

Patient Controlled Epidural Analgesia (PCEAs) in Labour

Version 4

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Care Group : Women and Children's
First implemented : December 2010
This Version Implemented : April 2025
Planned full review : April 2028
Keywords : Epidural, PCEA
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Comments : References to SaTH Guidelines in the text pertain to the latest version of the Guideline on the intranet.
This guideline only refers to women in labour.
This guideline should be read in conjunction with the following Maternity and Tissue Viability Guidelines:
Postnatal Care (135)
VTE (167)
Pressure Ulcer-Prevention & Management

Version	Implementation Date	History	Ratified By	Full Review Date
1	December 2010	New	Anaesthetic Group 28/7/10	Dec 2013
2	3 rd February 2014	Full review	Maternity Governance MGG	Feb 2017
2.1	20 th April 2015	<ul style="list-style-type: none"> Clarification of Tinzaparin administration. Addition of intralipid administration for management of Local Anaesthetic Toxicity Actions after Internal Review re connection of epidural infusions 	MGG Maternity Governance	Feb 2017
3	9 th January 2017	<ul style="list-style-type: none"> Addition of section 5.4.9 for pressure area assessment following SI Full version review 	MGG Maternity Governance	January 2022
3.1	11 th October 2021	<ul style="list-style-type: none"> Full version review Removed reference to Paper notes Encouraged thoughtful IV fluids rather than routine 		
3.2	20/9/22	<ul style="list-style-type: none"> 'HRCR' replaced with 'Internal Review' as per Ockenden action. (Louise Weaver) 		
3.3	16 th November 2022	<ul style="list-style-type: none"> Addition of section 5.10 Mobilising after an epidural analgesia following SI 	Maternity Governance	January 2025
3.4	January 2023	<ul style="list-style-type: none"> Alternative volumes, concentrations and mixtures have been added due 	Updated by Dr L Branfield	January 2026

Version	Implementation Date	History	Ratified By	Full Review Date
		to patient safety alert NatPSA/2023/002/CMU from 23/01/23		
3.5	March 2024	<ul style="list-style-type: none"> References made to NRFlt equipment (Patient safety alert NatPSA/2024/002/NHSPS) 	Updated by Dr L Branfield	January 2026
4	April 2025	Full version review	Obstetric Anaesthetic Governance Dr A Wickramasinghe Dr K Kada-Venkata	April 2028

1.0 Introduction

Epidurals for labour at the Shrewsbury and Telford NHS Trust Delivery Suite are administered by patient controlled epidural analgesia (PCEA). These guidelines will inform those with responsibility for caring for these patients about this process.

Epidurals are inserted by an anaesthetist trained in the technique. Connecting the catheter to the pump and initiating the infusion should only be done by a suitably trained anaesthetist. Deaths have occurred when epidural infusions have been connected to intravenous cannulae and non-anaesthetists should **NOT** connect the epidural cannula to the infusing fluid and pump under **ANY** circumstance – even under the direction of an anaesthetist. The midwife caring for the patient will check the epidural mixture and connections, and to recognise and respond to complications.

2.0 Aim(s)

To enable midwives to provide care to patients with PCEAs and to enable midwives to provide relevant information to the patient and their relatives.

3.0 Objectives

- 3.1 To clarify the responsibilities of the midwife and the anaesthetist caring for the patient with a PCEA.
- 3.2 To provide guidance on how to monitor a patient with a PCEA.
- 3.3 To describe possible complications and how to initiate management of these complications.
- 3.4 To describe how these new guidelines will be implemented and audited.

4.0 Definitions

- 4.1 **Epidural analgesia** - implies local anaesthesia and low dose opioids administered via a dedicated pump and line into a catheter placed in the epidural space.
- 4.2 **Patient controlled** - means that the patient will control via a handset when the boluses will be given – constrained by a lockout period and the dosage programmed into the pump.
- 4.3 **LMWH**- Low Molecular Weight Heparin
- 4.4 **PCEA** – Patient Controlled Epidural Analgesia
- 4.5 **AAGBI** Association of Anaesthetists of Great Britain and Ireland

5.0 Process

5.1 Responsibilities

5.1.1 Responsibilities of the anaesthetist

- To ensure they have the appropriate training and assessments.
- To ensure there are no contraindications to the procedure.
- To gain informed consent.
- To insert the epidural catheter and establish effective analgesia.
- To prescribe the infusion (on the pre-printed prescription chart).
- To ensure the correct mixture will be given.
- To ensure the correct set-up of the pump and connection of lines.
- To act upon any concerns raised by the midwife.

- To manage any complications appropriately and to ensure resuscitation equipment and drugs are available nearby.
- Ensure that the pre-infusion checks are completed with the midwife and signed on the epidural prescription chart.
- To complete the appropriate documentation.

5.1.2 Responsibilities of the midwife

- To ensure they have received the appropriate training
- To check the correct mixture will be given
- To check that the epidural infusion is not connected intravenously
- To monitor the height of the block (motor and sensory), blood pressure (BP), analgesic efficacy, and sedation levels.
- To recognise and initiate a response to complications.
- To communicate with the medical and other staff as appropriate.
- Ensure that the pre-infusion checks are completed with the anaesthetist and signed on the epidural prescription chart.
- To complete the appropriate documentation.

5.2 Precautions

- The patient must have a working intravenous cannula before commencing with the insertion of the epidural. This enables fluids and drugs to be given if needed, for example if hypotension occurs. Routine pre-loading with fluid is not necessary. It is important, however, to make sure the cannula remains patent by keeping it flushed, and that IV fluids are given when needed to patients who cannot restore or maintain their fluid balance by mouth.
- A bleeding tendency may contraindicate insertion of the epidural, for example low platelets in PIH (See Appendix 3) or administration of LMWH. Epidural will not be inserted for at least 12 hours with women who have received prophylactic LMWH and 24 hours for women having therapeutic LMWH.
- LMWH must not be administered within 4 hours after removal of an epidural.
- Other possible contraindications to epidural are previous back surgery, neurological problems, and local or generalised sepsis. The patient may decline an epidural even if the procedure has been recommended by medical or midwifery staff.
- Never use other opioids while an epidural is in progress, for example intramuscular pethidine or oramorph.
- Never lie a patient with an epidural flat on her back, a wedged will be used or lie on her side or sat up
- The woman must not be left alone for 20 minutes after the commencement of the epidural or 20 minutes after an anaesthetist administered top-up.

5.3 Equipment and drugs

- All staff involved with epidurals should be familiar with the relevant pumps and lines.
- The pumps and lines must be dedicated to epidural use only and must be clearly labelled. Use only NRFit (non-luer) kits and lines.
- The bags used for epidurals in labour will be Bupivacaine 1mg/ml (0.1%) with Fentanyl 2 micrograms/ml (0.2%) solution for infusion in 250ml
- If this is not available, use Bupivacaine 1mg/ml (0.1%) with Fentanyl 2 micrograms/ml (0.2%) solution for infusion in a 500ml bag
- or if the combination product is not available use Bupivacaine 312.5mg/250ml (0.125%) solution for infusion in a 250ml bag or Levobupivacaine 1.25mg/ml (0.125%) solution for infusion in a 200ml bag.
- Infusions containing Fentanyl are kept in the epidural controlled drug (CD) cupboard located in the blood gas machine room on Delivery Suite. Infusions containing Bupivacaine or Levobupivacaine only are kept in in the same locked room on delivery suite but in a designated space outside the CD cupboard.
- The pump should be programmed to give the patient a 5ml bolus when she presses the button. A lockout period of 10minutes and an hourly limit of 6 boluses should be applied. The anaesthetist should give a test dose immediately after inserting the

- epidural, followed 5 minutes later by a 10-15ml loading dose (via the pump or manually).
- The anaesthetist can give an extra 5-10ml via the pump hourly if required, but the patient must be instructed not to use her PCEA for 30 minutes after such a top-up. The integrity of the system must not be breached by anaesthetist for these top-ups – the top-ups must be delivered via the pump.

5.4 Observations

5.4.1 The aim of the epidural is to affect sensation of pain, but it also affects motor (movement) nerves and autonomic nerves (for example those that control BP).

5.4.2 Essential observations are (see appendix 1)

- blood pressure
- sedation levels
- analgesia efficacy
- height of block (sensory and motor).

These will be recorded **every 5 minutes for 20 minutes** following the **commencement of the epidural** and every **5 minutes for 20 minutes** following an anaesthetist-administered bolus. Thereafter hourly observations will be recorded. All observations should be documented on the epidural chart.

5.4.3 If the woman's systolic blood pressure drops below 90mmHg, initiate the following actions simultaneously:

- Place her in the left lateral position.
- Give her oxygen via a face mask at 15l/ minute.
- Give a fluid bolus of 200- 300ml.
- Call an anaesthetist urgently.

5.4.4 Pain is scored 0-3:

0= No pain.

1= Patient is aware of the contractions, but they are not distressed. 2=

The contractions are distressing the patient.

3= The contractions are unbearable.

If the pain score is 2 or 3, check that all the connections are intact and that the pump is delivering a bolus when the patient triggers it. Also check that the patient is using the PCEA optimally: she should trigger the bolus when the pain is mild, not wait for the pain to become unbearable. She should also position herself with the painful side down when triggering the bolus or put herself in the sitting position if she is in second stage.

Do not give her any opioids (for example pethidine) while she has a PCEA.

If the woman is not pain-free 30 minutes after each administration of local anaesthetic/opioid solution, recall the anaesthetist for review. The anaesthetist may decide to give a top-up (5-10ml via the pump). The patient should be instructed not to use her PCEA for 30 minutes after such a top-up.

5.4.5 Sedations levels are recorded as:

- A** Alert.
- V** Responds to voice.
- P** Responds only to pain.
- U** Unresponsive.

If the patient has also stopped breathing, call 2222 and start CPR (refer to SaTH Resuscitation Policy).

P or U is an emergency.

Follow these emergency actions simultaneously:

- Fast bleep an anaesthetist
- Disconnect the epidural
- Give the patient 15l/m oxygen via a non-rebreathe mask
- Put patient in the left lateral position
- Inform Midwife Coordinator

5.4.6 Sensory block - level can be tested using ethyl chloride spray. Start from the lower abdomen. Spray the ethyl chloride progressively upwards until the patient feels a normal cold sensation. This is the upper level of the block. See Appendix 1 for a diagram of the different zones.

- A** Well below the umbilicus and **inadequate**.
- B** At the umbilicus and is the **correct level**.
- C** Halfway between the umbilicus and the nipple line. **Caution must be taken**. If the level has not descended within 30 minutes, call an anaesthetist.
- D** Above the nipple line and is a **danger zone**. Inform an anaesthetist immediately.

5.4.7 The **emergency actions** listed in 5.4.5 must be followed if

- The woman has difficulty breathing
- If the woman's arms start to feel very heavy or she experiences a tingling sensation in them

5.4.8 Motor block: It is also important to assess the level of motor block in order to assess the level of motor function, to prevent pressure sores, and to detect the onset of certain complications like an epidural haematoma or migration of the catheter.

The motor function is assessed in both legs using the Bromage score:

0 = Fully able to bend ankles and knees.

1 = Just able to move her knees.

2 = Bend ankles (move feet) only, but cannot move knees.

3 = Unable to move either feet or ankles.

Call an anaesthetist if she persistently **scores 2 or 3**. Put simply she is safe if she can move her knees – even slightly. Also call an anaesthetist if there is a sudden unexplained change in her motor score – especially if it is unilateral.

5.4.9 Pressure area assessment

Women who have epidural in labour are at higher risk of developing a pressure ulcer due to the reduced mobility and lack of sensation to move or adjust positions.

The main pressure areas at risk are the buttocks, sacrum, and heels

Pressure area skin assessment will be required as follows

- 2 hourly pressure area skin assessment while epidural in use
- Removal of epidural catheter following birth
- At least once on transfer to postnatal ward or MLU and document on MIS

Assessment of the skin will be documented on the pressure area section of the partogram as follows:

1= Normal colour skin no evidence of erythema

2= Erythema noted - action is required - position change to offload pressure on the area of skin and review as above.

- 3= Non blanching erythema** – this is stage 1 pressure ulcer development and action **MUST** be taken to prevent further development. Change of position to offload pressure, complete Datix.

Following birth and removal of epidural catheter review the woman's pressure area and document as above accordingly within Birth Notes.

Once transferred to postnatal ward/MLU review and document in MIS – using the numerical reference as above in the comments section of the postnatal workflow-Transfer assessment (e.g. pressure area =1).

Seek advice/refer to Tissue Viability Team as required also refer to Pressure Ulcers-Prevention and Management Guideline.

5.5 Potential problems:

- Urinary retention: The patient may require a residual, and possibly ultimately an indwelling catheter
- Pruritis (itching): please refer to the obstetric anaesthesia guidelines for the management of this problem.
- Disconnection of the epidural infusion: if this occurs while repositioning a patient it may not necessarily mean discontinuation of the infusion. Please discuss with an anaesthetist. Reattachment of an epidural infusion will **only** be carried out by an anaesthetist (Appendix 4)

5.6 Local Anaesthetic Toxicity

When an infusion of local anaesthetic through a catheter is used i.e. with PCEA, local anaesthetic toxicity may develop at any time. It may present in many different ways making it very difficult to recognise.

5.6.1 Signs

- Sudden alteration in mental status, severe agitation or loss of consciousness, with or without tonic-clonic convulsions
- Cardiovascular collapse

5.6.2 Immediate management and treatment – refer to the AAGBI Safety Guideline as per Appendix 2. If patient is in cardiovascular collapse, instigate CPR and ensure call to 2222. Refer to SaTH Resuscitation Policy

5.6.3 Ensure availability of Lipid Emulsion via ODP's. Stored on ward 24 in anaesthetic room.

5.6.4 Follow up - as per AAGBI Safety Guideline Appendix 2

5.7 Removing the epidural catheter

5.7.1 Place the patient on her side and slowly remove the catheter. If any resistance is met, do not pull – call an anaesthetist. Make sure the tip is present to ensure the catheter is complete. Call an anaesthetist if it is not. Apply a sterile dressing to the site.

5.7.2 The time of epidural catheter removal will be documented in the Birth/Maternity Notes

5.8 Disposal of unused epidural mix

Following removal of epidural catheter, the midwife must ensure that the any epidural solution containing Fentanyl is removed from the pump and discarded in accordance with the **SaTH Medicines Code Section 4.20 for controlled drugs**

5.9 VTE Prophylaxis

LMWH will be prescribed in accordance with the Venous Thromboembolism (Maternity) guideline (167). The first dose will not be administered for at least 4 hours after removal of the epidural catheter. Individual clinical circumstances may require this time to be altered and will be discussed with the anaesthetist / obstetrician accordingly.

5.10 Mobilising after epidural analgesia

The woman should not attempt to mobilise until it is established that she can straight leg raise both legs. This is usually done at 4 hours post epidural removal, when the 1st dose of LMWH is also administered. A member of staff (usually a WSA) must be present on initial mobilisation in case of unrecognized leg weakness.

6.0 Training

Midwives working on Delivery Suite are required to attend training in accordance with the Training Needs Analysis.

Anaesthetists will be trained in the use of the epidural pumps during departmental audit meetings or directly on the labour ward.

7.0 Monitoring/audit

Compliance with this guideline / SOP will be audited as part of the Shrewsbury and Telford Hospital NHS Trust's five-year rolling programme of NICE and local guideline audits, unless circumstances require an earlier or more frequent audit. The audit will be carried out against the auditable standards and the results of the audit will be reported and acted on in accordance with the Trust Clinical Audit Policy (CG25).

8.0 References

Caring for patients with continuous epidural infusions. Shrewsbury and Telford Hospital guidelines, reference no. 3866. Elcock D, Lloyd J

Good practice in the management of continuous epidural analgesia in the hospital setting. Nov 2004. RCA, RCN et al

Stratmann G, Gambling DR, Moeller-Bertram T, Stackpole J, Pue AF, Berkowitz J. A randomised comparison of a five-minute versus fifteen-minute lockout interval for PCEA during labour. International Journal of Obstetric Anaesthesia, Volume 14, Issue 3, July 2005, pages 200-207

Carvalho B, Cohen SE, Giarrusso K, Durbin M, Riley ET, Lipman, S.
"Ultra-light" patient-controlled epidural analgesia during labour: effects of varying regimes on analgesia and physician workload. International Journal of Obstetric Analgesia, Volume 14, Issue 3, July 2005, Pages 223-229

Birmingham Women's Hospital Handbook for Obstetric Anaesthesia 2008
Version 1.2 pp 13-19

McKenzie I. Assessment of motor block. Children's pain management service, The Royal Children's Hospital, Melbourne. May 2009.

NICE CG130 Intrapartum Care

AAGBI Safety Guideline – Management of Severe Local Anaesthetic Toxicity Sath

Pressure Ulcers-Prevention and Management

The Society for Obstetric Anesthesia and Perinatology Interdisciplinary Consensus Statement on Neuraxial Procedures in Obstetric Patients With Thrombocytopenia

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Appendix 1

Monitoring and Assessment

Monitor **every 5 minutes for at least 20 minutes** after commencement/ change/ anaesthetist – administered top-up

1.0 Blood Pressure

See emergency actions if systolic BP <90mmHg

2.0 Pain score:

- No pain..... 0
- Aware of contractions but not distressing.....1
- Contractions distressing..... 2
- Contractions unbearable..... 3

If the **pain score is 2 or 3**, check that all the connections are intact and that the pump is delivering a bolus when the patient triggers it. Also check that the patient is using the PCEA optimally: she should **trigger the bolus when the pain is mild**, not wait for the pain to become unbearable. She should also position herself with the painful side down when triggering the bolus, or put herself in the sitting position if she is in second stage.

Do not give her any opioids (for example pethidine) while she has a PCEA.

Call the anaesthetist if she remains in pain. The anaesthetist may decide to give a top-up (5-10ml via the pump). The patient should be instructed not to use her PCEA for 30 minutes after such a top-up.

3.0 Sedation:

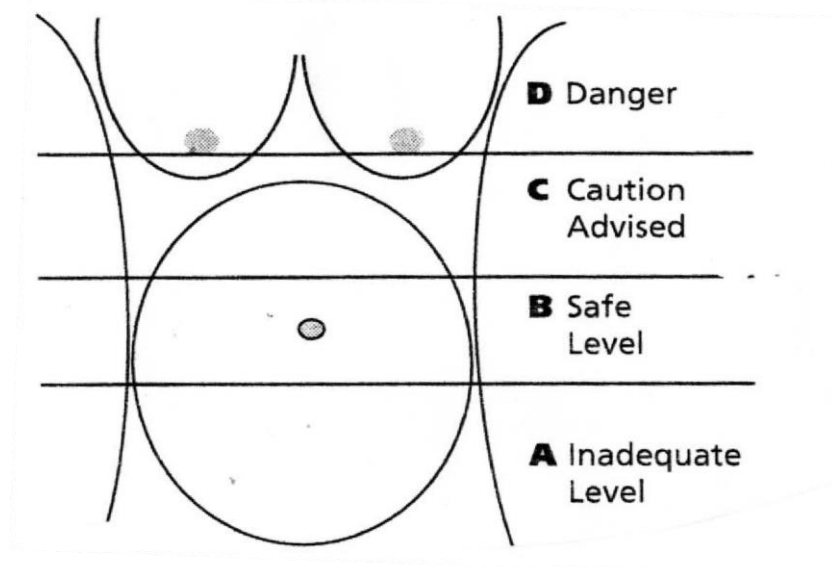
- Alert..... A
- Responds to voiceV
- Responds to pain/ shaking..... P
- Unroutable..... U

4.0 Level of sensory block.

How to assess block level:

Use ethyl chloride spray. Apply to abdomen commencing on the lower abdomen and moving upwards. Ask women to report when cold sensation experienced. This is the upper level of the block.

- **A** Well below the umbilicus and is **inadequate**.
- **B** At the umbilicus and is the **correct level**
- **C** Halfway between the umbilicus and the nipple line. **Caution should taken, if not correct within 30 minutes call an anaesthetist.**
- **D** Above the nipple line and is in the **danger zone – call an anaesthetist immediately.**



5.0 Motor block is assessed in both legs using the Bromage score:

- 0 = The patient can fully bend her ankles and knees.
- 1 = She is just able to move her knees.
- 2 = She can bend her ankles (move her feet) only, but cannot move her knees.
- 3 = She is unable to move either her feet or ankles.

Call an anaesthetist if she persistently scores 2 or 3. Put simply she is safe if she can move her knees – even slightly. Also call an anaesthetist if there is a sudden unexplained change in her motor score – especially if it is unilateral.

Emergency actions:

1. If the patient stops breathing, call 2222 and initiate CPR.
2. In the following circumstances:
 - The patient's systolic blood pressure is < 90mmHg.
 - The patient has a sedation score of P or U.
 - The patient's sensory level is in the danger zone.
 - The patient reports her arms to be very heavy or have a tingling sensation.
 - The patient has difficulty breathing.

These emergency actions should be initiated simultaneously:

- Fast bleep an anaesthetist
- Disconnect the epidural
- Give the patient 15 l/m oxygen
- Put patient in the left lateral position

3-10 Local anaesthetic toxicity v.2

Signs of severe toxicity:

- Sudden alteration in mental status, severe agitation or loss of consciousness, with or without tonic-clonic convulsions.
- Cardiovascular collapse: sinus bradycardia, conduction blocks, asystole and ventricular tachyarrhythmias may all occur.
- Local anaesthetic toxicity may occur some time after an initial injection.

START

- 1 Stop injecting the local anaesthetic (remember infusion pumps).
- 2 Call for help and inform immediate clinical team of problem.
- 3 Call for cardiac arrest trolley and lipid rescue pack.
- 4 Give 100% oxygen and ensure adequate lung ventilation:
 - Maintain the airway and if necessary secure it with a tracheal tube.
 - Avoid hypercarbia – consider mild hyperventilation.
- 5 Confirm or establish intravenous access.
- 6 If circulatory arrest:
 - Start continuous CPR using standard protocols (→ 2-1) but:
 - Give intravenous lipid emulsion (Box A).
 - Use smaller adrenaline dose ($\leq 1\mu\text{g.kg}^{-1}$ instead of 1 mg)
 - Avoid vasopressin.
 - Recovery may take >1 hour.
 - Consider the use of cardiopulmonary bypass if available.

If no circulatory arrest:

- Conventional therapies to treat hypotension, brady- and tachyarrhythmia.
- Consider intravenous lipid emulsion (Box A).

- 7 Control seizures:
 - Small incremental dose of benzodiazepine is drug of choice.
 - Thiopental or propofol can be used, but beware negative inotropic effect.
 - Consider neuromuscular blockade if seizures cannot be controlled.

Box A: LIPID EMULSION REGIME

USE 20% Intralipid® (propofol is not a suitable substitute)

Immediately

- Give an initial i.v. bolus of lipid emulsion 1.5 ml.kg^{-1} over 2-3 min (~100 ml for a 70 kg adult)
- Start an i.v. infusion of lipid emulsion at $15\text{ ml.kg}^{-1}.\text{h}^{-1}$ (17.5 ml.min^{-1} for a 70 kg adult)

At 5 and 10 minutes:

- Give a repeat bolus (same dose) if:
 - cardiovascular stability has not been restored or
 - an adequate circulation deteriorates

At any time after 5 minutes:

- Double the rate to $30\text{ ml.kg}^{-1}.\text{h}^{-1}$ if:
 - cardiovascular stability has not been restored or
 - an adequate circulation deteriorates

Do not exceed maximum cumulative dose 12 ml.kg^{-1} (70 kg: 840 ml)

Box B: CRITICAL CHANGES

Cardiac arrest → Check already done 1 to 5, then → 6

Box C: AFTER THE EVENT

Arrange safe transfer to appropriate clinical area
Exclude pancreatitis: regular clinical review, daily amylase or lipase
Report case on your local critical incident system and to the relevant national system (these vary between each devolved nation and in Ireland)

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3-10

Appendix 3

Special Considerations for Regional Blockade

Our local guidance for epidural insertion in the presence of thrombocytopenia is:

- ☐ A **platelet count of > 100** is acceptable for siting a regional block.
- ☐ A **platelet count between 70 and 100** Epidural Should be inserted by Senior Anesthetist only .

- A **platelet count of < 70** is an **absolute contra-indication** to a regional block.
- ☐ **Please note that in the presence of pre-eclampsia** platelet function may not be normal if the platelet count is below 100, or if there is a >50% drop in platelet count within 24 hours

Appendix 4

Epidural catheter disconnection from pump: -If the disconnection is witnessed and happened between catheter and filter, wrap the end of the epidural catheter in a sterile swab and call anaesthetist immediately. The catheter end can be cut and re-sterilised. If the timing of the disconnection is unclear, the catheter may have to be removed. If the disconnection happened between filter and infusion set then filter need be replaced and connected back to infusion set after cleaning the end with sterile swab