LRI Children's Hospital

Guideline for the Care of Neonates, Children and Young People Requiring Epidural Analgesia

Staff relevant to:	All Health Professionals who care for neonates, children and young people requiring epidural analgesia.
Team approval date:	October 2022
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Written by:	Zoe Syrett
Policy No:	C7/2015

Contents

1. Introduction and who this guideline applies to

This guideline has been developed to provide Health Professionals in UHL with guidance in the safe, effective care and management of a neonate, child or young person receiving epidural analgesia.

Related Documents:

- **Consent to Examination or Treatment UHL Policy**
- **Vascular Access UHL Policy**
- **Urethral Catheterisation for Male and Female Children UHL Childrens Hospital Guideline**
- **Aseptic Non Touch Technique UHL Guideline**
- **Paediatric Observation Priority Score (POPS) and Paediatric Early Warning Score (PEWS) UHL Childrens Guideline**
- **Prescribing and Administration of Medicines in Children (including neonates)**

2. Guideline for the Care of Neonates, Children and Young People Requiring Epidural Analgesia.	
No.	**Action**
2.1	The decision to use epidural analgesia will be made by the anaesthetist. Ensure that the parent/carer and child are given a full explanation of what an epidural is, answer any questions and ensure that an information leaflet on epidurals is available and given to the parent/carer and young person at the time of consent of treatment.
2.2	Ensure that the epidural pump and appropriate giving set is sent to theatre with the child. **N.B** This is not applicable for neonates; pumps will be collected from the Children's Hospital.
2.3	Ensure the prescription is prescribed on the pre-printed stickers: • Green for plain Levobupivacaine 0.125% • Yellow for Fentanyl 2 micrograms/ml and Levobupivacaine 0.125% • Clonidine 1 microgram/ml and levobupivacaine 0.125%
2.4	**SET UP PROTOCOL:** • Levobupivacaine 0.125% 0.1-0.4mls/**kg**/hr Maximum 15mls/hr • Fentanyl 2mcg/ml and Levobupivacaine 0.125% 0.1-0.4mls/**kg**/hr Maximum 15mls/hr • Clonidine 1mcg/ml and Levobupivacaine 0.125% 0.1-0.4mls/**kg**/hr Maximum 15mls/hr • Neonate and thoracic protocols: 0.1-0.2mls/**kg**/hr Maximum 15mls/hr • Pump to be programmed according to manufactures instructions. • Pump start rate and prescription must be checked by **two** registered health professionals competent in the use of epidural analgesia (2 nurses or 1 anaesthetist and 1 nurse). This also applies to bag changes.

Monitoring	
No.	**Action**

2.5	• Explain to the parent/carer and child what observations are necessary and why
	• Wherever possible care for the child close to the nurses station
	• Nursing ratio standard for epidural care is 1:4 this is to ensure the required level of care is maintained
	
	<u>Observations</u>
	• **¼ Hourly** for the **first hour** (normally done in recovery) **or until child stabilised**
	  • Pulse
	  • Respirations
	  • Oxygen saturations
	  • Pain
	  • Emesis
	  • Sedation
	• Then **1 hourly** thereafter
	• **Blood pressure** (for clonidine epidural and in over 6 year old patients only or if condition dictates i.e. excessive blood loss intra-operatively/oliguria/hypotension)
	  • Hourly for the first 4 hours, then 4 hrly thereafter if remains within normal parameters
	• **4 hourly**
	  • Site check & pressure area care
	  • Temperature
	  • If temperature is persistently above 38°c inform the anaesthetist/pain nurse
	• **Bromage score & block level check**
	  • Hourly for the first 4 hours, then 4 hrly thereafter if:
	  • Low bromage score
	  • Block level within expected level of block (on yellow sheet)
	  • Child comfortable – low pain score
	  • Any change in infusion rate or bolus given, high block level, increase in bromage score, increased pain score or hypotension **must revert back** to **hourly** observations
	• **<u>If epidural rate is increased or a bolus given</u>** you must go back to **¼ hourly** observations, then repeat as above.

Pulse, respiration, oxygen situations & blood pressure

- See PEWS/Eobs

Pain, emesis and sedation

- See Childrens Hospital Pain Assessment Tool Chart

Bromage Score

(Indicating motor loss)

0 = No motor block

1 = Inability to raise extended leg; able to move knees and feet

2 = Inability to raise extended leg and move knee; able to move feet

3 = Complete motor block of limb

Bromage score for hip spica can be modified a follows:

0 = No motor block (can move feet)

3 = Inability to move feet

If the Bromage score increases, contact the anaesthetist or Pain Specialist Nurse immediately. See dense block troubleshooting.

N.B The child's normal level of motor function should be considered when scoring (e.g. in the case of children with cerebral palsy this may be altered).

Block level check

- Use Ethyl Chloride, Ice or touch
    - T10 = Umbilicus
    - T8 = mid-point between umbilicus and xiphisternum
    - T6 = Xiphisternum
    - T4 = Nipple line

Site check & pressure area care

- You must ensure the epidural catheter is securely taped to the child's back.
- Check epidural site for leakage, redness and swelling. Leakage does not always indicate that the epidural needs to be removed. See troubleshooting guide below and **DO NOT REMOVE** the dressing
- Reduced sensation from the epidural can allow pressure areas go unnoticed increasing the possibility of tissue damage

2.6	**Assessment:** • Assess pain using the pain tool identified during the admission process • Where applicable allow the child to assess their own pain • Assess sedation level using the Childrens Hospital Sedation Scale • Assess emesis level using the Childrens Hospital Nausea and Vomiting Scale
2.7	**Discontinuing the epidural:** • Standard running time is 48 hrs unless a different time limit has been documented by the anaesthetist • You must ensure that the baby/child/young person has received adequate analgesia prior to stopping the infusion • **YOU MUST NOT** wean down the epidural rate • Leave epidural catheter in situ for 4 hours after discontinuing. **You must continue epidural observations during this 4 hour period** • Record and sign the volume remaining on the front sheet with **two** registered nurses checking the amount • Dispose of the infusion in appropriate facility • When removing the epidural catheter ensure the blue tip is intact (**N.B** if the catheter is difficult to remove and the tip is split, broken or absent contact the anaesthetist immediately) • If the insertion site and/or catheter tip shows signs of infection, send the tip to microbiology for culture and sensitivity • Cover the site with a dressing such as a spot plaster or Opsite spray, if possible • If a spica in situ, position child to enable good visualisation, it may be necessary to use a pen torch
2.8	**Low Molecular Weight Heparin Prophylaxis:** • If LMWH is prescribed pre-operative it should be prescribed for **1800hrs** the day prior to surgery as **12hrs** should elapse between a dose of LMWH and placement/removal of an epidural catheter. • LMWH can be administered **4 hours after** placement/removal of the epidural catheter
2.9	**Urinary catheters will be inserted if:** 1. Surgically indicated 2. Based on clinical requirements, special consideration will be given to those children returning to level 2-3 areas post operatively 3. Urinary catheter to be removed alongside epidural catheter unless placed for surgical reason

3. Troubleshooting

3.1 Monitor for signs of local anaesethic toxicity

Signs:	Nursing action:
• Drowsiness/feeling lightheaded • Tingling around mouth and lips • Numbness of tongue • Tinnitus or visual disturbances • Weakness or tingling in the arms • Twitching/muscle spasms • Convulsions • Loss of consciousness • Cardiovascular collapse • Respiratory arrest	• **STOP INFUSION IMMEDIATELY AND SIT UP** • **Call 2222** for cardiovascular collapse • If child is alert and oriented – call anaesthetics/on call anaesthetist • If drowsy or sedated – call CICU doctors and prepare for resuscitation. Consider naloxone if opioids administered
Be aware that intravenous Intralipid 20% may be requested as an antidote for local anaesthetic toxicity and know where the nearest bag is located • **Ward 10 – cupboard 10 (labelled on outer door)** • **Ward 19 – Bottom cupboard Next to TTO's (labelled on outer door)** • **Recovery - treatment room** **For ASRA guidelines regarding local anaesthetic toxicity see appendix 1**	

3.2 Respiratory Depression:

Signs:	Nursing action:
• The child's respiratory rate falls below rate ranges on PEWS eObs or that which is normal for the child • The child's SpO2 levels fall below 90%	• Stop the pump and assess sedation • Give oxygen • If child is easily rousable – call anaesthetics/on call anaesthetist • Consider Naloxone if epidural bag contains Fentanyl

3.3 Pain

Nursing Action:

• Assess severity and location of pain
• Assess sensory block
  ○ Both sides of the body should be checked, ideally the child should have an insensitive band around the wound site (N.B it is not uncommon to have uneven blocks – different level on either side)
  ○ A position change/tilt may be all that is needed to provide adequate block, this may mean being positioned/tilted on the side of surgery
• Check the pump, line, and insertion site for any possible kinks/leakage/disconnection
• Administer other analgesics as prescribed
• Contact pain nurse/anaesthetist

NB: Staff should be aware that an increase in pain or breakthrough pain may indicate surgical complications

3.4 Hypotension:

Nursing Action:

• Lie flat - **Do not tip head down**
• Check fluid balance
• Test sensory level
  ○ If block above expected level stop epidural and contact anaesthetics
  ○ If block below expected level continue epidural and look for other causes of low BP (e.g. haemorrhage, drug reaction) and contact anaesthetics
• Contact medical support/anaesthetics for possible fluid bolus

3.5 Nausea and Vomiting:

Nursing Action:
• Administer anti-emetic as prescribed • If due to Fentanyl epidural, consider low dose naloxone/changing bag to plain local anaesthetic bag • Aspirate nasogastric/gastrostomy if applicable • Contact medical support/anaesthetics

3.6 Urinary Retention:

Nursing Action:
• Most patients will have an indwelling urinary catheter for the duration of epidural • If no catheter monitor urinary output closely as lumbar epidurals may affect the bladders' ability to empty fully • If urinary retention occurs and no/adequate urinary output after 4 hours, please escalate to NIC/medical staff

3.7 Patchy/low Block:

Nursing Action:
• If blocked area becomes ill defined or 'patchy' with pain, contact the CNS or anaesthetist. Patchy blocks can be an early sign that the patient may lose dermatome level completely and may need a bolus top up by the anaesthetist • Increase epidural rate within the prescribed parameters starting with 0.05mls/kg/hr increase and observe • See pain troubleshooting above for possible position changes • If no increased pain revert back to hourly block checks and observe

3.8 Dense Block:

Nursing Action:
• A dense block is not unusual in recovery or following a bolus and if bromage score continues to score 3 after the first 4 hours contact CNS or anaesthetist *(Local anaesthetic may affect motor nerves as well as sensory nerves)* • For management of unresolving dense block please see appendix 2

3.9 High Throracic Block:

Nursing Action:

• If block above T4:
  ○ Stop infusion
  ○ Sit patient up
• Contact anaesthetist or CNS
• Pump maybe recommenced once block is at safe level at lower rate

3.10 Leaking Epidural:

Nursing Action:

• Leakage from the entry site is common, this can be due to the Tuohy needle being larger than the epidural catheter
• If the patient is comfortable
  ○ Observe site 1-2 hourly
  ○ Reinforce the dressing if necessary, ensuring good visualisation of the insertion site, DO NOT remove the original dressing
• If the patient is in increased pain, contact the CNS or anaesthetist
• If dressing completely off, stop epidural, contact CNS or anaesthetists

3.11 Soiled dressing:

Nursing Action:
• If any debris or faeces is under the clear dressing, stop epidural and remove epidural catheter - contact CNS or anaesthetists • **NB –** for tunnelled epidurals the epidural catheter insertion site and exit site will be in different positions so both sites must be visualised as secure under the clear dressing, if unsure contact CNS or anaesthetists

3.12 Temperature:

Nursing Action:
• If temperature is persistently above 38.0°C notify CNS or anaesthetist

4. Complications of Epidurals:

Dural Puncture Headache:
• This usually occurs when the Dura mater is inadvertently punctured during the placement of the epidural catheter • The main symptom is a postural frontal headache, photophobia, tinnitus, and nausea & vomiting • Headache is severe and made worse by sitting up or mobilising - It may be associated with nausea and vomiting, photophobia, tinnitus, cranial nerve palsies • Symptoms are relieved by lying flat and most dural headaches resolve spontaneously by one week **Management of Post Dural Puncture Headache:** • Inform anaesthetist/CNS • Give regular simple analgesics – paracetamol & NSAIDS • Maintain good hydration – regular drinks/IVI • Avoiding coughing or straining – laxatives may be needed • Blood patch if headache remains persistent - the anaesthetist may perform an “autologous blood patch” (administering a small amount of the patients own blood epidurally to seal over the leak in the Dura)

Epidural Haematoma:

- Epidural haematoma associated with epidural analgesia in children is rare
- An epidural haematoma can arise from trauma to an epidural blood vessel during catheter insertion or removal. Although the incidence of a haematoma occurring is extremely rare, (Llewwllyn and Moriarty, 2007) particular care must be taken in patients receiving anti-coagulant therapy
- Initial symptoms include back pain and tenderness. As the haematoma expands to compress the nerve roots or the spinal cord, this proceeds to sensory/motor weakness, loss of bowel bladder control

Management of Epidural Haematoma:

- MRI
- Surgical decompression

Epidural Abscess:

- This is an extremely rare complication (Llewwllyn and Moriarty, 2007)
- Infection can be introduced into the epidural space via contaminated equipment or drugs or from an endogenous source, leading to bacteraemia which seeds to the insertion site or catheter tip
- Alternatively, infection can track down from the entry site on the skin to the epidural space

Recognition & Management of Epidural Abscess:

- Symptoms include back pain and tenderness accompanied by redness with a purulent discharge from the catheter exit site
- Signs of infection
- MRI
- Surgical decompression
- Discuss antimicrobial with microbiologist

5. Education and Training

All nursing staff caring for and setting up epidurals must be IV competent and have attended and signed off competent for the epidural section of the Paediatric Pain Management Study Day. This will ensure that staff:

- Can give an explanation to the child and family on epidurals to achieve maximum benefit from its effects
- Can programme the pump safely
- Can check, programme and change the pump if the child's condition changes
- Are able to troubleshoot the pump
- Are able to troubleshoot any problems or complications associated with epidurals
- Have an understanding of the potential complications of epidural analgesia and are able to deal with them effectively
- Have an understanding of which drugs can be given alongside epidural analgesia

6. Monitoring and Audit Criteria

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
Competency assessments for all users	HELM to check for compliance after the pain study day	Pain specialist nurse	Registers from the Pain Study Day to be monitored against HELM annually to monitor compliance	Pain Nurse Specialist to liaise with relevant Clinical Area Managers if issues raised around compliance
100% prescriptions are on appropriate pre-printed stickers	Prescription charts monitored on pain round	Pain specialist nurse	Pain nurse to liaise with relevant clinical area management if issues arise with prescribing	Datix

7. Supporting Documents and Key References

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15. NURSING AND MIDWIFERY COUNCIL (2021). Keep records of all evidence and decisions. London, Nursing and Midwifery Council.

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8. Key Words

Epidural, Neonates, Children, Fentanyl, Levobupivacaine, Bromage

The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.
As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

Contact and review details	
Guideline Lead (Name and Title) Zoe Syrett - Children's Pain Specialist Nurse	**Executive Lead** Chief Nurse
Details of Changes made during review: • Added use of clonidine • Set-up protocols amended to include clonidine and neonatal and thoracic protocols • Added nursing ration standard 1:4 • BP & Bromage score monitoring frequency updated • Block level assessment now includes anatomical structures in relation to vertebrae. • Advice on urinary catheter removal updated • Added a new section on trouble shooting, monitoring for signs of toxicity and complications.	

Appendix1: ASRA checklist

AMERICAN SOCIETY OF REGIONAL ANESTHESIA AND PAIN MEDICINE

CHECKLIST FOR TREATMENT OF LOCAL ANESTHETIC SYSTEMIC TOXICITY (LAST)

The Pharmacologic Treatment of LAST is Different from Other Cardiac Arrest Scenarios

- **Reduce** individual epinephrine boluses to ≤ 1mcg/kg
- **Avoid** vasopressin, calcium channel blockers, beta blockers, or other local anesthetics

- Stop injecting local anesthetic
- Get help
  - Consider lipid emulsion therapy at the first sign of a serious LAST event
  - Call for the Intralipid 20%
  - Alert the nearest cardiopulmonary bypass team - resuscitation may be prolonged
- Airway management
  - Ventilate with 100% oxygen / avoid hyperventilation / advanced airway device if necessary
- Control seizures
  - Benzodiazepines preferred
  - **Avoid** large doses of **propofol**, especially in hemodynamically unstable patients
- Treat hypotension and bradycardia – **if pulseless, start CPR**

Lipid Emulsion 20% (Precise volume and flow rate are not crucial)	
Greater than 70 kg Patient	Less than 70 kg Patient
Bolus 100 mL Lipid Emulsion 20% rapidly over 2-3 minutes • Lipid emulsion infusion 200-250 mL over 15-20 minutes	Bolus 1.5 mL/kg Lipid Emulsion 20% rapidly over 2-3 minutes • Lipid emulsion infusion ~0.25 mL/kg/min (ideal body weight)
If patient remains unstable: • Re-bolus once or twice at the same dose and double infusion rate; be aware of dosing limit (12mL/kg) • Total volume of lipid emulsion can approach 1 L in a prolonged resuscitation (e.g > 30 minutes)	

- Continue monitoring
  - At least 4-6 hours after a cardiovascular event
  - Or, at least 2 hours after a limited CNS event
- Do not exceed 12 mL/kg lipid emulsion (particularly important in the small adult or child)
  - Much smaller doses are typically needed for LAST treatment
- See reverse side of this checklist for further details

Risk Reduction (Be sensible)

- Use the least dose of local anesthetic necessary to achieve the desired extent and duration of block.
- Local anesthetic blood levels are influenced by site of injection and dose. It is important to identify patients at increased risk of LAST prior to using local anesthetics, e.g., infants <6 months old, small patient size, advanced age and frailty, heart failure, ischemic heart disease, conduction abnormalities, or rhythm disorders, metabolic (e.g., mitochondrial) disease, liver disease, low plasma protein concentration, acidosis, and medications that inhibit sodium channels. Patients with very low ejection fraction are more sensitive to LAST and may be especially prone to elevated local anesthetic levels associated with 'stacked' injections.
- Consider using a pharmacologic marker and/or test dose, e.g. epinephrine 2.5 to 5 mcg/mL (total 10-15mcg). Know the expected response, onset, duration, and limitations of a "test dose" in identifying intravascular injection.
- Aspirate the syringe prior to each injection while observing for blood in the syringe or tubing
- Inject incrementally, while observing for signs and inquiring for symptoms of toxicity between each injection.
- Consider discussing local anesthetic dose as part of the pre-procedural or pre-surgical pause ("time out").

Detection (Be vigilant)

- Monitor the patient during and after completing injection. Clinical toxicity can be delayed 30 minutes or longer.
- Use standard American Society of Anesthesiologists (ASA) monitors.
- Communicate frequently with the patient to query for symptoms of toxicity.
- Consider LAST in any patient with altered mental status, neurological symptoms or signs of cardiovascular instability after a regional anesthetic (e.g., change in HR, BP, ECG). Consider LAST even when the local anesthetic doses is 1) small (susceptible patient), 2) atypically administered (subcutaneous, mucosal, topical), 3) administered by the surgeon, or 4) after recent tourniquet deflation.
- Central nervous system signs (may be subtle, atypical, or absent)
  - Excitation (agitation, confusion, vocalization, muscle twitching, seizure)
  - Depression (drowsiness, obtundation, coma, or apnea)
  - Non-specific (metallic taste, circumoral numbness, diplopia, tinnitus, dizziness)
- Cardiovascular signs (occasionally the only manifestation of severe LAST)
  - Initially may be hyperdynamic (hypertension, tachycardia, ventricular arrhythmias), then
    - Progressive hypotension
    - Conduction block, bradycardia or asystole
    - Ventricular arrhythmia (ventricular tachycardia, Torsades de Pointes, ventricular fibrillation or asystole)
- Sedation may abolish the patient's ability to recognize or report LAST-related symptoms.

Treatment

Suggested components of a "Intralipid Kit"

- Bag Intralipid 20%
- Several large syringes and needles for administration
- Standard IV tubing
- ASRA LAST Checklist

- Administer lipid emulsion at the first sign of a serious LAST event.
- Lipid emulsion can be used to treat LAST caused by any local anesthetic.
- Standard dose epinephrine (1 mg) can impair resuscitation from LAST and reduce the efficacy of lipid rescue. Use smaller doses than typical for ACLS, e.g., ≤ 1mcg/kg boluses, or for treating hypotension.
- Propofol should not be used when there are signs of cardiovascular instability.
- Prolonged monitoring (2-6 hours) is recommended after any signs of LAST, since cardiovascular depression due to local anesthetics can persist or recur after treatment.
  - If LAST event is short-lived and without signs of cardiovascular instability, one may consider proceeding with surgery after an uneventful~30 minute interval of monitoring.

Please report LAST events to www.lipidrescue.org

The Third American Society of Regional Anesthesia and Pain Medicine Practice Advisory on Local Anesthetic Systemic Toxicity. Executive Summary 2017. Reg Anesth Pain Med 2018;43:113-123

The ASRA LAST™ smart phone app can be purchased from The Apple App Store or Google Play

Appendix 2: Management of prolonged leg weakness/dense block with epidural analgesia

Management of Prolonged Leg Weakness/Dense Block with Epidural Analgesia

All patients receiving epidural analgesia must have leg strength assessed regularly using the "Bromage score". Increasing leg weakness usually means that the infusion rate is too high. However, it may mean that the patient is developing an epidural haematoma. If not diagnosed and treated promptly this will lead to paraplegia.
Thoracic epidural analgesia should not cause profound leg weakness