# Lumbar Puncture (Neonatal Service) Standard Operating Procedure UHL Neonatal Unit (LocSSIPs)

| **Change Description** | **Reason for Change** |
|---|---|
| ☐ Change in format | ☐ Trust requirement |

| **APPROVERS** | **POSITION** | **NAME** |
|---|---|---|
| Person Responsible for Procedure: | Specialist Registrar in Paediatric Medicine<br>Consultant Neonatologist | Dr Edward Artley<br>Dr Sumit Mittal |
| SOP Owner: | Specialist Registrar in Paediatric Medicine<br>Consultant Neonatologist | Dr Edward Artley<br>Dr Sumit Mittal |
| Sub-group Lead: | Consultant Neonatologist | Dr Sumit Mittal |

Appendices in this document:

**Appendix 1: UHL Safer Surgery Invasive Procedure Safety Checklist : Lumbar Puncture (Neonatal Services)**

## Introduction and Background:

Lumbar puncture is a common diagnostic procedure used to investigate the cause of neurological/brain pathologies.

It is a simple procedure commonly performed at the both of UHL Neonatal Units. It involves sampling of cerebrospinal fluid from the subarachnoid space, at a level below the termination of the spinal cord. This involves the introduction of a needle between the spinal processes, typically at the fourth lumbar intervertebral space. There are risks and complications that parents should be informed of prior to the procedure.

**Indications**

- Investigate for:
  - Meningitis/encephalitis
  - Suspected sub-arachnoid haemorrhage
  - Other neurological/brain pathologies
- Most commonly babies will be considered for lumbar puncture following partial septic screen and commencement of antibiotics, indications include:
  - has a C-reactive protein concentration of 10 mg/litre or greater, or
  - has a positive blood culture, or
  - does not respond satisfactorily to antibiotic treatment [1]

**Contra-indications**

- Severe cardio-respiratory instability
- Suspected meningococcal sepsis
- Evidence of raised intracranial pressure with risk of cerebral herniation
- Thrombocytopoenia (<50 x $10^9$/L) or other bleeding tendencies, including anticoagulation
- Skin infection at the site of the lumbar puncture
- Vertebral anomalies

**Risks and Complications**

- Pain and discomfort
- Bleeding from procedural site
- Cardio-respiratory compromise from incorrect positioning
- Failure to obtain specimen
- Irritability post procedure
- Spinal haematoma/abscess

Never Events:

List management and scheduling:

The decision to perform a lumbar puncture should be made by a physician (Level 2 Specialist Registrar or above) or appropriately qualified non-physician (Advanced Neonatal Nurse Practitioner).

The minimum dataset required are:

- Name
- Hospital S Number
- Date of Birth
- Responsible Consultant
- Decision maker
- Operator
- Indication
- Pre procedural blood test (FBC/Clotting) when there are bleeding concerns
- Current medications

Clinical consideration that patient is medically stable to undergo the procedure

Patient preparation:

- Ensure that the procedure has been explained to parents by medical staff with clear documentation in the parent communications sheet.
- Confirm ID of patient prior procedure with another member of the medical staff.

- Ensure patient has not been fed immediately prior to procedure, consider aspiration of stomach if required.
- Place patient on cardiac/saturations monitor and ensure baseline observations including blood glucose have been noted.
- Ensure Sucrose 24% analgesia is available and is documented on the drug chart.
- Make sure all necessary equipment is collected prior to starting the procedure, this includes the following:
    - Sterile dressing pack
    - Sterile gloves
    - Surgical gown
    - LP needles
    - Chlorhexadine 2% sachet
    - Offsite Spray
    - 4 x white top 30ml bottles, 1 x Yellow Top - number the white top bottles to ensure order
    - Sharps bin

## Workforce – staffing requirements:

The minimum safe staffing required is three; the person performing the procedure (the operator), an assistant to hold the patient in position, and an assistant to catch the CSF specimens in an aseptic technique and to monitor observations during the procedure.

Competency of the operator performing the procedure will be documented in their training portfolio following DOPS or equivalents. The operator and assistants should have up to date statutory and mandatory training on infection prevention.

## Ward checklist, and ward to procedure room handover:

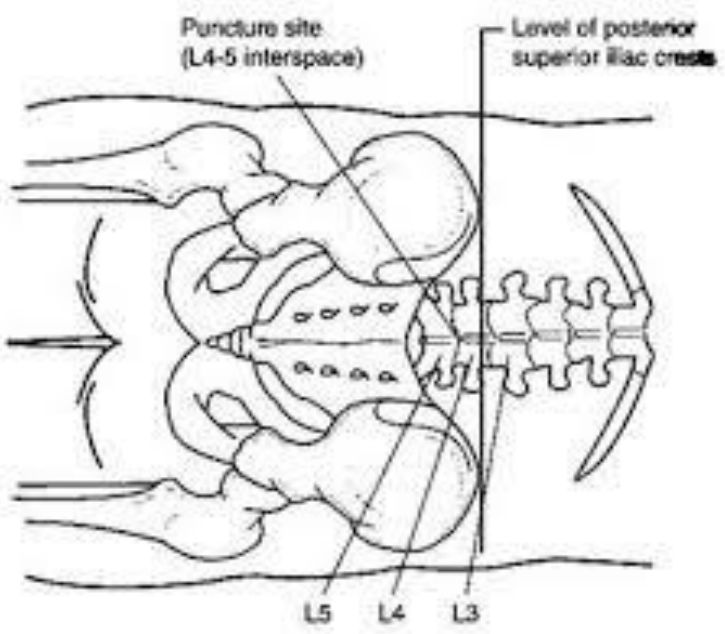
The Neonatal Lumbar Puncture Checklist (see Appendix 1) should be filled in and filed in the notes. This can be filled in partly by any doctor/ANNP looking after the patient and completed by the operator. Alternatively the operator can complete the whole document.

## Procedural Verification of Site Marking:

- Use waterproof, sterile sheets under the patient.
- The operator should aim to perform the procedure with the patient's spine comfortably visible at eye level.
- The assistant holding the patient stands on the other side of the bed to the operator, placing the infant laterally at the edge of the the bed with the patient's back to the operator.
- The assistant holding the patient then holds the shoulders and legs, curling the patient into a

fetal position to achieve maximum spine flexion with care to keep the head in a neutral position.

- Ensure hips and spine remain in line and at 90 degrees to the bed.
- The site of the fourth intervertebral space (between L3 and L4) can be located by imagining a line between the tops of the ilial crests as demonstrated in the figure below and palpating for the space.




Anatomy of lumbar spine showing sites for dural puncture

## Team Safety Briefing:

This procedure should be done with privacy provided using screens when required. The operator and both assistants should both be present and check that the pre-procedure section of the checklist has been completed. They should also confirm the identity of the patient, the indication and that the parents have been updated. There should also be confirmation that all the required equipment is ready.

## Sign In:

The assistants and operator will run through the “sign in” section of the procedural checklist (Appendix 1).

## Time Out:

The assistants and operator will run through the “time out” section of the procedure checklist

(Appendix 1).

Performing the procedure:

- Care must be taken to ensure an aseptic technique, with use of sterile gloves and surgical gown.
- Ensure the required equipment and the patient's lumbar spine are within the sterile field.
- Following correct patient positioning and cleaning of the area with aqueous chlorhexadine, the operator will palpate the area to identify the correct intervertebral space.
- Position the spinal needle with the bevel towards the ceiling, enter the needle into the skin into midline and pause, after the patient has settled, aiming toward the umbilicus advance the needle until there is a fall in resistance.
- Remove the stylet and observe for any CSF flow, if there is none consider rotating the needle slightly/advancing slightly
- If unsuccessful consider repeating the next vertebral space down, with a maximum number of three attempts for each operator – consider asking for another operator in this case
- Aim to collect at least six drops in each bottle in the bottles in the number order that they are labelled, this is done by the second assistant, with care to ensure this is done in a non-touch technique.
- Once completed re-insert the stylet prior to removal of the spinal needle – care should be taken to ensure that the needle is not pulled back during the procedure without the stylet insitu.
- Apply pressure to the puncture site with sterile gauze from the dressing pack prior to offsite spray and a band aid.
- Ensure each of the bottles are correctly labelled prior to sending to the relevant department.
    - Bottles 1&3 should be reserved for MCS
    - Bottle 2 should be reserved for protein
    - The yellow top should be for glucose biochemistry
    - Bottle 4+ should be considered for virology/biochemistry/other tests
- Blood stained CSF can still be used for culture, even if it fails to clear for an accurate cell count.
- Ensure that a simultaneous blood glucose has been obtained and clearly documented on the checklist.

Monitoring:

- If there are clinical concerns prior to the procedure, the patient should be attached to continuous saturation and heart rate monitoring, this should continue during the entire procedure to ensure cardiorespiratory stability.
- A pre-procedural blood glucose should be obtained and clearly documented on the checklist.

Prosthesis verification:

| |
|---|
| Not applicable. |
| Prevention of retained Foreign Objects: |
| There should not be any retained objects upon completion of this procedure. |
| Radiography: |
| Radiography is not routinely advised in relation to this procedure. Ensure there is nil history of vertebral anomaly demonstrated on spine imaging. |
| Sign Out: |
| On completion of the procedure, the “sign out” section of the procedure checklist (Appendix A) should be completed by the operator.<br>• Ensure any sharps are disposed of safely using a sharps bin.<br>• Ensure any non-sharp waste is disposed of safely in the relevant bin.<br>• Ensure that the specimens are labelled correctly.<br>• Ensure that the specimens are delivered to the relevant labs via porter or pod systems – if using porters ensure a reference code has been documented.<br>• Ensure the microbiology technicians have been updated to receive the specimens for processing.<br>• If out of hours, inform oncall microbiology technicians and arrange transport at LGH for transfer of samples, if at LRI the pods or porters may be used.<br>• Ensure the procedure checklist has been completed, signed and filed in the patient’s notes, this will be deemed a suitable account of the procedure with nil further separate documentation necessary. |
| Handover: |
| The patient’s parents and nurse should be updated that the procedure is complete, this should also include:<br>• If there were any complications.<br>• A rough estimate how long results should be available.<br>• If a repeat attempt is required. |
| Team Debrief: |
| A team debrief should occur at the end of all procedure sessions. |

This should take place in a private area away from the clinical environment where the patient is, and should include:

- Things that went well
- Any problems with equipment or other issues
- Areas for improvement
- A named person for escalating issues

This discussion can be documented as part of the procedure checklist (appendix 1).

## Post-procedural aftercare:

- Standard observations should be continued for these patients based on the care they are currently receiving.
- Ensure the site of the lumbar puncture is kept clean and inspected on clinical review for any signs of infection.

## Discharge:

- Neonatal patients will be discharged depending on their individual clinical cases and as such is not relevant to this guideline.

## Governance and Audit:

- All incidents will be reported on Datix
- Any breach of the SOP in which a patient could or did come to harm is a safety incident which should be reported on Datix.
- The incident will then be reviewed and investigated by the parents department where the procedure took place, and disseminated to all relevant party members of the team to learn from such incidents.
- There will be Audit activity to log activity of completed checklist forms, results will be then be reviewed by the department.
- To submit monthly Safe Surgery Audit and WHOBARS assessment as per Safe Surgery Quality Assurance & Accreditation programme.

## Training:

All operators and nursing staff should be aware of this SOP.

Training of new operators will be done by more experienced medical staff with portfolio assessments of direct observational procedural skills assessment. Once they have been judged fit to perform unsupervised they can then become training operators.

This training should be encouraged across the staff as much as possible.

Documentation:

The UHL Safer Surgery Invasive Procedure Safety Checklist : Lumbar Puncture (Neonatal Services) (Appendix 1) should be used as documentation of all parts of the lumbar puncture process, and should be filed in the patient notes.

References to other standards, alerts and procedures:

1: Neonatal infection (early onset): antibiotics for prevention and treatment, NICE Clinical Guideline: https://www.nice.org.uk/guidance/cg149

National Safety Standards for Invasive Procedures, NHS England 2015: https://www.england.nhs.uk/patientsafety/wp-content/uploads/sites/32/2015/09/natssips-safety-standards.pdf

UHL Safer Surgery Policy: B40/2010
UHL Sedation Policy: Safety and Sedation of Patients Undergoing Diagnostic and Therapeutic Procedures B10/2005
UHL Consent to Treatment or Examination Policy A16/2002
UHL Delegated Consent Policy B10/2013
UHL Guideline: Anticoagulation management ("bridging") at the time of elective surgery and invasive procedures (adult) B30/2016
UHL Patient Identification Band Policy B43/2007
UHL Guideline: Management of adult patients with diabetes undergoing elective surgery and procedures B3/2013
UHL Guideline: Venous thromboembolism risk assessment B9/2016
UHL Guideline: Antibiotic guide for surgical prophylaxis in adults B14/2007 (or other relevant guideline)
Shared decision making for doctors: Decision making and consent (gmc-uk.org)
COVID and PPE: UHL PPE for Transmission Based Precautions - A Visual Guide
COVID and PPE: UHL PPE for Aerosol Generating Procedures (AGPs) - A Visual Guide

END

## Appendix 1: UHL Safer Surgery Invasive Procedure Safety Checklist: Lumbar Puncture (Neonatal Services)



Patient ID Label or write name and number
Hospital No.:
Name:
D.O.B.:
Sex:

STOP THE LINE

Safer Surgery Checklist
Invasive Procedure Safety Checklist
Lumbar Puncture
(Neonatal Services)

LocSSIPs

NHS University Hospitals of Leicester NHS Trust

Date: Time:
Operator:

**BEFORE THE PROCEDURE/ SIGN IN**

Prior to list with all team members

| | | | |
|---|---|---|---|
| Clinical Indication | Yes ☐ | No ☐ | N/A ☐ |
| Parents aware of the procedure/ assent | Yes ☐ | No ☐ | N/A ☐ |
| Confirmation of the correct patient (I.D check) | Yes ☐ | No ☐ | N/A ☐ |
| Observations stable/ no contraindications (eg low platelets) | Yes ☐ | No ☐ | N/A ☐ |
| Sedation/analgesia prescribed | Yes ☐ | No ☐ | N/A ☐ |
| Operator performs surgical hand wash | Yes ☐ | No ☐ | N/A ☐ |
| Operator dons surgical gown and sterile gloves | Yes ☐ | No ☐ | N/A ☐ |
| Known allergy: | Yes ☐ | No ☐ | |

**TIME OUT**

Immediately before commencement of Procedure

| | | | |
|---|---|---|---|
| Observations stable | Yes ☐ | No ☐ | N/A ☐ |
| Simultaneous blood glucose | Yes ☐ | No ☐ | N/A ☐ |
| Sterility maintained | Yes ☐ | No ☐ | N/A ☐ |
| Clean site with appropriate solution and allowed to dry | Yes ☐ | No ☐ | N/A ☐ |

Needle gauge

Level: L3/L4 ☐ L4/L5 ☐ L5/S1 ☐

Number of Attempts:

CSF Appearance:

| | | | |
|---|---|---|---|
| Stylet reinserted prior to removal | Yes ☐ | No ☐ | N/A ☐ |

**SIGN OUT**

After counts
Before patient or team members leave room

| | | | |
|---|---|---|---|
| Removal of sharps | Yes ☐ | No ☐ | N/A ☐ |
| Samples requested: MCS ☐ Glucose ☐ Protein ☐ Viral PCR ☐ Other ☐ | | | |
| Samples numbered and labelled | Yes ☐ | No ☐ | N/A ☐ |

Time sent to lab:

| | | | |
|---|---|---|---|
| Parents updated | Yes ☐ | No ☐ | N/A ☐ |
| Team debriefed | Yes ☐ | No ☐ | N/A ☐ |

Doctor Name:

Doctor Signature:

Lumbar Puncture (Neonatal Service) Standard Operating Procedure UHL Neonatal Unit (LocSSIPs) Approved by CMG 2023

'Based on the WHO Surgical Safety Checklist. URL http://www.who.int/patientsafety/safesurgery/en. © World Health Organization 2008 All rights reserved'

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