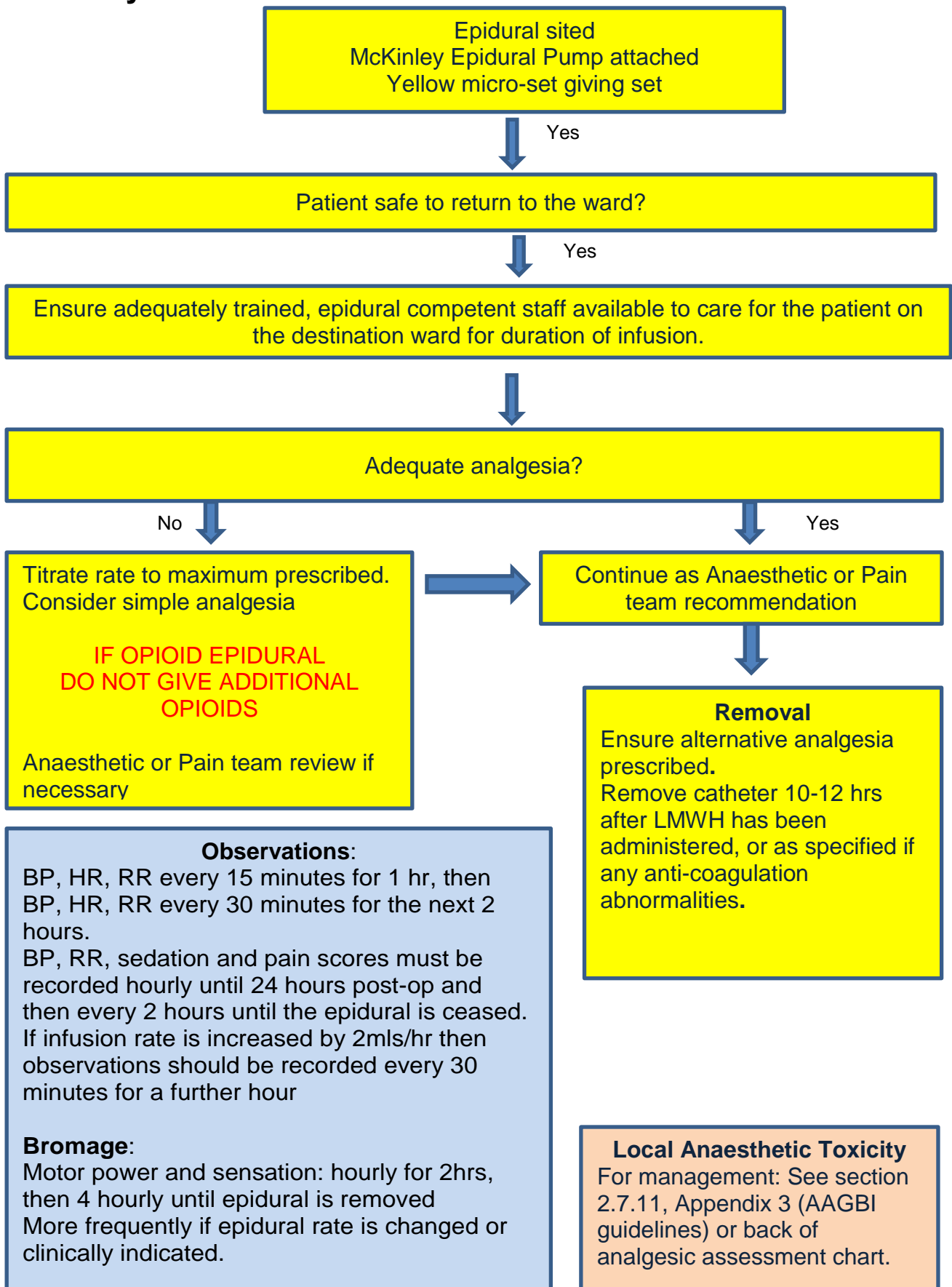


Care of Epidural Infusions in Adults Clinical Guideline

V10.0

April 2020

Summary



1. Aim/Purpose of this Guideline

- 1.1. To provide a guide to appropriate and safe administration of epidural infusions in appropriate clinical areas.
- 1.2. This version supersedes any previous versions of this document.
- 1.3. **Data Protection Act 2018 (General Data Protection Regulation – GDPR) Legislation**

The Trust has a duty under the DPA18 to ensure that there is a valid legal basis to process personal and sensitive data. The legal basis for processing must be identified and documented before the processing begins. In many cases we may need consent; this must be explicit, informed and documented. We can't rely on Opt out, it must be Opt in.

DPA18 is applicable to all staff; this includes those working as contractors and providers of services.

For more information about your obligations under the DPA18 please see the 'information use framework policy', or contact the Information Governance Team rch-tr.infogov@nhs.net

2. The Guidance

- 2.1. Pre-insertion information should be given to patients by anaesthetist and/or nursing staff. "Pain after surgery" (RCHT023) patient information sheet to be given to patients pre-operatively.
 - 2.1.1. The epidural catheter is inserted in theatre. An aseptic non-touch technique must be used. The patient is returned to the ward with the epidural running following a period of monitoring in recovery.
 - 2.1.2. Only appropriately trained staff may care for epidural infusions. Staff must have attained theoretical and practical competence, maintaining competence by regular use of skill and by attending 3 yearly medical devices training and clinical updates.
 - 2.1.3. McKinley Body Guard Pump 545 and yellow Microset Bodyguard giving set must be used for epidural infusions. Pump identity numbers must be recorded on setting up infusion. The pump is kept in a locked box which attaches to a drip pole. The key must be held by the nurse in charge.
 - 2.1.4. The yellow epidural label supplied by pharmacy should be attached to the epidural catheter and dated.
 - 2.1.5. The epidural infusion is prescribed, with full instructions as necessary. The normal prescription is either Fentanyl 2mcg or 4mcg with 0.125% levobupivacaine or 0.167% levobupivacaine with no Fentanyl.

- 2.1.6. Rate of infusion boundaries clearly noted on prescription.
- 2.1.7. No additional opioids should be given for the duration of the epidural infusions unless sanctioned/prescribed by the anaesthetist.
- 2.1.8. Epidural bag and infusion rate must be changed by a registered nurse, who is competent in the administration of IV drugs and the management of epidural infusions. The change of bag must be checked and witnessed by another registered nurse/midwife/learner. An aseptic non-touch technique must be used. All patients who have an epidural infusion should have either an IV infusion or a patent IV cannula in case of adverse reactions.
- 2.1.9. Delays in reloading epidural infusions should be avoided so as to achieve constant analgesia.
- 2.1.10. Infusion pumps should be placed at trunk height to prevent syphoning of contents due to effects of gravity.
- 2.1.11. Epidural analgesia should normally be continued for at least 48 - 72 hours post-operatively. Some patients may need an infusion for considerably longer. There is no absolute limit to the length of time of an epidural infusion. Meticulous attention must be paid to sterility of the infusion line and drug solution.
- 2.1.12. If equipment is faulty it must be returned to Medical Physics after being cleaned and labelled according to hospital policy.
- 2.1.13. Monitoring should be documented on RCHT Trust EWS Chart [Early Warning System] and Analgesic Assessment chart, electronically or on paper.
- 2.1.14. An Epidural Care Plan must be implemented.

2.2. Clinical Observations:

- 2.2.1. Blood pressure, pulse and respiratory rate should be recorded every 15 minutes for 1 hour and then every 30 minutes for the next 2 hours. Blood pressure, respiratory rate, sedation and pain scores must be recorded hourly until 24 hours post-op and then every 2 hours until the epidural is ceased. The frequency of other observations may be reduced after 12 hours unless otherwise clinically indicated.
- 2.2.2. Motor power and sensory observations should be recorded hourly for the first 2 hours, then 4 hourly until epidural is removed or more frequently if epidural rate is changed or clinically indicated. [Bromage Scores – Appendix 4]
- 2.2.3. If the epidural infusion rate is increased by 2mls/hr then observations should be recorded every 30 minutes for a further hour to ensure the patient is in a stable condition.

- 2.2.4. If a bolus dose is given by the anaesthetist or Pain Specialist Nurse the administrator should not leave the ward for twenty minutes so that they may respond promptly to respiratory depression or hypotension. Observations should then be recorded every 5 minutes for 30 minutes to ensure patient is in a stable condition.
- 2.2.5. Observe for signs of local anaesthetic toxicity these should be recorded, as above, on the analgesia assessment chart.
- 2.2.6. The patient can be nursed sitting up and should be mobilised with assistance unless contraindicated by type of surgery performed.
- 2.2.7. Patients should be situated on a ward in such a way that allows close supervision by staff.

2.3. Care of Infusion:

2.3.1. Sterility/line disconnection.

- There must be a filter on the epidural catheter attached in theatre and kept in situ.
- The infusion line should always be firmly connected. Any inadvertent disconnection means the infusion is no longer sterile.
- If the fine epidural line becomes disconnected from the filter the infusion must be disconnected and the epidural catheter removed.
- If the line disconnects upstream of the filter it may be reconnected with a new filter and line. An aseptic non-touch technique must be used. Contact the pain specialist nurse or anaesthetist.
- If the line is tunnelled, please contact the patient's Consultant Anaesthetist or the Pain Services for advice.
- Great care must be taken when changing the infusion bag to maintain sterility using an aseptic non touch technique.
- The Microset yellow epidural giving set should be changed weekly or according to hospital policy.

2.3.2. Drug Errors.

- The epidural infusion line must be labelled distinctly. During subsequent infusion bag changes in order to prevent administration of the epidural mixture by the wrong delivery system, it is best practice to check the entire delivery system ie. the empty infusion bag and administration giving set is contacted to the epidural line.

2.3.3. Pump Occlusion.

- If pump alarms "occluded" this indicates there is undue pressure usually caused by a blockage.
- If it is an up stream occlusion this is between the bag and the pump. And usually occurs if the giving set has been trapped in the

locked box.

- If it is a downstream occlusion this is due to an occlusion between the pump and the patient. Ensure the giving set and epidural are patent and line clamp open.
- If the occlusion persists contact the Pain specialist nurse or anaesthetist if out of hours.

2.4. Care of Dressings:

- 2.4.1. Epidural catheters should be secured with a Lockit catheter clamp and covered with clear occlusive dressing.
- 2.4.2. Dressings should be observed daily for signs of bleeding or infection, ie, inflammation, swelling, tenderness or exudate. Dressings can be left in situ if there are no signs of any of the above. Minimal disturbance of the catheter is advised to reduce the risk of infection. If the Lockit requires changing please contact Pain specialist nurse or anaesthetist.
- 2.4.3. On occasions epidurals are tunnelled percutaneously. This secures the line and enables the catheter to remain insitu for a longer time period.

2.5. Removal of Catheter:

- 2.5.1. Procedure for removal of epidural catheter - refer to the Royal Marsden Manual of Clinical Nursing Procedures.
- 2.5.2. When the infusion is no longer required and alternative analgesia proven to be successful, the catheter should be removed by ward staff that have undergone suitable training and witnessed assessment.
- 2.5.3. The epidural catheter should be removed 10-12 hours after the last heparin administration if low molecular weight heparin (LMWH), eg. Dalteparin, is given. An aseptic non-touch technique must be used.
- 2.5.4. The catheter tip should be examined to ensure the catheter removed is complete. The tip should only be sent for micro-culture and sensitivity if there is any sign of redness, inflammation or pyrexia. The nurse who has removed the catheter should then document this in the patient's notes.
- 2.5.5. Any opiate left must be discarded into a denaturing kit and this should be witnessed and documented in the ward's CD wastage book as per RCHT Controlled Drug Policy.
- 2.5.6. Removal of tunnelled epidurals - The catheter is not stitched in. It requires greater traction to remove due to resistance against the skin.

- 2.5.7. On discontinuation, the pump should be cleaned and labelled according to hospital policy and returned to theatres or pump library for storage.

2.6. Anticoagulation and epidurals.

- 2.6.1. If a patient is receiving Anticoagulation therapy the following should apply pre and post epidural insertion and removal.
- 2.6.2. Low Molecular Weight Heparin [LMWH]
- Insertion of epidural catheter should be at least 12 hours following last dose. Removal should 10-12 hours post last dose.
 - Alternative or additional anticoagulation therapies please refer to RCHT Anticoagulation Policy

For further information please refer to: Association of Anaesthetists of Great Britain and Ireland, Obstetric Anaesthetists' Association and Regional Anaesthesia UK. Regional anaesthesia and patients with abnormalities of coagulation. *Anaesthesia* 2013; 68: pages 966-72.

<http://onlinelibrary.wiley.com/doi/10.1111/anae.12359/abstract>

- 2.6.3. Heparin Infusion or other types of heparin – seek medical advice.
- 2.6.4. Rivaroxaban therapy should not be commenced until epidural removed. If rivaroxaban has been given an epidural catheter is not to be removed earlier than 18 hours after the last administration of rivaroxaban. The next rivaroxaban dose is to be administered not earlier than 6 hours after the removal of the catheter.
- 2.6.5. Single injection spinal/intrathecal
- Medical/surgical/anaesthetic staff should be aware if a patient is receiving any of the above therapy prior to this procedure.

2.7. Complications/side effects:

- 2.7.1. Inadequate Analgesia.
- If the analgesia is inadequate despite the infusion running at the maximum prescribed rate, an anaesthetist or the Pain specialist nurse should be asked to review the patient as soon as possible. The prescription may need to be amended and/or the amount of Fentanyl changed to give better analgesic effect. Consider giving simple non-opioid analgesia.
- 2.7.2. Hypotension.
- Moderate hypotension is a common side effect of epidural local anaesthetics. If the systolic blood pressure is less than 90mmHg or level indicated by the anaesthetist, follow epidural guidelines and give 250mls IV fluid which should be prescribed in theatre

according to algorithm. Persistent hypotension is usually a sign of hypovolaemia. The possibility of post-operative bleeding must be excluded. Increase frequency of observations. If no improvement, inform medical staff.

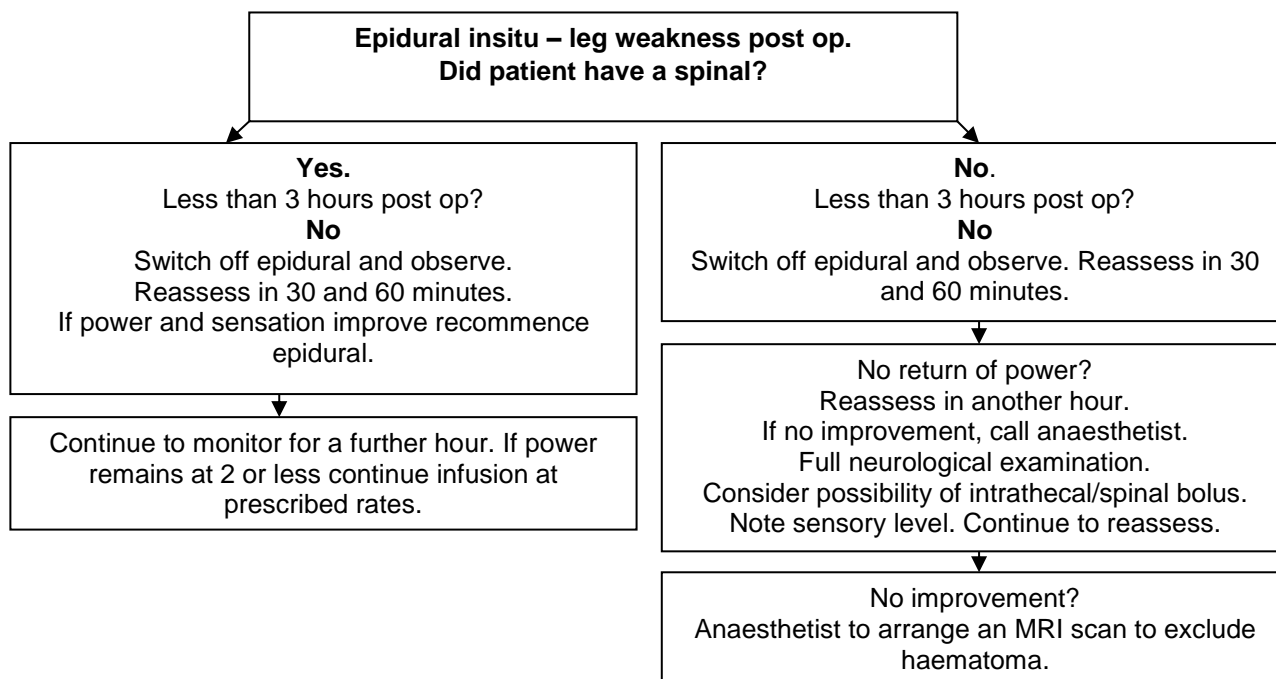
DO NOT ELEVATE THE FOOT OF THE BED

2.7.3. Respiratory Depression

- Epidural opioids can cause sedation and respiratory depression. This is usually gradual in onset and detectable as a slow respiratory rate in a sedated patient. Increasing levels of sedation are an earlier warning sign of this complication than a slow respiratory rate. The sedation score must be regularly measured on every patient having epidural opioids.
- If the respiratory rate is less than 8 and/or sedation score 3, stop infusion. Give oxygen and inform medical staff. Consider giving naloxone.
- If respiratory rate <5 and sedation score 3 give naloxone. Naloxone should be given in increments of 100mcg every 5 minutes.
- Draw up 400mcg (1ml) of naloxone and 3mls of sodium chloride 0.9% and give in 1ml increments. This should be given until respiratory rate >8 and sedation score <2. Observe pain and sedation scores closely. If not resolved after 0.4mg seek further medical advice.

2.7.4. Motor Weakness and Sensory Loss.

- Monitoring of sensory and motor block is essential so that potentially serious complications can be detected early.
- There may be some degree of altered sensation due to epidural local anaesthetic. The patient should be encouraged to exercise their feet and ankles to aid circulation.
- If there is an increase in motor weakness this could be due to excessive epidural drug administration, the epidural catheter penetrating the dura and into CSF or the development of an epidural abscess or haematoma
- These symptoms may be accompanied by back pain. The patient must be reviewed **URGENTLY** by the anaesthetist or consultant in pain management, and in this instance, the infusion stopped until the patient has been reviewed. (See algorithm).



2.7.5. Nausea and Vomiting.

- Epidural opioids can sometimes cause nausea and vomiting which should initially be treated in the usual way with anti-emetics. If it persists ask an anaesthetist or the pain specialist nurse to review the epidural prescription.

2.7.6. Pruritis.

- Pruritis is occasionally a side effect of the opioid and can be treated either by a low dose of Naloxone or by oral anti-histamines eg, Piriton.

2.7.7. Urinary Retention.

- Most patients having major surgery will have a urinary catheter insitu. Both epidural local anaesthetics and opioids can increase the chance of retention. Any patient without a catheter must be regularly checked to detect urinary retention.

2.7.8. Headache.

- Severe frontal headaches should be reported to the anaesthetist, medical team or pain specialist nurse at once. This may indicate a leak of cerebral spinal fluid or dural puncture. It may be relieved by the patient lying flat in bed, simple analgesics and replacement of fluids either orally or intravenously.

2.7.9. Leaking Epidural.

- If there is obvious leakage but epidural is effective then pad the catheter site and continue to observe pain scores. If leaking and pain becomes severe then remove epidural and introduce alternative appropriate analgesia. An aseptic non-touch technique must be used. Any heavy blood loss through the dressing should be referred to the anaesthetist and a pressure dressing applied.

2.7.10. Local Anaesthetic Toxicity

Any signs should be reported immediately to medical staff. **Signs of toxicity:**

1. Mild	- Restlessness / confusion - Light-headedness - Numbness of tongue and lips (lip smacking) - Tinnitus - Double vision, blurred vision
2. Moderate	- Heaviness of limbs - Muscular twitching - Convulsions
3. Severe	- Cardiac arrhythmias - Hypotension - Respiratory arrest - Cardiac arrest

2.7.11. Treatment of toxicity: See Appendix 3 for AAGBI guidelines.

If symptoms are mild (1):

- Stop local anaesthetic infusion and inform medical team
- Attach ECG and monitors
- Maintain oxygenation and BP
- Consult with medical team, Pain Team or on call anaesthetist
- Continue to observe closely

If symptoms are moderate or severe (2 or 3):

- Stop local anaesthetic infusion
- Attach ECG and monitors
- Phone for help immediately – fast bleep 4444 medical team / anaesthetist or cardiac arrest 2222
- Collect Lipid Rescue Box from the nearest recovery area or Eden ward.
- Maintain airway and give high flow oxygen.
- Hypotension will be treated with IV fluids
- Convulsions will be treated with diazepam
- Commence CPR if in cardiac arrest
- Treatment will require intravenous Intralipid 20% (from the lipid rescue box). The initial dose is 1.5ml/kg over 1 minute, followed by an intravenous infusion of 15ml/kg over 1 hour.
 - For a 70kg adult this means 100mls over 1 minute followed by 1000mls over 1 hour.
 - Intra-lipid rescue box available from both theatres / recovery, and Eden ward if Tower block theatre is closed at night/weekends.
 - Any problems should be documented in the patient records.

2.7.12. Intra-lipid rescue box available from both theatres / recovery, and Eden ward if Tower block Theatre is closed at night/weekends.

2.7.13. Any problems should be documented in the patient records.

3. Monitoring compliance and effectiveness

Element to be monitored	Adherence to guideline
Lead	Acute Pain Team
Tool	The patient will be reviewed daily by the acute pain team or on call anaesthetist. Adherence to the guideline will be recorded on the acute pain form (paper CHA2602 or electronic hospital data base) and in the medical notes. DATIX reports will be investigated.
Frequency	The pain forms/database will be audited yearly.
Reporting arrangements	The audit is reported to the Acute pain lead consultant and the anaesthetic governance lead.
Acting on recommendations and Lead(s)	Acute Pain Team. Dr Nicholas Marshall. Consultant anaesthetist and Acute Pain Lead.
Change in practice and lessons to be shared	Required changes to practice will be identified and actioned within 1 month. A lead member of the team will be identified to take each change forward where appropriate. Lessons will be shared with all relevant stakeholders.

4. Equality and Diversity

4.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the ['Equality, Inclusion & Human Rights Policy'](#) or the [Equality and Diversity website](#).

4.2. *Equality Impact Assessment*

The Initial Equality Impact Assessment Screening Form is at Appendix 2.

Appendix 1. Governance Information

Document Title	Care of Epidural Infusions in Adults Clinical Guideline V10.0		
Date Issued/Approved:	25 Feb 2020		
Date Valid From:	April 2020		
Date Valid To:	April 2023		
Directorate / Department responsible (author/owner):	Sarah Medicott, Pain Specialist Nurse		
Contact details:	01872 252095		
Brief summary of contents	Guidelines for nursing staff caring for Patient's with an epidural infusion.		
Suggested Keywords:	Epidural Epidural infusion Local anaesthetic toxicity Motor and sensory block		
Target Audience	RCHT ✓	CFT	KCCG
Executive Director responsible for Policy:	Medical Director		
Date revised:	January 2020		
This document replaces (exact title of previous version):	Clinical Guideline for the Care of Epidural Infusions (Adult) V9.0		
Approval route (names of committees)/consultation:	Pain Consultants and specialist nurses via email		
Care Group General Manager confirming approval processes	Theatres and Anaesthetics Care Group General Manager		
Name and Post Title of additional signatories	Not Required		
Name and Signature of Care Group/Directorate Governance Lead confirming approval by specialty and care group management meetings	{Original Copy Signed}		
	Name: Matt Body		
Signature of Executive Director giving approval	{Original Copy Signed}		
Publication Location (refer to Policy on Policies – Approvals and Ratification):	Internet & Intranet	✓	Intranet Only

Document Library Folder/Sub Folder	Clinical / Pain
Links to key external standards	None
Related Documents:	<p>The Royal College of Anaesthetists et al (2004) Good Practice in the Management of Continuous Epidural Analgesia in the Hospital Setting.</p> <p>The Royal Marsden Hospital Manual of Clinical Nursing Procedures. London. Blackwell Publishing.</p> <p>Macintyre P, Ready L. (2001) Acute Pain Management. London. WB Saunders.</p> <p>Higgins D. (2006) How to Remove Epidural Catheters. Nursing Times Vol 102 (12) p28-29.</p> <p>Association of Anaesthetists of Great Britain and Ireland, Obstetric Anaesthetists' Association and Regional Anaesthesia UK. Regional anaesthesia and patients with abnormalities of coagulation. <i>Anaesthesia</i> 2013; 68: pages 966-72. http://onlinelibrary.wiley.com/doi/10.1111/anae.12359/abstract</p> <p>Thrombosis Prevention Investigation and Management of Anticoagulation Clinical Guideline. RCHT document library.</p> <p>Bromage Score: Bromage P Philadelphia: 1978:144.</p> <p>Local Anaesthetic Toxicity Guidelines RCHT Document Library.</p> <p>AAGBI Safety Guidelines. Management of Severe Local Anaesthetic Toxicity. The Association of Anaesthetists of Great Britain and Ireland 2010.</p> <p>Aseptic Non Touch Technique Policy RCHT Document Library.</p>
Training Need Identified?	<p>Yes.</p> <ul style="list-style-type: none"> • Registered Nurse competent in administering intravenous medication. • Self-directed learning pack or online epidural theory completed.

	<ul style="list-style-type: none"> • Practical assessment/supervised practice completed. • Attendance at epidural new user training (which includes medical devices epidural pump training) or 3 yearly attendances for medical devices epidural pump update training.
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Version Control Table

Date	Version No	Summary of Changes	Changes Made by (Name and Job Title)
01 Mar 12	6	Now on current hospital template and headings. Amended; Page 6 Intralipid rescue box available from theatres, or Poldark ward if General Theatre is closed at night/weekends.	Sharon Dunstan Senior Pain Specialist Nurse
23 Jul 12	7	Amended; Page 2. No's 14 and 15 Monitoring should be documented on RCHT Trust MEWS Chart [Modified Early Warning System] and Analgesic Assessment chart. An Epidural Care Plan must be implemented	Sharon Dunstan Senior Pain Specialist Nurse
3 Mar 14	8	General rewording and reorganisation of contents. 2.1.5 – Wording changed as all prescribing now on EPMA. 2.3.3 – Clarification re occlusion. 2.7.2 – Treatment of hypotension now reads 250ml bolus in IV fluid rather than colloid. 2.7.4 – Algorithm for leg weakness added. 2.7.10 – Signs of local anaesthetic toxicity added. 2.7.11 – List management of local anaesthetic toxicity added. Intralipid rescue box is now situated on Tolgus ward and not Poldark ward. 2.7.12 – Reference for anticoagulation abnormalities.	Jayne Thomas. Pain Specialist Nurse.
17 Mar 17	9	2.1.5 Bupivacaine changed to levobupivacaine. 2.1.14 NEWS chart – EWS chart, paper or electronic. 2.7.12 Tolgus ward has become Eden ward.	Jayne Thomas Lead pain specialist nurse.

01 Jan 2020	10	<p>Formatted onto current hospital template.</p> <p>2.2.4 Change in observation frequency following clinician administered bolus from every 15 mins for 1 hour to every 5 minutes for 30 minutes. In line with forthcoming new epidural guidelines.</p> <p>2.6.2 Additional guidance regarding anticoagulation to refer to RCHT anticoagulation policy.</p> <p>2.7.1 Wording changed regarding the need to amend the prescription or drug in the epidural.</p> <p>Addition of flow chart summary.</p> <p>Governance training needs amended to reflect online learning package and new user training.</p> <p>Appendix 3 added: AAGBI guidelines for the management of local anaesthetic toxicity.</p> <p>Appendix 4 added: Bromage Scale</p>	Sarah Medicott Pain specialist nurse.
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All or part of this document can be released under the Freedom of Information Act 2000

This document is to be retained for 10 years from the date of expiry.
This document is only valid on the day of printing

Controlled Document

This document has been created following the Royal Cornwall Hospitals NHS Trust Policy for the Development and Management of Knowledge, Procedural and Web Documents (The Policy on Policies). It should not be altered in any way without the express permission of the author or their Line Manager.

Appendix 2. Initial Equality Impact Assessment Form

Name of the strategy / policy / proposal / service function to be assessed Care of Epidural Infusions in Adults Clinical Guideline V10.0						
Directorate and service area: Anaesthetics / Pain			New or existing document: Existing			
Name of individual completing assessment: Sarah Medicott			Telephone: 01872 252792			
1. <i>Policy Aim*</i> <i>Who is the strategy / policy / proposal / service function aimed at?</i>		Guidelines for nursing staff caring for patients with epidural infusions.				
2. <i>Policy Objectives*</i>		To maintain safe standards for the delivery of this method of pain control.				
3. <i>Policy – intended Outcomes*</i>		Patients with epidural infusions are cared for safely and effectively. Side effects and complications identified early and dealt with safely. Requirement for training identified.				
4. <i>*How will you measure the outcome?</i>		Regular audit. Review of patient by acute pain team and anaesthetist. Monitoring of DATIX reports.				
5. <i>Who is intended to benefit from the policy?</i>		Patients and staff.				
6a <i>Who did you consult with</i>		Workforce	Patients	Local groups	External organisations	Other
		Yes	No	No	No	No
b). <i>Please identify the groups who have been consulted about this procedure.</i>		Acute pain team and department governance lead				
What was the outcome of the consultation?		Agreed				

7. The Impact

Please complete the following table. **If you are unsure/don't know if there is a negative impact you need to repeat the consultation step.**

Are there concerns that the policy could have differential impact on:					
Equality Strands:	Yes	No	Unsure	Rationale for Assessment / Existing Evidence	

Age		X		
Sex (male, female, trans-gender / gender reassignment)		X		
Race / Ethnic communities /groups		X		
Disability - Learning disability, physical impairment, sensory impairment, mental health conditions and some long term health conditions.		X		
Religion / other beliefs		X		
Marriage and Civil partnership		X		
Pregnancy and maternity		X		
Sexual Orientation, Bisexual, Gay, heterosexual, Lesbian		X		
<p>You will need to continue to a full Equality Impact Assessment if the following have been highlighted:</p> <ul style="list-style-type: none"> You have ticked "Yes" in any column above and No consultation or evidence of there being consultation- this <u>excludes</u> any <i>policies</i> which have been identified as not requiring consultation. or Major this relates to service redesign or development 				
8. Please indicate if a full equality analysis is recommended.			Yes	No
9. If you are not recommending a Full Impact assessment please explain why.				
No concerns that the policy has negative impact.				
Date of completion and submission	16/03/2020	Members approving screening assessment	Policy Review Group (PRG) APPROVED	


This EIA will not be uploaded to the Trust website without the approval of the Policy Review Group.

A summary of the results will be published on the Trust's web site.

Appendix 3. AAGBI Guidelines for the management of Local Anaesthetic Toxicity

AAGBI Safety Guideline

Management of Severe Local Anaesthetic Toxicity







1 Recognition	Signs of severe toxicity: <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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 	WITHOUT CIRCULATORY ARREST Use conventional therapies to treat: <ul style="list-style-type: none"> • hypotension, • bradycardia, • tachyarrhythmia
	GIVE INTRAVENOUS LIPID EMULSION (following the regimen overleaf) <ul style="list-style-type: none"> • 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 	CONSIDER INTRAVENOUS LIPID EMULSION (following the regimen overleaf) <ul style="list-style-type: none"> • Propofol is not a suitable substitute for lipid emulsion • Lidocaine should not be used as an anti-arrhythmic therapy
4 Follow-up	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> 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 Trelawney and tower theatre recovery areas or Eden ward out of hours

This guideline is not a standard of medical care. The ultimate judgement with regard to a particular clinical procedure or treatment plan must be made by the clinician in the light of the clinical data presented and the diagnostic and treatment options available.
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Appendix 4. Modified Bromage Scale, to assess the degree of motor blockade:

	Score/ Grade	Degree of Block	Action required
 <p>Free movement of legs and feet</p>	I	Nil (0%)	Nothing required.
 <p>Just able to move knees with free movement of feet</p>	II	Partial (33%)	<p>Monitor for return of function – check the epidural insertion level - is the block consistent with the block placement?</p> <p>Consider reducing the rate. Reassess in 30 minutes. Escalate as appropriate.</p>
 <p>Unable to flex knees but free movement of feet.</p>	III	Almost Complete (66%)	<p>Check Epidural insertion level.</p> <p>Reduce the rate, closely monitor for return of function.</p> <p>If no improvement after 60 minutes, switch of the infusion and seek anaesthetic/pain team advice.</p>
 <p>Unable to move legs of feet</p>	IV	Complete (100%)	<p>Stop infusion.</p> <p>Reassess in 30 and 60 minutes: If no improvement call anaesthetist.</p> <p>Full neurological examination and note sensory level</p> <p>Monitor and arrange MRI to exclude epidural haematoma if no improvement.</p>