The Trust Clinical Guideline for the Management of Maternal Postnatal Neurology Injuries

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For Use in:	Maternity Services
By:	Anaesthetists, Obstetricians and Midwives
For:	Women with postnatal neurological injuries
Division responsible for document:	Women & Children's Services
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This guideline has been approved by the Maternity Guidelines Committee as an aid to the diagnosis and management of relevant patients and clinical circumstances. Not every patient or situation fits neatly into a standard guideline scenario and the guideline must be interpreted and applied in practice in the light of prevailing clinical circumstances, the diagnostic and treatment options available and the professional judgement, knowledge and expertise of relevant clinicians. It is advised that the rationale for any departure from relevant guidance should be documented in the patient's case notes.

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Version and Document Control:

Version Number	Date of Update	Change Description	Author
2	05/03/2019	Updated February 2019 Two sections were introduced.	Dr Monica Morosan
2.1	04/04/2022	Reviewed, minor changes.	Dr Monica Morosan Dr David Wotherspoon

This is a Controlled Document

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Quick reference guideline/s

Section 1

Sinister signs / symptoms warranting urgent referral:

- Cauda equina.
- Lower limb numbness and weakness (persisting beyond the duration of local anaesthetic agent used).
- Radicular pain.
- Sudden onset of severe back pain.
- Headache and neck stiffness.
- Sphincter dysfunction (bowel, bladder).
- Neurological signs and symptoms that appeared after an initial recovery from the block.
- Signs and symptoms post intrathecal/epidural drug error.
- Signs and symptoms following a blood patch.
- Any in the presence of fever.

Special situations:

- Epidural haematoma.
- Epidural abscess.
- Conus trauma.
- Arachnoiditis.
- For Urgent referrals – who to contact: Consultant Obstetric Anaesthetist on-call (via switch) and Neurology Registrar on call (available until 10pm); after 10pm contact the Hospital@Night Medical Registrar on-call. Discuss the need for urgent imaging. Spinal surgeon (on-site orthopaedics) to be contacted in space occupying lesions or prolapsed disc.

Section 2 **List of conditions** (see below):

- Meralgia paresthetica: reassurance.
- Foot drop: investigations: MRI spine to rule out conus injection.
    - Referral to orthotics and obstetric physiotherapists (gait management) will be required.

- Follow-up in neurology outpatients clinic.

- Femoral palsy: reassurance and obstetric physiotherapy referral.
- Obturator palsy: reassurance and obstetric physiotherapy referral.

- Sciatic nerve palsy: Investigations: If disc prolapse suspected: MRI, if not then physiotherapy with follow up in neuro outpatients clinic (+/- EMG).
- Cauda equina: immediate MRI and immediate on-call neurology and spinal surgeon referral. Management directed by neurologist and spinal surgeons.
- Lumbosacral plexopathy: Physiotherapy and Neurology outpatients referral (EMG can be arranged by neurology if required later).
- Myelopathy post spinal anaesthetic: Urgent MRI and immediate referral to neurologist on-call.
- Arachnoiditis: MRI spine and neurology referral; management should be directed by neurologist.
- Epidural abscess and epidural haematoma: Immediate MRI with Gadolinium and immediate referral to spinal surgeon if positive findings (on-site service via switch).
- Post-Surgical Inflammatory Neuropathies (PSIN): Neurology referral and consideration of immunomodulatory drugs.

  All these conditions should be discussed with the on-call Consultant Anaesthetist and management documented in the notes.
- For all conditions other than obstetric palsies (and especially post blood patch neurology complications) the patients will have to be de-briefed and reviewed in the high-risk obstetric anaesthetic clinic (appointment to be arranged via Anaesthetic Secretary ext. 3677) and a GP letter sent.

Objective/s

The purpose of this guideline is to give Anaesthetists, Obstetricians and Midwives a structured approach to dealing with these complications and to inform juniors on which cases require immediate senior input and investigation and which cases can have an expectant management.

Rationale

Neurological complications following childbirth may be secondary to central neuraxial analgesia and anaesthesia or secondary to labour and delivery (Obstetric palsy). There is

a tendency to blame the epidural or spinal for any neurological injury, however it is recognised that the majority of neurological injuries are Obstetric palsies.

Neurological complications after central neuraxial analgesia and anaesthesia are rare and the incidence therefore varies considerably between different surveys. This is further complicated by the fact that these surveys are often retrospective, have a degree of bias and include obstetric palsies.[1-7] A review[1] published in 2000 estimated that the incidence ranges from 0-36.2 in 10,000 epidurals and 35.4 in 10,000 spinals. The 3rd National Audit Project[2] (NAP3) published by the Royal College of Anaesthetists estimated the incidence of neurological complications (pessimistic interpretation) to be 1: 161,550 following an epidural, 1: 67,000 following a spinal and 1:25,000 cases following a Combined Spinal Epidural (CSE). The Obstetric Anaesthetists Association currently quotes the risks as being 1 in 1000 – 2000 for temporary nerve damage and 1 in 24,000 for permanent nerve damage[3]. Direct damage to the spinal cord by needles or catheters is rarer still with one study estimating this at 5 per million blocks[11].

Neurological injuries related to regional analgesia and anaesthesia tend to be lesions of the central nervous system. They can be traumatic (nerve root damage from epidural catheter insertion) or resulting from direct conus medullaris damage with spinal needle, infective (epidural abscess, meningitis), ischaemic (epidural haematoma) or chemical in nature (adhesive arachnoiditis, aseptic meningitis)[8].

The majority of obstetric palsies are related to the process of labour or pressure from the foetus. The lumbosacral trunk is vulnerable to compression by the head as it crosses the posterior pelvic brim. The obturator nerve is also vulnerable to this as compression within the obturator canal can occur. The femoral nerve may be compressed as it passes under the inguinal ligament and may be damaged by prolonged flexion, abduction and external rotation of the hips in the second stage or excessive lithotomy position.

In patients with pre-existing neurological injuries the anaesthetist will have to weigh the benefits vs risks of siting regional anaesthesia. Broad recommendations include limiting the total local anaesthetic dose by reducing the concentration, avoiding vasoconstrictor adjuvants and using neuraxial opioids that are devoid of neurotoxic effects.

Neuraxial blocks should not be done in patients with spinal dysraphism including conditions such as myelomeningocele and spina bifida amongst others.

Most neurological injuries are temporary and resolve within 2 months. [9]

Broad recommendations

Upon referral the patient must be reviewed as soon as possible and a detailed history should be taken followed by a targeted neurological examination. Nerve injuries due to epidural or spinal insertion tend to have a radicular distribution and the sensory component is therefore distributed in a dermatomal pattern. Obstetric palsies are peripheral nerve

injuries and as such the sensory disturbance tends to be in the distribution of the peripheral nerve (see diagram).[10]

History:

- Onset, duration, sensory and motor components.
- Presence of risk factors (see below).
- Review obstetric and anaesthetic notes.
- Sinister signs and symptoms **– requires urgent referral.**
    - Lower limb numbness and weakness.
    - Radicular leg pain.
    - Acute onset back pain.
    - Any symptom in the presence of pyrexia.
    - Headache and neck stiffness.
    - Urinary or anal dysfunction.
    - Deteriorating symptoms or onset after period of being asymptomatic.

Examination:

- Heart rate, blood pressure, respiration rate, temperature.
- **Full neurological examination:**
    - Should include cranial nerves, upper limbs and lower limbs.
    - Motor power.
    - Sensation.
        - Light touch, pinprick, position.
        - Dermatome or peripheral nerve distribution?- is important as dermatomal distribution not respecting a nerve distribution suggests a central nervous system lesion (spinal level)-see attached diagrams.
    - Tone.
    - Knee and ankle reflexes/ Babinski reflex.
- **Back examination:**
    - Localised tenderness / swelling.
    - Regional anaesthesia site erythema or discharge.

- Sensation over paraspinous muscles: innervated by posterior rami of nerve root; involvement suggests nerve root damage.
- Pain on palpation of spinous processes suggests intraspinal mass.
- Shooting pains on movement or palpation.

- **Investigations (if indicated):**
  - FBC and CRP.
  - Blood cultures.
  - CT / MRI.
  - Nerve conduction studies guided by neurologists.

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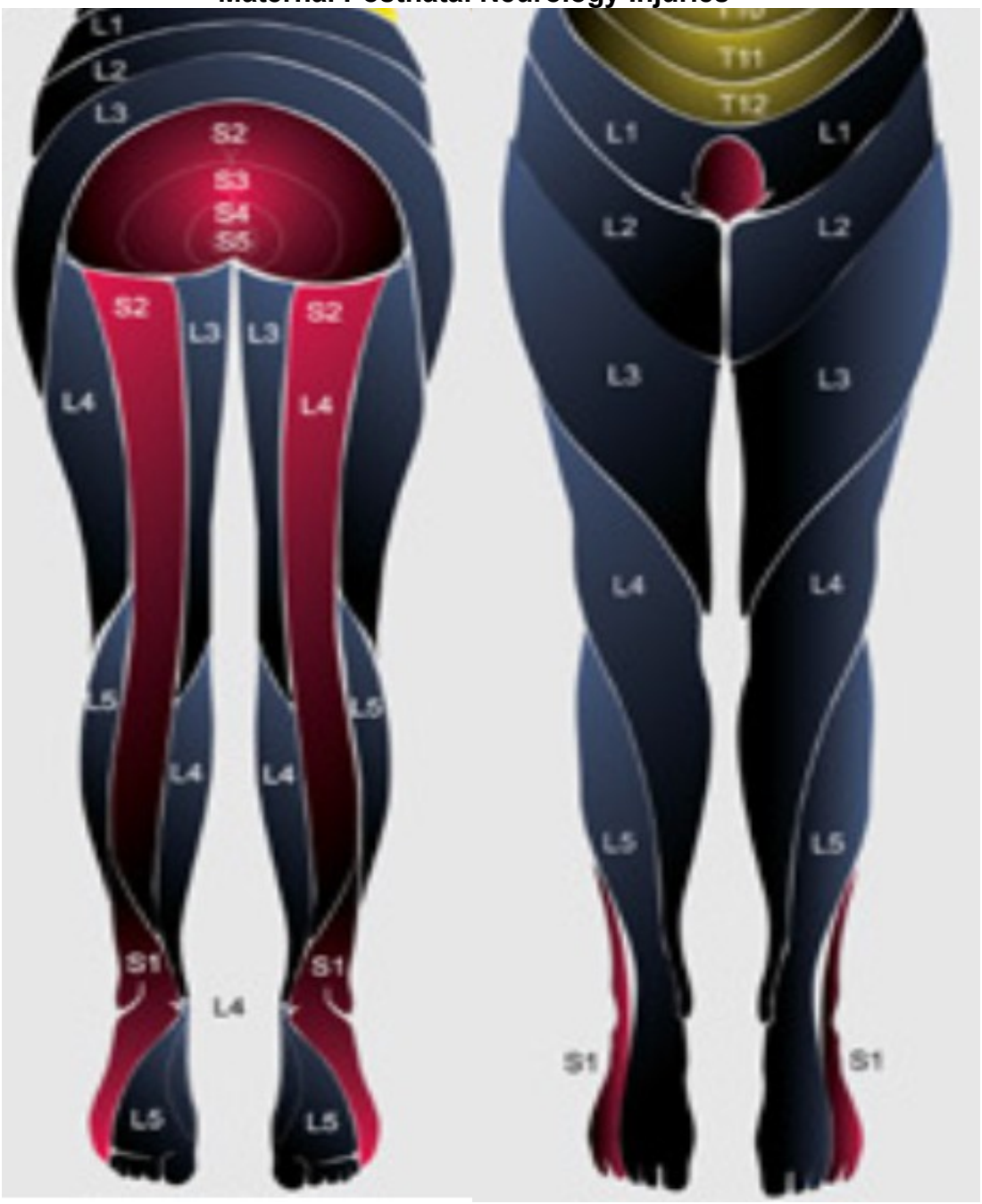

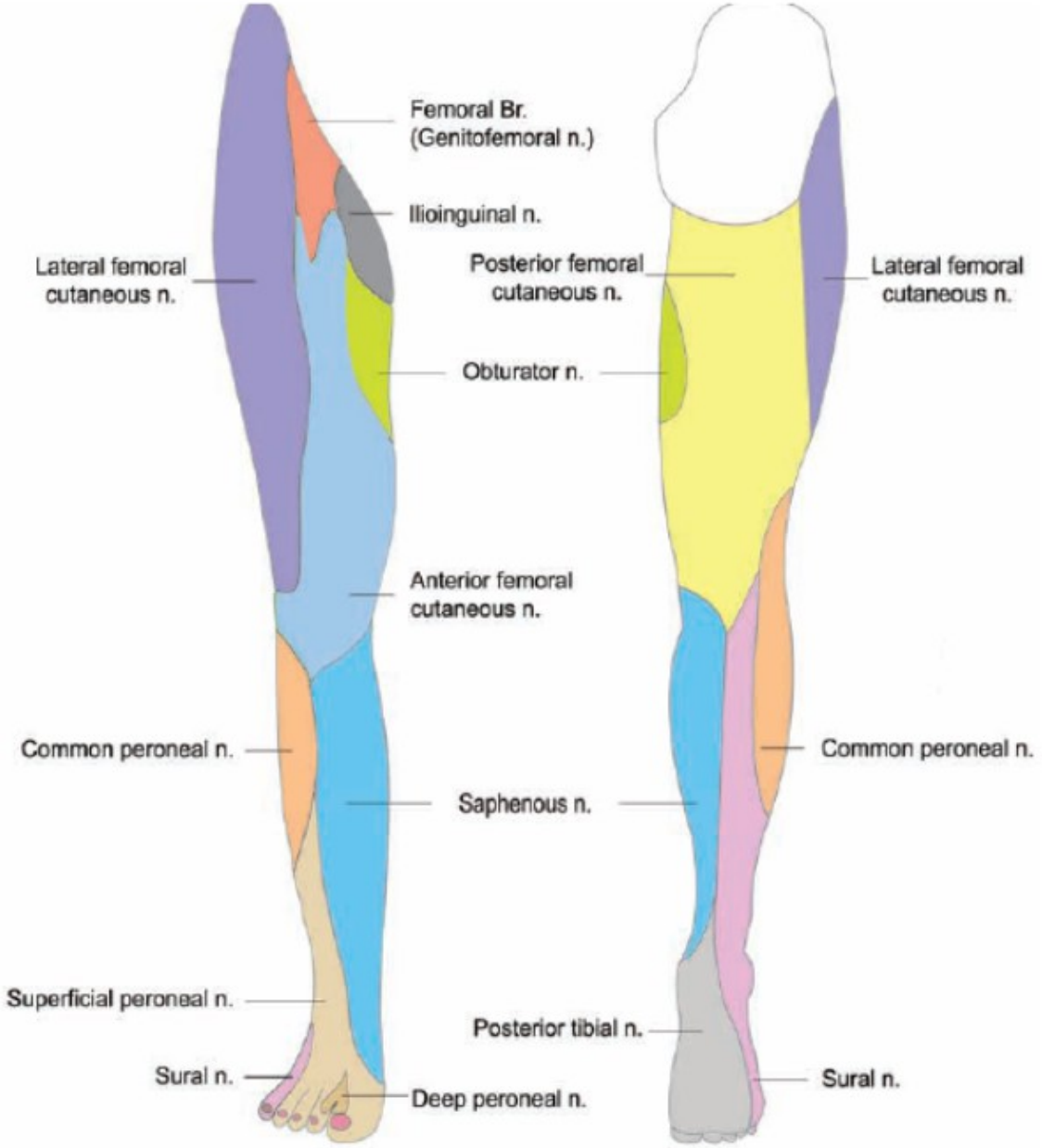

Fig 1. Dermatomal distribution lower limb (LL) and periheral nerve distribution LL (lower image) (reproduced from NYSORA.com- permission granted)

General Management:

The following conditions need referring to the on-call neurology registrar urgently: Suspicion of cauda equina, arachnoiditis, myelopathy, epidural haematoma or epidural abscess.

Patients should be admitted for assessment and analgesia provided, if required. A discussion of the case with obstetric anaesthesia consultant and in severe cases the obstetric consultant on-call should take place. The anaesthetist who performed the original procedure should be informed as soon as it is feasible. In cases where EMG needs to be organised, request forms can be obtained from Dunston ward and a follow up appointment with results should be organised with Dr Blakeney's secretary via switch.

Common presentations:

Meralgia paresthetica

Caused by compression of the lateral cutaneous nerve as it passes around the anterior superior iliac crest or through the inguinal ligament by increasing abdominal mass.

- **Distribution:**
  - Lateral cutaneous nerve of thigh.
- **Presentation:**
  - 3rd trimester onwards.
  - Uncomfortable numbness, occasional burning.
  - May be unilateral or bilateral.
  - Exacerbated by certain positions, standing or walking.
  - No motor component.
- **Investigation and treatment:**
  - None required; reassurance only.

Foot drop

Caused by peroneal nerve injury can occur peripherally, if accompanied by foot sensory changes alone then peripheral lesion of peroneal nerve is suspected (classical leg in stirrups or conus medullaris injection or prolonged squatting, excessive knee flexion, prolonged lithotomy). When is accompanied by higher altered sensory level with sparing of gluteal motor function and intact posterior cutaneous nerve of thigh- then a compression in pelvis is suspected.

- **Distribution**
  - L4-L5, S1 distribution.
- **Presentation**
  - Weakness of dorsiflexion of the foot and eversion, weakness of toes extension, steppage gait.

- Sensory loss anterolateral aspect of lower limb / dorsum of foot and toes.

- **Investigation and treatment**
  - Foot drop will interfere with mobilisation. A referral to orthotics for splinting will be required.
  - If conus injection is suspected (high level spinal injection, with severe pain during injection of LA) an urgent MRI spine is warranted and discussion of results with the on-call neurologist should follow.

Isolated Obturator palsy

Cause: Damage by foetal head or forceps near pelvic brim.

- **Distribution:**
  - 3rd and 4th lumbar roots and some 2nd.
- **Presentation:**
  - Inability to adduct thigh and pain in groin.
- **Investigations and treatment:**
  - Immediate physiotherapy referral and reassurance.

Isolated Femoral palsy

Cause: damage by foetal head or forceps near pelvic brim.

- **Distribution:**
  - 2nd, 3rd, 4th lumbar roots; anterior division gives motor innervation to pectineus, and sartorius and sensory to antero-medial aspect of thigh, while posterior division is motor to quadriceps and sensory to medial side of lower leg.
- **Presentation:**
  - Classically: Thin patient, LSCS with self-retaining retractors. An injury will present with wasting of quadriceps muscle, failure of fixation of knee (will "give way" during mobilisation) weakness of lower leg extension and abolished knee jerk. In high lesions, hip flexion will be compromised.
- **Investigations and treatment**
  - Recovery is rapid and full. Referral to physiotherapy will be required.

Sciatic nerve palsy

Involvement is frequently secondary to a protruding disc in pregnancy.

- **Distribution:**
    - 4th, 5th lumbar and 1st and 2nd sacral. It is sensory to sole of foot and motor to all muscles below knee and posterior thigh. If the presentation is with pain in buttocks, pain in posterior thigh and weak gluteal muscles, then the damage occurred in pelvis. Lesions below sciatic notch spare gluteal muscles but not hamstrings.
- **Presentation:**
    - Difficulty in walking, weak legs.
- **Investigations and treatment:**
    - MRI spine is warranted if a prolapsed disc is suspected (20% of disc pathology will require surgical management). Otherwise, immediate physiotherapy referral and reassurance.
    - Sciatic nerve palsy of aetiology different than prolapsed disc: EMG as outpatient and physiotherapy referral.

      Caveat: Numb soles are a common presentation immediately postpartum (first time out of bed). If presenting in isolation can be due to worsening fluid retention peripartum. Reassure and mobilise. Beware of tight TED stockings.

Cauda Equina

Caused by highly concentrated local anaesthetic agents with spinal catheters, poor distribution of intrathecal local anaesthetics due to an anatomical abnormality (including spinal stenosis) or central canal protrusion of a prolapsed disc.

- **Distribution:**
    - S3-S5 dermatomes anaesthesia.
- **Presentation:**
    - Saddle-shape anaesthesia (buttocks, perineum and inner surface of thighs), bladder disturbances or constipation and bilateral leg weakness (paraplegia) low back pain (root pain).
- **Investigations and treatment:**
    - Warrants immediate MRI spine investigation and immediate on-call spinal surgeon referral. Management should be directed by spinal surgeon in this case.

Lumbo-sacral plexopathy (plexopathy=involvement of multiple nerves in a plexus). Incidence 1:2,000 in pregnant population.

- **Distribution:**
  - Variable levels.
- **Presentation:**
  - Usually unilateral. Classical: Pain in thigh and lower leg with involvement of gluteal muscle and muscles in distribution of sciatic nerve. A limited plexopathy has been described post difficult vaginal deliveries, manifesting as perineal sensory loss and sphincter dysfunction. Also, inability to adduct thigh and pain in groin have been described.
- **Investigations and treatment:**
  - EMG shows denervation of muscles in that distribution. Neurology outpatient appointment should be made.

Isolated "Numb Bottom"

Sensory loss post prolonged epidural infusion and prolonged sitting in bed.

- **Distribution:**
  - 1st and 2nd sacral nerves.
- **Presentation:**
  - Numbness in buttock area.
- **Investigations and treatment:**
  - Reassurance. Can be discharged home with telephone follow up to make sure it subsides.

UNCOMMON PRESENTATIONS

Myelopathy post spinal:

Can be temporary in toxicity secondary to an effect of LA or more permanent in damage from direct conus injection (reported immediately during injection).

- **Distribution:**
  - Variable.
- **Presentation:**

- Asymmetrical paraparesis (unilateral weakness and numbness).

- **Investigations and treatment:**
  - Urgent MRI should be performed and immediate referral to on-call neurologist.
  - There may be a role for high dose methylprednisolone in direct spinal cord trauma. This should be on advice from the neurology team and following MRI[12].

Arachnoiditis from irritative agents leads to thickening and opacification of arachnoid membranes, with adhesions between dura and arachnoid mater leading to obliteration of subarachnoid space. It occurs soon after a spinal or can present weeks later.

- **Distribution:**
  - Variable.
- **Presentation:**
  - Onset is with pain (described as burning, stinging, aching) in one or more sensory roots, unilateral, then bilateral in lumbar distribution. Tendon reflexes can be affected. It progresses to spastic ataxia, then areflexic paralysis of legs, sphincters of bowel and bladder and sensory loss.
- **Investigations and treatment:**
  - MRI spine and on-call neurology Registrar referral. Corticosteroids are controversial (epidural or systemic). Immunosuppressants (azathioprine and interferon), TENS and gabapentin have been tried with inconsistent results.

Epidural abscess and Epidural haematoma are feared complications of regional anaesthesia that have been described extensively in literature and guidelines. (Guideline Ref No: CA2029/B17 (Trustdocs id 1191) Trust Guideline for the Management of Adult Patients Receiving Epidural Analgesia: Flowchart on Management of leg weakness. (Flow chart 1) and Appendix C: Epidural - discharge advice for patients).

- **Distribution:**
  - Variable.
- **Presentation:**
  - **Epidural abscess**: (Classic triad: Fever, back pain and neurological deficit) Insidious onset: Localised back pain, radicular pain (lancinating pain in abdomen) and paraesthesia, muscular weakness, sensory loss, sphincter dysfunction followed by paralysis, suspect in septic cases with epidural sited, IVDU patients, DM.

- **Epidural haematoma:** Severe localised pain, with delayed radicular pain (mimics sciatica, but also described as shooting up and down the back with movement) associated with leg weakness, paraesthesia, urinary incontinence, faecal incontinence (Guideline Trustdocs Id 12793).
- Appendix 1 Vertebral/Spinal Haematomas).

- **Investigations and treatment:**
  - MRI with Gadolinium, hours of suspecting the diagnosis and immediate discussion with spinal surgeon should follow. Decompression if indicated should occur within 6 hours from diagnosis.

Postsurgical Inflammatory Neuropathies (PSIN) are rare mono- or poly-peripheral neuropathies that present hours to days after surgery which may or may not be in the distribution of the surgery or anaesthetic[12].

- **Investigations and treatment:**
  - Neurology referral for timely diagnosis as course can be improved by early immunomodulation therapy.

Clinical audit standards:

- Obstetric anaesthesia database audit of complications reported at routine inpatient follow-up, telephone follow-up and complications following blood patches.
- Number of correctly identified obstetric palsies and correct management instituted.
- Referrals to neurology/spinal surgeons and management.

Summary of development and consultation process undertaken before registration and dissemination

The authors listed above drafted this guideline on behalf of NNUH obstetric anaesthesia consultant body, who have agreed the final content. It has also been agreed by the head of Neurology Department Clinical Governance, Dr Mamutse whose input was invaluable in its final content development. Overall comments received were positive and related some issues which were addressed during the submission process.

This version has been endorsed by the Maternity Guidelines Committee.

Distribution list/ dissemination method

This guideline will be sent via email to all midwifery staff and junior obstetricians and anaesthetists who work in delivery suite and postnatal wards. It is available to view in the guidelines section on the trust intranet in the Department of Anaesthesia and the Department of Obstetrics and Gynaecology Department pages.

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Flowchart of management of postpartum neurological injuries