Updated: Management of obstetric accidental dural puncture and post-dural puncture headache

Classification:	Guideline
Authors Name:	(1) Dr Vinod Gagrani , (2) Dr Preeti Dewan
Authors Job Title:	(1) Speciality Doctor, (2) Consultant Anaesthetist
Authors Division:	Surgical
Departments/Group this Document applies to:	Anaesthetics Midwives

Approval Group: Anaesthetics CIG Maternity Guideline Review Group	**Date of Approval:**	Sep 2023
	Last Review:	Apr 2023
	Review Date:	Apr 2026

Unique Identifier: MIDW/GL/46	**Status:** Approved	**Version No:** 7

Guideline to be followed by (target staff): Anaesthetists, midwives, obstetricians

To be read in conjunction with the following documents: N/A

Are there any eCARE implications? Yes

CQC Fundamental standards:
Regulation 9 – person centred care
Regulation 10 – dignity and respect
Regulation 11 – Need for consent
Regulation 12 – Safe care and treatment
Regulation 13 – Safeguarding service users from abuse and improper treatment
Regulation 17 – Good governance

Disclaimer –

Since every patient's history is different, and even the most exhaustive sources of information cannot cover every possible eventuality, you should be aware that all information is provided in this document on the basis that the healthcare professionals responsible for patient care will retain full and sole responsibility for decisions relating to patient care; the document is intended to supplement, not substitute for, the expertise and judgment of physicians, pharmacists or other healthcare professionals and should not be taken as an indication of suitability of a particular treatment for a particular individual. The ultimate responsibility for the use of the guideline, dosage of drugs and correct following of instructions as well as the interpretation of the published material **lies solely with you** as the medical practitioner.

Index

Guideline Statement

The International Headache Society (IHS) now defines post-dural puncture headache (PDPH) as, "Headache occurring within 5 days of a lumbar puncture, caused by cerebrospinal fluid (CSF) leakage through the dural puncture. It is usually accompanied by neck stiffness and/or subjective hearing symptoms. It remits spontaneously within 2 weeks, or after sealing of the leak with autologous epidural lumbar patch." Although no longer included in the IHS description, the headache is typically positional and may follow spinal anaesthesia or dural puncture with an epidural needle. Up to 5% of patients may present with an atypical headache that has no postural element.

Accidental dural puncture (ADP), occurs in about 1% of women who receive epidural anaesthesia. Over 50% of women will experience a post-dural puncture headache (PDPH) following dural puncture with a 16-18 gauge epidural needle. (Choi & Lucas, 2005, as cited in Obstetric Anaesthetists' Association, 2018, p.8)

Women who undergo spinal anaesthesia may also develop a PDPH (incidence varies depending on needle type and size).

This guideline aims to give guidance on the immediate and subsequent management of an ADP and the recognition of a PDPH. It has been developed from guidance *Treatment of obstetric post-dural puncture headache* produced by the Obstetric Anaesthetists' Association (Obstetric Anaesthetists' Association, 2018) and adapted for use at MKUH.

Executive Summary

All women who experience ADP with an epidural needle or PDPH after spinal anaesthesia should be reviewed daily by a member of the anaesthetic team. All follow-ups should be documented clearly on eCare. When a woman experiences PDPH, follow-ups should continue until the headache resolves.

Any case of suspected obstetric PDPH should be referred for anaesthetic assessment and reviewed by the anaesthetic team within 24 hours. A medical history should be taken, and a physical examination performed to exclude other potential causes of postnatal headache.
Before hospital discharge, women who have experienced ADP or PDPH should be given information on symptoms that require further medical assessment and who to contact if they develop these symptoms.
Appropriate follow-up after discharge from hospital should be arranged for any woman who experiences ADP or PDPH.

Definitions

ADAU – Antenatal Day Assessment Unit
ADP – Accidental dural puncture
CSF – Cerebro spinal fluid
CVST - Cerebral Venous Sinus Thrombosis
EBP -Epidural Blood Patch
GP – General Practitioner
PDPH – post-dural puncture headache

1.0 Roles and Responsibilities:

1.1 Anaesthetists

- To explain the risk of ADP and PDPH to women requesting an epidural for labour and receiving spinal anaesthesia. To review any women referred with a suspected PDPH within 24 hours of referral.
- To recognize and immediately manage the ADP (see section 3.2).
- To document the ADP or PDPH on
    - o
    - o on eCARE / Powerchart,
        - Obstetric Anaesthetic Procedure Form,
        - Add the patient to Obstetric Anaesthetic Follow up list,
        - Add sticky note on patient list mentioning the procedure /date / time
        - add patients name to whiteboard mentioning all the above

      to communicate with the midwife to ensure they are aware of it.
- To initiate a '**dural puncture pathway'**(see section 3.3) for any confirmed or suspected ADP or PDPH.
- To inform the woman about the ADP and to explain PDPH. To provide her with written information regarding the management of a PDPH.
- If appropriate, to carry out an epidural blood patch procedure.
- To follow up the woman with ADP or PDPH daily until the headache resolves or the woman no longer wishes daily contact.
- To arrange a follow up in the obstetric anaesthetic clinic, approximately 1-2 months after the ADP or PDPH.

1.2 Midwives

- To monitor the block hourly in patients with an epidural.
- To include the ADP or PDPH in any SBAR handover.
- If a woman complains of a persistent headache and they have received either an epidural or spinal anaesthesia within the last two weeks, contact the on call obstetric anaesthetist (bleep 1876) to arrange a review. If this happens after hospital discharge, the woman will need to attend ADAU for review.
- To check the woman's blood pressure, pulse, respiratory rate, temperature and conscious level prior to anaesthetic review.

1.3 Obstetricians

- To include the ADP or PDPH in the hospital discharge summary to the GP.

2.0 Implementation and dissemination of document

Staff can access the policy via the Hospital intranet in the 'Maternity' section of 'Trust documentation.'
Anaesthetic trainees are informed about relevant guidelines on induction.

3.0 Processes and procedures

3.1 Introduction

After an ADP, there is at least a 50% chance of a PDPH developing. The PDPH usually develops within 24 hours of the ADP but can occur up to 5 days afterwards. The headache may also occur immediately after the ADP, especially if air is accidentally injected into the CSF using a loss of resistance to air technique before the dural tap is actually recognised.

3.2 Recognition

Free flow of CSF from the Tuohy needle hub. If in doubt whether the fluid is CSF or saline the temperature of the fluid can be assessed on the back of the anaesthetist's gloved hands. Alternatively, this can be tested for glucose and protein by using a urine reagent stick or litmus paper (CSF slightly alkaline). Note: Due to potential dilution and false negative results, sample for test should be collected after aspirating and discarding 2mls from the catheter.

	Normal saline	CSF
Temperature	Cold	Warm
Sugar	5-7.5	7.5-8.5
Protein	Nil	+ or trace
pH	Nil	+/++

It may be detected after epidural insertion when free flow of CSF down the catheter is noted.
It can also be detected if immediate intense pain relief is noted along with dense motor block, symptomatic hypotension with risk of proceeding towards breathlessness, unconsciousness, and other signs of local anaesthetic toxicity when the **10** mls test dose from the premix bag is given.

3.2 Immediate management

If accidental puncture occurs with the epidural needle and obvious CSF flows out, a single attempt may be made to thread the epidural catheter through the dura into the subarachnoid space, leaving 2–3cm of catheter in the space. Ensure patient is in flexed position while introducing and securing catheter to prevent displacement of the catheter on resuming relaxed position. If any difficulty in passing the catheter or if neurological symptoms such as pain or paresthesia is reported, stop, and withdraw the catheter along with the needle.

Several studies have shown that the incidence and severity of post dural puncture headache may be reduced if an intrathecal catheter is used.
Other studies mention that although intrathecal catheters may not reduce incidence of PDPH but the need for Epidural blood patch is reduced. Still other studies attribute the benefit to reduced risk of repeat dural puncture. Also there are studies which mention no difference in the incidence of PDPH either placement of an intrathecal catheter or replacement of an epidural catheter. Hence both the procedures are safe to adopt depending on circumstances

<u>If a Spinal catheter is sited</u>
-The spinal catheter should be clearly labelled as such with specific stickers provided. All top-ups must be given cautiously by an anaesthetist.

-A suggested dose would be 1-2mls increments of 0.25%bupivacaine under strict sterile precautions available on labour ward.

Alternatively, if the preferred option is to re-site the epidural in an adjacent space.
-Consider getting more experienced help if appropriate.
-If the initial 'test-dose' with 10ml of the 0.1% levobupivicaine+2mcg/ml fentanyl from the premix bag does not result in spinal anaesthesia, the epidural infusion pump may be used,
-discuss with the consultant on call if unsure.

N.B. There is substantially increased incidence of unexpectedly high blocks with epidurals following dural puncture. Therefore, the spread of the block must be closely monitored.

The epidural should be well topped up until the head is on the perineum. When it is visible women should be allowed to push to try and achieve a normal birth, if possible.

Inform:
The patient
The midwife looking after the woman and the midwife in charge
The obstetrician
Incoming on call obstetric anaesthetist
Consultant obstetric anaesthetist must be informed as early as possible.

3.3 Delivery in Theatre:

Isobaric bupivacaine injected through a multi-orifice catheter may well produce a very different block to the hyperbaric solution injected via the pencil point needle.

If any issues with pain relief during labour with the intrathecal catheter, then remove the catheter and perform a single shot spinal as you would normally.

If an intrathecal catheter has been used for labour and Caesarean section becomes necessary, discuss management with on-call Consultant anaesthetist. A 'category one' caesarean may require general anaesthesia since the epidural/spinal catheter will require cautious top-ups.

If the intrathecal catheter has been working well then intrathecal top up via the catheter may be preferable.

Intrathecal top-ups should always be done in theatre with full monitoring and ODP present. There is always a possibility of a high block.

Consider the dead space in the filter and the epidural catheter (1ml). Top-up with 0.5% isobaric bupivacaine. The 1 st dose should be 2mls (this gives a dose of 5mg intrathecal, the other 5mg remaining in the epidural filter and catheter).

Assess block after top-up and further increments of 0.5ml 0.5% isobaric bupivacaine (2.5mg) should be given until an appropriate height of block achieved.

Do NOT flush the catheter. Diamorphine (250 micrograms) should be given for post-operative pain relief. This should be done by first aspirating 2mls from the epidural catheter (to ensure all the

bupivacaine is removed) and then injecting the diamorphine followed by 2mls 0.9% sodium chloride.

If the catheter cannot be aspirated freely do NOT flush as this can result in a very high and rapid block.

After delivery, the catheter should be removed as normal. Do not infuse saline through the catheter.

If PDPH develops during labour:

Headache usually develops 12 to 24 hours postpartum. Headache immediately following a dural tap may also occur especially if air is accidentally injected into the CSF using a loss of resistance technique. If a headache is present, then assisted delivery can be advised to the obstetric team.

3.3 Dural Puncture Pathway

All women with a suspected ADP or PDPH should be reviewed daily whilst in hospital, and followup at home should continue daily via telephone, after discussion with the woman, until the headache has resolved. All follow-up visits and phone calls should be clearly documented on eCARE.
Do not forget to record the patient's telephone number for later follow ups. The details should also be written on the whiteboard in the obstetric anaesthetic office.
Provide patients with information about PDPH and the options for management, using the Obstetric Anaesthetists' Association '*Headache after an epidural or spinal injection? What you need to know*'
http://www.labourpains.com/assets/_managed/cms/files/Headache_after_epidural.pdf

Email

- anaesthetic secretary
- obstetric anaesthesia leads

3.4 Post dural puncture headache (PDPH)

The International Headache Society (IHS) now defines PDPH as, "Headache occurring within 5 days of a lumbar puncture, caused by cerebrospinal fluid (CSF) leakage through the dural puncture. It is usually accompanied by neck stiffness and/or subjective hearing symptoms. It remits spontaneously within 2 weeks, or after sealing of the leak with autologous epidural lumbar patch." (International Headache Society, 2018, 7.2.1)

Classic features of the headache caused by dural puncture are listed below but presentation is often variable.

- Headache is often frontal-occipital.
- Most headaches do not develop immediately after dural puncture but usually 24-48 hours after the procedure with 90% of headaches presenting within 3 days.
- The headache is usually postural; it is worse in the upright position and eases when supine. (However, 5% of women may not have a postural element.)
- Associated symptoms that may be present include:
  - neck stiffness
  - photophobia

- tinnitus
- visual disturbance
- cranial nerve palsies.

Gutsche's test

Abdominal compression with the palm of the hand positioned under the right costal margin, while the mother is sitting, may relieve the headache during the subsequent couple of minutes (Gutsche's test).
The pressure on the liver pushes blood into the epidural venous plexus and temporarily increases epidural space pressure, pushing CSF cephalad.
To demonstrate this sign, you must apply very firm pressure, using counter-pressure with your hand behind the patient. Warn the mother carefully, especially if she has had a caesarean section, but do not tell her in advance what you expect to happen.
A positive test, with instant relief of headache lasting while compression is maintained, will both confirm the diagnosis and indicate whether EBP (epidural blood patch) is likely to be effective. Other causes of headache are unlikely to be affected.

3.4.1 Conservative Management

Aims to relieve symptoms while waiting for the dural tear to heal by itself. This may be enough for mild cases of PDPH. The management includes:

1. **Bed rest**
   Although most women gain some relief from PDPH when supine, the effect may be transient. Prolonged bed rest is not recommended as it may increase the risk of thromboembolic complications.
2. **Oral fluids**
   Normal hydration should be maintained but there is no evidence of benefit from excessive fluid administration in the treatment of PDPH.
   In the treatment of PDPH, intravenous fluids need only be used to prevent dehydration when adequate fluid cannot be taken orally.
3. **Abdominal binders**
   There is currently insufficient evidence to recommend the use of abdominal binders in the treatment of obstetric PDPH. (Obstetric Anaesthetists' Association, 2018, p.2)

3.4.2 Pharmacological Management

1. **Simple oral analgesia**
   Regular oral analgesia should be offered to women with postnatal headache.
2. **Opioid analgesia**
   Opioid analgesia may be offered to women with obstetric PDPH if simple oral analgesia is ineffective but long-term therapy (>72 hours) is not recommended.
3. **Caffeine**
   The proposed mechanism of action of caffeine in PDPH is by cerebral vasoconstriction and increased CSF production.
   There is limited evidence to support the use of caffeine in the treatment of obstetric PDPH. (Obstetric Anaesthetists' Association, 2018, p.3) If used, treatment with caffeine should not exceed 24 h, oral therapy is preferred, and doses should not exceed 300 mg with a maximum of 900 mg in 24 h. A lower maximum dose of 200 mg in 24 h should be

considered for women who are breastfeeding particularly those with low birth weight or premature infants. Women receiving caffeine therapy should have their intake of caffeinated drinks monitored and the recommended daily dose should not be exceeded. Commercially available coffees and high-energy drinks typically contain 100-200 mg of caffeine.
The average caffeine content of these drinks are as follows:
A 200 ml cup of brewed coffee : 160mg
A 200ml cup of instant coffee: 120mg
A shot of espresso: 100mg
A cup of tea: 40mg A can of red bull: 80mg
A can of coke: 35mg

4. Other drugs

There is currently insufficient evidence to recommend the use of aminophylline, ACTH, steroids, triptans, gabapentioids, desmopressin, methylergonovine, ondansetron, mannitol or neostigmine and atropine in the treatment of obstetric PDPH. (Obstetric Anaesthetists' Association, 2018, p.3-4)

3.4.3 Invasive procedures other than epidural blood patch

1. Acupuncture
2. Greater occipital nerve block
3. Sphenopalatine ganglion blocks
4. Epidural morphine
5. Epidural crystalloids, dextran, hydroyethyl starch or gelatin
6. Epidural fibrin glue

There is currently insufficient evidence to recommend any of these procedures in the treatment of obstetric PDPH. (Obstetric Anaesthetists' Association, 2018, p.3)

3.4.4 Epidural blood patch (EBP)

3.4.4.1 Indication

The intensity of maternal symptoms may dictate the need for an EBP. When PDPH is less severe, which may reflect a smaller dural tear with less CSF leak, conservative therapy may be preferred in the hope that headache resolves without the need for an EBP. If headache is more significant, leading to difficulty with performing activities of daily life and caring for the baby, an EBP is usually considered.

An EBP should not be performed where there is a contraindication to a neuraxial block. Contraindications include maternal systemic infection and coagulopathy. In particular, as postnatal thromboprophylaxis is common, adequate time must elapse after the last dose of anticoagulant and performance of an EBP.

3.4.4.2 Efficacy

Multiple factors are likely to affect the success of an EBP. Although success rates of over 90% have been reported in older observational studies, more recent evidence suggests that complete and permanent relief of symptoms following a single EBP is only likely to occur in up to one third of cases where headache follows dural puncture with an epidural needle. In cases of partial or no relief, a second EBP may be performed after consideration of other causes of headache.

3.4.4.3 Timing

Women should be informed that performing an EBP within 48 h of dural puncture is associated with a reduction in its efficacy and a greater requirement for a repeat EBP. However, in severe obstetric PDPH, an EBP within 48 h of dural puncture may be considered for symptom control although it may need to be repeated.

3.4.4.4 Investigations

If the diagnosis of obstetric PDPH is strongly suspected, there is no evidence that imaging is needed before performing an EBP. If the headache changes in nature, neurological signs develop, conscious level reduces, headache is atypical in nature, or when two EBPs have been unsuccessful, urgent consideration should be given to further investigation and imaging.

3.4.4.5 Pre-procedure preparation

Usual preparation would include
History

- Duration of headache
- H/o – Anticoagulant use (if yes – Last dose)
- H/o Fever
- H/o – New onset Neuro deficits if any (Prompts Neurology advice / investigations
- H/o Pre-existing neurodeficits (For Documentation

Examination

- Gutsche's test – confirmation / Prognostication
- Local examination (spine) – For infections (C/I to procedure)

Bloods
WBC count /CRP if evidence of infection in above

Consent

- Provision of information (information leaflet / Verbal) regarding the procedure and its conduct
- Obtaining verbal consent

Before Booking

- The patient must be apyrexial (<37.5 Celsius). , / no new neurodeficits
- A clinically appropriate time should elapse before an EBP is performed in a woman receiving anticoagulants
- A consent form should be signed by the anaesthetist and the woman.
- The procedure needs to be booked as an emergency procedure in phase 1. (needs two consultants assigned)
- Booking done using EMER lumbar puncture

3.4.4.6 Risks of epidural blood patch

Inadvertent dural puncture

This is a risk during an EBP and so this possibility should form part of the consent process.

Back pain

During an EBP, back pain may occur in 50% of women. Twenty-four hours after an EBP, over 80% of women may experience back pain. This may continue for several days but

severity usually decreases over a few days with resolution for most by four weeks. There is no evidence to support increased rates of chronic back pain after an EBP. (Obstetric Anaesthetists' Association, 2018, p.5) As back pain both during and after an EBP is common, and in some cases severe, it should be discussed as part of the consent process.

Neurological complications Arachnoiditis

Injection of blood adjacent to nerve tissue is considered to be a risk factor for developing arachnoiditis, yet despite injecting relatively large volumes of blood during an EBP, reports of arachnoiditis are rare. It is unclear whether reports of severe back pain following an EBP represent cases of arachnoiditis.

Spinal Haematoma

Space occupying lesions in the spinal canal have the potential to produce both ischaemic and inflammatory damage to nerve tissue. A number of obstetric cases of spinal-subdural haematoma and intrathecal haematoma associated with the performance of an EBP have been reported and non-obstetric cases have been described.

Other neurological complications

A variety of other neurological complications have been reported after an EBP. It is unclear whether these were the direct result of the EBP, the dural puncture and CSF loss, or unrelated.
None are common and the issue of reporting bias must be considered (Obstetric Anaesthetists' Association, 2018, p.26):

- Seizures
- Cerebral venous sinus thrombosis
- Intracerebral haemorrhage
- Facial nerve palsy
- Infection, either localised to the lower back or meningitis
- Visual disturbance
- Incontinence
- Neck and shoulder pain
- Chronic back pain from calcification of injected blood
- Monoplegia
- Cerebral ischaemia
- Horner's syndrome

3.4.4.7 Risks of not performing an epidural blood patch

There may be disadvantages to a continued CSF leak which is not treated with an EBP. A number of possible complications have been reported. These may be discussed during the consent for the procedure.

- Chronic headache
- Chronic back pain
- Cranial-Subdural Haematoma

A rare complication of dural puncture. Caudad shift of the brain resulting from CSF leak may lead to rupture of fragile subdural bridging veins and bleeding into the subdural space.

- **Cerebral Venous Sinus Thrombosis (CVST) • Cranial Nerve Palsy**
  The most common palsies affected cranial nerves VI and VII.
- **Seizures**
  There is currently insufficient evidence to suggest that an EBP reduces the risk of chronic headache, chronic back pain, cranial subdural haematoma, CVST or improves outcome in those with cranial nerve palsy in women with obstetric PDPH. (Obstetric Anaesthetists' Association, 2018, p.28)

3.4.4.8 Performing the EBP procedure

The procedure should be performed by two anaesthetists, one of whom should be a Consultant or senior registrar/Specialty Doctor.

Level
The major effect of an EBP appears to be within a few segments of the site of injection. Blood injected during an EBP spreads predominantly cranially. It is therefore recommended that an EBP is performed at the same level or one space lower than that at which the original dural puncture occurred.

Ultrasound
There is currently insufficient evidence to recommend the routine use of ultrasound or radiological guidance when performing an EBP. (Obstetric Anaesthetists' Association, 2018, p.29)

Volume
A volume of blood of 20 mL is recommended when performing an EBP. Injection should stop before 20 mL is injected if not tolerated by the patient.

Blood cultures
There is currently insufficient evidence to recommend that blood cultures should be sent routinely when performing an EBP. There is insufficient evidence to recommend the administration of antibiotics when performing an EBP. (Obstetric Anaesthetists' Association, 2018, p.31) An EBP should not be performed in the presence of maternal systemic infection.

3.4.4.9 Post-procedure management

There is currently insufficient evidence to recommend for how long women should remain in bed following an EBP or in what precise position. (Obstetric Anaesthetists' Association, 2018, p.31) It is recommended that regular observations of maternal pulse, blood pressure and temperature are recorded following an EBP.
The EBP should be documented on eCARE using the obstetric anaesthesia procedure form
Patient to be added to Neuraxial procedure follow up list with a sticky note mentioning "Epidural blood patch" and its date and time

3.4.4.10 Indications for repeating an epidural blood patch

A second EBP may be performed once other causes of headache have been excluded. Where the diagnosis of obstetric PDPH is likely and an EBP has produced resolution of symptoms but headache subsequently returns, a second EBP may be offered as it is likely to be of benefit. If an EBP has produced some improvement in symptoms but the headache persists, a second EBP can

be considered as it may be of benefit. In cases where an EBP has no effect on headache, or if the diagnosis of obstetric PDPH is less certain, or the nature of headache has changed, discussion with other specialties including obstetrics, neurology and neuroradiology should take place before a second EBP is performed. If two EBPs have failed to relieve symptoms, other causes of headache must be considered and involvement of other specialties is recommended before performing a third EBP. There is insufficient evidence to state the optimum timing of a repeat EBP in terms of efficacy and safety. (Obstetric Anaesthetists' Association, 2018, p.32)

3.4.4.11 The effect of an epidural blood patch on subsequent neuraxial techniques

Evidence of an effect of an EBP on the success of subsequent neuraxial blockade is equivocal. All studies that have assessed the effect have methodological flaws. Current evidence is insufficient to comment on whether an EBP affects outcome of subsequent neuraxial blockade. (Obstetric Anaesthetists' Association, 2018, p.33)

3.4.5 Follow-up of women with PDPH

See 'Roles and Responsibilities, section 1.0'.
In keeping with the principles of Duty of Candour, when dural puncture occurs during epidural catheter insertion or PDPH develops, women should be provided with a full account of events and an apology for any distress caused by anaesthetic interventions. In addition, women should receive an explanation of mechanism of PDPH and treatment options. Any questions about aspects of PDPH and its management should be answered.

Women who receive an EBP should be reviewed by an anaesthetist within 4 h of the procedure.
Women who are discharged home on the day of an EBP should be contacted the following day.
Women who remain in hospital should be reviewed daily until discharge or until symptoms resolve.
Before discharge, women should be given verbal and written advice on when to contact the hospital should their headache return or other symptoms develop.
All follow-up visits and telephone contacts should be documented on eCARE.
Information on obstetric PDPH and EBP should also be given to the woman's general practitioner and community midwife.
Women with an ADP and/or PDPH should be offered an appointment in the anaesthetic clinic, approximately 1-2 months after the PDPH.

3.5 Differential Diagnosis of PDPH

Exacerbation of symptoms with the upright position does not occur with other forms of postpartum headache except pneumoencephalus. Other conditions that may cause postpartum headache are:

1. Non-specific postnatal headache.
2. Migraine (history of migraine,unilateral pulsatile headache, associated with vasomotor signs).
3. Pre-eclampsia (recent labour complicated with condition up to 10 days postpartum).
4. Septic and aseptic meningitis (increasing headache,nausea, vomiting &neck stiffness).
5. Intracranial haemorrhage/mass lesion (signs of intracranial hypertension).
6. Cerebral vein thrombosis (a headache of increasing intensity,convulsions,Intracranial hypertension, deteriorating consciousness and fever. MRI and MRA are diagnostic).
7. Postnatal depression headache.

8. Pneumoencephalus (sudden headache, due to injection of air in the subdural or subarachnoid space, associated with epidural using loss of resistance to air technique. Headache is worse in sitting position and relieved by lying down. It disappears after few hours).

3.6 Special consideration of Jehovah's Witnesses

Jehovah's Witnesses pose special ethical, legal, and moral dilemmas in anesthesiology because of their refusal to accept transfusions of blood or blood products even in cir-cumstances in which their lives may be at risk. Many Witnesses refuse transfusion of their own blood if it loses physical continuity with their circulation.

There are few case reports describing the conduct of Epidural blood patch in such patients using a connection that connects between Leur lock socket of Epidural needle to Leur lock socket of a three way. All the reports describe the procedure using Leur lock connections. However there is no report describing the same using NRFit Connections.

We recognise that conduct of such a procedure will require either one of the below

1. A connecting line between Leur lock Threeway socket to NRFit Epidural needle socket
2. A connecting line between NRfit Threeway socket to NRFit Epidural needle socket

Our market research currently shows unavailability of above connections, as such following options may be offered.

1. Explaination of the procedure
2. Mention specifically that we cannot maintain strict continuity of the blood with the body during the procedure and seek consent that it is acceptable to them
3. If consent provided –
    a. Document consent on Ecare
    b. Conduct the Epidural blood patch in a routine way described above
4. If patient declines –
    a. Document declination on Ecare
    b. Offer the conservative measures available as described above

4.0 Statement of evidence/references

Bamber, J.H., Lucas, D.N., Plaat, F. et al. (2019) The identification of key indicators to drive quality improvement in obstetric anaesthesia: results of the Obstetric Anaesthetists' Association/National Perinatal Epidemiology Unit collaborative Delphi project. [Online]. *Anaesthesia*. doi:10.1111/anae.14861. Available from: https://onlinelibrary.wiley.com/doi/10.1111/anae.14861 [Accessed 8 January 2020]

Chapter 9: Guidelines for the provision of anaesthesia services for an obstetric population 2019. In: Royal College of Anaesthetists (2019) *Guidelines for the provision of anaesthetic services*. [Online]. Available from: https://www.rcoa.ac.uk/gpas/chapter-9 [Accessed 6 January 2020]

Choi, P.T-L. and Lucas, S. Postdural puncture headache. In: Halpern, S.H. and Douglas, M.J. (eds.) (2005) *Evidence-based obstetric anesthesia.* Oxford: Blackwell Publishing; 192-207. (Cited in Obstetric Anaesthetists' Association, 2018, p.8)

International Headache Society (2018) *International classification of headache disorders (ICHD-3).* [Online]. 3rd ed. Available from: https://ichd-3.org/ [Accessed 6 January 2020]

Obstetric Anaesthetists' Association (2016) *Headache after an epidural or spinal injection? What you need to know*. [Online]. Available from: https://www.labourpains.com/assets/_managed/cms/files/Headache_after_epidural.pdf [Accessed 6 January 2020]

Obstetric Anaesthetists' Association (2018) *Treatment of obstetric post-dural puncture headache*. [Online]. Available from: https://www.oaaanaes.ac.uk/assets/_managed/cms/files/Guidelines/New%20PDPH%20Guidelines.p df [Accessed 6 January 2020]

Russell, R., Laxton, C., Lucas, D.N. et al. (2019) Treatment of obstetric post-dural puncture headache. Part 1: Conservative and pharmacological management. [Online]. *Int J Obstet Anesth*. May;38:93-103. doi: 10.1016/j.ijoa.2018.12.006. Epub 2018 Dec 21. Available from: https://www.clinicalkey.com/#!/content/journal/1-s2.0-S0959289X18303844 [Accessed 8 January 2020]

Heesen M, Klöhr S, Rossaint R, Walters M, Straube S, van de Velde M. Insertion of an intrathecal catheter following accidental dural puncture: a meta-analysis. Int J Obstet Anesth. 2013 Jan;22(1):26-30. doi: 10.1016/j.ijoa.2012.10.004. Epub 2012 Dec 5. PMID: 23219220.

Verstraete S, Walters MA, Devroe S, Roofthooft E, Van de Velde M. Lower incidence of post-dural puncture headache with spinal catheterization after accidental dural puncture in obstetric patients. Acta Anaesthesiol Scand. 2014 Nov;58(10):1233-9. doi: 10.1111/aas.12394. PMID: 25307708.

Kaddoum R, Motlani F, Kaddoum RN, Srirajakalidindi A, Gupta D, Soskin V. Accidental dural puncture, postdural puncture headache, intrathecal catheters, and epidural blood patch: revisiting the old nemesis. J Anesth. 2014 Aug;28(4):628-30. doi: 10.1007/s00540-013-1761-y. Epub 2013 Dec 18. PMID: 24347033.

Jagannathan DK, Arriaga AF, Elterman KG, Kodali BS, Robinson JN, Tsen LC, Palanisamy A. Effect of neuraxial technique after inadvertent dural puncture on obstetric outcomes and anesthetic complications. Int J Obstet Anesth. 2016 Feb;25:23-9. doi: 10.1016/j.ijoa.2015.09.002. Epub 2015 Sep 18. PMID: 26597407.

Russell, R., Laxton, C., Lucas, D.N. et al. (2019) Treatment of obstetric post-dural puncture headache. Part 2: Epidural blood patch. [Online]. *Int J Obstet Anesth*. May;38:104-118. doi: 10.1016/j.ijoa.2018.12.005. Epub 2018 Dec 22. Available from: https://www.clinicalkey.com/#!/content/journal/1-s2.0-S0959289X18303856 [Accessed 8 January 2020]

Olsen, Kevin R. MD; Screws, Ashley L. MD; Vose, Stephen O. MD. Blood Patch in a Jehovah's Witness: Case Report of a Novel Arterial-to-Epidural Closed-Circuit Technique. A & A Practice 10(8):p 201-203, April 15, 2018. | DOI: 10.1213/XAA.0000000000000661

Jagannathan N, Tetzlaff JE. Epidural blood patch in a Jehovah's Witness patient with post-dural puncture cephalgia. Can J Anaesth. 2005 Jan;52(1):113. doi: 10.1007/BF03018593. PMID: 15625269.

Silva Lde A, de Carli D, Cangiani LM, Gonçalves Filho JB, da Silva IF. Epidural blood patch in Jehovah's Witness: two cases report. Rev Bras Anestesiol. 2003 Sep;53(5):633-9. English, Portuguese. PMID: 19475317.

5.0 Governance

5.1 Document review history

Version number	Review date	Reviewed by	Changes made
7	September 2023	Dr Vinod Gagrani , Dr Preeti Dewan	3.6 Special consideration of Jehovah's Witnesses added Changes to documentation to align with launch of eCare 3.3 management in theatre
6.1	07/2020	E Tyagi/ N Lucas	Audit criteria amended
6	December 2019	Dr. E. Tyagi Consultant Anaesthetist	Reviewed - New PDPH guideline published by OAA

5.2 Consultation History

Stakeholders Name/Board	Area of Expertise	Date Sent	Date Received	Comments	Endorsed Yes/No
Anaesthetists	Anaesthetics	03/12/2019		None	
All staff in Maternity		16/12/2019		Comments from JC	Yes
Jayne Plant	Library	25/06/2019	10/01/2020	Comments received	Yes
Fran Mngola	Pharmacist	16/12/2019			
Julie Cooper	Head of Midwifery	16/12/2019	09/01/2020	Comments received	
Niamh Kelly	Clinical Governance	16/12/2019	10/01/2020	Comments received	
Guideline review meeting	Women's Health	06/09/2023	06/09/2023	Update approved	Yes

5.3 Audit and monitoring

Audit/Monitoring Criteria	Tool	Audit Lead	Frequency of Audit	Responsible Committee/Board
PDPH cases review using the audit topics and standards suggested by the OAA guideline	Notes/documentation	Lead for obstetric anaesthesia	Every 2 years	Information shared with obstetric anaesthetic team
percentage of women who had an epidural (or a combined spinal epidural) for labour analgesia who had an accidental dural puncture	eCARE audit record (being developed)	Lead for obstetric anaesthesia	Monthly, once audit tool developed	Information shared with obstetric anaesthetic team

5.4 Equality Impact Assessment

As part of its development, this Guideline and its impact on equality has been reviewed. The purpose of the assessment is to minimise and if possible remove any disproportionate impact on the grounds of race, gender, disability, age, sexual orientation, religion or belief, pregnancy and maternity, gender reassignment or marriage and civil partnership. No detriment was identified. Equality Impact assessments will show any future actions required to overcome any identified barriers or discriminatory practice.

Equality Impact Assessment			
Division	Women and Children's	Department	Maternity
Person completing the EqIA	Dr. Eleanor Tyagi	Contact No.	
Others involved:		Date of assessment:	
Existing policy/service	Yes	New policy/service	No
Will patients, carers, the public or staff be affected by the policy/service?	Yes		
If staff, how many/which groups will be affected?	Anaesthetists, midwives, women who have an accidental dural puncture and/or post-dural puncture headache		

Protected characteristic	Any impact?	Comments
Age	NO	Positive impact as the policy aims to recognise diversity, promote inclusion and fair treatment for patients and staff
Disability	NO	
Gender reassignment	NO	
Marriage and civil partnership	NO	
Pregnancy and maternity	YES	
Race	NO	
Religion or belief	NO	
Sex	NO	
Sexual orientation	NO	

What consultation method(s) have you carried out?			
Sent to anaesthetic colleagues to review, via email to staff in women's health and guideline review group meeting			
How are the changes/amendments to the policies/services communicated?			
Via email to obstetric anaesthetists			
What future actions need to be taken to overcome any barriers or discrimination?			
What?	Who will lead this?	Date of completion	Resources needed
Review date of EqIA			