EPIDURALS : POST OPERATIVE CARE GUIDELINES
(For CNB insertion, see RA section)

- EPIDURALS provide excellent analgesia for young children only if dermatomal coverage is adequate
- In case of inadequate dermatomal cover, the pain consultant is responsible for deciding how to best optimise analgesia which may include removing the catheter & alternative pain control. If IV opiates are used please remove any opiate additive in the epidural solution that is infused.
- Strict asepsis to be maintained with vigilance not to contaminate with potential neurotoxic agents eg alcohol/cleaning solutions when diluting or topping up epidural
- Prerequisites:
    - Should be nursed in ICU or HD setting with appropriate monitoring
    - Should have a working IV line
    - Total doses/infusion rates should not exceed the recommended limits for age.

EPIDURALS: PAIN TEAM DUTIES

- Twice daily review until discharge from the pain service
- Removal of catheter should be performed by 72H post-insertion
- The patient should be followed up at least 1 day more after the epidural is removed
- Assessment management of analgesic quality dermatomal level as well as complications including dressing issues, catheter migration, pruritus, somnolence, numbness, neurological complications as well as pressure sores
- Adjust refill prescription as needed trouble-shoot equipment problems

EPIDURAL DRESSINGS

- Dressing: a "window" dressing should be applied to facilitate inspection of the insertion site and catheter marking at skin level
- The dressing should be intact, clean, dry & adherent
  Double Tegaderm application (small and big) reduces the incidence of catheter leak as does using Dermabond to seal the puncture site.
- The catheter should be taped such that the catheter marking at skin is clearly visible & easy to inspect
- Continuous caudal catheters should be securely fixed with Steristrips and dressed with a waterproof dressing such as Tegaderm, covered with Hypafix to avoid fecal contamination

EPIDURAL SOLUTION PREPARATION:

- Diluted ASEPTICALLY
- Please predict/precalculate at least 48h-72h amount to be used to determine bag volume (using average infusion rate at 0.3 ml/kg/h) and use an appropriately sized cartridge
- Diluent for Epidurals must be normal saline and NOT water
- All drugs must be preservative free & sterile
- Labeling: Use special coloured Epidural stickers & labels
  "FOR EPIDURAL USE ONLY"
  with Clearly written prescription: LA (%) & additive (mcg/ml)
  LA amount (in mg), total volume (ml), diluent (N/S) & additive used amount (mcg) labeled patient's name, with date & time & signed
- Always use a filter
  Make sure all connections are secure and cover connections with a plastic bag to avoid contamination

TROUBLE-SHOOTING EPIDURALS: common problems

1. Inadequate pain relief

Usually due to inadequate dermatomal level/ malposition of catheter tip & occasionally from a failed block.

Solutions:

1. Achieve target by correct insertion level & position of catheter tip; pre-empt & bolus with a sufficient volume of LA intra-op or post-op before starting the infusion; *NB : Unless the epidural is sited sufficiently close to the segment required for analgesia, it will be difficult to achieve excellent analgesia without giving huge & potentially toxic volumes of LA.*
2. Additives eg epidural fentanyl (either as bolus or added to the infusion) may be helpful; if using epidural morphine (hydrophilic) bolus, this should be given at least 1 h before completion of surgery to give it adequate time to take effect & only if confident epidural is sited correctly in the epidural space

In instances when a lumbar epidural may be preferable to a thoracic epidural because of the risks inherent (i.e. small child<20 kg), morphine can be used instead of fentanyl in the epidural solution to improve dermatomal spread of analgesia.

3. Check epidural site (for catheter kink/migration) ascertain dermatomal levels
4. Attempt rescue slowly bolus lignocaine 0.5-1% (about 0.5- 1 ml/kg).

If pain is relieved with the bolus, either increase the infusion rate OR change epidural solution to morphine instead of fentanyl.
If there is no pain relief at all, either re-site the epidural or remove it & prescribe appropriate analgesia.

2. Excessive Sedation:

Sedation score must be closely monitored as a score exceeding 2 may be the only indication of impending respiratory arrest.

0	no sedation
1	mild sedation (occ. drowsy, but easily aroused)
2	mod sedation (freq. drowsy, but easily aroused)
3	severe sedation (diff to arouse)
S	normal sleep, fairly easy to arouse

**Score of 3 needs URGENT & PROMPT intervention: stop infusion, call for help, stimulate the child, apply oxygen if needed.

3. Respiratory Depression

This is potentially life threatening. Patient will require O2 via bag and mask if RR < 20 -22 /min in infants & <8 -12 /min in older children
IV naloxone may be titrated as necessary. As the administration of naloxone is associated with its own side effects, give in small increments and at intervals of 2 – 5 min.

4. Pruritus

A common side effect with epidural opiates. Reduce the dose (if pain free) or treat symptomatically with calamine lotion, talcum powder. If unrelieved, IV diphenhydramine (Benadryl) 0.2 - 0.5 mg/kg over 15 minutes, q6h can be given. Warning: Diphenhydramine can give rise to significant somnolence! Alternatively very low dose naloxone bolus or infusion at 0.25 mcg/kg/h can be utilized.

5. Nausea & Vomiting

- IV ondansetron (1st line) 0. 1 – 0.2 mg/kg q 8 h
- IV metoclopramide (2nd line) 0.10 – 0.15mg/kg q 6-8h slow bolus. Watch out for side effects e.g. oculogyric crisis.
- If the child is on N/G tube, check if it is draining freely - the cause may be a blocked tube and distended bowel.

*Amount of opiates used may have to be reduced.

6. Leak around the catheter

This is commonly seen in young children, particularly with small catheters. Tegaderm dressing will need to be changed if there is any suspicion of compromise of sterility e.g. lifting up of the dressing due to the fluid. Use sterile technique, Opsite spray and clean gauze to staunch where necessary to ensure that the new dressing is as dry and secure as possible.

7. Catheter Disconnection

Do *not* reconnect if it is at the catheter end unless it is an observed disconnection and the proximal catheter end is still sterile.

Epidural will have to be removed and discontinued, alternative methods of analgesia started.

8. Motor Blockade - daily Bromage score to be assessed & charted

3	complete (no movement)
2	almost complete (moves feet only)
1	partial (only knee movement)
0	none

Alert the anaesthesia consultant if Bromage is abnormal.

9. Numbness

Document dermatomal level, extent, associated motor weakness and dysaesthesias. Try to reduce the epidural LA concentration, or withdraw the catheter a little whilst positioning the numb side up.

Please remove it if unimproved/unresolved in 24h. Will require follow-up & a consultant to oversee until resolution

10. Urinary Retention

Urinary catheterisation may be necessary. Ultra-Low dose naloxone 0.25 mcg per kg may also be used

11. Hypotension

This is not very common in children but it is nevertheless advisable to ensure the patient is well hydrated before an epidural is commenced.

A bolus of IV 5 - 10 ml/kg of crystalloid is enough to correct this. If BP does not respond to this fluid challenge, always suspect another cause e.g. ongoing blood loss/sepsis.

12. Infection

The epidural site should be inspected daily for evidence of inflammation. Check the temperature chart and document maximum recorded temperature (Tmax) as well as total white trend.

The epidural catheter should be removed if you suspect infection (e.g. pustule) or sepsis; culture the tip of the catheter if necessary.

13. Coagulopathy or anti-coagulation (refer to Chapter on Regional Anaesthesia)

Ensure that coagulation profile is normal or that an appropriate period has elapsed since the last dose of heparin before removing the epidural catheter.

14. **Other problems** are rare and require discussion with the primary physicians / surgeons w.r.t imaging and intervention as well as with the patient/parents
    1. Epidural haematoma
    2. Snapped/ retained catheter
    3. Inadvertent Dural Tap
    4. Spinal Headache
    5. Cauda Equina Syndrome

Discontinuing Epidurals:

When discontinuing epidurals, it is important to:

1. Ensure adequate alternative analgesia (PO), if the patient is still NPO, consider switching to PCA if HD/ICU bed is no longer available. Start paracetamol orally / rectal whilst still on epidural.
2. Position the patient properly (lateral and flexed) for catheter removal (do not do this unassisted)
3. Withdraw the catheter carefully and check that the tip of the catheter is intact after removal.
4. Do not tug forcibly on the catheter. It may snap.
5. Place a dry dressing over the site.
6. Patients should be monitored in HD or ICU setting and no opiates be given for 6h after the last dose of epidural morphine.