CLINICAL GUIDELINES ID TAG	
Title:	***Continuous Peripheral Nerve Block Guideline***
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Directorate:	***Acute***
Date Uploaded:	26th October 2015
Review Date	***25th October 2018***
Clinical Guideline ID	CG0432

Continuous Peripheral Nerve Block Guideline

Southern Health and Social Care Trust

DEFINITION

Perineural catheter analgesia provides a limb specific method for profound analgesia following surgery of the upper or lower extremity and thorax. Continuous peripheral nerve blockade involves infusion of local anaesthetic at low dosages to provide analgesia while often sparing motor function. Patient controlled operation of these catheters is available and should be encouraged. Opioid medications are not used in these infusions and concurrent oral opioid and other adjuvant analgesics are recommended and encouraged.

For the purpose of this guideline the abbreviation PNB refers to Peripheral Nerve Block.

Potential drawbacks associated with continuous PNB include catheter malfunction, infection, local anaesthetic systemic toxicity, and anticoagulation issues with catheter placement or removal. Catheter removal is not as great an issue as it is for epidural catheters, the exception being lumbar plexus and paravertebral catheters.

PURPOSE

- To provide safe effective pain management utilizing continuous PNB analgesia.
- To provide a consistent method of assessing and caring for patients receiving PNB analgesia.
- To safely remove PNB catheters.

GUIDELINE

Registered Staff Nurses identified by their manager will undertake competency based training allowing them to care for patients receiving PNB analgesia. This includes patient monitoring, changing infusion bags and removal of PNB catheters with a written anaesthetist order.

The Anaesthetist will be responsible for all orders regarding PNB initiation, setting up RA Pump in theatre or recovery, dosage adjustments, maintenance, discontinuation and adjunctive analgesics, anti-emetics, and sedatives.
Continuous PNBs will be run through an infusion pump targeted for PNB use initiated in Theatre or Recovery.

Oxygen, suction, and resuscitative equipment must be readily available.
The patient must have patent IV access.

PROCEDURE

Types of Catheters - This policy applies to the use of non stimulating catheters (B-BRAUN Contiplex™, PAJUNK PlexoLong Sono™, PAJUNK SonoLong Curl Sono™) placed for either upper or lower extremity surgery. Single wound catheters (e.g. Iliac crest bone grafts) may also be managed under this guideline.

Infusion Pumps –

1. Electronic (Smiths Medical™ CADD Solis)
2. Elastomeric (I-flow) pumps

Will be employed to deliver continuous infusion, variable infusion rates, and a patient control bolus for breakthrough pain.

Local Anesthetic- 0.125% Levobupivacaine 200ml bag (Chirocaine™ 1.25mg/ml - AbbVie) or 0.2% Ropivacaine 200ml bag (Naropin™ 2mg/ml - Astra Zeneca) will be used as the local anesthetics of choice in the regional anaesthesia pumps.

Perineural Catheter Infusions Rates –

Standard infusion rates for effective analgesia will start at 7ml/h for single nerves (i.e. femoral, sciatic …) and 10 ml/h for nerve plexus infusions (i.e. brachial plexus, lumbar plexus …) with range 2-15ml/h, single nerves and plexus infusions unless prescribed otherwise by anaesthetist. For more information see table below.

Patient controlled techniques (i.e. "continuous flow" and "on demand" features) are preferred when available since these systems usually result in a lower total dose of local anaesthetic and in greater efficacy. For recommended setting see table below.

Maximum 4 hour dose of local anaesthetic (continuous infusion and boluses) is limited to 60ml for safety reasons.

	Basal Infusion Rate (range)	**Patient Controlled Bolus and Lockout**
	Standard infusion	
Single nerve	7 ml/h (2-15 ml/h)	N/A
Plexus	10 ml/h (2-15 ml/h)	N/A
	Patient Controlled Regional Infusion	
Single nerve	5ml/h (2-10ml/h)	5ml bolus/60min
Plexus	7ml/h (2-10 ml/h)	5ml bolus/60 min

The Anaesthetist will:

- Insert PNB catheter using strict aseptic technique and inject initial dose to establish patient's sensory block.

- Secure the catheter in place. It is recommended to use “Dermabond” tissue glue on dry skin, covered with “Tegaderm”, especially with interscalene catheters which have the highest rate of dislodgement. The “Lock- It” system may be used to secure the catheter when appropriate.
- Rule out intravascular catheter placement by an appropriate bolus (2-3 ml 1% Lidocaine + adrenaline 1:200.000) through the catheter at time of placement or prior to discharge to ward
- Setup the regional anaesthesia pump with appropriate local anaesthetic bag and initiate infusion.
- Prescribe Local Anaesthetic in medicine KARDEX under “Regular Injectable Medicine” using PNB grey sticker (for PNB sticker see end of guideline)
- Fill in “Peripheral Nerve Block Infusion Documentation Chart”
- Label the PNB tubing with grey “REGIONAL BLOCK” label.
- Administer top-up doses of local anaesthetic as required.

The Registered Staff Nurse will:

- Ensure patient has established and patent IV access.
- Monitor and document the patient’s vital signs (HR, BP, RR and Sp02) in NEWS chart and sedation level, pain score, sensory block, motor block, nausea score, insertion site, symptoms of LAST (local anaesthetic systemic toxicity), infusion rate and top up in in Peripheral Nerve Block Documentation Chart.
- Assess and immediately report signs and symptoms of LAST/allergic reaction/adverse effects (See documentation chart) to the Pain Team/Anaesthetist (Emergency Anaesthetist – out of hours – Bleep 1130).
- Change premixed medication infusion bags.
- Perform independent double checks for changing bags, mode and rate of infusion.

Duration of PNB Infusions

PNB infusions should be limited to less than 96 hours, except for extenuating circumstances on a case by case basis.

1. Electronic (CADD – Selvio) pumps can be safely refilled (same way as epidural pumps)
2. Elastomeric (I-flow) pumps cannot be refilled. If additional infusion is needed after a pump runs out, a 2nd pump will need to be utilized.

Breakthrough Pain

If patients complain of persistent pain > 2/3 despite continuous local anaesthetic infusion, consider managing the patient with oral multimodal therapy (see below) and evaluating the catheter by member of Acute Pain Team (APT) or Anaesthetist. Upon evaluation, several options for troubleshooting are available. The bolus through catheter may be given using either 5 -10 ml of 2% Lidocaine or 0.25% Levobupivacaine. If the patient experiences improvement in their pain relief, the APT member or Anaesthetist should increase the background infusion usually in 2-5 mL increments.

If no improvement is experienced, the catheter should be considered incorrectly positioned and be removed. In this case IV Morphine PCA can be prescribed (follow the guidance for IV PCA) or a new PNB catheter may be inserted by anaesthetist.

*** Sudden onset of acute pain in previously working PNB catheter might in certain cases be a sign of ACUTE COMPARTMENT SYNDROME (In this case urgently call T&O surgeon!) ***

Multimodal Therapy

While advanced regional anaesthesia techniques may significantly diminish acute pain, patients undergoing extensive surgery, particularly those who are opioid-tolerant, may require multimodal analgesia in addition to PNB infusion. Anaesthetist will consider and prescribe the following analgesics as appropriate*:*

- PARACETAMOL 1g IV/PO QID
- *Short –acting Opioids*: Most patients will be given short-acting oral opioids, most commonly OXYNORM 5-10mg 2-4 hourly PO.
- NSAIDS: After discussing with the surgeon, adding NSAID of your choice (eg IBUPROFEN 200 – 400mg PO TID) will diminish the opiate requirement. Avoid traditional NSAIDS in patients with a history of gastritis, renal dysfunction, and/or bleeding diathesis. PARECOXIB 40mg IV BD, a COX-2 inhibitor, offers some advantages including less risk of gastritis, no platelet inhibition, and reduced central sensitization.
- *Long-acting Opioids*: Challenging acute pain patients may require a short course of long-acting agents, such as modified release OXYCODONE 10-20 mg BD PO. Initiate therapy with the lowest possible dose with the intent to discontinue therapy after the catheter is discontinued.
- *Other*: Co-administration of anticonvulsants (e.g. GABAPENTIN 300-600 mg PO TID) can be effective in reducing opioid requirements, particularly in opioid-tolerant patients in the acute pain setting.

Catheters and anticoagulation

Deep peripheral nerve catheters (e.g. lumbar plexus or paravertebral catheters) should not be placed or removed during periods of significant anticoagulation. Do not place or remove deep catheters within 12 hours of the last prophylactic LMWH dose. For more information see AAGBI guideline (Regional Anaesthesia and Patient with Abnormalities of Coagulation – November 2013).

	Care of the Blocked Limb
General rules	• Move blocked limb cautiously but as often as possible to avoid prolonged pressure on the blocked limb • Provide skin care and maintain limb alignment • Avoid contact of the blocked limb with hot or cold objects
Upper Limb	• Keep limb in sling

	• Protect elbow with a pillow placed under the arm (prevent ulnar nerve injury)
Lower Limb	• Keep limb padded and on a pillow (prevent injury to peroneal nerve) • Assess quad function prior to mobilizing (when femoral block is used) • Ensure 2 persons assist to transfer • Ensure patient avoids walking independently on blocked leg

Care of the Peripheral Nerve Block (PNB) injection/insertion site.

- Observe site for redness, excessive bruising, swelling and infection (i.e. pain, warmth, discharge).
- Check dressing over insertion site 4 hourly and with each top-up injection.
- Do not routinely replace the primary dressing.
- Observe for a wet dressing indicating leakage of blood or medication. If dressing saturated, reinforce tape around dressing or replace dressing using aseptic technique. If concerned, notify acute pain team or anaesthetist.
- Ensure catheter is always securely taped.
- Be cautious when moving or turning the patient so the catheter is not dislodged.
- Check catheter tubing and pump connection for disconnection or kinking.
- If the catheter becomes disconnected, call the acute pain team/anaesthetist immediately.
- Patient <u>should not</u> bathe or shower while catheter in situ.

Removing Peripheral Nerve Block (PNB) Catheters.

Supplies:

- Clean gloves
- 2 x 2 gauze
- Sterile semi-permeable dressing (e.g. 4-sided Elastoplast, Opsite … etc).
- If tip / site is to be cultured: Dressing tray, sterile scissors, sterile specimen container, microbiology swab, requisition and labels

Procedure:

- Perform hand hygiene.
- Position patient so that catheter site is easily accessible.
- Turn off infusion pump.
- Place sterile field to receive catheter if tip culture is ordered.
- Use sterile gloves.
- Remove dressing and tape (if any). *(Note: Catheter may come out with dressing)*
- Gently withdraw catheter steadily and place on sterile field if tip is to be sent for C&S

Note: If unable to remove the catheter or there is any resistance upon removing catheter, stop and notify anaesthetist immediately.

- Assess the catheter site for unusual bleeding, bruising, swelling, or redness.

Note: If evidence of infection, obtain swab for C & S from the site and notify surgical team.

- After catheter removal clean site with appropriate antiseptic solution (eg. Chlorhexidine 2%, Betadine …) and apply an occlusive dressing.

Note: Check catheter tip to ensure it is intact. If not intact notify the anaesthetist immediately.

If the PNB catheter is suspected as a source of infection:

- Use sterile scissors to remove 5 cm from the distal end of catheter and place in sterile container and label specimen container at bedside.
- Recheck site one hour following catheter removal for any persistent fluid leakage, localized bleeding, expansion of bruising or hematoma. If present notify the anaesthetist immediately.
- Remove sterile semi-permeable dressing (e.g. 4-sided Elastoplast) in 24 hours.

Document:

- Date and time of removal
- Condition of insertion site
- Condition of catheter tip
- If any bleeding, fluid drainage, hematoma at catheter site present
- Whether tip / site was cultured
- Patient response to procedure
- Complications and intervention

Report to the anaesthetist if:

- There is alteration to sensation or movement during or following removal.
- If persistent fluid leakage, localized bleeding or expansion of bruising or hematoma is noted.
- If sensory block is not resolved within 24 hours after catheter removal.

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 .....

IMMEDIATELY

Give an initial intravenous bolus injection of 20% lipid emulsion
1.5 ml.kg^{-1} over 1 min

AND

Start an intravenous infusion of 20% lipid emulsion at **15 ml.kg^{-1}.h^{-1}**

AFTER 5 MIN

Give a **maximum of two** repeat boluses (same dose) if:

- cardiovascular stability has not been restored **or**
- an adequate circulation deteriorates

Leave **5 min** between boluses

A maximum of **three** boluses can be given (including the initial bolus)

AND

Continue infusion at same rate, but:

Double the rate to **30 ml.kg^{-1}.h^{-1}** at any time after 5 min, if:

- cardiovascular stability has not been restored or
- an adequate circulation deteriorates

Continue infusion until stable and adequate circulation restored or maximum dose of lipid emulsion given

Do not exceed a maximum cumulative dose of 12 ml.kg^{-1}

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

IMMEDIATELY

Give an initial intravenous bolus injection of 20% lipid emulsion
100 ml over 1 min

AND

Start an intravenous infusion of 20% lipid emulsion at 1000 ml.h^{-1}

AFTER 5 MIN

Give a **maximum of two** repeat boluses of 100 ml

AND

Continue infusion at same rate but **double** rate to 2000 ml.h^{-1} if indicated at any time

Do not exceed a maximum cumulative dose of 840 ml

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).

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