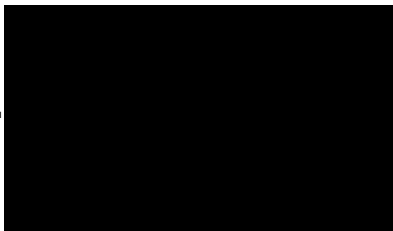
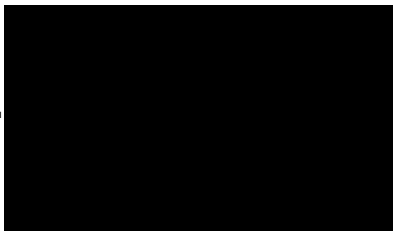




Guidelines for the management of a patient with an epidural infusion. Version 2.0

Clinical Director

Signed... 

Name... 

Date.....12/04/2011.....

Meta Data

Guideline Title:	<i>Guidelines for the management of a patient with an Epidural Infusion</i>
Guideline Author:	[REDACTED]
Guideline Sponsor:	<i>Directorate of Anaesthesia</i>
Date of Approval:	<i>April 2011</i>
Approved by:	[REDACTED]
Date of Ratification (CSC):	
Review Date:	<i>January 2013</i>
Related Policies/Topic/Driver	<i>Heart of England Medicines Policy 2008, IV policy, BLS/ALS,</i>

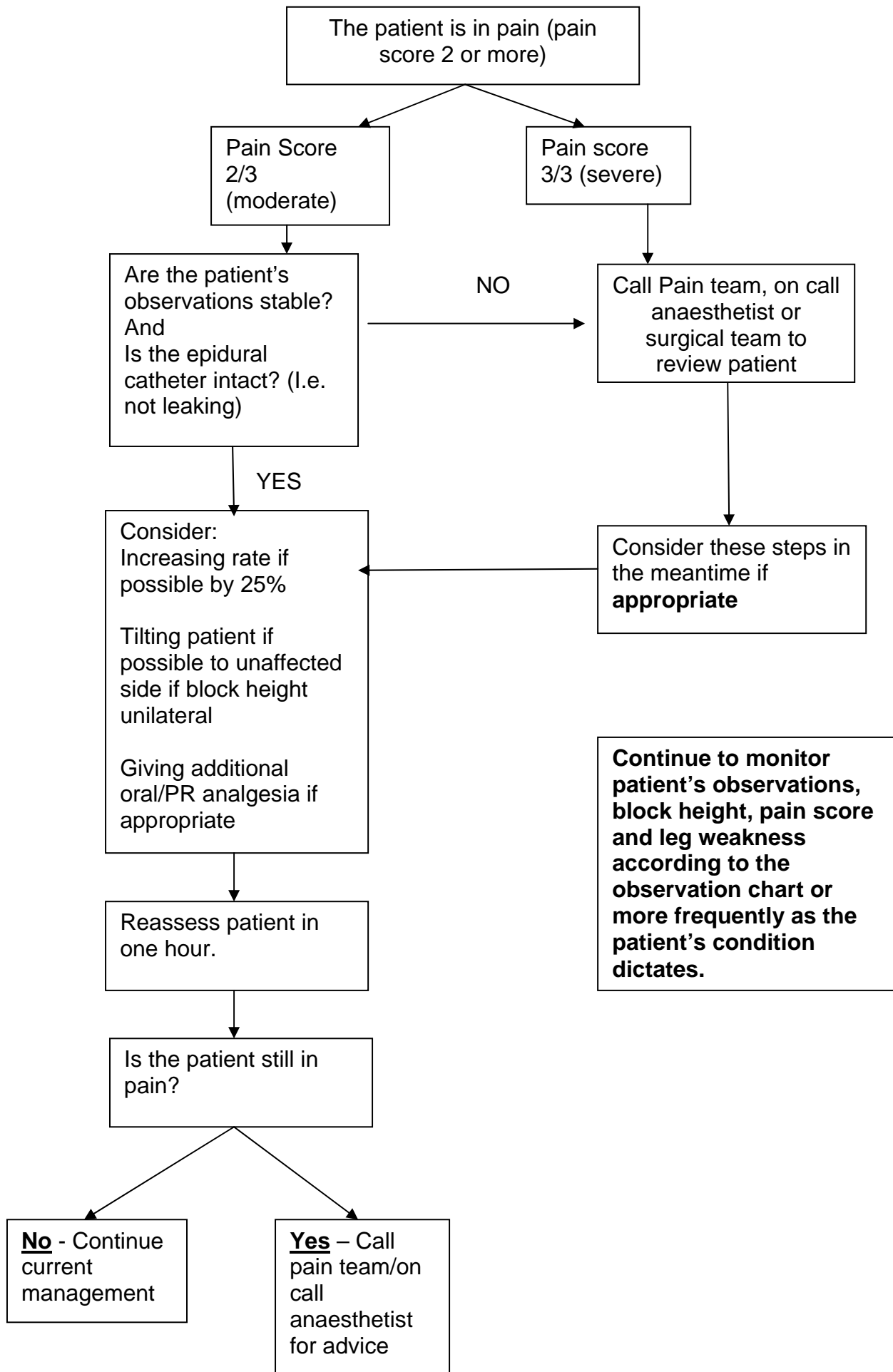
Revision History

Version No.	Date of Issue	Author	Reason for Issue
1	July 2008	[REDACTED]	Replace existing policy
2.0		[REDACTED]	Updated Guidelines

1. Overview/Introduction

Epidural analgesia offers unique benefits in the relief of acute and post-operative pain. When regional analgesia is used to its full potential, it offers patients pain free post surgical recovery. It is one of the most effective techniques for the management of acute pain; and for all types of surgery, epidural analgesia is thought to provide better post operative pain relief compared with parenteral opioid administration (Macintyre et al 2010). Although provision of an epidural service for postoperative patients requires time, effort and attention to detail on the part of the medical and nursing staff, the results certainly justify the input. Epidural analgesia has been used since the late 1940s as a method of controlling post operative pain (Chapman and Day 2001).

2 Flowchart. Guidelines for the Management of a Patient with an Epidural Infusion



3. Objectives of the Guideline

To provide advice and guidance on the management of epidural infusions for all healthcare professionals involved in the patient's care.

A registered nurse/midwife, who has been trained in the management of epidural infusions, will be able to care for these patients. The Pain Nursing Team and the Department of Anaesthesia have developed guidelines for care. These guidelines cover all aspects of care, assessment, monitoring, prescribing, potential problems and their management. These should be adhered to at all times.

Following the appropriate procedure, the nurse may replace empty infusion bags, stop the infusion and initiate emergency therapeutic measures if complications arise, and adjust the rate of infusion within the prescribed range

Following advice from the NPSA (2007), registered nurses must be trained and assessed as competent in looking after epidural infusions. The pain team are carrying out ongoing epidural competency training sessions for nursing staff. All trained nurses in the trust must undertake this competency training.

4. Body of Guideline

What is an Epidural?

Epidural analgesia is the administration of local anaesthetic (with or without an opiate) into the epidural space.

The epidural space lies between the ligamentum flavum and the dura mater around the vertebral canal from the cervical to the lumbar regions of the vertebral column. A very fine catheter made of plastic is inserted, under aseptic conditions, into the epidural space in the spine. Placement of the epidural catheter can be anywhere along the lumbar or thoracic region of the spinal column, depending on the site of the pain/operation. Epidural catheters are sited by anaesthetists.

Close post-operative observations and monitoring of the patient are required to avoid side effects.

NB: Not all indwelling catheters are epidurals – occasionally continuous para-vertebral infusions are used. The catheter can be introduced under direct vision into the intrapleural space during surgery. Infusion of local anaesthetic into the intrapleural space produces good postoperative analgesia with significantly less hypotension and urine retention.

It is important to distinguish between the two forms of infusions as the analgesia produced by a para-vertebral infusion is unilateral rather than bilateral with an epidural infusion, (Richardson et al 1995, Soni et al 1994). Paravertebral infusions should be prescribed on a separate paravertebral infusion chart.

Epidural analgesia has many advantages, such as:

- a) Optimisation of acute/post operative pain relief
- b) Decreased risk of post-operative chest complications
- c) Evidence of lower rate thromboembolism
- d) Some of the undesirable metabolic responses to surgery are reduced
- e) Absence of vasoconstriction can lessen myocardial work and therefore decrease the risk of myocardial infarction
- f) Reduce the incidence of paralytic ileus associated with parenteral opioid analgesia

Indications for Epidural Analgesia:

- a) Acute post operative pain
- b) Acute pain e.g. trauma.
- c) Chronic pain
- d) Obstetrics (see separate policy)
- e) As an alternative to general anaesthesia

Contra-indications

- a) Infection at the puncture site
- b) Coagulation problems or disorder
- c) Allergy to local anaesthetics
- d) Systemic infections
- e) Raised intra-cranial pressure
- f) Spinal abnormalities or deformities may make catheter placement difficult
- g) Patient refusal

- h) Unavailability of staff trained in the management of epidural analgesia. Macintyre and Ready (2001) note that staff managing patients with epidural infusions should have undertaken a period of formal training.

How does an Epidural Work?

Epidural analgesia is a method of 'blocking' the nerve roots lying outside the dura using a local anaesthetic solution (Bruce 1992). This gives analgesia to the area supplied by these nerves. Analgesia is provided by a continuous infusion (or occasionally by bolus injection administered by anaesthetists or the pain sisters) of local anaesthetic and/or opiate drugs through the epidural catheter.

The epidural space surrounds the spinal column and is separated from the CSF by the dura.

Three types of nerve pass through it:

- (1) Sensory nerves carrying pain fibres
- (2) Motor nerves to muscles
- (3) Sympathetic nerves, which control tone in blood vessels

For more information on the anatomy of the epidural space please refer to The Royal Marsden Guidelines.

Types of drug typically used in epidurals:

- (1) Local anaesthetics e.g. bupivacaine
- (2) Opioid e.g. fentanyl or diamorphine

Epidural infusions of local anaesthetic and opioid combinations are commonly used in the UK (Wheatly et al 2001). This is based on the rationale that better analgesia is achieved with lower doses of each drug, therefore minimizing drug-related side effects.

Effect of Local Anaesthetics in Epidurals

- (1) Block sensory nerves and pain transmission. This provides analgesia.
- (2) Can block motor impulses. Temporary paralysis will result, until the local anaesthetic wears off. Weaker solutions are less likely to block motor function but can still give analgesia.
- (3) Block sympathetic impulses, causing vasodilation, which can result in a drop in blood pressure.

Effect of Opioids in Epidurals

There are opioid receptors in the spinal cord which, when occupied by opioid drugs produce analgesia. The area of analgesia produced usually corresponds to the level of the epidural insertion and the nerves that arise at that level. So a lumbar epidural containing an opiate will give analgesia to the lower part of the body. Much smaller amounts of opiate are needed, than if given IM or IV, because it is administered close to the receptors. Opioids given this way MAY still cause nausea and respiratory depression. Respiratory depression can occur up to 24 hours after the opiate is administered

After insertion an initial test dose is administered by the anaesthetist, and if no problems are experienced then the infusion can commence.

At all times, it remains the responsibility of the anaesthetic staff to place the catheter, administer the initial or test dose (to establish correct catheter placement), and to prescribe all medications (including dose, range, concentration and diluent).

PROCEDURE FOR THE ADMINISTRATION OF EPIDURAL ANALGESIA VIA A CONTINUOUS INFUSION

This procedure must only be carried out by a doctor, or by a registered nurse or midwife who has been trained in the management of epidural infusions and has been assessed as competent. The practitioner must also be competent in the administration of intravenous therapy and in Basic Life Support techniques. Continuous infusions via an epidural are administered by a designated Mckinley epidural pump. The pump must NEVER be operated by any member of staff who has not had specific epidural training. The pump has a built-in “LOCK” facility, which MUST be used to ensure that infusion rates cannot be accidentally altered.

Anaesthetic staff should prescribe epidural analgesia on the standard Epidural Infusion Chart and on the standard Drug Prescribing and recording sheet stating “See Epidural Infusion Chart” or add a link on the EP system “Epidural – see separate chart”.

The prescription is for either:

- Bupivacaine 0.1% 250mls
- Bupivacaine 0.1% 500mls with fentanyl 2microgram/ml
- Bupivacaine 0.125% 250mls with fentanyl 4microgram/ml

On the prescription chart there should also be prescribed:

- Oxygen 2 – 4 litres alongside epidural
- Naloxone up to 400microgram if resps < 10
- Antiemetic prescribed PRN

The anaesthetist should state the range between which the epidural may be infused on the Epidural Infusion Chart. The qualified nurse is able to titrate the epidural

Infusion rate within this range if necessary, according to the patient's pain score and observations.

NB *A patient on an epidural infusion should always be catheterised

* A patient on an epidural infusion should always have IV access

Equipment Needed for Commencement of an Epidural Infusion

Mckinley epidural pump

*250mls bupivacaine 0.1% or 500mls Bupivacaine 0.1% with added Fentanyl, either 2microgram/ml or 4microgram/ml, as decided by anaesthetist.

Receiver

*Yellow Epidural giving Set

Yellow Epidural Infusion Chart

Drug Prescribing and Recording sheet or EP system

Label for Epidural Line

The epidural infusion must be attached and commenced by the Anaesthetist, usually in the recovery room.

- Wash hands and apply alcohol hand rub to remove transient organisms
- Check the Epidural Infusion Chart and the Drug Prescribing and Recording sheet or EP system in accordance with the Medicines Policy (2008). Prepare the epidural pump and check the Epidural rigid infusion bag with the prescription. Check the patient's details on their ID bracelet with the Epidural Infusion Chart and the Drug Prescribing and Recording sheet or EP system, and check the patients allergy status to prevent errors in administration and comply with epidural guidelines.
- Attach the epidural bag to the giving set.
- Whilst disconnected from patient, purge epidural giving set through pump to eliminate air bubbles.
- Remove the cap from the filter attached to the patient and attach giving set, using aseptic technique.
- Check the epidural catheter insertion site to ensure there is no blood in the line or the line has not moved.
- Assess the level of block and pain score, carry out observations in accordance with the epidural infusion chart ensuring it is safe to commence the epidural infusion. The infusion can now be commenced; the rate should be set according to the Epidural Infusion Chart, and titrated if needed.
- Sign the Epidural Infusion Chart and the Drug Prescribing and Recording sheet or EP system and document patient's observations on the Epidural Infusion Chart. Record actions in patient's notes.

- Monitor patient's observations as per guidelines or more frequently as their condition dictates.

*The epidural solution must be supplied in a rigid bag and the epidural giving set should be a yellow colour to comply with NPSA guidance.

MONITORING A PATIENT WITH AN EPIDURAL

NURSING A PATIENT WITH AN EPIDURAL TAKES TIME, SKILL AND CARE

It is clear that an epidural, although providing good pain relief can also cause problems. This can be avoided by monitoring the following parameters.

BLOCK HEIGHT

The height of the block should be established and documented clearly by the anaesthetist who administers the initial or test dose.

This will provide a baseline against which all future assessments of block height can be made.

Block height is assessed using response to cold. Block height should be checked by using ethyl chloride spray.

Block height should be assessed and documented according to the epidural charts instruction, whenever the patient complains of pain or has difficulty breathing or following any intervention such as an epidural bolus.

A block height above T4 must be reported immediately to the on call anaesthetist or the Pain Sisters.

BLOOD PRESSURE

This must be measured to ascertain adequate circulating volume. If the patient is bleeding into the surgical area and the epidural is working correctly, and providing analgesia, there will be no pain but the blood pressure will drop, the hypotension may be caused by this bleeding, incorrectly attributed to vasodilatation caused by the epidural. If the patient did not have an epidural then the bleeding would cause pain at the operative site. This vital sign is masked and in all cases of hypotension, post surgery bleeding must be borne in mind.

NB: Ephedrine must be available on the wards receiving patients with epidural infusions and should only be administered by anaesthetic staff with experience in managing epidural complications.

PULSE RATE

This must be monitored alongside blood pressure. Atropine must be available in those areas receiving epidural patients, because patients are at risk of becoming

bradycardic. Atropine must only be administered by medical staff with experience in managing symptomatic bradycardia (ie ALS trained).

SEDATION SCORE

This is valuable in detecting high spread and impending respiratory depression.

NAUSEA AND VOMITING

These should be monitored and treated for the patient's comfort.

URINE OUTPUT

No urine may be due to a full bladder and lack of sensation. Low volume suggests an inadequate circulating volume and should be treated with intravenous fluids after review by the medical team.

All patients on an epidural infusion should be catheterised and have their urine output monitored.

LEG WEAKNESS

Leg weakness can occur if the motor nerves become blocked by the local anaesthetic. Leg weakness should be monitored regularly as set out on the epidural chart.

GIVING ADDITIONAL ANALGESIA

A patient should be given regular oral/IV/PR paracetamol to supplement the epidural and enhance pain relief if not contraindicated.

If needed a regular NSAID can be given alongside the epidural to enhance pain relief if not contraindicated.

If the epidural infusion contains fentanyl then additional opiates should not be given unless advised by the pain team/anaesthetist.

CLINICAL PROBLEMS THAT MAY OCCUR

a. The epidural may not be working (patient is in pain)

The patient may have no block height, or block on one side only. The epidural may work but at a lower level than is required.

All these problems can often be sorted out by adjusting the patient's position or increasing the infusion rate according to the rate prescribed by the anaesthetist on the epidural infusion chart. If the block height is one sided, lying the patient with the painful side down will allow gravity to help. The drugs will tend to travel to the nerves on that side.

If the patient has a pain score of 3 please contact the Pain Sisters or on call anaesthetist as they may need to give an epidural bolus.

b. Hypotension

This may be caused by dilation of the blood vessels causing reduced blood circulatory volume. However there may be other causes of hypotension. This should always be investigated.

If systolic blood pressure is between 90 – 100mmHg:

- The epidural rate may need to be reduced
- Continue to monitor patient closely

If systolic blood pressure is less than 90mmHg:

- Stay with the patient and continue close observation
- Contact the on call anaesthetist/medical team.
- Stop the epidural
- Lay the patient flat (do not tip the head end of the bed downwards).
- Continue with oxygen
- Administer IV fluids as prescribed

Ensure ephedrine is available on the ward. This should only be given by an anaesthetist if required.

c. Difficulty in breathing / Raised Block Height

If local anaesthetic affects nerves higher than T4, difficulty in breathing may occur. This becomes apparent if the diaphragm is affected. Before this happens the patient may notice numbness and tingling in the little fingers.

This is an important sign and if it occurs:

- Call the anaesthetist and pain team immediately
- Switch-off the epidural infusion
- Continue oxygen 4L/minute by face mask
- Sit the patient up as they may find it easier to breathe
- Monitor both blood pressure and pulse rate as both will probably be **low**
- Patient may require increased IV fluid rate which will need to be prescribed by the medical team/anaesthetist.
- Continue to monitor patient closely and check BP every 5 minutes
- Have atropine and ephedrine available which should only be given by appropriately trained medical/anaesthetic staff.

C) Motor Blockade

Motor blockade can occur if the patient has a lumbar epidural. This is because low motor nerves are blocked resulting in leg weakness.

Whilst a degree of motor blockade is acceptable, complete paralysis should be avoided.

Follow guidelines on epidural chart for scoring of leg weakness.

Reduce epidural rate if needed by 25 – 50% to improve motor function.

Do not attempt to mobilise patient if leg weakness is evident.

If motor function does not improve seek advice from the anaesthetist/pain sisters.

Any sudden onset of complete paralysis of lower limbs should be reported immediately and the epidural infusion should be stopped (See serious complications).

D) Nausea and Vomiting

Nausea and vomiting can be associated with opiate use or due to hypotension.

- Administer antiemetics as prescribed at the first sign of nausea.
- Ask medical team to prescribe an alternative antiemetic if not effective.
- Antiemetics will need to be prescribed and given regularly.
- Consider other potential causes of nausea.

E) Sedation

Sedation can occur if opiates are used in the epidural infusion.

- Monitor sedation score as per epidural observation chart
- If patient has mild sedation consider reducing the rate of the infusion by 25 – 50% or consider asking an anaesthetist to prescribe an epidural infusion without an opiate.
- If patient is unrousable accompanied with reduced respiratory rate this may result in respiratory arrest and the epidural should be stopped immediately. Medical/Anaesthetic advice should be sought immediately. Naloxone will need to be given as prescribed.

F) Respiratory Depression

This is usually due to opiates in the epidural infusion. It can occur at any time and up to 24 hours after stopping the infusion (Morgan et al, 1989). Rarely is it due to massive overdose of local anaesthetic.

Patient very drowsy with respirations less than 10 per minute:

- call the 1st on-call anaesthetist and pain team
- Turn off the epidural infusion

- Continue with oxygen 4L/minute by face mask
- Try to wake the patient and ask them to take a deep breath
- Administer naloxone 100 micrograms, repeated if necessary at 2 minute intervals up to a maximum of 400 micrograms as prescribed.

NB: Naloxone has a short half life of 30 minutes therefore the patient should be closely monitored to ensure that respiratory rate remains above 12 per minute.

G) Low urine output

All patients on an epidural infusion should be catheterised and have their urine output monitored.

The sensation of a full bladder may not be felt in patients on an epidural infusion; the muscles of micturition may also be affected by local anaesthetic.

If a patient has reduced urine output (>35ml/hr – as per MEWS parameters)

- Observe for any signs of distension
- Check urine catheter is draining
- Medical advice should be sought
- IV fluids may need to be increased. These will need to be prescribed by medical staff.

H) Bradycardia

This is caused by a block of sympathetic nerves and can be treated with atropine or glycopyrrolate which must only be given by appropriately trained medical/anaesthetic staff. It can be an indicator of a high block if it is associated with hypotension. In some patients a slow, steady pulse rate may mean that they are comfortable and pain free.

I) Pruritis

Itching is only a problem with epidurals containing opiate drugs. Antihistamines will probably not help.

J) Catheter disconnection

If the epidural filter becomes disconnected from the epidural catheter then this must not be reconnected as this is an infection risk. The pain team/anaesthetist must be contacted and alternative analgesia commenced.

Rare Serious Potential Complications

1. Dural puncture/tap

This usually occurs when the dura mater is inadvertently punctured during the placement of the epidural catheter (Royal Marsden Guidelines). This results in leakage of the CSF through the dura.

This typically presents as a severe headache worsened when the patient sits up.

- Contact Pain/Anaesthetic team for advice
- Request additional analgesia to be prescribed by the medical team to treat the headache
- Keep patient on bed rest
- Replacement fluids (either IV which will need to be prescribed or oral) to encourage formation of CSF

If the headache persists the patient may require further anaesthetic intervention.

2. Catheter migration into an epidural blood vessel

This is extremely rare, occurring in less than 0.2% of patients (Wheatley et al 2001). If this should happen then all drugs are effectively given intravenously. With the quantities of opiates used this may not be catastrophic but must not be allowed to continue as sedation and respiratory depression may be rapid in onset.

However local anaesthetic given intravenously will cause a tingling sensation in the mouth, numbness, twitching, convulsions and cardiac arrest.

- STOP EPIDURAL INFUSION.
- Summon emergency assistance and anaesthetic support if this is suspected.
- Cardiopulmonary support may be necessary.
- Prepare emergency drugs and equipment

3. Catheter Migration across the dura into the CSF

This is very rare

If the catheter migrates into the CSF the epidural solution may reach the cranial subarachnoid space. If this occurs the respiratory muscles are paralysed together with the cranial nerves. This will result in apnoea, profound hypotension and unconsciousness.

- STOP EPIDURAL INFUSION
- Summon emergency assistance and anaesthetic support.
- Cardiopulmonary support may be necessary
- Prepare emergency drugs and equipment

4. Epidural Haematoma

This can occur from bleeding within the epidural space. The patient may experience back pain and tenderness and nerve root pain. The patient may display sensory and motor weakness hence the need for regular motor observations.

This can be gradual or sudden in onset.

- Immediate anaesthetic/medical advice should be sought
- Urgent neurological assessment is required. The epidural catheter may need to be removed as a result of this assessment
- CT/MRI scan may be necessary to accurately diagnose condition
- If a haematoma is diagnosed urgent surgery may be needed to avoid paraplegia (Mackenzie et al 1998).

5. Epidural abscess

This can occur when there is infection in the epidural space.

The patient may experience back pain and tenderness. The patient may have redness and purulent discharge from catheter exit site.

They will show signs of sepsis.

They may also develop nerve root signs and sensory and motor weakness.

- Immediate anaesthetic and medical advice should be sought
- Urgent neurological assessment is required. The epidural catheter may need to be removed as a result of this assessment and sent off for M, C & S.
- CT/MRI scan may be necessary to accurately diagnosis condition
- If an abscess is diagnosed urgent surgery may be needed to avoid paraplegia.

***PLEASE BE AWARE THAT SOME OF THE ABOVE COMPLICATIONS CAN OCCUR AFTER THE REMOVAL OF THE EPIDURAL CATHETER**

When can you discontinue an epidural?

An epidural infusion can stay insitu for up to 5 days unless documented otherwise by the pain team or an anaesthetist. However an epidural may be taken down earlier than this, for example patients on the ERAS (enhanced recovery after surgery) pathway.

The patient should be tolerating oral fluids and be able to take oral analgesia before an epidural is discontinued.

Regular oral analgesia **MUST** be prescribed and a dose given 30 minutes before an epidural infusion is stopped. Once it is apparent that the patient is comfortable the epidural can be removed. There is no need to wean the epidural rate down.

Procedure for removal of epidural line

The removal of an indwelling epidural catheter should be carried out by registered nurses following this procedure:

The removal of epidural catheters should only take place:

- Once the patient is able to adequately tolerate oral analgesia
- If the epidural is deemed ineffective by the pain team/anaesthetist
- If the patient develops a pyrexia of unknown origin

*An epidural catheter should not be removed for at least 12 hours following the administration of anticoagulants e.g. heparin or low molecular weight heparin or if there is a clotting deficiency.

- Stop epidural infusion
- Explain procedure to patient to obtain verbal consent
- Wash hands or use alcohol gel to remove transient organisms
- Position patient comfortably with back arched to facilitate removal of catheter by separation of vertebrae.
- Carefully remove tape and dressing from catheter insertion site to allow access
- Using aseptic technique, support the surrounding skin and pull gently on the catheter. No force should be necessary. If the catheter does not withdraw easily, seek advice from pain team/anaesthetist.
- Check blue catheter tip is insitu and no exudate present which may indicate infection.
- Only send catheter tip for M,C & S if infection is suspected.
- Apply sterile dressing to cover area until wound has healed.

*Clexane should not be given again for at least 2 hours after the removal of an epidural catheter.

NB –Please continue to observe for any leg numbness or weakness or any problems with bowel/bladder function for 12 hours after epidural catheter removal. If any concerns please contact the on call anaesthetist/pain sisters/medical team responsible for the patient as a full neurological assessment may be required.

5. Reason for Development of the Guideline

Epidural analgesia is an effective form of pain relief for post operative patients. These guidelines have been developed to provide guidance for healthcare professionals on the management of epidural analgesia and to follow NPSA standards.

6. Methodology

This guideline has been developed by updating the previous epidural policy. The authors are [REDACTED]

[REDACTED] Consultation has been with The Clinical Director of Anaesthetics, the Pain Management Sisters and Pharmacy.

7. Implementation

These guidelines will replace the existing epidural policy and will be posted on the trust clinical guidelines database and the trusts pain management site. The guidelines will also be disseminated through planned and snapshot teaching sessions.

8. Monitoring

The guidelines shall be subject to periodic audit and review. An audit tool is currently in the process of being developed to assist with monitoring the guidelines and their use.

9. Application of the Guideline

The guidelines apply to post operative patients and those patients identified who require an epidural infusion for their pain management.

The guidelines would benefit several members of staff within the trust including nurses, doctors, anaesthetists, medical and nursing students and theatre staff.

10. References

- 01) Bruce (1992) Epidural Analgesia – Pain Relief Surgical Nurse Vol.5, No.4, pp 4-8
- 02) Chapman. S & Day. R (2001) Spinal anatomy and the use of epidurals. Professional Nurse, No 16, pp 1174 – 1177.
- 03) Macintyre. P & Ready. L (2001) Epidural and intrathecal analgesia in – Acute Pain Management : A practical Guide, 2nd Edition. W.B Saunders, London.
- 04) Macintyre. P, Scott. D, Schug. S, Visser. E, Walker. S (Editors) (2010) Acute Pain Management – Scientific evidence, 3rd Edition. Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine.
- 05) Mackenzie. A (1998) Spinal epidural abscess – the importance of early diagnosis and treatment. Journal of neurosurgery Psychiatry, no 65 (2), pp 209 -212.

- 06) Medicines Policy (2008) Heart of England Foundation Trust.
- 07) Morgan. M (1989) The rational use of intrathecal and epidural opioids. British Journal of Anaesthesia 63, pp 165-188
- 08) National Patient Safety Agency (2007) Safer practice with epidural injections and infusions
- 09) Richardson J et al (1995) A prospective randomised comparison of intrapleural and paravertebral analgesia in thoracic surgery. British Journal of Anaesthesia 63, pp 165-188
- 10) Soni. A K et al (1994) Video assisted thoroscopic placement of Para vertebral catheters: a technique for post operative analgesia for bilateral thoroscopic surgery. British Journal of Surgery 63,pp 165-188
- 11) The Royal Marsden Hospital (2004) The Royal Marsden Hospital Manual of Clinical Nursing Procedures – 6th Edition,
- 12) Wheatley. R, Schug. S & Watson. D (2001) Safety and Efficacy of Post Operative Epidural Analgesia. British Journal of Anaesthesia, 87, pp 47 – 61.

FURTHER READING

- Douketis. J, Dentali F (2006) Managing anticoagulant and antiplatelet drugs in patients who are receiving neuraxial anesthesia and epidural analgesia: a practical guide for clinicians. Techniques in Regional Anesthesia and Pain Management 10:46-55.
- NMC (2008) Standards for medicines management
- Royal College Of Anaesthetists (2004) Good practice in the management of continuous epidural analgesia in the hospital setting.
- Tan. T, Schug. S (2006) Safety Aspects of Post Operative Pain Management . Reviews in Analgesia, Vol 9, pp 45 – 53.
- Weetman. C, Allison. W (2006) Use of Epidural Analgesia in Post Operative Pain Management. Nursing Standard, Vol 20 pp 54 – 64.