

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



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Introduction

Epidural analgesia can be highly effective for managing acute pain after surgery or trauma to the chest, abdomen, pelvis or lower limbs. It provides excellent pain relief with high patient satisfaction when compared with other methods of analgesia and may avoid side effects associated with systemic therapy. However, epidural analgesia can cause serious, potentially life-threatening complications and all practitioners should be aware of these. Safe and effective epidural management requires a co-ordinated multidisciplinary approach (1, 2). This document is a revised version of the guideline published in 2020 (3).

Scope of recommendations

- ▶ These guidelines are concerned with the management of epidural analgesia in the hospital setting in the United Kingdom, including continuous infusions, patient-controlled epidural analgesia (PCEA) and intermittent top-up injections.
- ▶ These guidelines are not concerned with the management of epidural analgesia for persistent cancer pain, palliative care or chronic pain.
- ▶ These guidelines are not concerned with the management of epidural analgesia for obstetrics. The Association of Anaesthetists & Obstetric Anaesthetist's Association have recently produced a safety guideline on the neurological monitoring after obstetric neuraxial blockade (4).
- ▶ These guidelines are not intended to guide the management of any other neuraxial techniques such as single shot spinal injections or intrathecal catheters.
- ▶ The features of an epidural pain management service are described. These recommendations should be considered with other guidelines on the provision of inpatient pain services (5).

1 Patient selection and consent

- 1.1 Patient selection for epidural analgesia should be based on a careful risk/benefit analysis for each patient.
- 1.2 Consider the use of a regional anaesthetic block techniques instead of an epidural in appropriate situations if there are lower risks associated.
- 1.3 In patients for whom the risks outweigh the benefits, alternative methods of pain relief should be sought.

Absolute contraindications	Relative and controversial contraindications
Patient refusal	▶ Cognitive or communication impairment that leads to difficulty in clinical assessment of epidural function or complications ▶ Sepsis/infection (eg, varicella zoster virus) ▶ Pre-existing central nervous system disorders (eg, multiple sclerosis) ▶ Preload dependent states (eg, aortic stenosis) ▶ Previous back surgery, preexisting neurologic injury ▶ Placement in anaesthetised adults ▶ Needle placement through tattoo
Infection at site of catheter insertion	
Raised intracranial pressure in those at risk of cerebral or cerebellar herniation	
Allergy to agents prescribed in epidural	▶ The immunocompromised patient and patients with an abnormality of coagulation (anticoagulants, thrombocytopenia and other bleeding diathesis)
Lack of appropriately trained medical/nursing personnel available	

Table 1

- 1.4 Continuous epidural analgesia is an invasive procedure with specific and potentially serious complications; every effort to obtain informed patient consent must be made, whilst recognising that in some patient groups such consent may not be possible. In such cases, GMC guidance on consent for patients who lack capacity should be followed.
- 1.5 The process of obtaining consent should comply with national and local guidance (6). There should be a discussion of the risks and potential benefits of epidural analgesia, including complications that may occur after discharge from hospital. The amount of information on risk discussed with patients will depend on the individual patient and what they want and need to know. The GMC stipulates that patients must be informed of potentially serious adverse outcome, even if the likelihood is very small. They should also be told of less serious adverse complications if they occur more frequently (6). Such risks should be explained in terms that the patient understands, and the quoted frequency of adverse events based on local and/or national evidence (such as NAP3 (2)). Explaining the risks and benefits of alternative treatments is an important part of the consent process. This process should begin in the preoperative period. <https://www.rcoa.ac.uk/safety-standards-quality/guidance-resources/consent-ethics>
- 1.6 Other sources of information should be available to enable patients to make an informed choice about their treatment. For example, patient information leaflets or other resources. Where possible, these should be given to patients in adequate time prior to the procedure, in order that they have sufficient time to process the information, and be in a form they can understand.
- 1.7 A summary of this consent discussion should be documented either in the patient's clinical record (notes or on the anaesthetic chart).

2 Personnel, staffing levels and ward environment

- 2.1 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 inpatient pain service (5). The service should ensure that appropriate documentation, administrative routines and clinical governance are in place.
- 2.2 Ultimate responsibility for the epidural infusion remains with the practitioner who instituted it (or supervising consultant if inserted by a trainee). However, the daily management of the patient and epidural, including the management of any complications that may arise, should be passed to the inpatient pain service, competent ward based registered nursing staff and parent team. An agreed form of communication should be used to facilitate this transfer of supervision.
- 2.3 Autonomously practicing anaesthetists, resident doctors, supervised SAS doctors and LED doctors should be able to demonstrate appropriate competencies before performing epidural injections and establishing infusions without the direct supervision of a consultant or senior colleague. These competencies are well defined, regularly reviewed and available from the Royal College of Anaesthetists and Faculty of Pain Medicine websites.
- 2.4 There should be adequate handover of information between those that manage epidurals in hours (including the inpatient pain team and on-call staff) about patients who are receiving epidural analgesia. An up-to-date list of epidurals should be maintained and readily available. This list should include the length of time the epidural has been in situ.
- 2.5 Registered nurses with specific training and skills in the supervision of epidural analgesia and management of its complications should 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 available to respond to adverse events in a timely fashion.
- 2.6 Oxygen and full resuscitation equipment should be available, including readily available access to 20% lipid emulsion (i.e. Intralipid® 20% emulsion, Fresenius Kabi AB) and naloxone.
- 2.7 Patient receiving epidural analgesia should have patent IV access for the duration it is in situ.
- 2.8 Patients receiving epidural analgesia should be situated on a ward in such a way that allows close supervision by nursing staff.
- 2.9 Before the patient returns to the ward, the responsible anaesthetist should be assured that the ward is sufficiently staffed to ensure safe regular patient assessment and safe management of the epidural. A system of communication should exist to inform the anaesthetist and theatre staff if this is inadequate. Patients should not be discharged to a ward if appropriate monitoring and care of an epidural is not available.
- 2.10 Patients with an epidural should be seen by the inpatient pain team at least once daily (5).
- 2.11 There should be 24-hour access to:
 - a. medical staff, trained and competent (see Section 14) in the management of epidurals, present within the hospital
 - b. senior anaesthetic advice and availability
 - c. a resuscitation team with a resident doctor with appropriate competencies
 - d. appropriate imaging for the detection of suspected spinal canal space occupying lesion (may not necessarily be on site).

3 Catheter insertion

- 3.1 Epidural catheter insertion should be performed using an aseptic technique. This should include surgical hand antisepsis, sterile gloves, sterile gown, hat, mask, suitable skin preparation and sterile drapes around the injection site (8).
- 3.2 Evidence suggests that chlorhexidine skin antisepsis is more effective than povidone iodine, though the latter may need to be used where allergy to chlorhexidine is present. Practitioners should be aware of the risks and benefits of all skin antiseptic preparations (including the various concentrations available). <https://anaesthetists.org/Home/Resources-publications/Guidelines/Skin-antiseptics-for-central-neuraxial-blockade>
- 3.3 The tip of the epidural catheter should be positioned at a spinal level appropriate for the surgery. The catheter should be secured in order to minimise movement in or out of the epidural space. A sterile dressing should allow easy visibility of the insertion site and catheter.
- 3.4 Anaesthetists inserting epidural catheters should be aware of, and adhere to, local infection guidelines.
- 3.5 Duration of catheter placement should be determined after weighing up the associated risks and benefits. Epidural catheters should not remain in situ for longer than clinically necessary and should be removed as soon as it is safe to do so (including taking into account anti-coagulation). Infection rates rise beyond 5 days of infusion and thus epidural infusions of more than 5 days duration should be avoided.

4 Anti-coagulation and epidurals

- 4.1 Dose, timings and therapeutic effect of all anti-coagulation and anti-platelet treatment should be considered both when:
 - a. Inserting an epidural
 - b. Removing an epidural
 - c. Instituting anticoagulation whilst an epidural is in situ
- 4.2 Failure to consider the concurrent use of anti-coagulation and anti-platelet treatment with epidural anaesthesia increases the risk of epidural haematoma, that if left untreated may lead to paralysis.
- 4.3 Local guidelines should be in place to reflect this, based on the best available safety evidence (such as the comprehensive guidelines produced by national bodies). <https://anaesthetists.org/Home/Resources-publications/Guidelines/Regional-anaesthesia-and-patients-with-abnormalities-of-coagulation>
- 4.4 Additionally, further advice may need to be sought from a haematologist if the patient has a co-morbidity that would adversely affect coagulation or the length of action of the anticoagulant (such as impaired renal function).

5 Equipment

- 5.1 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 should be frequently trained in the use of this equipment and need to maintain their skills with regular practice.
- 5.2 Infusion pumps should be configured specifically for epidural analgesia only, with pre-set limits for maximum infusion rate and bolus size; lock-out time should be standardised if used for PCEA (9). There should be a documented maintenance programme.
- 5.3 The epidural infusion system between the pump and patient should be closed; there should be no injection ports. An anti-bacterial filter should be inserted at the junction of epidural catheter and infusion line.
- 5.4 Effective management of epidural analgesia may require the administration of a bolus injection of solution into the system. This may be performed using the pump, thus not breaching the system. If a separate handheld syringe is used, the injection should be performed using a strict aseptic technique. Bolus injections should only be performed by staff with appropriate training and competencies and more intensive monitoring of the patient is required immediately after the injection.
- 5.5 Epidural infusion lines should be clearly identified as such. The National Patient Safety Association recommended the use of yellow labelling and yellow tubing to differentiate epidural/spinal lines from arterial (red), enteral (purple) and regional (grey) infusions (10, 11).
- 5.6 All epidural infusions and boluses should be performed with devices that will not connect with intravenous Luer connectors or intravenous infusion spikes. All NHS institutions should have transitioned to the use of the NRFit™ (ISO 80369-6) neuraxial connector (12). Vigilance is still required when attaching local anaesthetic infusions to the lines so that the correct solution is given. Only trained staff should change epidural bags and there should always be a second check and labelling of the bag with the patient's name, time, date, practitioners' signatures. It is preferential to use prefilled syringes/infusions.
- 5.7 Resuscitation equipment and medications should be immediately available wherever epidural infusions are employed.
- 5.8 These medications should not only include standard cardiac arrest medications and oxygen but also 20% lipid emulsion (i.e. Intralipid®), naloxone and a vasopressor according to local guidelines.

6 Medicines for epidural analgesia

- 6.1 There should be a limited range of epidural solutions agreed and approved in every hospital through local formulary and other relevant governance processes(13). In times of national shortage of epidural solutions, a multidisciplinary team approach is necessary with preference for licensed products following full risk assessments. Formulary and electronic order sets/protocols would need to be changed, and proper communication cascaded. When the shortage has been resolved a reversal of these measures has to be safely communicated.
- 6.2 Dosing regimes should take into consideration the patient's weight with the maximum dose clearly defined to minimise the risk of cumulative local anaesthetic toxicity.
- 6.3 UK-Licensed products should be prescribed whenever possible. Prescription of unlicensed infusions, batch manufactured in MHRA licensed facilities, should comply with GMC guidelines. Epidural infusions should not be prepared in clinical areas unless in exceptional circumstances.
- 6.4 Epidural infusions should be labelled 'For Epidural Use Only'.
- 6.5 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 (13).
- 6.6 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.
- 6.7 The use of drugs beyond their licence ("off-label use") should be consistent with GMC guidance, local hospital policy, and informed by recommendations of the British Pain Society (14).
- 6.8 Epidural infusions should be connected to the epidural catheter as soon as possible by the clinician responsible for its insertion to minimise errors due to wrong route administration of local anaesthetic.
- 6.9 Reporting via in-house systems any adverse incidents concerning epidurals should prompt internal investigation of the root causes. These should be regularly discussed at pain and anaesthetic governance meetings with learning outcomes disseminated within the organisation. If relevant adverse events suspected to be associated with epidural infusions should always be reported via the MHRA Yellow Card Scheme.

7 Patient monitoring

- 7.1 All patients with an epidural catheter in situ should be reviewed daily by the inpatient pain team. This should include those patients who have recently had an epidural catheter removed.
- 7.2 Patients should be monitored initially for immediate complications in a higher dependency area such as a recovery unit, critical care or specialised ward until such time that the responsible clinician is satisfied that safe discharge to the ward may occur.
- 7.3 Patients should be monitored closely throughout the period of epidural analgesia, with sensory and motor assessments continued until the return of normal function after cessation of the treatment. This should be performed by trained staff aware of its significance and the action required in response to abnormal values. Monitoring should include: heart rate and blood pressure; respiratory rate; sedation score; temperature; pain intensity score at rest and on movement; degree of motor and sensory block; National Early Warning Score (NEWS2) (15), or appropriate paediatric early warning score; infusion rate, name and concentration of local anaesthetic used should be checked against the prescription and documentation. Monitoring should be continued after the epidural has been removed to identify complications e.g. epidural haematoma developing. Patients should be given verbal and written information on the signs and symptoms of epidural complications and where to seek help should they arise post discharge from hospital.
- 7.4 Patients nursed in a head down position for prolonged periods risk cephalad spread of epidural solution, with the potential for subsequent complications and should be more closely observed (16, 17).
- 7.5 The insertion site should be regularly examined for signs of leaking or inflammation at least once a day.
- 7.6 Additional requirements for monitoring will be determined by the nature of the surgery, condition and age of the patient.
- 7.7 The frequency of observations should be determined by normal clinical considerations. Minimum frequency of observations should be every four hours.
- 7.8 Observations 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.
- 7.9 Minimum period of monitoring following a bolus top up of an epidural should be every 5 minutes during the first 30 minutes.
- 7.10 Monitoring should follow clear written protocols and compliance with these should be audited.
- 7.11 Pain scores, numerical and functional (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.

- 7.12 Sedation is often the most sensitive indication of opioid-induced ventilatory impairment when opioids are added to the epidural infusion.
- 7.13 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 (3, 18), however it is commonly misrepresented (19). An aide memoir such as that reproduced in *Figure 1* should be included in local written protocols.

Score	Degree of motor block	
1	Complete block; unable to move feet or knees	
2	Able to move feet only	
3	Just able to flex knees; free movement of feet	
4	No block; full movement of knees and feet	

Figure 1: The Bromage scale. Reproduced with permission from Association of Anaesthetists (4)

- 7.14 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.
- 7.15 If a dense motor block fails to resolve after cessation of ongoing epidural infusions (no reduction in motor block/improvement in Bromage score for two consecutive hours), or if the motor block increases (Bromage score reduces) from one hour to the next, an escalation in care is warranted, and an anaesthetist should be called to assess the patient.
- 7.16 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).
- 7.17 New onset of severe back pain in a patient with a recent epidural should raise suspicion of epidural abscess or haematoma (1). Patients should be given written information and counselled to report any symptoms even after discharge from hospital.
- 7.18 Staff should be aware that increased or breakthrough pain in an otherwise working epidural may indicate surgical complications including the development of compartment syndrome. These patients should be urgently reviewed by an appropriate healthcare professional. Special care should also be taken when interpreting physical signs in patients who may have sustained neurological damage.
- 7.19 All monitoring of epidurals should be recorded appropriately in the patient's clinical record.

8 Epidural complications & management

- 8.1 The complications listed in the table below should be quickly recognised by healthcare professionals caring for a patient with an epidural.
- 8.2 Protocols for the management of these complications should be available locally and should always include pathways for escalation to senior anaesthetic staff, and where appropriate, to other medical specialties.
- 8.3 All nurses and doctors looking after patients with epidurals should receive training on recognition and management of epidural complications.

Complication	Recommendations
Hypotension	▶ Hypotension should be recognised and treated promptly. A fall in blood pressure greater than 20% from baseline warrants further assessment and management. ▶ Assessment of hypotension should include the exclusion of causes other than sympathetic blockade. ▶ Management may require the use of a fluid bolus and vasoactive drugs. Protocols should be in place to ensure the patient is managed by a suitably competent person if these are required.
Spinal Canal Space Occupying Lesions (including epidural haematoma and epidural abscess)	▶ Nursing staff should be trained to recognise signs and symptoms of spinal canal space occupying lesions in patients treated with epidurals. ▶ Epidural abscess should be considered in all patients with signs of (otherwise unexplained) systemic infection with an epidural in situ or with infection at the epidural site. However, not all patients with epidural abscess display fever. ▶ The presence of severe or increasing back pain, even in the absence of fever may indicate epidural infection and should be reported to the responsible anaesthetist or on-call service immediately. ▶ Other symptoms that should raise concern include inappropriate motor weakness (even when unilateral). ▶ The 3rd National Audit Project identified epidural catheter removal as the time of greatest risk for epidural haematoma development (2). Local guidelines on the timing of safe catheter removal should be followed when patients are receiving anti-coagulant medication. ▶ Clinical suspicion of a spinal canal space occupying lesion should prompt urgent discussion with a senior anaesthetist. Epidural haematoma and abscess are considered neurosurgical emergencies. ▶ Clinical suspicion of an epidural vertebral canal haematoma or abscess should be investigated firstly with an urgent MRI scan (unless contraindicated) by the team responsible for managing the epidural. If this pathology is identified, there must be urgent discussion with the local neurosurgical unit to determine further management.

Complication	Recommendations
Total spinal	▶ Total spinal is an anaesthetic emergency that should be considered in any case of respiratory arrest, cardiovascular collapse or loss of consciousness in a patient who has recently received an epidural bolus. ▶ The medical emergency or resuscitation team should be mobilised, and treatment in the first instance is stopping the epidural infusion and supportive measures in accordance with adult or paediatric life support guidelines. This includes: securing the airway, ensuring adequate ventilation and supporting the cardiovascular system with fluids and/or vasoactive medications. ▶ Differential diagnosis should be considered, especially local anaesthetic toxicity which would require treatment with intralipid (see below).
Post-Dural Puncture Headache (PDPH)	▶ Any patient developing a headache following epidural anaesthesia or with a known accidental dural puncture should be reviewed and treatment instigated until headache resolution. ▶ Differential diagnoses should be considered for all patients. ▶ Those patients not responding to conservative treatment should be offered epidural blood patch, if appropriate. ▶ Those with unresolved symptoms should be discussed with a neurologist and undergo further investigations to exclude complications of PDPH or an alternative diagnosis when appropriate.
Local Anaesthetic Toxicity (LAT)	▶ The Association of Anaesthetists have published concise guidelines regarding the management of severe local anaesthetic toxicity (20). These should be readily available in all areas where boluses are administered via epidurals along with an emergency treatment box including 20% lipid emulsion (i.e. Intralipid®) for the treatment of LAT.
Neuropraxia and Major Nerve Damage	▶ In the rare event of any form of nerve injury occurring after epidural insertion (but not related to a spinal canal space occupying lesion) urgent referral to a neurologist should be made. ▶ Any nerve or spinal cord damage after epidural should be reported using locally established patient incident reporting systems.

Table 2

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 assessing pain scores must be appropriate for developmental age (21).
- 9.2 Dosing regimens for children should 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 less than 5Kg. Opioids added to the local anaesthetic solution should also be avoided in this group of babies under 5Kg owing to the increased risk of apnoea in this group (21).
- 9.3 A suggested maximum rate of epidural infusion of 0.125% Bupivacaine should be:
 - ▶ For neonates and infants <5kgs the maximum infusion rate is 0.1-0.3 ml/kg/hr
 - ▶ For children over 5 kgs the maximum infusion rate is 0.4mls/kg/hr
- 9.4 It is important to carefully consider the rate of epidural infusion in pre-term babies beyond the official neonatal period i.e. over 4 weeks of age; these may be best considered as neonates.
- 9.5 As in adults, the lowest possible effective concentration of local anaesthetic should be used.
- 9.6 Clear protocols for prescription, monitoring and troubleshooting of paediatric epidural infusions should be used. Infusion devices should be programmed and cross-checked with extreme care as there is an increased risk of error when managing small infants and neonates. Epidurals should only be nursed in areas where the staff are competent to manage epidurals and their complications. (22).
- 9.7 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. An epidural catheter can be left in situ for a maximum of 96 hours (72 hours in a neonate). Infection rates rise beyond 5 days of infusion.
- 9.8 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. It can be difficult to assess these parameters in paediatric patients with developmental and/or motor delays or movement disorders e.g. cerebral palsy. Appropriate adjustments should be made in these patient groups.
- 9.9 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 unacceptably high doses of local anaesthetic. Whilst caudal catheters are effective, these can become infected unless carefully dressed or tunnelled away from the insertion site.
- 9.10 An anaesthetist with appropriate competencies and training should be available to attend a child who is receiving an epidural infusion, when needed.
- 9.11 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 these occur after discharge home. Many children are discharged before the mean time of onset of these signs and symptoms.
- 9.12 Information specific to the use of epidurals in paediatric patients should be provided to parents and/or carers based on local guidelines, since although complications are rare they can be serious (21). The process of consent should follow best practice outlined by the GMC (24).

10 Documentation, guidelines and protocols

- 10.1 Contemporaneous records should 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. The timing of the insertion and removal of the catheter in relation to anticoagulation and anti-platelet treatments needs to be documented.
- 10.2 Safety should be enhanced by the use of electronic prescribing systems or alternatively standard pre-printed prescription forms rather than handwritten prescriptions that might be misinterpreted. Patients should have a visible alert that they had an epidural in situ for example an alert on the patient's electronic records or an epidural alert wristband. This documentation should include:
 - ▶ the contact numbers for the inpatient pain service and anaesthetics team on call
 - ▶ the date and time of the insertion and plan removal of the epidural catheter
 - ▶ the dose and timings of all anti-coagulation anti-platelet treatment planned while the epidural is in situ and timings for these when the epidural is removed.
- 10.3 Contact telephone and/or bleep numbers for expert medical and nursing personnel should be printed on documents that are kept on the ward, and near to the patient.
- 10.4 The following provides a summary of local protocols and guidelines that should be produced by services that manage epidurals.

Suggested epidural protocols and guidelines to be produced by local services	
Overall management of patients with epidural infusions.	Protocol for the management of a failing epidural.
Instructions for the use of the infusion device.	Management of accidental catheter disconnection.
Description of the drug concentrations used in the hospital.	Instructions for removal of the epidural catheter and monitoring for complications.
Description of infusion rates and how to adjust them.	Insertion and removal of epidural catheters in patients receiving anticoagulants.
Instructions for changing epidural solution bags or syringes.	Multimodal pain management during epidural infusion.
Frequency of observations.	Policy on the coadministration of opioid analgesics by other routes when given as part of an epidural infusion.
Maintenance of intravenous access throughout the infusion period.	Pain management after cessation of the epidural infusion.
Identification and management of early and late complications.	Management of opioid and local anaesthetic toxicity.
Management of inadequate analgesia.	Mobilisation during and after epidural removal, e.g. during enhanced recovery programmes.

11 Clinical governance

- 11.1 There should be regular clinical effectiveness audits concerned with epidural analgesia. These should 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.
- 11.3 Clinicians, members of the pain team and pharmacy should have direct input into epidural policies and guidelines. These should be approved by local drugs and therapeutics committees and local governance processes.

12 Education

- 12.1 There should be formal, documented training in place for doctors, nurses, clinical pharmacists and other allied healthcare professionals 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.

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Guideline development

The original version of these guidelines was published in 2004 (25) and in 2010 was revised by an expert working group (3) in accordance with the existing evidence base, guidelines published by relevant professional bodies and, where evidence was lacking, the consensus opinion of group members. This latest version has been amended to include up to date evidence and guidance where available to reflect current best practice. The proposed updated guidelines were then submitted to the governing bodies of the endorsing professional organisations for consideration and approval. This process has led to further changes and the final published version. The previous version did not consider the management of epidural complications or anticoagulation in detail. As it was decided further detail on these subjects would be appropriate, additional sections on Epidural Complications and Management (Section 8) and Anti-coagulation and Epidurals (Section 4) have been included in the final published version.

Professional organisations represented in the guideline development group

- ▶ Association of Anaesthetists
- ▶ Association of Paediatric Anaesthetists of Great Britain and Ireland
- ▶ Faculty of Pain Medicine of the Royal College of Anaesthetists
- ▶ Pain Nurse Network
- ▶ Royal College of Anaesthetists
- ▶ Royal College of Nursing
- ▶ Royal Pharmaceutical Society
- ▶ Society of British Neurological Surgeons

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- ▶ Council members of Society of British Neurological surgeons
- ▶ Members of the Board and Council of the Association of Anaesthetists

Feedback

In order to ensure this guidance remains accurate and current, feedback is welcome and should be sent to contact@fpm.ac.uk.

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