

Best practice in the management of epidural analgesia in the hospital setting



FACULTY OF PAIN MEDICINE
of The Royal College of Anaesthetists



Royal College of Anaesthetists



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Association of Anaesthetists of Great Britain and Ireland



British Pain Society



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1 Introduction

1.1 Epidural analgesia is highly effective for controlling acute pain after surgery or trauma to the chest, abdomen, pelvis or lower limbs. It has the potential to provide excellent pain relief, minimal side-effects and high patient satisfaction when compared with other methods of analgesia. However, epidural analgesia can cause serious, potentially life-threatening complications; safe and effective management requires a co-ordinated multidisciplinary approach.

1.2 This document is a revised version of the guideline published in 2004.¹ In 2009, the Royal College of Anaesthetists published the results of a nationwide audit of major complications associated with central neuraxial block in the UK.² These data have significantly informed this guideline.

1.3 All practitioners should be aware of the complications associated with the use of epidural analgesia. Some complications can be fatal or result in permanent harm. Frequent complications include:
hypotension;
respiratory depression (opioid use);
motor block;
urinary retention;
inadequate analgesia;
pruritus (opioid use).

Infrequent but well recognised complications include:
cardiovascular collapse;
respiratory arrest;
unexpected development of high block, e.g. catheter migration, intrathecal injection; local anaesthetic toxicity;
post dural puncture headache syndrome (including sub-dural haematoma);
drug administration errors (especially wrong route);
pressure sores;
superficial infection around catheter;
epidural haematoma or abscess;
meningitis;
spinal cord ischaemia;
permanent harm, e.g. paraplegia, nerve injury.

2 Scope of recommendations

2.1 These guidelines are concerned with the management of epidural analgesia in the hospital setting, including continuous infusions, patient-controlled epidural analgesia (PCEA) and intermittent top-up injections. They are not concerned with the management of epidural analgesia for obstetrics, palliative care or management of persistent non-cancer pain.

2.2 The features of an epidural pain management service are described. These recommendations should be considered with other guidelines on the provision of acute pain services.³⁻⁴

3 Patient selection and consent

- 3.1 Patient selection for epidural analgesia should be based on a careful risk/benefit analysis for each patient. Risk factors include: impairment of coagulation (pathological or therapeutic); infection; compromised immunity; duration of epidural catheterisation; cardiovascular stability; and inadequate postoperative monitoring capability.
- 3.2 Continuous epidural analgesia is a significant procedure with specific and potentially serious complications; therefore, informed patient consent should be obtained. The process of obtaining consent should comply with national and local guidance. There should be a discussion of the risks and potential benefits of epidural analgesia, including information on late complications that may occur after discharge from hospital. A summary of this discussion should be documented in the patient's notes. Consent should be facilitated by written patient information. A suitable leaflet⁵ is available on the Royal College of Anaesthetists' website; it is not copyrighted and can be modified to account for local factors.

4 Personnel, staffing levels and ward environment

- 4.1 The Department of Anaesthesia should ensure that there are designated personnel and clear protocols to support the safe and effective use of epidural analgesia. This should be the responsibility of a multidisciplinary Acute Pain Service including a consultant anaesthetist and clinical nurse specialist(s) with support from pharmacy.³⁻⁴ The service should ensure that appropriate documentation, administrative routines and audit are in place.

- 4.2 Ultimate responsibility for the epidural infusion remains with the practitioner who instituted it (or supervising consultant if inserted by a trainee). However, immediate supervision of the patient may be passed to the Acute Pain Service and properly trained ward staff. An agreed form of communication should be used to facilitate this transfer of supervision.
- 4.3 Trainee and Staff and Associate Specialist/ Speciality doctors must possess appropriate competencies before performing epidural injections and establishing infusions without the direct supervision of a consultant or senior colleague. These are well defined, regularly reviewed and available from the Royal College of Anaesthetists and Faculty of Pain Medicine websites.
- 4.4 There must be adequate handover of information between on-call staff about patients who are receiving epidural analgesia. Ideally, an up-to-date list of ongoing epidurals should be maintained and readily available.
- 4.5 Nurses with specific training and skills in the supervision of epidural analgesia and management of its complications must be present on the ward and on every shift (i.e. 24-hour cover). Staffing levels and expertise should be sufficient to enable adequate monitoring and care to be given to all patients receiving epidural analgesia. These staff must be immediately available to respond to adverse events. Oxygen and full resuscitation equipment must be available.
- 4.6 Patients receiving epidural analgesia should be situated close to the nurses' station, thus ensuring close supervision. If nursing in a single room is being considered, a full risk assessment with respect to the epidural should be undertaken and staff should be sure that appropriate monitoring and care can take place in this environment.
- 4.7 Before the patient returns to the ward, the responsible anaesthetist should be assured that the ward is sufficiently staffed to ensure safe management of the epidural. A system of communication should exist to inform the anaesthetist and theatre staff if this is inadequate.
- 4.8 There should be 24-hour access to:
- medical staff, trained and competent in the management of epidurals, immediately available to attend patients;
 - senior anaesthetic advice and availability; and
 - a resuscitation team with a resident doctor with appropriate competencies.

5 Catheter insertion

- 5.1 Epidural catheter insertion must be performed using an aseptic technique. This should include hand washing, sterile gloves, sterile gown, hat, mask, appropriate skin preparation and sterile drapes around the injection site.

- 5.2 The tip of the epidural catheter should be positioned at a spinal level appropriate for the surgery. A catheter placed in a low position may be associated with poor analgesia and need for large volumes of infusion in adults.
- 5.3 The catheter should be secured in order to minimise movement in or out of the epidural space. The dressing should allow easy visibility of the insertion site and catheter.
- 5.4 Anaesthetists inserting epidural catheters should be aware of, and adhere to, local infection guidelines (including use of prophylactic antibiotics in special circumstances).
- 5.5 Local guidelines should be in place with respect to the insertion and removal of epidurals in patients on anticoagulants or with impaired coagulation. All staff should be aware of, and adhere to, these guidelines.

6 Equipment

- 6.1 Ideally, equipment for epidural insertion and infusion should be standardised throughout the institution so that it is familiar to all staff providing or supervising epidural analgesia. Staff must be trained in the use of this equipment.
- 6.2 Infusion pumps should be configured specifically for epidural analgesia with pre-set limits for maximum infusion rate and bolus size; lock-out time should be standardised if used for PCEA. Pumps should be designated for epidural analgesia only and should be labelled as such.⁶ There should be a documented maintenance programme.
- 6.3 The epidural infusion system between the pump and patient must be considered as closed; there should be no injection ports. An anti-bacterial filter must be inserted at the junction of epidural catheter and infusion line.

- 6.4 Effective management of epidural analgesia may require the administration of a bolus injection of solution into the system. This may be performed using the syringe within the pump, thus not breaching the system. If a separate handheld syringe is used, the injection must be performed using a strict aseptic technique. Bolus injections must be performed by staff with appropriate training and competencies and more intensive monitoring of the patient is required immediately after the injection.
- 6.5 Epidural infusion lines should be clearly identified as such. The National Patient Safety Association (NPSA) has recommended the use of yellow tubing to differentiate epidural/spinal lines from arterial (red), enteral (purple) and regional (grey) infusions.⁷
- 6.6 In November 2009, the NPSA recommended that equipment should be developed that will enable NHS institutions to perform all epidural, intrathecal and regional infusions and boluses with devices that will not connect with intravenous Luer connectors or intravenous infusion spikes.⁸ Practitioners involved in the use of epidural analgesia should be aware of this project and respond to further national guidance.
- 6.7 Resuscitation equipment, oxygen and appropriate drugs must be readily available wherever epidural infusions are employed.
- ## 7 Drugs for epidural analgesia
- 7.1 There should be a limited number of solutions approved and available for epidural infusions in every hospital.⁶ They should be prepared under strict sterile conditions in specifically designed units. Many are available commercially. Any variation from this should occur in exceptional circumstances only and with the agreement of the responsible consultant after a risk/benefit analysis.
- 7.2 Epidural infusions should be labelled 'For Epidural Use Only'.⁶
- 7.3 Epidural infusions should be stored in separate cupboards or refrigerators from those holding intravenous and other types of infusions in order to reduce the risk of wrong route administration.⁶
- 7.4 The lowest possible effective concentration of local anaesthetic should be used in order to preserve motor function as much as possible. This improves patient satisfaction and aids detection of neurological complications. If higher concentrations are required, the infusion rate should be reduced periodically to allow assessment of motor block.
- 7.5 The use of drugs beyond licence should be consistent with local hospital guidelines and informed by recommendations of the British Pain Society.⁹

8 Patient monitoring

- 8.1 Patients must be monitored closely throughout the period of epidural analgesia. It should be performed by trained staff aware of its significance and action required in response to abnormal values. Monitoring should include:
- heart rate and blood pressure;
 - respiratory rate;
 - sedation score;
 - temperature;
 - pain score;
 - degree of motor and sensory block.
- 8.2 In addition, requirements for monitoring will be determined by the nature of the surgery, and condition and age of the patient.
- 8.3 The frequency of observations should be determined by normal clinical considerations. With respect to the epidural, they should be more frequent in the first 12 hours of the epidural infusion, after top-up injections, changes of infusion rate and in periods of cardiovascular or respiratory instability.
- 8.4 Monitoring should follow clear written protocols and compliance to these should be audited.
- 8.5 Epidural blockade can cause hypotension. However, when hypotension occurs after surgery, other common causes should be considered and excluded, e.g. bleeding, myocardial insufficiency, sepsis, pulmonary embolus, dehydration.
- 8.6 Pain scores (at rest and on movement or deep breathing) and sedation scores will help to identify inadequate or excessive epidural drug administration. Monitoring protocols should give clear guidance on actions required if analgesia is inadequate.
- 8.7 Sedation is often the most sensitive indication of opioid-induced respiratory depression.

- 8.8 Monitoring of sensory and motor block is essential for the early detection of potentially serious complications. The Bromage Scale is an accepted tool for the measurement of motor block.¹⁰ An increasing degree of motor weakness usually implies excessive epidural drug administration. However, it can indicate very serious complications including dural penetration of the catheter, or the development of an epidural haematoma or abscess. Therefore, it is essential that protocols are in place to manage the scenario of excessive motor block. Examples of suitable algorithms and specific advice on protocols for this situation are given in the report on the audit of major complications of central neuraxial block performed by the Royal College of Anaesthetists.²
- 8.9 An epidural abscess or haematoma can cause severe, permanent neurological damage and must be detected and treated as soon as possible. This diagnosis must be considered if excessive motor block does not resolve rapidly after stopping the epidural infusion. A clear protocol should be in place describing the actions required in this situation, including informing senior anaesthetic staff and immediate availability of suitable imaging and surgical expertise.
- 8.10 Records must be kept of the monitoring described above as well as epidural infusion rate, total amount used, inspection of epidural insertion site, patency of intravenous access and integrity of pressure areas.
- 8.11 Staff should be aware that increased or breakthrough pain may indicate surgical complications including the development of compartment syndromes. Special care should be taken when interpreting physical signs in patients who may have sustained neurological damage.

9 Epidural analgesia in children

- 9.1 All the recommendations in this guideline apply also to neonates, infants and children but methods of monitoring and assessment scores must be appropriate for developmental age.¹¹
- 9.2 Dosing regimens for children must be adapted for age and weight with maximum dosage clearly defined to minimise the risk of cumulative local anaesthetic toxicity, especially in neonates and infants < three months of age.¹¹
- 9.3 Clear protocols for prescription, monitoring and troubleshooting of paediatric epidural infusions should be used. Infusion devices should be programmed and double checked with extreme care as there is an increased risk of error when managing small infants and neonates.¹²

- 9.4 Hourly assessments are recommended, especially in the first 12 hours. There should be regular review of the need to continue the infusion, especially after 48 hours.
- 9.5 Motor block should be assessed and documented formally using an age-appropriate assessment. A clear action plan should be in place if motor block persists or progresses.
- 9.6 Spread of local anaesthetics in neonates and infants is extensive and low catheters can be used to provide an effective block for thoraco-lumbar dermatomes without using unacceptable doses of local anaesthetic. Whilst caudal catheters are effective, these can become soiled unless carefully dressed or tunnelled away from the insertion site.
- 9.7 Compartment syndrome is a particular concern after very prolonged procedures, after lower limb surgery and when the patient has been positioned during surgery in other than the standard supine position.¹²
- 9.8 An anaesthetist with appropriate competencies and training should be immediately available to attend a child who is receiving an epidural infusion.
- 9.9 The use of drugs beyond licence has been discussed in 7.5. Specific advice with respect to children has been published by the Association of Paediatric Anaesthetists of Great Britain and Ireland.¹¹
- 9.10 Written and verbal advice should be provided to patients and carers alerting them to the signs and symptoms of an epidural abscess and what to do if they occur. Many children are discharged before the mean time of onset of these signs and symptoms. An information leaflet for parents and older children¹³ is available on the Royal College of Anaesthetists' website.

10 Documentation, guidelines and protocols

- 10.1 Contemporaneous records must be kept of events throughout the period of epidural analgesia. This includes consent, insertion and removal of the catheter, prescription of the infusion, monitoring, additional doses and notes about any complications or adverse events.
- 10.2 Safety is enhanced by the use of standard pre-printed prescription forms rather than hand written prescriptions that might be misinterpreted.
- 10.3 Contact telephone and/or bleep numbers for expert medical and nursing personnel must be printed on documents that are kept on the ward, and near to the patient.
- 10.4 Protocols and guidelines should include;
 - overall management of patients with epidural infusions;
 - instructions for the use of the pump;
 - description of the drug concentrations used in the hospital;
 - description of infusion rates and how to adjust them;
 - instructions for changing epidural solution bags or syringes;
 - frequency of observations;
 - maintenance of intravenous access throughout the infusion period;
 - identification and management of early and late complications;
 - management of inadequate analgesia;

management of accidental catheter disconnection;

instructions for removal of the epidural catheter and monitoring for complications;

insertion and removal of epidural catheters in patients receiving anticoagulants;

pain management after cessation of the epidural infusion;

management of opioid and local anaesthetic toxicity;

mobilisation after epidural removal, e.g. during enhanced recovery programmes.

11 Audit and critical incidents

- 11.1 There should be regular audits concerned with epidural analgesia. These could include:
 - efficacy and patient satisfaction;
 - incidence of complications;
 - adherence to management protocols.
- 11.2 There should be clear procedures for the reporting of, and response to, critical incidents associated with the use of epidural analgesia.

12 Education

- 12.1 There should be formal, documented training in place for doctors and nurses who are responsible for supervising patients receiving epidural analgesia.
- 12.2 Training programmes should include induction and regular update sessions and be commensurate with the responsibilities of the staff involved.

References

- 1 Good practice in the management of continuous epidural analgesia in the hospital setting. *RCoA*, London 2004 (archived – please contact FPM).
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- 3 Guidelines for the provision of anaesthetic services. *RCoA*, London 2009 (www.rcoa.ac.uk/gpas).
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- 5 Epidurals for pain relief after surgery. *RCoA*, London 2008 (www.rcoa.ac.uk/node/1854).
- 6 Patient safety alert: Safer practice with epidurals injections and infusions. *NPSA*, London 2007 (www.nrls.npsa.nhs.uk/EasySiteWeb/getresource.axd?AssetID=60063&type=full&servicetype=Attachment).
- 7 Design for patient safety: a guide to the design of electronic infusion devices. *NPSA*, London 2010 (www.nrls.npsa.nhs.uk/resources/?EntryId45=68534).
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- 9 The use of drugs beyond licence in palliative care and pain management. A position statement prepared on behalf of the Association for Palliative Medicine and the British Pain Society. *APM* and *BPS*, London 2005 (www.britishpainsociety.org/pub_professional.htm#drugsmain).
- 10 Description of the Bromage Scale. The 3rd national audit project of the Royal College of Anaesthetists. Major complications of central neuroaxial block in the United Kingdom. *RCoA*, London 2009 (pg 142) (www.rcoa.ac.uk/nap3).
- 11 Good practice in postoperative and procedural pain. *APAGBI*, London 2008 (www.britishpainsociety.org/pub_professional.htm#apa).
- 12 Llewellyn N, Moriarty A. The national pediatric epidural audit. *Pediatric Anesthesia* 2007;17:520–533 (<http://onlinelibrary.wiley.com/doi/10.1111/j.1460-9592.2007.02230.x/full>).
- 13 An epidural for pain relief after surgery in children. *RCoA*, London 2009 (www.rcoa.ac.uk/node/2163).

Guideline development

Members of the working group considered the original version of the guidelines¹ in detail and modified them in accordance with the current evidence base and recent guidelines published by relevant professional bodies. Where there was a paucity of evidence to inform changes, these were derived by obtaining the consensus opinion of the group members. The proposed new guidelines were then submitted to the governing bodies of the endorsing professional organisations for consideration and approval. In addition, views of the Regional Advisors of the Faculty of Pain Medicine were obtained. This process led to further minor changes and the final published version.

The original version¹ did not consider the use of epidurals in obstetric practice. The present working group decided that this was entirely appropriate as many obstetric factors influence their safe and effective management.

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