CLINICAL GUIDELINE TITLE	**Local Anaesthetic Nerve Block Continuous Infusion Guidelines for Adults Patients**

1) SUMMARY

This document provides guidance on the management of continuous local anaesthetic (LA) nerve block infusions, for adult patients, for the treatment of post-operative or acute pain. This guidance incorporates current guidance from the Royal College of Anaesthetists, European Society of Regional Anaesthesia and American Society of Regional Anaesthesia on best practice and prevention of LA toxicity. *Note: for patients receiving a continuous epidural infusion, please see separate guidelines.*

KEY POINTS

- LA infusions are effective in the management of acute pain after surgery and trauma
- Registered practitioners should be aware of:
  - Drug-related side-effects and their management
  - Indications and contraindications for LA infusions
  - Complications relating to analgesia and their management
  - Frequency of observations
  - Criteria for stopping LA infusions
  - Who to contact in an emergency
  - Training required and competency assessment process

Quick link accesses (Ctrl + Click to follow links)

Hypotension	Bradycardia	Observations
Uncontrolled Pain	Local anaesthetic toxicity	Motor block

2) INTRODUCTION

A continuous local anaesthetic nerve block infusion is used to provide targeted pain control to a specific area of the body. LA drugs work by blocking nerve impulses that are transmitted by sensory, sympathetic and motor nerves.

This type of pain relief should be used as part of a multi-modal approach to the patient's pain management. Patients will commonly be prescribed regular paracetamol, an opioid and possibly a non-steroidal anti-inflammatory drug in addition to a continuous LA infusion. There may also be bolus doses of LA drugs prescribed to be administered by the anaesthetic team only. Monitoring after these doses is described later in this document.

Types of LA nerve block infusions include:

- **Interscalene** – shoulder surgery
- **Supraclavicular, infraclavicular and axillary** – upper limb surgery
- **Paravertebral** - thoracic and upper abdominal surgery
- **Erector Spinae** – thoracic surgery, breast surgery and rib fractures
- **PECS I/II** – breast surgery
- **Serratus Anterior** – thoracic surgery and rib fractures
- **Sciatic/femoral/fascia iliaca** – lower limb surgery
- **Rectus sheath** – abdominal surgery
- **Transversus Abdominis Plane (TAP)** – abdominal surgery

There may be other continuous LA nerve block infusions used, which are not included in the above list. The principles and management of the patient will remain the same.

3) DEFINITIONS

LA drugs Work by blocking nerve impulses that are transmitted by sensory, sympathetic and motor nerves.

Local anaesthetic toxicity Rare and potentially life-threatening complication and can happen after accidental administraion of a LA drug into a blood vessel, either when the LA catheter has migrated or when the LA infusion line has been connected to an intravenous (IV) line. (Litz et al 2006, Foxall et al 2007)

Motor block Limb weakness can be complication following the administration of LA drugs. These agents preferentially block sensory nerve fibres, but in high concentrations, or high infusion rates, motor nerves may also become blocked (Royal College of Anaesthetists 2010).

4) SCOPE

All registered practitioners caring for patients receiving a continuous LA infusion must adhere to this guideline. Clinicians should liaise with the ward manager or senior nurse to ensure that at least one trained nurse who is competent in the management of patients receiving a LA infusion is on duty for each shift. To ensure patient safety, patients with LA Infusions should not leave the clinical area unless accompanied by a trained member of nursing staff.

Practitioner pre-requisites with level 1 access codes

Registered practitioners who meet the following criteria can access the menu options, change the infusion bag, change the infusion rate within prescribed parameters, discontinue the infusion and remove the LA infusion catheter. All registered practitioners can charge the pump, by placing it in the charger.

- A certificate in IV drug administration.
- Attended the Trust pain study day and completed the LA teaching session. There is no need to repeat training unless there are concerns about the individual's ability to care for patients requiring continuous LA infusions.
- Complete a period of supervised practice and successfully complete the LA competency assessment available via the Pain Management webpage on the trust's intranet. We recommend that this is completed within 3 months of training.
- Complete bodyguard 545^{TM} pump training.

Additional pre-requisites for registered practitioners with level 2 access codes

Registered practitioners who meet the following criteria can in addition to the above set up continuous LA infusions, change protocols and clear air in the line.

- Successfully completed advanced training and competency assessment to programme bodyguard 545^{TM} pumps.
- Successfully passed a programming test in accordance with National Health Service Litigation Authority (NHSLA) guidelines.

Advanced training can be arranged with a member of the Pain Service.

Student nurses should be encouraged to observe and learn about continuous LA infusions but must not participate in procedures.

5) FULL GUIDELINE

5.1 Patient inclusion and exclusion criteria

Patient inclusions

- Requires a continuous LA nerve block infusion for acute or postoperative pain relief.
- Consented for a continuous LA infusion.
- A LA catheter inserted by a suitably trained doctor or specialist nurse.
- Received a LA test dose.
- A prescription has been completed for the continuous LA infusion.

Patient exclusions

Absolute

- Patient refusal.
- Allergy or sensitivity to LA drugs.
- Local or generalised sepsis.
- Complete heart block (for paravertebral infusions following thoracic surgery).
- Space occupying tumour in the proposed site of catheter placement.

Relative

- Coagulopathy or patients taking anticoagulants – this will be reviewed on a case by case basis.
- Anatomical deformity at insertion site.
- Pre-existing neuropathies depending on a case-to-case basis (Ilfield 2017).

5.2 Staff preparing and commencing LA continuous infusions

The following staff can prepare and commence LA continuous infusion
Anaesthetists
*Clinical Nurse Specialists in the Pain Service
*Registered nurses in the Recovery Unit at CXH, HH and SMH
*Registered nurses in GICU at HH and SMH (band 7 and above)
*Registered nurses in 11 West & 11 North at CXH (band 7 and above)
*Registered nurses in cardiothoracic recovery and high dependency unit at HH (band 7 and above)
*Clinical Practice Educators in Critical Care (band 6 and above)

*Providing they meet the additional practitioner pre-requisites set out in section 4

Please note site nurse practitioners cannot prepare LA infusions. However, they can use level 2 access codes to prime air from the line.

If there are any concerns about patients with peripheral nerve catheter infusions, please contact the Pain Service or out of hours contact the site nurse practitioners (first line) or the on-call anaesthetist (second line).

Site	Days	Time	Bleeps
CXH	Mon-Fri	08.30-16.30 Out of hours Out of hours	4001 (clinical nurse specialist) 6183 (site nurse practitioner) 8111 or 8189 (on-call anaesthetist)
HH	Mon-Fri	08.30-16.30 Out of hours Out of hours	5461 (clinical nurse specialist) 8113 (site nurse practitioner) 9313 (on-call anaesthetist)
SMH	Mon-Fri	08.30-16.30 Out of hours Out of hours	1043 (clinical nurse specialist) 1065 (site nurse practitioner) 1213 (on-call anaesthetist)

5.3 Preparing and commencing LA continuous infusions

5.3.1 LA infusion pump and drugs used

The yellow bodyguard 545^{TM} pumps are used for all continuous LA infusions along with elastomeric pumps (subject to trust approval). For a quick pump user guide, refer to *Appendix 1.*

Premixed infusion bags of levobupivacaine are available to prevent the risk of drug error. Please note that these bags are also used for epidural infusions so they are labelled **'For Epidural Use Only'**. Local anaesthetic drugs must be stored separately from intravenous drugs and other infusion bags (NPSA 2007).

The following standard solutions are used:

Local Anaesthetic	Levobupivacaine 0.125%
Size of bag	100ml or 200ml
Rate of infusion	1 – 15ml/hr

Occasionally an anaesthetist may choose to administer non-standard solutions by adding other drugs to a LA mixture. In this instance, the infusion bags will be prepared and changed by the anaesthetist and not by ward staff.

5.3.2 Preparing & Commencing a LA Infusion

Refer to *appendix 2* for a list of clinical areas where nurses are currently trained to care for patients receiving continuous local anaesthetic nerve block infusions.

- Complete a continuous LA infusion referral form.
- Infusion bag and prescription should be checked by two registered practitioners, one of whom should be trained in IV drug administration.
- Connect the prescribed solution to a dedicated yellow administration set and prime via the pump, ensuring all air is removed (refer to appendix 1 for priming instructions).
- Programme the pump in accordance with the prescription. The programme must be checked by two registered practitioners, one of whom is deemed competent in the management of patients receiving continuous LA infusions and completed programme training for the bodyguard 545^{TM} pump.
- Identify the patient, checking that the hospital number on the identity band and the prescription match.
- Attach one LA label to the administration set near the connection port and another label on the LA infusion catheter by the filter.
- A transparent dressing should be applied to the LA catheter insertion site to ensure early detection for signs of leakage or infection.
- Applying the principles of ANTT, connect to the patient and press start/ok. This connection should be checked by two registered practitioners, one of whom should be trained in IV drug administration.
- Commence the LA infusion at the prescribed rate, sign the prescription on Cerner or ICIP within Critical Care areas and commence the observations.

5.3.3 Emergency Drugs

Ensure the following drugs are readily accessible within clinical areas caring for patients requiring continuous LA infusions.

Intralipid 20%

The drug is located within all critical care and theatre recovery areas.
For the management of severe local anaesthetic toxicity follow this link
(Refer to appendix 3)

Ephedrine 30mg ampoule
For administration by suitably trained medical staff

Metaraminol 10mg ampoule
For administration by suitably trained medical staff

Intravenous fluids

5.4 Care and monitoring of the patients

5.4.1 Observations

When a patient is receiving a continuous LA infusion, please complete the following observations on the LA infusion Assessment Chart in the I-view pain management band via Cerner or ICIP in Critical Care Areas

The following scores rank intensity or magnitude and are used to assess pain, sedation and nausea. A verbal rating score is used to assess pain intensity. The patient should be asked the following questions: "On moving, is your pain none, mild, moderate or severe?"

Pain	Sedation	Nausea
None	A - Alert	None
Mild	C – New confusion	Nauseous
Moderate	V – Responds to voice	Vomiting
Severe	P – Responds to pain	
	U - Unresponsive	

5.4.2 Frequency of observations

Observation	Frequency on starting a LA Infusion	After a rate increase	After an LA bolus
Blood pressure	15min for 1hr, 30min for 4hr, 1hr for 4hr then 4hourly until continuous LA infusion is disconnected	15 and 45 min after rate increase	Every 5min for 15mins, then every 15mins for the following 45 min
Heart rate			
Pain scores		60min after increase	30min after bolus
Motor block		60min after increase	30min after bolus
Temperature	Every 4hr		
Pressure areas	Pressures areas must be assessed at least once per nursing shift to detect for signs of skin damage. Waterlow assessment tool is available in the I-view adult ongoing assessment band via Cerner.		
LA catheter insertion site	Routinely at least once per nursing shift or every 12hr. Please check site and connections following patient activities, such as mobilising		

5.4.3 The management of adverse effects and complications related to LA infusions

Symptoms	*Causes and presentation*	*Action*
Uncontrolled 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 • 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 Pain Service / on-call anaesthetist**
	Presence of **compartment syndrome** must be excluded in patients with peripheral nerve catheters who report moderate to severe pain. This requires urgent escalation to senior member of the surgical team	
Hypotension ***A sudden drop in BP in the post-operative patient may be due to haemorrhage***	**Systolic blood pressure is < 90 mmHg** **Systolic BP is <80mmhg**	**• Increase the rate of IV fluid infusion • Contact the patient's own team** **• As above, then stop the LA infusion • Contact the on-call anaesthetist • Ensure ephedrine or metaraminol are accessible**
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 Pain Service or the on-call anaesthetist to reduce the rate of the LA infusion • 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**
Bradycardia	**If the block is high above T4 with normal heart rate** **If the block is high and the patient has bradicardia and tingling in the fingers**	**• Position the patient at an angle of 45 degrees head up • Continue to monitor the patient • Contact the Pain Service or the on-call anaesthetist to reduce the rate of the LA infusion •Stop the LA infusion •Summon emergency assistance • Maintain the patient's airway and circulation, as required**
Local anaesthetic toxicity	**• Numbness and tingling around the mouth • Light headedness • Tinnitus • Anxiety • Visual disturbance • Disorientation • Muscle twitching • Convulsions • Unconsciousness • Coma • Cardiac arrest**	**• Stop the infusion immediately • Summon emergency medical assistance • Maintain the patient's airway and circulation • Ensure benzodiazepines, such as diazepam or lorazepam, are available • Ensure intralipid is accessible • Prompt action is essential** **Refer to AAGBI guideline: Management of severe LA toxicity 2010 (appendix 3)**
Pressure Ulcers	**Redness to skin in region of dependent pressure areas with blistering or broken skin. The patient may be unaware of pain due to the effect of LA**	**• Ensure the patient is assessed for the presence of motor block • Contact the Pain Service or the on-call anaesthetist to assess and reduce the infusion rate (if appropriate) to alleviate motor block**
Pneumothorax **Can be spontaneous or as a result of the catheter being inserted without direct visualisation**	**• Tachypnoea • Uneven chest wall expansion • Dyspnoea • Decreased SaO2 • Sharp pain**	**• Reassure patient • Administer oxygen via facemask • Contact the patient's medical team urgently • Stop the LA infusion**
Catheter migration into the epidural space	**Bilateral spread of sensory block with possible hypotension and bradycardia**	**• Stop the LA infusion • Contact the Pain Service or the on-call anaesthetist • If BP <90mmhg, increase IV fluids as able**

Unilateral diaphragmatic paralysis **This is caused by phrenic nerve blockade**	**Respiratory distress**	**• Reassure patient** **• Administer oxygen via facemask** **• Sit patient upright** **• Contact the patients medical team immediately** **• Stop the LA infusion**
Horner's Syndrome. **This is caused by sympathetic nerve blockade and subsequent overload of parasympathetic activity**	**Symptoms affecting one side of the face:** **• Drooping eyelid (ptosis)** **• Constricted pupil (miosis)** **• Absence of sweating to face/neck (anhidrosis)**	**• Reassure the patient** **• Sit patient upright** **• Contact the patients medical team immediately** **• Stop the LA infusion**
Hoarseness. **This is caused by laryngeal nerve block**	**Patient complains of hoarse voice and sore throat**	**• Reassure the patient** **• Sit patient upright** **• Contact the patients medical team immediately** **• Stop the LA infusion**

5.5 Discontinuation of the continuous LA infusion

Continuous LA infusions should only be discontinued after discussion with the anaesthetist, Pain Service and/or surgical team. Catheters should be reviewed daily after 72 hours on a case by case basis.

5.5.1 Procedure for discontinuing the LA nerve catheter

Prior to discontinuing the infusion, prescribe either regimen 1 or regimen 2 for the patient as detailed below (if either is contra-indicated contact the patient's medical team).

Regimen 1	Regimen 2
• Paracetamol 1 gram, 6 hourly regularly • Tramadol 50mg, 6 hourly regularly • Tramadol 50mg, 6 hourly PRN • Morphine sulphate solution (e.g. Oramorph) 10-20mg, 4 hourly PRN	• Paracetamol 1 gram, 6 hourly regularly • Dihydrocodeine 30mg, 6 hourly regularly • Dihydrocodeine 30mg, 6 hourly PRN • Morphine sulphate solution (e.g. Oramorph) 10-20mg, 4 hourly PRN

World Health Organisation (1996)

5.5.2 Procedure for discontinuing the LA infusion

- To stop the LA infusion, press the 'stop/no' button.
- Turn the pump off by pressing the on/off button in the top left hand corner of the keypad
- Remove the LA administration set from the pump
- Clean the pump as per infection control policy
- Return the pump to theatre recovery as soon as possible
- Following discontinuation, the LA catheter should be removed as soon as possible.

5.5.3 Removal of the LA Infusion Catheter

All registered practitioners can remove the catheter

- Explain the procedure to the patient
- Decontaminate hands and apply clean non-sterile surgical gloves
- Remove the dressing from the catheter site. Observe and remove any suture if visible, then gently pull out the catheter
- Contact the Pain Service or the on-call anaesthetist in the event of difficulty in removing the LA catheter
- Clean around the catheter exit site with sterile normal saline if necessary. Apply a small transparent dressing to the site for 24 hours and continue to observe
- Check that the catheter is intact by observing for the blue or black tip at the end of the catheter and document its removal in the medical notes
- If the catheter is incomplete, inform the anaesthetist, the patient's consultant and document in the medical notes. Keep the incomplete catheter in a specimen container for viewing.

6) IMPLEMENTATION

Training required for staff	Yes
If yes, who will provide training:	*Pain Service*
When will training be provided?	LA teaching session on the Trust's Pain study day, one to one for LA infusion competency and for NHSLA (Programming of Epidural/LA)
Date for implementation of guideline:	

7) MONITORING / AUDIT

When will this guideline be audited?	Continuously by Pain Service. Annual audits will need to be conducted in relation to storage of LA drugs and labelling of epidural equipment (NPSA 2007)
Who will be responsible for auditing this guideline?	Pain Service and staff within clinical areas that manage LA infusions
Are there any other specific recommendations for audit?	Staff competency assessed following attendance on the Trust's LA teaching session. Practical competencies assessed by Pain Service, senior registered practitioners and Clinical Education Teams against this guideline

8) REVIEW

Frequency of review	**Please indicate frequency of review:** *Every 3 Years* **Person and post responsible for the review:** The lead nurse(s) for the Pain Service

9) REFERENCES

1. Foxall, G., McCahon, R., Lamb, J., Hardman, J. and Bedforth, N. (2007) Levopbupivacaine-induced seizures and cardiovascular collapse treated with Intralipid. *Anaesthesia*, 62(5), pp. 516-518.
2. 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.
3. Litz, R., Popp, M., Stehr, S. and Koch, T. (2006). Successful resuscitation of a patient with ropivacaine-induced asystole after axillary plexus block using lipid infusion. *Anaesthesia*, 61(8), pp. 800-801.
4. National Patient Safety Agency. (2007) Patient safety alert 21: Safer practice with epidural injections and infusions. Available at: www.npsa.nhs.uk
5. Royal College of Anaesthetists, (2010). *Best Practice in the Management of Continuous Epidural Analgesia in the Hospital Setting. London*. Royal College of Anaesthetists official website [online]. Available at: https://www.rcoa.ac.uk/system/files/FPM-EpAnalg2010_1.pdf [accessed 17 Feb. 19].
6. World Health Organisation, (1996). *Cancer Pain Relief: with a guide to opioid availability, 2nd ed. Geneva*: World Health Organisation official website [online]. Available at: http://www.who.int/iris/handle/10665/37896 [accessed 17 Feb. 19].

10) GUIDELINE DETAIL

Start Date:	**3rd February 2020**
Approval Dates	Theatres, Anaesthetics and Pain 02/09/2019 Drugs and Therapeutics Committee 26th November 2019 (chair's action 26th November 2019) EBSE January 2020
Has all relevant legislation, national guidance, recommendations, alerts and Trust action plans been considered, and included as appropriate in the development of this guideline?	National Patient Safety Agency. (2007) Patient safety alert 21: Safer practice with epidural injections and infusions. Available at: www.npsa.nhs.uk Association of Anaesthetists of Great Britain and Ireland, Obstetric Anaesthetists' Association & Regional Anaesthesia UK (2013) Regional anaesthesia and patients with abnormalities of coagulation. Anaesthesia, 68, pp966-72 Royal College of Anaesthetists. (2010) Best Practice in the management of epidural analgesia in the hospital setting. Royal College of Anaesthetists, Faculty of Pain Medicine. London. www.rcoa.uk/fpm Royal College of Anaesthetists. (2009) The 3rd National Audit Project of the Royal College of Anaesthetists of Major Complications of Central Neuraxial Block in the United Kingdom. www.rcoa.ac.uk/nap3
Have all relevant stakeholders been included in the development of this guideline?	**Please list all (name and role):** Dr Nicola Stranix, Inpatient pain consultant, Charing Cross hospital Dr Ashwin Kalbag Inpatient pain consultant , Charing Cross hospital Dr Marta Prestedge Inpatient pain consultant, Hammersmith hospital Dr Alison Knaggs Consultant Anaesthetist, St. Mary's hospital Dr Jenny Illingworth Consultant Anaesthetist, St. Mary's hospital
Who will you be notifying of the existence of this guidance?	All clinical areas that manage patients requiring local anaesthetic nerve block infusions, anaesthetics, theatres and recovery, critical care & high dependency units, critical care outreach team, clinical practice educators
Related documents	Acute & chronic pain guidelines Patient Controlled Analgesia (PCA) for post-operative and acute pain Injectable Medicines guide Controlled Drugs policy Medical Devices Management policy Decontamination policy Prevention & Management of Pressure Ulcers policy
Author/further information	**Name:** Roya Hejazi, Eamon McMonagle **Title:** Clinical Nurse Specialists, Pain Service **Name**: Boyne Bellew **Title**: Consultant Anaesthetist **Division:** Surgery, Cancer and Cardiovascular **Site:** Charing Cross hospital **Telephone/Bleep:** 17568/4001 **Trust email address:** roya.hejazi@nhs.net eamon.mcmonagle@nhs.net boyne.bellew@nhs.net Contributing Authors: Dr Gillian Chumbley, Nicola Bourne, Dr R. Doyle, Dr G Lockwood, Dr A Knaggs

Document review history	**Next review due: 26th November 2022** Replaces previous guidelines dating to 2006 Version 2 –Evidence Based Practice committee recommendations Version 3 – Drugs and Therapeutics Committee recommendations Version 4 - Proposed switch to use of levobupivacaine for local anaesthetic infusions Version 5 – DTC 14/07/15 Version 6 – DTC recommendations July 2015 Version 7 – corrections following consultation Version 7.1 – reviewed guideline Version 7.2 – amendments following DTC meeting **Version 8.0 – finalised version**
THIS GUIDELINE REPLACES:	Continuous local anaesthetic nerve block infusions, clinical nursing guidelines for adult patients id 2164

11) INTRANET HOUSEKEEPING

Key words	Local anaesthetic infusions, Adult patients, Nursing guidelines
Which Division/Directorate category does this belong to?	Surgery, Cancer and Cardiovascular
Which specialty should this belong to when appearing on the Source?	Theatres, anaesthetics and pain

12) EQUALITY IMPACT OF GUIDELINE

Is this guideline anticipated to have any significant equality-related impact on patients, carers or staff? No

Appendix 1 – CME Bodyguard 545™ user guide

COLOURVISION BODYGUARD

Pain Management Pump

Quick user guide

ColourVision BODY GUARD 545 Epidural Infusion Pump

ColourVision BODY GUARD 575 PCA Infusion Pump

CME Medical Device Training is RCN-Accredited

Keypad Lock

With the keypad lock activated, the user can STOP and START an infusion, and with the infusion running use the INFO key to review infusion status.
Users cannot (for example) power off, rate change, change bolus or lockout time, deliver a clinician activated bolus or go to the main menu with the keypad lock activated.

Accessing infusion summary

During an infusion, repeatedly press the INFO to access current infusion information:
volume infused/to be infused (VI/VTBI), battery level, Pt bolus attempts/given, Clinican Bolus, protocol review screen and date & time

Note

- Refer to Operating Manual for full operating instructions
- Users must have undertaken training before operating this device
- Screen information/sequences may vary with different software versions and local pump configuration

Always follow screen prompts and before pressing keys to proceed, ensure selections made correspond with what is required

cme medical
Listen > Develop > Deliver

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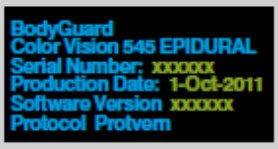
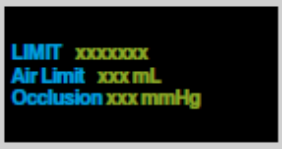
Start a new infusion

Prepare bag and set as per local policy

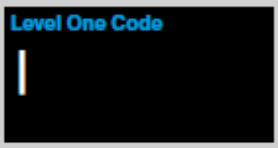
To power on, press and hold down the **ON/OFF** key until a beep is heard and screen displays



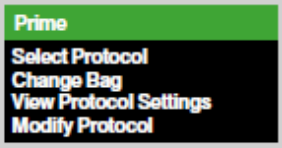
Screen displays pump identification



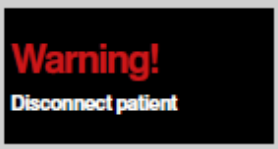
Next screen displays pump settings



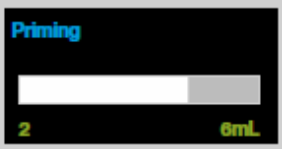
Enter code, press START/OK



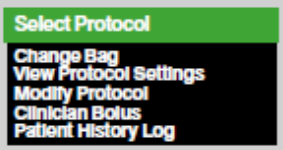
To prime, press START/OK



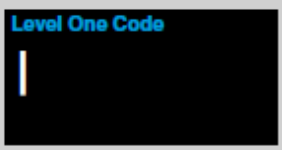
Ensure the set is disconnected from the patient. Press START/OK



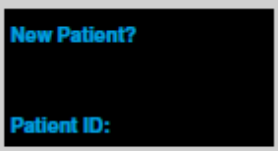
On completion, the screen returns to the main menu



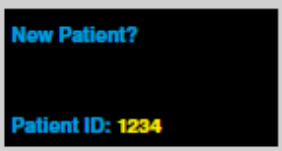
To select protocol, press START/OK



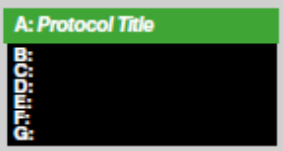
Enter code, press START/OK



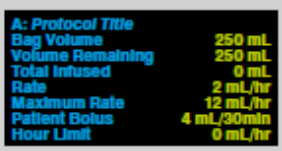
Enter the ID number for a new pt (optional)



Press START/OK



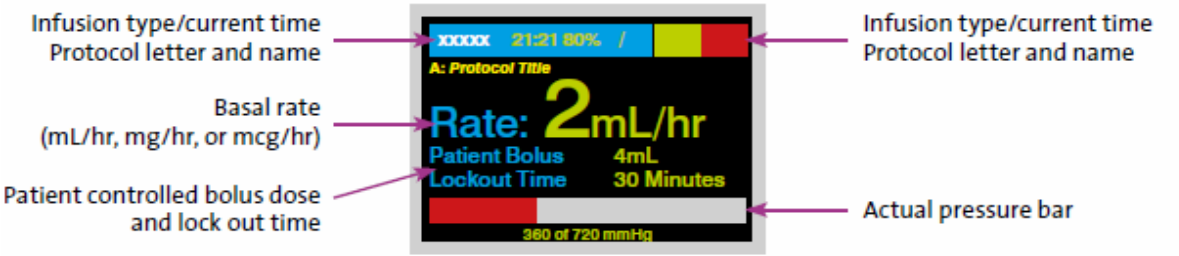
Select the Protocol required (use ↑↓ key if necessary), press START/OK



Check protocol, if correct, press START/OK

Connect set to the **correct** patient access port and unclamp if necessary
When ready to do, press START/OK to start protocol/infusion

Infusion screen running



Rate Change During Delivery (Rate Titration)

Remember to de-activate and activate keypad lock if necessary

1. With the infusion in progress, enter the new rate using the numerical keypad, press **START/OK**
2. Enter relevant code, press **START/OK**
3. Check the rate change is complete on the infusion running screen

Bag Change

Ensure set is clamped/disconnected from patient`s access device.

If end infusion alarm activates:

- Keypad Lock is automatically removed
- Press **STOP/NO** to confirm end of infusion and mute alarm
- Follow screen prompts to return to main menu, complete bag change, re-commence protocol and activate keypad lock

If changing bag prior to end infusion alarm:

- Press **INFO** to record VTBI and VI
- De-activate keypad lock
- Press **STOP/NO** to stop the infusion
- Follow screen prompts to return to main menu, complete bag change, re-connect/unclamp set, resume protocol, and activate keypad lock

Note: When a protocol is resumed and the protocol summary displays, the new VTBI and the total of all volume infused to date out of previous bag(s) will display.

Alerts, alarms and troubleshooting

When an **ALERT** is activated:

The infusion continues, LED indicator light remains green, intermittent beeps are heard approx. every 3/4 mins and a screen message alternates with the infusion running screen.

When an **ALARM** is activated:

The infusion stops, the LED indicator light turns red, a continuous audible alarm activates and a screen message displays indicating the cause.

Press STOP/NO to mute alarms and follow screen prompts.

Screen	Description
Low Battery	Alert: Approximately 30 minutes of battery life remaining. Connect to mains power.
Near End	Alert: Bag nearly empty, approximately 5mL volume remaining. Prepare new bag, if applicable.
Pump Stopped	Pump has been left in the STOP state for more than 2 minutes with no key presses. Press START/OK to resume, press STOP/NO to continue pause or press and hold down STOP/NO for menu.
End Battery Press Stop	Battery power is depleted. Connect to mains power immediately. Place pump in charger or use the battery cable to connect to the DC socket.
End of Infusion Press STOP/NO for Menu	Current infusion programme has completed. Either discontinue use or change bag to start a new protocol.
Air/Up Occlusion Check for air/ occlusion	Air in set or the set is occluded between the infusion bag and pump. If air is visible, disconnect set from patient and prime the set and resume protocol. Check for occlusion source (kinked or trapped set).
Down Occlusion Check set/access	The set or access device is occluded (below pump). Straighten the set and/or remove or open any clamp or clip. Change/flush the access device.
Missing Set Key Load Set Key & Close Door	The set is loaded incorrectly or user has loaded a non-proprietary set .Load administration set with key in keyway. Check set is the correct dedicated BodyGuard set.
Door Open Close Door	The pump door has opened during infusion. Check set is loaded correctly, close door and re-start infusion.
System Error Press Info	A technical/Internal malfunction has occurred Follow on screen prompts. User may be prompted to power off and on to rectify the problem.
Error (number) Send for Service	If the problem cannot be rectified, power off and remove from patient use. Follow local policy and contact service dept.

CV545 & 575 Pain Mgt/QUGv2/May2014

Appendix 2 - Commencing a continuous local anaesthetic Infusion

Patients receiving continuous local anaesthetic infusions are normally nursed in the following areas (does not include areas within Maternity Care or Paediatrics, see separate guidelines):

SMH	CXH	HH
Main Theatre Recovery Unit	Main Theatre Recovery Unit	Main Theatre Recovery Unit
Adult Intensive Care and High-dependency Unit	11 North & West (Critical Care Unit)	General Intensive Care Unit
Charles Pannett (General Surgery)	7 North (Colorectal & Urology)	A8 (Hepatobiliary Surgery)
Major Trauma Unit	7 South (Orthopaedics)	Cardiothoracic Recovery & High Dependency Unit
Zachary Cope (Vascular)		A9 (Cardiothoracic Surgery)
Valentine Ellis (Orthopaedics)		Victor Bonney (Gynaecological surgery)
Accident & Emergency department		Coronary Care Unit **(under exceptional Circumstances only)**
Lindo Wing Levels 2 & 3 (Private Patients)	15 North and South wards, (Private patients) **DO NOT** accept patients receiving continuous local anaesthetic infusions	Sainsbury Wing Levels 3 & 4 (Private Patients)

Appendix 3 - Management of severe local anaesthetic toxicity

AAGBI Safety Guideline

Management of Severe Local Anaesthetic Toxicity

1 Recognition

Signs of severe toxicity:

- Sudden alteration in mental status, severe agitation or loss of consciousness, with or without tonic-clonic convulsions
- Cardiovascular collapse: sinus bradycardia, conduction blocks, asystole and ventricular tachyarrhythmias may all occur
- Local anaesthetic (LA) toxicity may occur some time after an initial injection

2 Immediate management

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

3 Treatment

IN CIRCULATORY ARREST

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

GIVE INTRAVENOUS LIPID EMULSION
(following the regimen overleaf)

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

WITHOUT CIRCULATORY ARREST

Use conventional therapies to treat:

- hypotension,
- bradycardia,
- tachyarrhythmia

CONSIDER INTRAVENOUS LIPID EMULSION
(following the regimen overleaf)

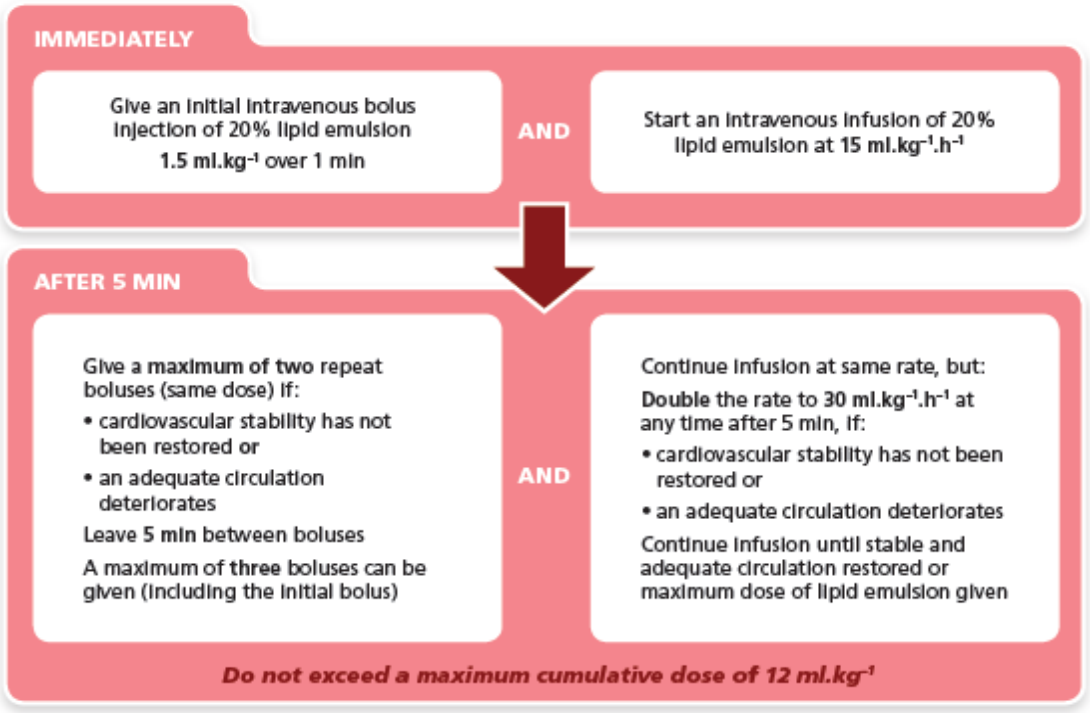
- Propofol is not a suitable substitute for lipid emulsion
- Lidocaine should not be used as an anti-arrhythmic therapy

4 Follow-up

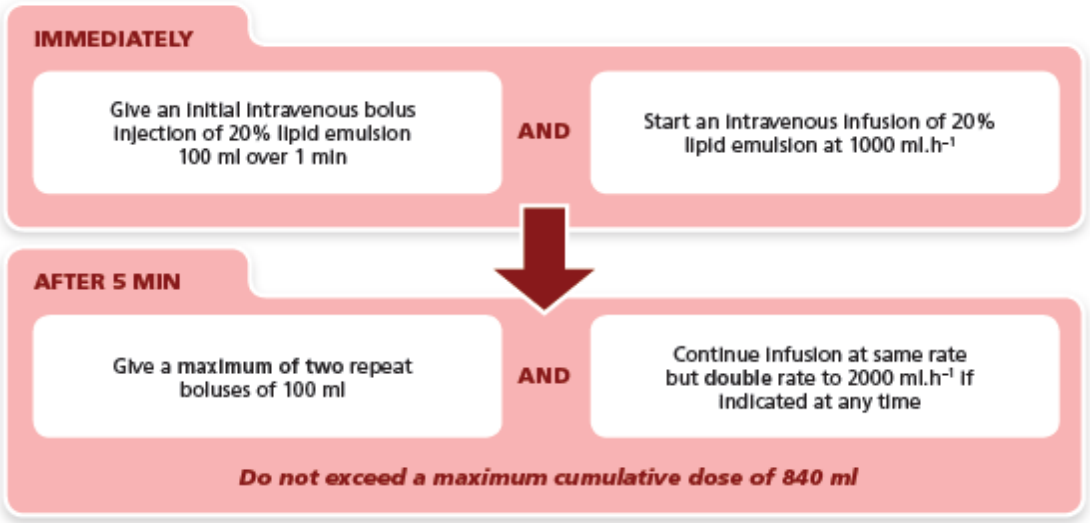
- Arrange safe transfer to a clinical area with appropriate equipment and suitable staff until sustained recovery is achieved
- Exclude pancreatitis by regular clinical review, including daily amylase or lipase assays for two days
- Report cases as follows:
  - In the United Kingdom to the National Patient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

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

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



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



This AAGBI Safety Guideline was produced by a Working Party that comprised:
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This Safety Guideline is endorsed by the Australian and New Zealand College of Anaesthetists (ANZCA).