on epidural form.
- Removal of catheter when tip does need to be sent for culture
- Cease infusion and clamp giving set
- Don protective eyewear
- Perform hand hygiene and don impervious gloves
- Remove tape and dressing and dispose
- Remove gloves and perform hand hygiene.
- Label specimen jar and wound swab.
- Open dressing pack on trolley, add sterile saline and open sterile scissors.
- Remove top of sterile specimen jar and position jar and lid so they will not be contaminated.
- Perform hand hygiene and don sterile gloves
- Inspect catheter site for swelling/ leakage/ inflammation / discharge
- Clean insertion site with sterile normal saline and allow to air dry
- Ensure the patient positioned to allow maximum intervertebral space (as described above) prior to gentle traction
- Using aseptic non-touch technique remove catheter with steady, gentle traction. If the epidural does not come out easily, notify IPS or anaesthetist (for obstetric patients)
- Examine the blue catheter tip and confirm it is intact with another nurse, midwife or medical officer
- Place the catheter on the sterile dressing pack and cut off distal 2cm of the tip using sterile scissors and place in the sterile specimen jar.
- Dip wound swab in the transport medium and swab insertion site. Obtain completed pathology request forms from medical officer and send specimens to pathology (refer to local procedure GNAH_0126 Specimens for pathology)

INTRAVENOUS CANNULA

The patient must have intravenous cannula access for 12 hours after the removal of an epidural catheter.

- Indwelling Urinary Catheter Removal
- The risk of urinary retention after the epidural is ceased is dependent on the drugs used in the epidural infusion solution.

- Drugs such as morphine and hydromorphone remain in the body for longer periods and can increase the risk of urinary retention, however, these drugs are not routinely used for paediatric epidural infusions on the wards.
- The indwelling catheter may be removed immediately after the epidural has been removed, unless the APS or anaesthetist directs otherwise.

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HUNTER NEW ENGLAND LOCAL HEALTH NETWORK		PLEASE USE GLUED LABEL IF AVAILABLE	
Facility _____		SURNAME _____	UNIT NUMBER _____
		OTHER NAMES _____	
		ADDRESS _____	
		DATE OF BIRTH _____	M.O. _____

BINDING MARGIN - DO NOT WRITETheatre GNS7902

PAEDIATRIC EPIDURAL INFUSION

Theatre

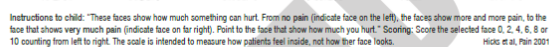
HUNTER NEW ENGLAND LOCAL HEALTH NETWORK		PLEASE USE GUMMED LABEL IF AVAILABLE		UNIT NUMBER
Facility _____		SURNAME		
		OTHER NAMES		
		ADDRESS		
ACUTE PAIN SERVICE (APS) EPIDURAL INFUSION ORDERS		DATE OF BIRTH		M.O.
		SIGNATURE		

HUNTER NEW ENGLAND LOCAL HEALTH NETWORK		PLEASE USE GUMMED LABEL IF AVAILABLE		UNIT NUMBER
Facility _____		SURNAME		
		OTHER NAMES		
ACUTE PAIN SERVICE (APS)		ACCUSED		
EPIDURAL INFUSION ORDERS		DATE OF BIRTH		M.O.

Gestational age 32 – 50 weeks: CRIES Neonatal Pain Scale (post-op pain, report of caregiver)

Krechel S, Bildner J. *Endotracheal Anesth* 1995

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Merkel et al. *Pediatric Nursing* 1997

No gain

Cognitively-impaired children: Please use Non-communicating Children's Pain Checklist (NCCPC) found in Acute Pain Resource Folder at nurses' station (*post-op pain: report of observer*)

McCrath et al. Dev Med Child Neurol 1999

Learning Package: Reflection on Learning

This document guides your reflection on the extent to which the package meets your professional development needs, and how you plan to apply your learning into practice. This tool is not part of the assessment process, and has been included as a document that you may wish to include in your professional portfolio. Time taken to complete learning package: _____

What was your purpose in completing this learning package?

Did you achieve this by completing the learning package?

Reflecting on the content, what key learning have you obtained?

What learning will you apply to your practice immediately? How will you do this?

What learning needs have you identified as a result of completing this learning package?

How do you plan to address these needs?

Signature: _____ Date: _____

LEARNING PACKAGE EVALUATION FORM

Your feedback regarding this learning package is important to ensure the package meets your learning needs. Please take 5 minutes to answer the following questions to facilitate any change required for future learning packages.

- | | | |
|--|-----|----|
| 1. The learning outcomes of the learning package were clearly identified | Yes | No |
| 2. The learning outcomes of the package were appropriate | Yes | No |
| 3. The content provided enabled me to meet the learning outcomes? | Yes | No |
| 4. The activities motivated my interest in the topic | Yes | No |
| 5. Activities and workbook questions supported my understanding of the topic | Yes | No |
| 6. The package was presented in a logical manner | Yes | No |
| 7. The assessment process related to this package was clearly outlined (if applicable) | Yes | No |
| 8. My most relevant learning outcomes from this package were: | | |

9. The key learning points from this package I can immediately apply to practice include::

10. The least relevant component(s) of this package were:

11. Some suggestions I would like made to improve the package would be:

12. Further comments:

Thankyou for your time to complete the evaluation

Return to:

Your Nurse Educator or Clinical Nurse Educator.