Brighton and Sussex University Hospitals NHS Trust

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POLICY FOR ADULT EPIDURAL INFUSIONS excluding maternity

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1. Introduction

Epidural analgesia provides dynamic analgesia after surgery. A local anaesthetic (LA) (e.g. levobupivacaine) and an opioid (e.g. fentanyl) are usually administered by continuous infusion via an epidural catheter using small doses to minimise side effects.

2. Purpose

The purpose of this policy is:

- To detail how national legislation and directives are applied as mandatory requirements
- To provide safe and effective care for BSUH patients receiving continuous epidural analgesia.

3. Definitions

3.1 Sensory block (block of sensory nerve fibres) results in decrease in skin sensation to pain, temperature, touch and pressure. This is normal with an epidural infusion.

3.2 Motor block (block of motor or movement nerves) results in *weakness or heaviness* in the region affected (frequently the lower limbs). This is more common with higher concentrations of local anaesthetic and with lumbar epidurals, or after prolonged infusion. Increasing lower limb motor block can be a sign of epidural haematoma or abscess. Upper limb motor block is never acceptable.

3.3 Sympathetic block of autonomic (sympathetic) nerves results in pooling of blood in the lower limbs and can cause a reduction in blood pressure. The higher the block, the more likely it is for a decrease in blood pressure to occur.

3.4 Unilateral block difference in sensation (or pain), or weakness between the right and left sides of the body. This is rarely due to spinal anatomy. Most commonly it is a result of epidural catheter position and can sometimes be managed by changing patient's position, withdrawal of the catheter or increasing rate of LA infusion

4. Responsibilities, Accountabilities and Duties

4.1 Chief Executive will be aware of his/her legal duties as the responsible person for meeting the requirements of national epidural management guidelines. They will be aware of the performance of the Trust in meeting all regulations and recommendations and will ensure that adequate resource is provided for appropriate action to be taken.

4.2 The Anaesthetic Department and Acute Pain Service (APS) are responsible for the development and maintenance of epidural management practices within the Trust with the aim of achieving and improving public and professional understanding of continuous epidural analgesia for surgical patients.

4.3 Medical staff It is the responsibility of the medical teams looking after the patient to ensure that this policy is adhered to.

4.4 Registered Nurses/Operating Department Practitioners (ODPs) who are trained as competent are responsible and accountable for monitoring patients with a continuous epidural infusion and maintaining their competence (go to IRIS https://iris.bsuh.nhs.uk/totara/dashboard/).

5. Policy

5.1 Indications for continuous epidural infusion

Major abdominal surgery
Major orthopaedic trauma
Limb amputation
Major joint replacement
Thoracic surgery

5.2 Contraindications for epidural catheter insertion and infusion

ABSOLUTE	RELATIVE
Patients with coagulation problems	Some spinal injuries/abnormalities
Local sepsis	Hypotension
Patient refusal	Recent anticoagulation
Untreated shock	Septicaemia
	Risk of compartment syndrome
	Learning disability (unable to safely monitor)
	Patients on steroid treatment
	Patients on anti-retroviral treatment

5.3 Epidural Insertion

Epidural catheters are inserted by an anaesthetist in Theatre using an aseptic technique. A 0.22-Micron bacterial filter is used in line.

5.4 Dressings

The epidural insertion site is covered by a well-secured transparent dressing to ensure easy observation and secured with a ‘stat lock’ if available. The rest of the catheter is secured up to the shoulder with an air permeable adhesive tape. The filter should be secured and clearly visible on the shoulder or chest.

5.5 Documentation

Details of the level of catheter placement, depth and any problems on insertion are documented on the anaesthetic chart and copied to the front of the epidural chart.

5.6 Prescription

Ready to administer bags for epidural infusion which have been approved by the Trust formulary committee should always be selected. The anaesthetist must prescribe the epidural solution and rates on the front of the epidural chart and prescription chart. An 'epidural line' label should be attached onto the epidural catheter near the filter.

5.7 Ordering and Storage

All epidural infusions must be ordered via a controlled drug book and stored separately from intravenous fluids in a locked cupboard, including those without added opioid.

Those containing a controlled drug must be stored in the controlled drug cupboard.

5.8 Setting up, titrating the epidural infusion and changing the bags

5.8.1 The following criteria must be met by staff prior to setting up, titrating an epidural infusion and/or changing a bag:

- Attendance at the acute pain management study day: updated 2 yearly.
- Intravenous (IV) competence as per intravenous policy
- Competence in the use of infusion devices
- Competence in looking after patients with epidurals and management of the epidural pumps.

5.8.2 The epidural pump is setup and the line attached to the patient in the Recovery ward by the initiating anaesthetist or trained Recovery staff.

5.8.3 Qualified nursing staff are permitted to titrate the pump within the limits of the prescription and change the bags, provided a secondary checker is used and they are both passed as competent to do so (see 6.0).

5.8.4 Pain Advanced Clinical Practitioners (ACP's) and nurse specialists, who are trained and assessed by the Lead Consultant Anaesthetist or ACP in Pain Management, can bolus through the epidural pump and/or give an opioid bolus through the epidural catheter (Appendix 7).

5.9 Equipment

Only McKinley Bodyguard epidural pumps should be used with dedicated yellow giving sets and with the appropriate epidural label applied: both are stored in the Recovery wards. Infusion pumps must be checked as per infusion devices policy.

5.10 Other Considerations

5.10.1 Patients must have intravenous (IV) access because side effects may require the urgent administration of drugs and/or IV fluids.

5.10.2 Patients should normally be catheterised in Theatre to monitor urine output and pre-empt urinary retention. If they cannot be catheterised; this should be documented after discussion with the surgeon before the patient leaves the Recovery room.

5.10.3 Supplementary opioids should NOT be given whilst the patient is receiving epidural opioids except those patients who are already receiving opioids regularly. These patients should normally be discussed with the APS.

5.10.4 All patients must have a fluid balance chart.

5.10.5 Naloxone must be available and prescribed on the prescription chart in clinical areas where patients with epidural infusions are being nursed.

5.11 Monitoring

Ensures effective analgesia, by regular pain assessment on deep breathing, coughing and movement and it ensures patient safety, by detecting potentially serious side effects such as respiratory depression/hypotension/epidural abscess or haematoma. All patients must have their observations charted on an epidural chart.

5.11.1 Suggested frequency of core observations:

must include heart rate, blood pressure, respiratory rate and sedation score, level of sensory block, motor block and functional (dynamic) pain assessment.

On commencement:

¼ hourly for 1 hour ½ hourly for 2 hours

Hourly for 5 hours 2 hourly for 4 hours

4 hourly for the duration of the epidural (unless otherwise indicated)

It is acceptable to omit a pain score overnight if the patient is asleep but respiratory rate must be checked hourly.

5.11.2 Observations after a bolus

a) Local anaesthetic plus opioid - heart rate and blood pressure should be recorded every 5 minutes for 20 minutes, then every 10 minutes for 40 minutes. Full epidural observations should be performed after 20 minutes. If pain persists inform the acute pain team/anaesthetist.

b) Opioid only – monitoring of respiratory rate and sedation score alone are necessary for a minimum of 20 minutes based on clinical assessment.

5.11.3 Observations after a rate change

A full set of epidural observations including heart rate and blood pressure, should be recorded after 30 minutes (5.11.1). Any significant change in the patient's condition, or if pain persists, inform APS/anaesthetist.

NB These observations are the minimum required for safe monitoring.
They do not take into account observations required for other post-operative reasons.

5.11.4 Other observations

- Epidural catheter site - check for pain at the site, redness/swelling/fluid leakage at everyone handover or if the condition of the patient changes
- Temperature - minimum 4 hourly

5.11.5 Extra observations after discontinuing the epidural infusion

- Regular dynamic pain assessment
- Confirmation of sensory and motor block recession asking the patient to report any lower limb neurological symptoms immediately.
- Skin condition at the epidural site.

5.12 Sitting the patient out of bed

Patients can develop postural hypotension. Mobilisation should be cautious and always with assistance. Hypovolaemic patients should not be sat out/mobilised**.**

5.13 Discontinuing the epidural infusion

The decision to stop the epidural infusion should be discussed with the patient and the nurse caring for the patient. It is preferable that this happens in the morning. Analgesia should be prescribed and administered beforehand. The APS/on-call anaesthetist is available for advice. Some patients may require overseas language or communication support (see 9.0).

5.14 Epidural failure

In anticipation of possible epidural failure prior to planned removal a prescription for alternative analgesia must always be available.

5.15 Disposal of the epidural infusion

Disposal of epidural solution containing opioid should be witnessed by two people, one of whom must be a registered nurse, a doctor or a pharmacist. The procedure should be documented and signed for on the epidural chart and the contents of the bag should be discarded into the sharps bin.

5.15 Removal of the epidural catheter

Registered nurses assessed as competent may remove the epidural catheter after explaining the procedure to the patient. The patient can lie on their side or lean forward with their back slightly curved. Using aseptic non touch technique (ANTT), the dressing is removed and the catheter gently pulled until the blue curved tip is out. If the catheter does not come out with gentle pulling, contact an anaesthetist or the APS. Cover the epidural site with a clear dressing and document removal and surrounding skin condition. Some patients may require overseas language or communication support (see 9.0).

5.16 Insertion and removal of the epidural catheter for patients receiving anticoagulants (Appendix 4a & b)

5.17 Accidental disconnection of the epidural catheter between the patient and the filter (Appendix 2a)

5.18 Managing epidural complications/side effects (Appendix 3)

6. Training Implications

6.1 Nurses looking after patients with a continuous epidural infusion must be trained as competent. This includes mandatory attendance on a Trust day of study in acute pain management followed by a two yearly update.

6.2 Nursing staff must also be assessed as competent in theory and practice by the acute pain nurses or practice educators.

6.3 Anaesthetists include epidural insertion and management as part of their training but other medical staff are not and therefore should not either prescribe or manage epidurals (except for patients in critical care under the guidance of the critical care consultant).

7. Monitoring Arrangements

Measurable Policy Objective	**Monitoring/Audit Method**	**Frequency**	**Responsibility for performing monitoring**	**Where is monitoring reported**
Ensuring staff complete documentation accurately	Chart audit Observation on ward rounds/ Continuously	Annual Daily	APS Ward Managers, Clinical Matrons	QSPE meetings; Directorate Audit Lead Datix Clin effectiveness
Ensuring all staff who look after patients on an epidural infusion attend study days	Recording attendance at training on IRIS + old databases	Continuously	APS Ward Managers Clinical Educators Training Dept IRIS	Databases, Ward managers and APS
Ensure that all staff who look after patients on an epidural infusion are competent	Database updated by trained Clinical educators, Link Nurses and APS	Continuously	Staff member, Ward Managers, APS, Practice Development team	On electronic databases; IRIS
Reporting poor practice and documentation	Acute Pain ward rounds	Continuously	APS, Ward Managers, Clinical Educators, Clinical matrons	Datix

8. Due Regard Assessment screening

As an NHS organisation, BSUH is under a statutory duty to set out arrangements to assess and consult on whether their policy and function impact on equality with regard to race, ethnic origin, nationality, gender, culture, religion or belief, sexual orientation, age, marriage and civil partnership status, pregnancy and maternity status and disability. A review of the assessed impact

of this policy against these criteria can be seen. Prior to insertion of an epidural catheter, anaesthetists must gain consent: complying with the Trust Mental Capacity Act and Consent to Examination or Treatment policies.

9. Links to other Trust policies

- Policy for the Safe and Secure Handling of Medicines
- Intravenous Therapy Administration for Adults
- Peripheral Intravenous Cannulation of Adults
- Standard Principles of Infection Prevention & Control
- Policy for Consent to Examination or Treatment
- Mental Capacity Act policy
- Supporting Staff and Patient's Language and Communication Needs Policy

10. Associated documentation

Where there is reference made to documentation on charts, this includes electronic charts and signatures in areas where they are used. This conforms to the Data Protection Act (http://www.legislation.gov.uk/ukpga/2018/12/contents/enacted) and the NMC Guidelines for the administration of medicines and record keeping (https://www.nmc.org.uk/standards/code/record-keeping/ Accessed 12/07/19).

Staff competence for the care of a patient with a continuous epidural infusion (available on IRIS https://iris.bsuh.nhs.uk/totara/dashboard/)

Other resources: http://nww.bsuh.nhs.uk/clinical/teams-and-departments/acute-pain/

11. References

- Acute Pain management: Scientific Evidence 3rd Edition: 2015 ANZCA (http://fpm.anzca.edu.au/documents/apmse4_2015_final Accessed 12/07/19)

- Best practice in the management of epidural analgesia in the hospital setting (https://anaesthetists.org/Home/Resources-publications/Guidelines/Best-practice-in-the-management-of-epidural-analgesia-in-the-hospital-setting (Accessed 12/07/19)

- Harrop-Griffiths et al (2013) Regional anaesthesia and patients with abnormalities of anticoagulation Anaesthesia 68(9):966-72

- Management of severe local anaesthetic toxicity 2010 https://anaesthetists.org/Home/Resources-publications/Guidelines/Management-of-severe-local-anaesthetic-toxicity (Accessed 12/7/19)

- NMC code of professional conduct 2015 https://www.nmc.org.uk/standards/code/ (Accessed 12/07/19)

Key documents

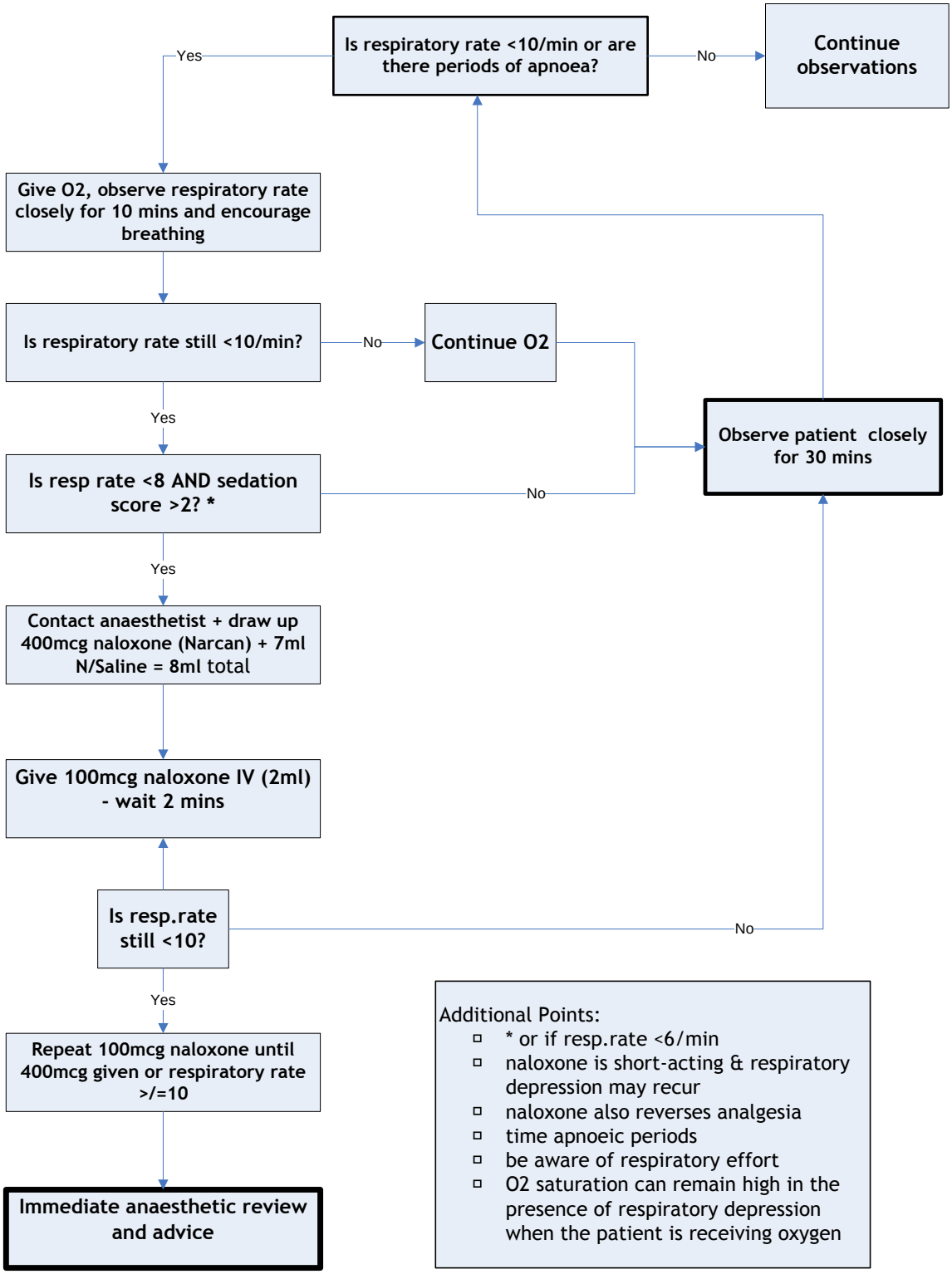
- NPSA Alert 21 – Safer Practice with epidural injections & infusions (March 2007) (https://www.sps.nhs.uk/wp-content/uploads/2018/02/2007-NRLS-0396-Epidural-injectns-PSA-2007-03-28-v1.pdf (Accessed 12/07/19)

- The Royal College of Surgeons of England, the College of Anaesthetists (1990) Report of the Working Party on Pain after Surgery (https://www.rcoa.ac.uk/system/files/FPM-Pain-After-Surgery.pdf) (Accessed 12/7/19)

- Regional Anaesthesia and patients with abnormalities of coagulation (https://anaesthetists.org/Home/Resources-publications/Guidelines/Regional-anaesthesia-and-patients-with-abnormalities-of-coagulation) Accessed 29/07/19

Appendix 1

Protocol for opioid- induced respiratory depression



Appendix 2a – Guidelines to minimise the risk of epidural infection

Insertion of epidural catheters should be performed in the Theatre

- An aseptic technique should be used including rigorous hand washing, gown, gloves, hat and mask and the use of a large sterile drape
- The skin entry site should be cleaned with alcoholic (70%) Chlorhexidine (0.5%) and allowed to dry.
- The catheter should be placed in a J-shape and not encircle the entry site.
- No gauze or foam should be used near or around the entry site.
- A sterile transparent dressing should be used to cover the catheter insertion site to enable observation of the site
- The catheter should be fixed up to the shoulder.

Monitoring the epidural site
Nursing staff must monitor the epidural site if the patient's condition changes or otherwise, at every shift change / handover. Check for pain at site, redness / swelling / fluid leakage and / or increasing lower limb weakness / numbness.

Leakage at the site
If the leak is small, seal edges of dressing or replace if loose or if there is a pooling of exudate, using an aseptic technique.

Management of accidental catheter disconnection:
If the disconnection is witnessed - swab the epidural catheter with an alcohol wipe, allow it to dry, reconnect and check with a moderate tug.
If you are unsure please check with the APS.

If the disconnection is not witnessed, keep the end of the catheter clean and contact the on-call anaesthetist/APS. They will usually advise removal of the catheter unless the epidural benefits are thought to be greater than the risk of epidural infection, even patients who have recently received anti-coagulant therapy, as the potential risk of infection overrides the potential risk of haematoma.

Giving boluses
The safest method of giving a bolus is via the infusion pump. Anaesthetists and the APS may give boluses and these must be recorded on the front of the observation chart.
When other boluses are given an aseptic non-touch technique, including thorough hand washing must be used.

Duration of infusion
- **48** hours maximum for patients who have had orthopaedic surgery
- **72** hours maximum for all other patients.

These limits may be exceeded on the advice of a consultant anaesthetist and with discussion with the consultant of the patient's medical team.

Appendix 2b - **Guidelines for managing suspected epidural infection**

If the epidural site is red, swollen and/or very painful or pus present then:

Immediately:

- Contact the APS/on call anaesthetist
- Swab site (perform blood cultures if febrile)
- Remove epidural catheter if advised by acute pain team/anaesthetist
  Send catheter tip for M, C & S (Request copy of results for acute pain team c/o anaesthetic dept)

Also: Inform on call consultant anaesthetist, infection control team and the surgical team looking after the patient, immediately. Complete a Datix report.

The patient may require investigation .e.g. urgent MRI scan.

BSUH Antibiotic prescribing guidelines can be found on 'Microguide'
(Go to: http://www.microguide.horizonsp.co.uk/viewer/bsuh/adult)

Check frequently for signs of worsening infection, back pain and lower limb weakness and inform the on call anaesthetist immediately if symptoms worsen.

Appendix 3 Managing epidural complications/side effects

Sedation: 0. Awake 1. Occasionally drowsy, easy to rouse 2. Drowsy 3. Sleepy, difficult to rouse 4. Unconscious and unrousable A. Asleep	Monitoring of sedation score and respiratory rate allows early detection of increasing respiratory depression as onset is usually gradual.
Respiratory depression	(Appendix 1)
High block: If there is difficulty in breathing Numbness above the nipples or tingling in patient's arms **not causing symptoms**	Stop the epidural and bleep an anaesthetist urgently: consider a Medical Emergency Team (MET) call Reduce the rate and call the APS/anaesthetist for advice
Hypotension: (Systolic <80 or symptomatic) Often caused by hypovolaemia but may be due to sympathetic block	• Reduce rate and discuss with APS/on-call anaesthetist • Lie patient flat (not head down) • Elevate legs • Give 0_2 • Contact an anaesthetist • Regular blood pressure checks until stable • Treat the hypovolaemia - re-establish epidural infusion under the instruction of an anaesthetist. **NB** if the epidural infusion is turned off for any length of time it may be difficult to re-establish analgesia.
Pain may be due to: 1. Misplaced epidural catheter 2. Block not dense enough - rate too low 3. Block not	Give supplementary simple analgesia and reposition patient if appropriate. Perform a full set of epidural observations and a pain assessment. 1, 2 & 3 Consider increasing the epidural rate by 2ml/hour and contact APS/ on-anaesthetist.

covering surgical site 4. Leaking at site 5. Catheter disconnected/ fallen out **N.B.** Be aware of altered pain or pain at other sites	4 & 5. Seek surgical opinion in addition to treating pain
Nausea & vomiting is multi-factorial in origin	Treat pain as above Give anti emetics as prescribed Seek surgical opinion if appropriate
Pruritus may be caused by opioid in the epidural infusion	Consider regular chlorphenamine or small doses of naloxone. If severe, consider using solution containing local anaesthetic alone.
Urinary retention may be caused by blocking the bladder sensory nerves.	5.10.2 of this policy.
Motor block/heavy limbs may occur in patients with epidurals	This can be a sign of haematoma or abscess Reduce rate and assess regularly to ensure motor block recedes. If increasing or persistent motor block: switch off epidural and call APS/ on-call anaesthetist
Uni-lateral block	• Check both sides when checking sensory block • Give supplementary simple analgesics unless contraindicated • Turn patient onto side that has no sensory block if applicable • Increase epidural rate by 2mls/hour within prescribed limits, if appropriate • Call APS/ on-call anaesthetist if ineffective •
Epidural infection can cause meningitis or abscess formation	Appendix 2a and 2 b

Epidural haematoma is caused by bleeding into the epidural space.	• If patient reports severe localised back pain; increasing lower limb weakness/motor block • **Report to anaesthetist - delay could result in permanent neurological damage**
Accidental Dural tap can occur when the anaesthetist inserts the epidural needle: a tear in the dura allows CSF to leak out causing a "spinal headache" (postural)	• Lie the patient flat, explain and reassure • Inform an anaesthetist • Ensure fluids are adequate. Give analgesia. • If unresolved after conservative management, a blood patch may be required.
Catheter migration into a blood vessel results in systemic absorption of opioids and local anaesthetics. Opioids may cause respiratory depression and sedation; local anaesthetic toxicity may cause perioral tingling, disorientation, twitching, cardiac arrhythmias and convulsions**.**	**Turn off the epidural infusion and fast bleep an anaesthetist/MET call.** **For management of local anaesthetic toxicity (Appendix 5)**
Catheter migration into the subarachnoid space - the epidural infusion is delivered into the CSF. This could cause a 'total spinal' and cause severe hypotension, unconsciousness and apnoea	**If there is rapidly increasing sensory & motor block unrelated to a bolus.** Turn off the epidural and bleep an anaesthetist urgently. Resuscitate if necessary (Appendix 5)

Appendix 4a Recommendations related to drugs used to modify coagulation. Recommended minimum times are based in most circumstances on time to peak drug effect + (elimination half-life ⨀ 2), after which time < ¼ of the peak drug level will be present. For those drugs whose actions are unrelated to plasma levels, this calculation is not relevant. Data used to populate this Table are derived from ASRA and ESRA guidelines [1, 2] and information provided by drug manufacturers. These recommendations relate primarily to neuraxial blocks and to patients with normal renal function except where indicated.

Drug	Time to peak effect	Elimination half-life	Acceptable time after drug for block performance	Administration of drug while spinal or epidural catheter in place[1]	Acceptable time after block performance or catheter removal for next drug dose
Heparins					
UFH sc prophylaxis	< 30 min	1–2 h	4 h or normal APTTR	Caution	1 h
UFH iv treatment	< 5 min	1–2 h	4 h or normal APTTR	Caution[2]	4 h
LMWH sc prophylaxis	3–4 h	3–7 h	12 h	Caution[3]	4 h[3]
LMWH sc treatment	3–4 h	3–7 h	24 h	Not recommended	4 h[4]
Heparin alternatives					
Danaparoid prophylaxis	4–5 h	24 h	Avoid (consider anti-Xa levels)	Not recommended	6 h
Danaparoid treatment	4–5 h	24 h	Avoid (consider anti-Xa levels)	Not recommended	6 h
Bivalirudin	5 min	25 min	10 h or normal APTTR	Not recommended	6 h
Argatroban	< 30 min	30–35 min	4 h or normal APTTR	Not recommended	6 h
Fondaparinux prophylaxis[5]	1–2 h	17–20 h	36–42 h (consider anti-Xa levels)	Not recommended	6–12 h
Fondaparinux treatment[5]	1–2 h	17–20 h	Avoid (consider anti-Xa levels)	Not recommended	12 h
Antiplatelet drugs					
NSAIDs	1–12 h	1–12 h	No additional precautions	No additional precautions	No additional precautions
Aspirin	12–24 h	Not relevant; irreversible effect	No additional precautions	No additional precautions	No additional precautions
Clopidogrel	12–24 h		7 days	Not recommended	6 h
Prasugrel	15–30 min		7 days	Not recommended	6 h
Ticagrelor	2 h	8–12 h	5 days	Not recommended	6 h
Tirofiban	< 5 min	4–8 h[6]	8 h	Not recommended	6 h
Eptifibatide	< 5 min	4–8 h[6]	8 h	Not recommended	6 h
Abciximab	< 5 min	24–48 h[6]	48 h	Not recommended	6 h
Dipyridamole	75 min	10 h	No additional precautions	No additional precautions	6 h
Oral anticoagulants					
Warfarin	3–5 days	4–5 days	INR ≤ 1.4	Not recommended	After catheter removal
Rivaroxaban prophylaxis[5] (CrCl > 30 ml.min^{-1})	3 h	7–9 h	18 h	Not recommended	6 h
Rivaroxaban treatment[5] (CrCl > 30 ml.min^{-1})	3 h	7–11 h	48 h	Not recommended	6 h
Dabigatran prophylaxis or treatment[7]					
(CrCl > 80 ml.min^{-1})	0.5–2.0 h	12–17 h	48 h	Not recommended	6 h
(CrCl 50–80 ml.min^{-1})	0.5–2.0 h	15 h	72 h	Not recommended	6 h
(CrCl 30–50 ml.min^{-1})	0.5–2.0 h	18 h	96 h	Not recommended	6 h
Apixaban prophylaxis	3–4 h	12 h	24–48 h	Not recommended	6 h
Thrombolytic drugs					
Alteplase, anistreplase, reteplase, streptokinase	< 5 min	4–24 min	10 days	Not recommended	10 days

Abbreviations Appendix 4a:

UFH, unfractionated heparin; sc, subcutaneous; APTTR, activated partial thromboplastin time ratio; iv, intravenous; LMWH, low molecular weight heparin, NSAIDs, non-steroidal anti-inflammatory drugs; INR, international normalised ratio; CrCl, creatinine clearance.

Notes to accompany Table Appendix 4a

1. The dangers associated with the administration of any drug that affects coagulation while a spinal or epidural catheter is in place should be considered carefully. There are limited data on the safety of the use of the newer drugs in this Table, and they are therefore not recommended until further data become available. The administration of those drugs whose entry in this column is marked as 'caution' may be acceptable, but the decision must be based on an evaluation of the risks and benefits of administration. If these drugs are given, the times identified in the column to the left ('Acceptable time after drug for block performance') should be used as a guide to the minimum time that should be allowed between drug administration and catheter removal.
2. It is common for intravenous unfractionated heparin to be given a short time after spinal blockade or insertion of an epidural catheter during vascular and cardiac surgery. Local clinical governance guidelines should be followed and a high index of suspicion should be maintained if any signs attributable to vertebral canal haematoma develop.
3. Low molecular weight heparins are commonly given in prophylactic doses twice daily after surgery, but many clinicians recommend that only one dose be given in the first 24 h after neuraxial blockade has been performed.
4. Consider increasing to 24 h if block performance is traumatic.
5. Manufacturer recommends caution with use of neuraxial catheters.
6. Time to normal platelet function rather than elimination half-life.
7. Manufacturer recommends that neuraxial catheters are not used.

Ref: Regional Anaesthesia and Patients with Abnormalities of coagulation, AAGBI 2013.

Appendix 4b Managing epidurals in place if antiplatelet therapy has been given within previous 7 days (see 4a above).

Epidurals should be avoided where long acting antiplatelet therapy has been administered within 7 days.

Exceptions:

a. After **careful risk-benefit analysis**, the anaesthetist has placed an epidural for postoperative analgesia.
b. An epidural has been **placed inadvertently**, despite the patient receiving antiplatelet therapy
c. The antiplatelet drug has been stopped prior to epidural insertion but **therapy inadvertently been restarted** prior to removal of the epidural catheter.

In all cases, attention to the detail of regular neurological assessment is important. The patient should be **carefully monitored for any "red flags"** suggestive of epidural bleeding or acute infection:

a) Motor weakness of lower limbs
b) Tenderness around epidural site
c) Pyrexia

If any of these are suspected, immediate referral should be made to the acute pain team for specialist review or out-of-hours to the anaesthetic on-call team.

If the epidural has been deliberately placed, informed consent is important, and the rationale for the decision should be documented in the notes.

If there has been inadvertent use of an epidural and an antiplatelet drug, **the acute pain team or on-call anaesthetist must be informed** as soon as the situation is recognised.

Review by acute pain team or an anaesthetist:

a) Document any red flags.
b) Review and document the clinical benefits of on-going epidural use.
c) Ensure regular neurological review is being done by nursing staff.
d) Inform anaesthetic consultant.
e) Consider discussing with a haematology consultant.
f) Agree and document a timeframe and conditions for removal of epidural catheter.

Appendix 4c Relative risk related to neuraxial and peripheral nerve blocks in patients with abnormalities of coagulation (Harrop-Griffiths W. et al., 2013)

	Block category	Examples of blocks in category
Higher risk	Epidural with catheter	
	Single-shot epidural	
	Spinal	
	Paravertebral blocks	Paravertebral block
		Lumbar plexus block
		Lumbar sympathectomy
		Deep cervical plexus block
	Deep blocks	Coeliac plexus block
		Stellate ganglion block
		Proximal sciatic block (Labat, Raj, sub-gluteal)
		Obturator block
		Infraclavicular brachial plexus block
		Vertical infraclavicular block
		Supraclavicular brachial plexus block
	Superficial perivascular blocks	Popliteal sciatic block
		Femoral nerve block
		Intercostal nerve blocks
		Interscalene brachial plexus block
		Axillary brachial plexus block
	Fascial blocks	Ilio-inguinal block
		Ilio-hypogastric block
		Transversus abdominis plane block
		Fascia lata block
	Superficial blocks	Forearm nerve blocks
		Saphenous nerve block at the knee
		Nerve blocks at the ankle
		Superficial cervical plexus block
		Wrist block
		Digital nerve block
		Bier's block
Normal risk	Local infiltration	

Appendix 5 AAGBI Guidelines Management of Severe LA toxicity (2010)

AAGBI Safety Guideline

Management of Severe Local Anaesthetic Toxicity

1 Recognition

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 (LA) toxicity may occur some time after an initial injection

2 Immediate management

- Stop injecting the LA
- Call for help
- Maintain the airway and, if necessary, secure it with a tracheal tube
- Give 100% oxygen and ensure adequate lung ventilation (hyperventilation may help by increasing plasma pH in the presence of metabolic acidosis)
- Confirm or establish intravenous access
- Control seizures: give a benzodiazepine, thiopental or propofol in small incremental doses
- Assess cardiovascular status throughout
- Consider drawing blood for analysis, but do not delay definitive treatment to do this

3 Treatment

IN CIRCULATORY ARREST

- Start cardiopulmonary resuscitation (CPR) using standard protocols
- Manage arrhythmias using the same protocols, recognising that arrhythmias may be very refractory to treatment
- Consider the use of cardiopulmonary bypass if available

GIVE INTRAVENOUS LIPID EMULSION

(following the regimen overleaf)

- Continue CPR throughout treatment with lipid emulsion
- Recovery from LA-induced cardiac arrest may take >1 h
- Propofol is not a suitable substitute for lipid emulsion
- Lidocaine should not be used as an anti-arrhythmic therapy

WITHOUT CIRCULATORY ARREST

Use conventional therapies to treat:

- hypotension,
- bradycardia,
- tachyarrhythmia

CONSIDER INTRAVENOUS LIPID EMULSION

(following the regimen overleaf)

- Propofol is not a suitable substitute for lipid emulsion
- Lidocaine should not be used as an anti-arrhythmic therapy

4 Follow-up

- Arrange safe transfer to a clinical area with appropriate equipment and suitable staff until sustained recovery is achieved
- Exclude pancreatitis by regular clinical review, including daily amylase or lipase assays for two days
- Report cases as follows:
  - in the United Kingdom to the National Patient Safety Agency (via **www.npsa.nhs.uk**)
  - in the Republic of Ireland to the Irish Medicines Board (via **www.imb.ie**)

If Lipid has been given, please also report its use to the international registry at **www.lipidregistry.org**. Details may also be posted at **www.lipidrescue.org**

Your nearest bag of Lipid Emulsion is kept .....

See next page for administration guidelines.

IMMEDIATELY

Give an initial intravenous bolus injection of 20% lipid emulsion

1.5 ml.kg^{-1} over 1 min

AND

Start an intravenous infusion of 20% lipid emulsion at **15 ml.kg^{-1}.h^{-1}**

AFTER 5 MIN

Give a **maximum of two** repeat boluses (same dose) if:

- cardiovascular stability has not been restored **or**
- an adequate circulation deteriorates

Leave **5 min** between boluses

A maximum of **three** boluses can be given (including the initial bolus)

AND

Continue infusion at same rate, but:

Double the rate to **30 ml.kg^{-1}.h^{-1}** at any time after 5 min, if:

- cardiovascular stability has not been restored or
- an adequate circulation deteriorates

Continue infusion until stable and adequate circulation restored or maximum dose of lipid emulsion given

Do not exceed a maximum cumulative dose of 12 ml.kg^{-1}

An approximate dose regimen for a 70-kg patient would be as follows:

IMMEDIATELY

Give an initial intravenous bolus injection of 20% lipid emulsion 100 ml over 1 min

AND

Start an intravenous infusion of 20% lipid emulsion at 1000 ml.h^{-1}

AFTER 5 MIN

Give a **maximum of two** repeat boluses of 100 ml

AND

Continue infusion at same rate but **double** rate to 2000 ml.h^{-1} if indicated at any time

Do not exceed a maximum cumulative dose of 840 ml

This AAGBI Safety Guideline was produced by a Working Party that comprised:
Grant Cave, Will Harrop-Griffiths (Chair), Martyn Harvey, Tim Meek, John Picard, Tim Short and Guy Weinberg.

This Safety Guideline is endorsed by the Australian and New Zealand College of Anaesthetists (ANZCA).

Appendix 6 Epidural Infusion Monitoring Chart

Surname
First name
Date of Birth
Trust ID Number
NHS number

EPIDURAL OBSERVATION CHART

DATE:
PUMP No:

Details of epidural insertion

Awake/sedated/asleep	Sitting/lateral	Air/0.9% sodium chloride
Level of insertion:	16G/18G	Catheter mark at skin:
Depth of space:	No of attempts:	
Length in epidural space:		

Any complications:

Intraoperative anaesthetic administered:

Test dose:	%	ml	Time:
Bolus:	%	ml	Time:
Bolus:	%	ml	Time:

Epidural opioid (or other drug) administered:

PRESCRIPTION *(Pre-filled bags only to be used)*

1. **Epidural solutions must be prescribed on the drug chart to ensure continuity of delivery**

   Levobupivacaine…….% Bag volume: ml plus Fentanyl 2mcg/4mcg (circle relevant)

   Bupivacaine…….% Bag volume: ml

   Levobupivacaine……..% Bag volume: ml

   Rate range……ml/hour

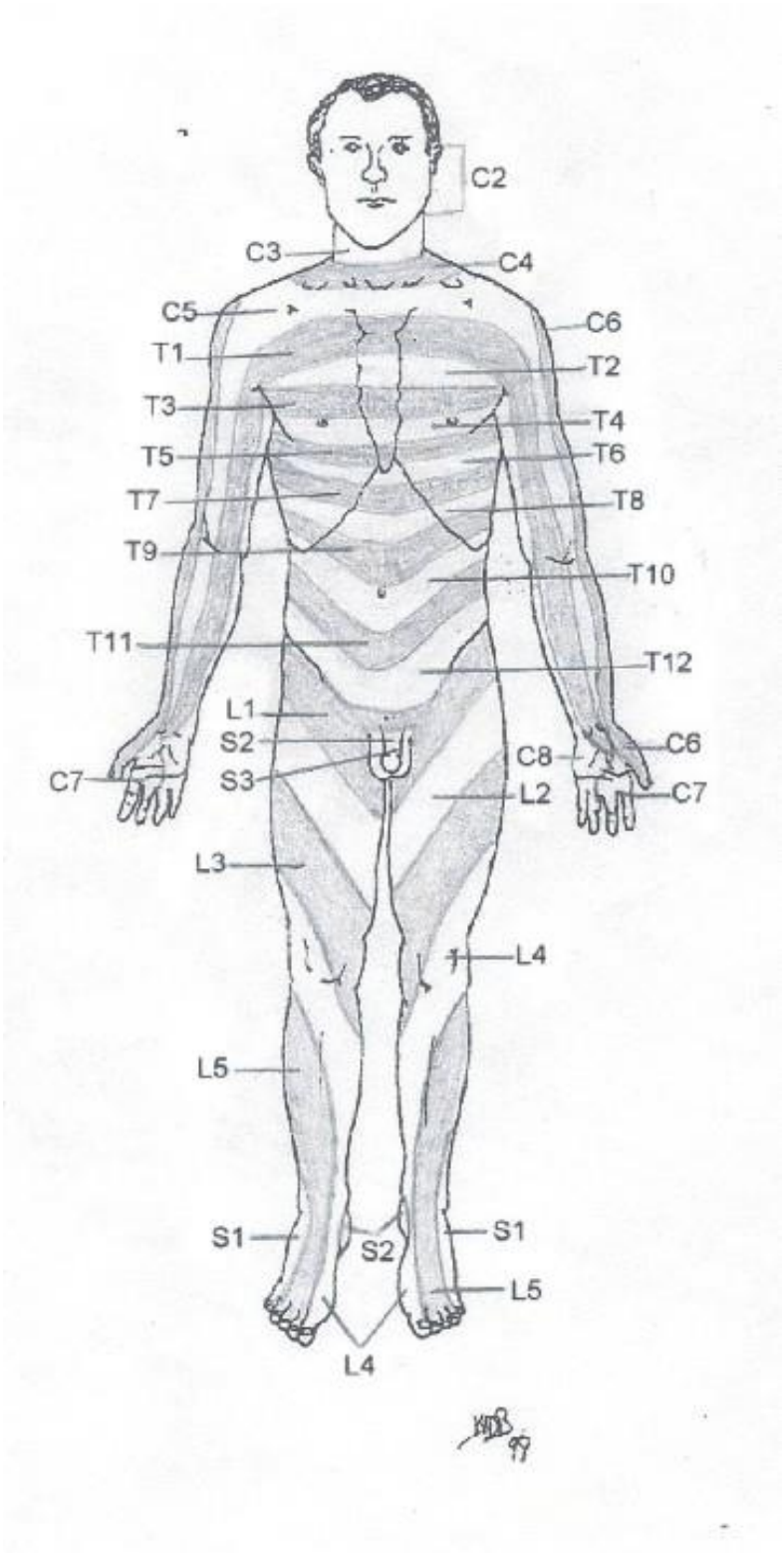
2. Naloxone 100 – 400 mcg IV PRN on drug chart YES (circle when prescribed)

Signature of anaesthetist: ……..……Print name……

Postoperative boluses given:	Bolus 1	Bolus 2	Bolus 3	Bolus 4
Solution/Drug				
Volume/Dose				
Date				
Time				
Signature of anaesthetist/pain nurse Print name				

NB: After bolus or rate change, observations should increase as advised by epidural policy.
Epidural solutions given outside of the epidural policy are at the discretion and responsibility of the prescribing anaesthetist

DERMATOMES


C2
C3
C4
C5
C6
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
L1
S2
S3
C7
C8
C6
C7
L2
L3
L4
L5
S1
S2
S1
L5
L4

On commencement: record observations every 15 minutes (Recovery and ICU)
Following this: ½ hrly for 2 hours; hrly for 5 hours; 2 hrly for 4 hours; 4 hrly for the duration of the epidural
Following a rate change: Record vital signs and epidural observations after 30 minutes

Min	Time	Rate ml/hr	Total vol	Sensory Block L		R		Motor Density Score	Sedation Score	Pain Score	Resp Rate	Site Check Y/N	Initials		Reason for Omission
				T	B	T	B								
15 min															
30 min															
45 min															
60 min															

Following a bolus: Record pulse & blood pressure every 5 mins for 20 mins then every 10mins for 40 mins. Perform and record a full set of epidural observations after 20 mins

Date	Time	Rate ml/hr	Total Vol	Sensory Block L		R		Motor Density Score	Sedation Score	Pain Score	Resp Rate **Hourly**	Site Check Y/N	Initials		Reason for Omission
				T	B	T	B						1	2	

Motor Density Score:
0 = no detectable weakness
1 = slight, unable to raise extended leg
2 = moderate, unable to flex at knee
3 = complete, unable to flex foot at ankle

Sedation Score:
0 = awake and alert
1 = slightly drowsy
2 = moderately drowsy but can talk when roused
3 = very drowsy and mumbling
4 = unconscious & unrousable
A = Asleep

Reason for omission:
A Patient asleep - unable to complete
B Patient condition prevents completion
C Patient refusal
D Other - state reason in nursing notes

Trouble shooting Guidelines

NB: If the pain team (Bleep 6468 - PRH; 8102 - RSCH) are not available and patient is in severe pain then contact an anaesthetist (Bleep 6327 - PRH; 8235 - RSCH)

Inadequate Analgesia

- Test and document sensory block level with ice
- Check epidural site for leakage and the line for disconnection
- Increase infusion rate within prescribed limits if appropriate
- If pain causing distress or is impacting on movement and deep breathing then inform pain team or on-call anaesthetist (out of hours)

Hypotension

- This may not be due to the epidural so always exclude other causes such as hypovolaemia before stopping epidural infusion
- **Severe hypotension** - systolic BP less than 80mm Hg or if patient symptomatic, give oxygen, call the on-call anaesthetist and give fluid challenge if prescribed.
- Do not tip patient head down (use leg elevation only)

Opioid induced respiratory depression - sedation score >2; respirations < 8

- Switch off the epidural infusion.
- Give oxygen and Naloxone (Appendix 1 Epidural policy)
- Immediately contact on call anaesthetist.

High Motor Block - weakness in arms/difficulty breathing

- Switch off the epidural.
- Immediately contact anaesthetist on call.
- Give oxygen.
- Measure and document all vital signs.
- Check sensory block height.

Signs of infection

Refer to the Epidural policy – Appendices 2 & 3
Inform the pain team or on call anaesthetist if the patient develops any signs of localised or systemic infection.

Epidural haematoma & Epidural abscess

Stop the epidural infusion and contact the pain team or on call anaesthetist immediately if the patient has increasing or an unexplained onset of motor block or difficulties in moving legs or if the patient has back pain localized to the site of epidural insertion
Ensure that any concerns are also reported to the patient's own team.

Anti-coagulants - refer to the Epidural policy – Appendix 4
For example: epidurals should not be removed until at least **12 hours after** an injection of Tinzaparin/Enoxaparin; 18 hours after Rivaroxaban.
Following epidural removal subsequent doses must not be given for at least **4 hours**.

Removal/Review

- Epidurals must be reviewed daily by the pain team/anaesthetist
- Epidurals must be removed at 72 hours (48 hours in orthopaedic patients)
- The patient's consultant/anaesthetic consultant must be involved if the decision to leave one in is suggested.

Disposal of epidural solution

Amount wasted (ml): Date: Time:
Signature of nurse (1): Print name:
Signature of nurse (2): Print name:

Appendix 7

Guidelines for the delivery of an epidural bolus (excluding maternity) by:
Pain Nurse Specialists

Guidelines for the delivery of an epidural bolus (excluding maternity) by:

Pain Nurse Specialists

1. Bolus of local anaesthetic (LA) + Fentanyl via an epidural pump

Patients following major surgery may have a continuous epidural infusion postoperatively. These patients may require an epidural top-up to maximise pain relief.
A bolus of epidural solution can be administered via the epidural pump within prescribed limits by trained anaesthetists and pain nurse specialists.
Hypotension is a risk and monitoring is required every 5 minutes for the first 20 minutes; every 10 minutes for 40 minutes and then hourly, after a bolus.

2. Bolus of Diamorphine only

When the patient is haemodynamically unstable a bolus of LA can result in hypotension. The elderly and cardiac patients are particularly vulnerable because rehydration may have to be undertaken cautiously. Opioids given by the epidural route rarely have an effect on blood pressure: this is due to a segmental rather than systemic effect (Ginosar et al, 2003; Wheatley et al, 2001).

Suggested dosage

Diamorphine 1.25 - 2.5 milligrams made up to 10mls with normal saline, prescribed on the drug chart by an anaesthetist/pain nurse specialist who is an Independent Prescriber.

Monitoring

Respiratory depression and increased sedation are possible side effects and the patient should be observed for at least 20 minutes after a bolus. Normal epidural monitoring should then be continued by a trained member of the ward staff.

Competence should be assessed by a Lead Clinician in pain management.
The pain nurse specialist is responsible for maintaining his/her own competence (NMC Code 2015). Update or reassessment is not necessary unless there has been a considerable break in practice or it is identified as necessary during appraisal / supervision.

References

Ginosar Y, Riley E, Angst M. (2003) The Site of Action of Epidural Fentanyl in Humans: The difference between Infusion and Bolus Administration*. Anesth Analg 97:1428-38.*

Wheatley R., Schug S. & Watson D. (2001) Safety & efficacy of post-operative epidural analgesia. *Br.Jnl.Anaesthesia* 87: 47 - 61

EPIDURAL BOLUS - CLINICAL & ACADEMIC REQUIREMENTS

The candidate must:

- Be competent with medical devices used
- Hold a current IV certificate
- Have at least 2 years' experience as a CNS in acute pain
- Have completed 5 supervised administrations of each - opioid bolus and bolus through the pump under the supervision of the a Consultant or ACP in pain management

The information required for assessment can be obtained from:

- Clinical experience
- Clinical supervision as discussed during evidence logging
- Epidural policy

CANDIDATE AND ASSESSOR TO COMPLETE AFTER ASSESSMENT:

Name:

Date:

Competent to practice: YES NO (please circle)

By signing below I confirm that following training and competency assessment on giving epidural boluses, I take full accountability for competency in my practice and I shall keep my knowledge and safe practice up to date.

Signature of Candidate:

Signature of Assessor:

EPIDURAL OPIOID BOLUS/BOLUS THROUGH THE PUMP

EVIDENCE LOG SHEET

DATE	Details of procedure and comments	Signature (assessor)	Signature (candidate)

Epidural Bolus - Competence for Acute Pain Nurses

THEORETICAL KNOWLEDGE

The Candidate must know	Competent	Comments
Patient suitability for epidural bolus		
Side effects of epidural bolus and treatment (including relevant drug dosages and mode of administration)		
How long the bolus is likely to last		
Current supporting evidence available		
Knowledge of the naloxone protocol		

PERFORMANCE CRITERIA

The Candidate must demonstrate	Competent	Comments
Communication with appropriate ward staff prior to procedure		
Appropriate pain assessment - including assessing block height		
Exclusion of other reasons for epidural ineffectiveness		
That alternative methods of pain relief have been given (where appropriate)		
Appropriate patient selection for bolus		
Assessment of the prescription for bolus		
Awareness of infection control and health & safety issues		
That the epidural bolus algorithm is followed		
Appropriate monitoring of the patient		
Equipment & prescription checks necessary		
Preparation for and appropriate action in the event of side effects		
Formulation of a plan for the patient's pain management over the next 24hrs		
Documentation is complete		

EPIDURAL BOLUS - CLINICAL & ACADEMIC REQUIREMENTS

The candidate must:

- Be competent with medical devices used
- Hold a current IV certificate
- Have at least 2 years' experience as a CNS in acute pain
- Have completed 5 supervised administrations of each - opioid bolus and bolus through the pump under the supervision of the Lead Clinician in pain management

The information required for assessment can be obtained from:

- Clinical experience
- Clinical supervision as discussed during evidence logging
- Epidural policy

CANDIDATE AND ASSESSOR TO COMPLETE AFTER ASSESSMENT:

Name:

Date:

Competent to practice: YES NO (please circle)

By signing below I confirm that following training and competency assessment on giving epidural boluses, I take full accountability for competency in my practice and I shall keep my knowledge and safe practice up to date.

Signature of Candidate:

Signature of Assessor:

EPIDURAL OPIOID BOLUS/BOLUS THROUGH THE PUMP

EVIDENCE LOG SHEET

DATE	Details of procedure and comments	Signature (assessor)	Signature (candidate)

Epidural Bolus - Competence for Acute Pain Nurses

THEORETICAL KNOWLEDGE

The Candidate must know	Competent	Comments
Patient suitability for epidural bolus		
Side effects of epidural bolus and treatment (including relevant drug dosages and mode of administration)		
How long the bolus is likely to last		
Current supporting evidence available		
Knowledge of the naloxone protocol		

PERFORMANCE CRITERIA

The Candidate must demonstrate	Competent	Comments
Communication with appropriate ward staff prior to procedure		
Appropriate pain assessment - including assessing block height		
Exclusion of other reasons for epidural ineffectiveness		
That alternative methods of pain relief have been given (where appropriate)		
Appropriate patient selection for bolus		
Assessment of the prescription for bolus		
Awareness of infection control and health & safety issues		
That the epidural bolus algorithm is followed		
Appropriate monitoring of the patient		
Equipment & prescription checks necessary		
Preparation for and appropriate action in the event of side effects		
Formulation of a plan for the patient's pain management over the next 24hrs		
Documentation is complete		

Appendix 8 Due Regard Assessment - To be completed and attached to any policy when submitted to the appropriate committee for consideration and approval

		Yes/No	Comments
1	**Does the document/guidance affect one group less or more favourably than another on the basis of:**		
	• Age	No	
	• Disability	Yes	Competence to consent through cognitive impairment. Ability to verbalise pain and inability to move might affect the safety of having a continuous epidural infusion.
	• Gender	No	
	• Gender identity	No	
	• Marriage and civil partnership	No	
	• Pregnancy and maternity	No	This policy does not apply to maternity
	• Race	Yes	If English is not the first language then an interpreter may be required for safety (see under disability). See 'Supporting Staff and Patient's Language and Communication Needs' Policy.
	Religion or belief	No	
	Sexual orientation including lesbian, gay and bisexual people	No	
2	Is there any evidence that some groups are affected differently and what is/are the evidence source(s)?	No	
3	If you have identified potential discrimination, are there any exceptions valid, legal and/or justifiable?	No	
4	Is the impact of the document/guidance likely to be negative?	No	
5	If so, can the impact be avoided?	No	
6	What alternative is there to achieving the document/guidance without the impact?	No	
7	Can we reduce the impact by taking different action and, if not, what, if any, are the reasons why the policy should continue in its current form?	No	
8	Has the policy/guidance been assessed in terms of Human Rights to ensure service users, carers and staff are treated in line with the FREDA principles (fairness, respect, equality, dignity and autonomy)		

If you have identified a potential discriminatory impact of this policy, please refer it to the APS, together with any suggestions as to the action required to avoid/reduce this impact. For advice in respect of answering the above questions, please contact Extension 8233