The Royal Wolverhampton NHS Trust

Disclaimer:
Our recommendations are based on current national guidelines and relevant evidence-base. This guideline helps inform clinicians clinical judgement. However, clinicians will consider the trade-off between the benefits and harms of an intervention before making a clinical decision.

PRT06
Protocol: Continuous infusion of local anaesthetic via elastomeric pump for regional nerve blocks in adult patients

Contents

Appendices:

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1.0 Procedure Statement (Purpose / Objectives of the Procedure)

Post operative pain relief can be attained with various modalities and regional anaesthesia plays a key part of it. Continuous infusions of local anaesthetics for nerve blocks/ fascial plane blocks are used for acute post-surgical pain as part of a multi-modal analgesic regimen, often with significantly reduced opioid requirements. They allow enhanced recovery from major surgery. This protocol will aid with the prescribing, administration and monitoring of patients receiving continuous infusions of local anaesthetic via elastomeric pump for acute pain purposes.

2.0 Accountabilities

This protocol has been researched and developed by the Acute Pain Team. Its use will be initiated by the prescribing anaesthetist and monitored by the ward nursing staff and the anaesthetists. Oversight will be provided by Pharmacy and the Acute Pain Team. The Acute Pain team is responsible to the Clinical Director, Anaesthesia, Perioperative and Pain Medicine Directorate.

3.0 Procedure/Guidelines Detail / Actions

3.1. Definitions

LA	Local Anaesthetic
TAP block	Transversus abdominis plain block
PCA	Patient Controlled Analgesia
NSAID	Non-steroidal anti-inflammatory drug
CKD	Chronic kidney disease
ePMA	Electronic prescribing and medicines administration
mL	Millilitres
Min	Minutes
ODP	Operating department practitioner
SBP	Systolic blood pressure
CNS	Clinical Nurse Specialist
AAGBI	Association of Anaesthetists of Great Britain and Ireland

3.2 Patient Selection/ Indications

Continuous infusions of local anaesthetic via elastomeric pump can be used for the following indications:

1. Major abdominal surgery where an epidural is not used which includes Rectus sheath or transversus abdominus plain (TAP) infusion.
2. Serratus anterior/ Erector spinae plain infusion for rib fractures[1,2.]
3. Wound catheter[3]

There may be other continuous LA nerve block infusions used which are not included in the above list but if the responsible anaesthetist/ surgeon feels appropriate for the purpose of post operative pain relief then the principles and management of the patient will remain the same. Local anaesthetic infusion is part of multimodal analgesia and regular paracetamol, opioid (oral/ PCA) and possible NSAID in addition if not contraindicated needs to be prescribed.

3.3 Contraindications

3.3.1 Absolute

- Infection at the catheter insertion site
- Allergy to LA drugs
- Patient refusal
- Unsafe environment, untrained staff and lack of effective monitoring.

3.3.2 Relative

- Deranged clotting profile- follow guidelines on regional anaesthesia and anticoagulation for reference
- Sepsis
- Anatomical deformity at insertion site
- Pre-existing neuropathies depending on a case-to-case basis.[4]

3.3.3 Caution in:

- Severe liver disease
- Severe renal dysfunction (CKD > 4)
- Acute Kidney injury

3.4 Summary of Protocol

Prescribe desired protocol on ePMA

a. Bilateral Rectus sheath/TAP catheter infusion of local anaesthetic

Initial bolus	**levobupivacaine 0.25% x 10 - 20mL through each catheter (Max total 40mL)**
Local anaesthetic for infusion	**Levobupivacaine 0.125%**
Total rate of infusion	**10 - 14 mL/hour***

***Preferably one elastomeric pump with Y- connector on catheter.**
If using two elastomeric pumps: 5 - 7mL/hr on each pump.

NOTE: Maximum dose of levobupivacaine is 400mg/day

b. Unilateral Wound/ Nerve sheath/ Fascial plane infusion of local anaesthetic

Initial bolus	**levobupivacaine 0.25% x 10 - 20mL through catheter**
Local anaesthetic for infusion	**Levobupivacaine 0.125%**
Rate of infusion	**10-14 mL/hour**

NOTE: Maximum dose of levobupivacaine is 400mg/day

3.5 Scope of Practice

Staff: Anaesthetists, ODPs and theatre nursing staff
Ward registered nursing staff
The Acute Pain Team
Critical care nursing staff
Critical care doctors

Clinical Areas: Operating Theatres at New Cross Hospital.
Integrated critical care unit (ICCU)
Surgical Wards; A5, A6, SAU(A9), A12, A14, D7

3.6 Roles and Responsibilities

Those responsible for the prescribing, administration and monitoring of patients receiving

continuous infusions of local analgesia via elastomeric pump should read and understand this protocol.

3.6.1 Responsibility of the prescribing Anaesthetist/Critical care doctor

- To ensure appropriate patient selection, provision of initial patient education and informed consent is obtained.
- To have appropriate knowledge of the chosen delivery system.
- To provide a clear and explicit prescription on ePMA(electronic prescribing) along with paper local anaesthetic infusion chart, using a standard solution of Levobupivacaine.
- Document nerve block along with catheter site in patient notes.
- Any change in rate after starting the infusion to be prescribed on local anaesthetic paper chart.
- To be available to provide support, advice and to problem solve.
- To ensure the patient is referred to the Acute Pain Team.
- To provide feedback to Acute Pain Team members and multidisciplinary colleagues.

3.6.2 Responsibilities of the Acute Pain Team

- To support and provide appropriate education for nursing and medical staff.
- To visit inpatients with Local anaesthesia analgesia to assess the effectiveness of the analgesia.
- To visit in-patients when requested and provide them with verbal information regarding this form of pain relief.
- To ensure up to date protocols/guidelines exist for the safe administration of local anaesthesia analgesia.
- To evaluate the management of pain (e.g. via audit) and develop the service in line with changing evidence practice.

3.6.3 Responsibilities of Registered nurses

- To be familiar with the equipment associated with local anaesthesia analgesia.
- To monitor the patient's condition and evaluate the effectiveness of local anaesthesia analgesia with documentation on CareFlow Vitals Clinical.
- Document the required data on the appropriate charts.
- To monitor the catheter site and document in notes and CareFlow Vitals Clinical.
- To report any relevant clinical problems to the Acute Pain Team and/or anaesthetic staff and take appropriate action.
- To ensure any technical faults with the equipment are reported to the acute pain team and/or anaesthetic staff and that appropriate action is taken.
- To discontinue local anaesthesia analgesia at the appropriate time and dispose of equipment correctly.
- To be aware of the nearest supply of Intralipid in case of toxicity.

3.6.4 Responsibilities of the Recovery nurse/ ODP

- All the aforementioned registered nurses' responsibilities plus
- To connect and commence regional analgesia if trained and competent to do so and if the catheter has been tested by the anaesthetist.
- To keep a supply of Intralipid within the Recovery unit (Cardiac arrest trolley) in case of toxicity.

3.7 Local anaesthetic infusion catheter management

3.7.1 Catheter insertion

- Insert the appropriate catheter under aseptic conditions using a sterile drape to produce a surgical field. Complete in a theatre environment where possible.
- Apply a sterile dressing to the entry site
- Clearly label all catheters/lines

3.7.2 Catheter care

- The infusion equipment must be checked by nursing staff at each shift change to ensure the catheter is not kinked or clamped, is not leaking and that the catheter entry site is clean and the dressing intact
- Catheter site inspections must be fully documented in the patient's nursing care plan and should be carried out at least daily.
- The catheter dressing must remain intact at all times
- Patients must not bathe due to the risk of cross contamination
- If there is evidence of infection at the catheter entry site e.g. redness, swelling or pus then the catheter should be removed and the tip sent to microbiology for cultures and sensitivities

3.7.3 Catheter removal

Catheters must be removed in the following instances:

i. Patient or surgical team request
ii. Signs/suspicion of infection /inflammation at catheter entry site
iii. Symptoms of local anaesthetic toxicity (refer to 3.9.2)

Catheters may require removal in the following instances:

i. The sterility of the dressing has been compromised
ii. The catheter has dislodged or is leaking
iii. Standard practice is to remove the catheter once elastomeric pump is empty. If it is felt that the patient will significantly benefit from a prolonged infusion then the elastomeric pump may be changed under aseptic conditions by the responsible anaesthetist.
iv. If infection is suspected, send the tip to microbiology for culture and sensitivity.

Note: Consideration must be paid to the patients anticoagulation status prior to catheter removal and please refer to the guideline on intranet 'Regional anaesthesia and patients receiving antithrombotic therapy' under anaesthetics.

Consult the Acute Pain Service if in doubt.

To remove the catheter:

1) Remove the dressing
2) The catheter should come out easily and painlessly. If there is any difficulty stop and contact the acute pain service.
3) Cover the exit wound with a dressing.

3.7.4 Disposal

- Cut the catheter as close to the elastomeric pump as possible if any local anaesthetic remains in the pump. This will allow the elastomeric pump to empty and will release the pressure.
- Dispose of the catheter and elastomeric pump as per Trust waste policy.

3.8 Preparing the Infusion

3.8.1 Setting up and running the Local Anaesthetic Infusion Pump system

Setting up local anaesthetic infusion pump system will be responsibility of anaesthetist/ critical care doctor that includes the steps detailed below.

Location of pre-filled elastomeric pumps
Pre-filled elastomeric pumps available in Nucleus Theatres Central drug fridge.

Equipment, drugs:

a) Select the appropriate size of single use prefilled local anaesthetic elastomeric pump (Preferably 600mL).

Connecting and programming

a) Connect elastomeric pump with catheter in clean environment.
b) Secure elastomeric pump so that it is not pulling on the catheter.
c) Dial the appropriate rate of local anaesthetic infusion with the key available within the elastomeric pump package and it is ready to start.
d) The pump will be attached by the anaesthetist/ critical care doctor or the recovery nurse/ ODP if trained to do so.
e) Label the line and pump using the stickers provided in the catheter and pump pack.
f) Put the patient label on the elastomeric pump.

Changing rate

a) Rate can changed as required as per protocol using the key available within the elastomeric pump package. Please keep the key in a secure place and NOT to be left with the patient. Document in the patient records where the key has been left.
b) Any change in rate to be documented on paper local anaesthetic chart.

3.9 Aftercare

3.9.1. Observations*

Patient receiving local anaesthetic infusion, please complete the following observations on CareFlow Vitals Clinical.

- Pain- None, mild, moderate, severe
- Conscious level- Alert, new confusion, responds to voice, responds to pain, unresponsive.
- Nausea- None, nausea, vomiting.

Frequency of observations

Observations	After initial bolus	Continuous infusion
Blood pressure	Every 5 min for 15 min with one further reading at 30min.	Hourly for 4 hours then 4 hourly until LA infusion is disconnected.
Heart rate		
Pain score	30 min post bolus	
Motor block	30 min post bolus	
Temperature		Every 4 hours
Pressure areas		Pressure areas must be assessed at least once per nursing shift to detect for signs of skin damage and necessary documentation.
LA catheter insertion site		Routinely at least once per nursing shift or every 12hours. Please check site for inflammation, pain, leaking, swelling and connections following patient activities, such as mobilising

*** Escalate if observations fall outside acceptable limits as per Trust policy (OP61).**

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3.9.2 Management of potential complications and undesirable effects

Potential complication/ undesirable effect symptoms	Possible causes and presentation	Action
Unrelieved pain	Pain score moderate or severe at rest or on moving and coughing	•Check insertion site for leakage or displacement of the catheter •Check filter for possible disconnection- DO NOT RE-ATTACH. •Check the pump for signs of malfunction •Consider other causes of pain, such as post operative complications, compartment syndrome for limbs or pain not covered by the LA nerve block •Ensure patient has had the benefit of other prescribed analgesia •If pain persists contact the Acute Pain Team / on-call anaesthetist
Hypotension	SBP<90mmHg	•Rule out other reasons of hypotension like haemorrhage. •Consider fluids and contact the patient's own team •As above, then stop the LA infusion •Contact the on-call anaesthetist
Motor block	The patient has difficulty or is unable to move the limb where the LA catheter is placed	•Reassure the patient that this is reversible •If pain is well controlled contact the Acute Pain Team or the on-call anaesthetist. LA infusion may need stopping to check motor recovery. •Observe the affected body part for risk of potential injury •Support the affected limb, for example the arm may need a sling •Patients who need to mobilise must be assessed and, if required, supervised when mobilising

Local anaesthetic toxicity	•Numbness and tingling around the mouth •Light headedness •Tinnitus •Visual disturbance •Disorientation •Muscle twitching •Convulsions •Unconsciousness •Coma •Cardiac arrest	Refer to AAGBI guideline Appendix 1. Intralipid is available in the nearest Theatre Recovery area (Cardiac arrest trolley)

3.9.3 Discontinuation of the continuous LA infusion

Continuous LA infusions should only be discontinued after discussion with the anaesthetist, Acute pain team and/or surgical team. Standard practice is to remove the catheter once elastomeric pump is empty. If it is felt that the patient will significantly benefit from a prolonged infusion (Up to 5 days) then the elastomeric pump may be changed under aseptic conditions by the responsible anaesthetist. Prior to discontinuing the infusion, review the drug chart for appropriate analgesia and prescribe accordingly. Removal of catheter and disposal of elastomeric pump has been discussed in earlier section 3.7.

4.0 Equipment Required

Pre-filled elastomeric pumps will be required for local anaesthetic infusion (DOSI-FUSER NRFit 600mL Multiflow pump).

5.0 Training

Regular training sessions will be organised for clinical staff by the medical devices and acute pain team.

6.0 Financial Risk Assessment

1	Does the implementation of this document require any additional Capital resources	Yes
2	Does the implementation of this document require additional revenue resources	No
3	Does the implementation of this document require additional manpower	No
4	Does the implementation of this document release any manpower costs through a change in practice	No
5	Are there additional staff training costs associated with implementing this document which cannot be delivered through current training programs or allocated training times for staff.	No
	Other comments	

7.0 Equality Impact Assessment

Not applicable
An equality analysis has been carried out and it indicates that:

Tick	Options
X	A. There is no impact in relation to Personal Protected Characteristics as defined by the Equality Act 2010.
	B. There is some likely impact as identified in the equality analysis. Examples of issues identified, and the proposed actions include:

8.0 Maintenance

Updating will be the responsibility of the Acute Pain team. Any significant changes in content will be reviewed by the Anaesthesia, Perioperative and Pain Medicine (APPM) Governance Group, the APPM Quality Improvement Forum (QIF) and the Trust Medicines Management Group (MMG).

9.0 Communication and Training

The existence of and contents of this protocol will be communicated to the responsible parties (see section 3.6).

Anaesthetist will be informed at QIF and via face-to-face teaching.

Nursing staff will be informed and educated with ward-based face to face teaching.

Pharmacy will be informed via pharmacy link colleague.

The protocol will be available on the Trust Intranet at homepage/departments/anaesthesia/Acute Pain/ Protocols

10.0 Audit Process

Audit will be conducted with data collection on the Acute pain ward round on the following parameters.

(i)Patient pain scores and side-effects

(ii)Discrepancy from the protocol set-up

(iii)Nursing and clinician feed-back

The object of audit will be to reduce problems with the introduction of a new service; demonstrate the adequate efficacy of the system; identify areas for improvement in the system and to feedback any discrepancies to the prescribing anaesthetists.

Criterion	Lead	Monitoring method	Frequency	Evaluation
Significant side-effects Discrepancies in Procedure application	Acute pain team	Routine ward rounds and colleague feed-back	6 monthly and then as needed	*Acute pain team*: Manpreet Singh Nigel Bowater Sara Lawley Bruce Allan

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11.0 References

1. Kim M, Moore JE. Chest Trauma: current recommendations for rib fracture, pneumothorax and other injuries. Current Anaesthesiology reports 10, 61-68 (2020).

2. Williams A, Bigham C, Marchbank A. Anaesthetic and surgical management of rib fractures. BJA education, 20(10): 332-340 (2020).

3. Liu SS, Richman JM, Thirlby RC, Wu CL. Efficacy of Continuous Wound Catheters Delivering Local Anesthetic for Postoperative Analgesia: A Quantitative and Qualitative Systematic Review of Randomized Controlled Trials. Journal of the American College of Surgeons, Dec 2006 , vol. 203, no. 6, p. 914-32.

4. Ilfield, B. (2017). Continuous peripheral nerve blocks: An update of the published evidence and comparison with novel, alternative analgesic modalities. Anaesthesia Analgesia, 124(1), pp. 308-335.

5. AAGBI LA toxicity: https://anaesthetists.org/Portals/0/PDFs/QRH/QRH_3-10_Local_anaesthetic_toxicity_v2_June%202023.pdf?ver=2023-06-23-141010-760.

6. Rucklidge M, Beattie E. Rectus sheath catheter analgesia for patients undergoing laparotomy. BJA education, 18(6): 166-172 (2018).

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Part A - Document Control

<table>
<tr><td>Procedure/ Guidelines number and version:

PRT06

Version 1.0</td><td>Title of Procedure/ Guidelines

Protocol: Continuous infusion of local anaesthetic via elastomeric pump for regional nerve blocks in adult patients</td><td colspan="2">Status:

Final</td><td>Author: Dr. Manpreet Singh

In conjunction with the Acute Pain Team;
Nigel Bowater CNS, Sara Lawley CNS and Dr Bruce Allan (Consultant Anaesthetist and Acute pain lead)

Contributions: Dr. Imraan Khan (Consultant Anaesthetist),

Jane Lewis (Principal Pharmacist, APPM and ICCU group)

For Trust-wide Procedures and Guidelines Chief Officer Sponsor: Chief Medical Officer

Dr. John Dyer – Clinical Director Anaesthetics, perioperative and pain medicine directorate</td></tr>
<tr><td rowspan="3">Version / Amendment History</td><td>Version</td><td>Date</td><td>Author</td><td>Reason</td></tr>
<tr><td>1.0</td><td>December 2025</td><td>As above</td><td>Introduction of protocol</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Intended Recipients: Anaesthetists, Surgical ward nursing staff, and pharmacists</td></tr>
<tr><td colspan="5">Consultation Group / Role Titles and Date:
•Acute pain group- 11/08/2025
•APPM group date- 20/08/2025
•Divisional governance group-
•MMG date- 07/10/2025</td></tr>
<tr><td colspan="2">Name and date of group where reviewed</td><td colspan="3">Trust Policy Group – December 2025</td></tr>
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Name and date of final approval committee (if trust-wide document)/ Directorate or other locally approved committee (if local document)	Trust Policy Group – December 2025
Date of Procedure/Guidelines issue	December 2025
Review Date and Frequency (standard review frequency is 3 yearly unless otherwise indicated – see section 3.8.1 of Attachment 1)	December 2028 (every three years)
Training and Dissemination: See section 9.0	
To be read in conjunction with: Nil	
Initial Equality Impact Assessment: Completed Yes / No Full Equality Impact assessment (as required): Completed Yes / No / NA If you require this document in an alternative format e.g., larger print please contact Policy Management Officer 85887 for Trust- wide documents or your line manager or Divisional Management office for Local documents.	
Contact for Review	Dr. Manpreet Singh Consultant Anaesthetist
Monitoring arrangements	
Document summary/key issues covered. This document provides guidance for local anaesthetic infusion for acute pain purposes in adult patients.	
Key words for intranet searching purposes	Local anaesthetic infusion

Appendix 1- Local anaesthetic toxicity and management (QRH, association of anaesthetists)[5]

3-10 Local anaesthetic toxicity v.2

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 toxicity may occur some time after an initial injection.

START

1. Stop injecting the local anaesthetic (remember infusion pumps).
2. Call for help and inform immediate clinical team of problem.
3. Call for cardiac arrest trolley and lipid rescue pack.
4. Give 100% oxygen and ensure adequate lung ventilation:
   - Maintain the airway and if necessary secure it with a tracheal tube.
   - Avoid hypercarbia – consider mild hyperventilation.
5. Confirm or establish intravenous access.
6. If circulatory arrest:
   - Start continuous CPR using standard protocols (→ 2-1) but:
   - Give intravenous lipid emulsion (Box A).
   - Use smaller adrenaline dose (≤ 1µg.kg^{-1} instead of 1 mg)
   - Avoid vasopressin.
   - Recovery may take >1 hour.
   - Consider the use of cardiopulmonary bypass if available.

If no circulatory arrest:

- Conventional therapies to treat hypotension, brady- and tachyarrhythmia.
- Consider intravenous lipid emulsion (Box A).

7. Control seizures:
   - Small incremental dose of benzodiazepine is drug of choice.
   - Thiopental or propofol can be used, but beware negative inotropic effect.
   - Consider neuromuscular blockade if seizures cannot be controlled.

Box A: LIPID EMULSION REGIME

USE 20% Intralipid® (propofol is not a suitable substitute)

Immediately

- Give an initial i.v. bolus of lipid emulsion 1.5 ml.kg^{-1} over 2-3 min (~100 ml for a 70 kg adult)
- Start an i.v. infusion of lipid emulsion at 15 ml.kg^{-1}.h^{-1} (17.5 ml.min^{-1} for a 70 kg adult)

At 5 and 10 minutes:

- Give a repeat bolus (same dose) if:
  - cardiovascular stability has not been restored or
  - an adequate circulation deteriorates

At any time after 5 minutes:

- Double the rate to 30 ml.kg^{-1}.h^{-1} if:
  - cardiovascular stability has not been restored or
  - an adequate circulation deteriorates

Do not exceed maximum cumulative dose 12 ml.kg^{-1} (70 kg: 840 ml)

Box B: CRITICAL CHANGES

Cardiac arrest → Check already done 1 to 5, then → 6

Box C: AFTER THE EVENT

Arrange safe transfer to appropriate clinical area
Exclude pancreatitis: regular clinical review, daily amylase or lipase
Report case on your local critical incident system and to the relevant national system (these vary between each devolved nation and in Ireland)

3-10