

Subject: 1. Clinical Guideline: How to Perform a Lumbar Puncture
2. Appendix: CSF Collection pack sample guide

Objective: To allow Clinical Staff to perform lumbar puncture safely

Target Level: Divisional Guideline - Medicine

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Evidence Base: Rank: D

Associated Documents: CT Scanning for Meningitis SAH Guidelines. Perioperative Anticoagulant Bridging Guideline, New Oral Anticoagulant (NOAC) Bleeding Guidelines, New Oral Anticoagulants (NOAC) and Surgery, Perioperative Antiplatelet Drug Guidelines

Information Classification Label

Date of Issue: August 2018

Unclassified

Review Date: August 2021

REVIEW HISTORY			
Issue No.	Page	Changes made with rationale and impact on practice	Date
2	2	Improved guidance on Risks of LP in patients taking drugs affecting Clotting/platelet function.	Jan 2015
2	3-4	Detailed guidance on use of 0.5% Chlorhexidine spray for skin antisepsis to avoid contamination of LP Needle.	Jan 2015
2	5	Guidance on who to contact for difficult LP's	Jan 2015
2	6	Improved guidance on specimen containers	Jan 2015
2	N/A	Nursing Competence etc removed	Jan 2015
3	3	Additions made to indications for LP	Aug 2018
3	6-8	Changes made to guidance for aseptic skin Preparation. Use of fenestrated sterile drape. Availability of patient information leaflet to assist with informed consent. Guidance on labelling of sample bottles and request forms. Guidance on distribution of CSF samples. Guidance on documentation with LP checklist.	Aug 2018
3	9-10	Changes to diagnostic aid and sample collection	Aug 2018
	12	Addition of LP checklist	Aug 2018
3	13	Addition of Patient information leaflet	Aug 2018

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Lumbar Puncture (LP)

1. Definition

A medical procedure which involves withdrawing cerebrospinal fluid (CSF), by the insertion of a hollow spinal needle into the lumbar subarachnoid space.

2. Indications

1. Diagnosis of encephalitis / meningitis
2. Diagnosis of sub-arachnoid haemorrhage following negative CT scan, no less than 12 hours and no more than 10 days, following onset of symptoms.
3. Diagnosis of other neurological diseases e.g Guillian barre syndrome, and/or following advice from neurology.
4. Treatment of idiopathic intracranial hypertension.

3. Contraindications and Cautions

1. LP is contraindicated in patients with papilloedema, deteriorating neurological conditions/reduced/fluctuating GCS, or where raised intra-cranial pressure or an intracranial mass is suspected.
2. In these cases CT or MRI scan should be undertaken prior to LP to avoid potentially fatal brain stem compression, herniation or coning. Refer to "CT Scanning for Meningitis SAH Guidelines" on intranet.
3. In the presence of a local skin infection or the patients with the following conditions as there maybe an increased risk of developing cerebral abscesses:
 - Frontal sinusitis
 - Middle ear discharge
 - Congenital heart disease
 - Prosthetic Heart Valves

In such cases advice must be sought from a senior medical doctor prior to performing a lumbar puncture.

1. In patients who are unable to cooperate for any reason.
2. Meningococcal Sepsis
3. In patients who are known to have degenerative spinal joint disease, spina bifida or have had previous spinal surgery.
4. In patients who are on long term anticoagulation therapy or have deranged clotting profile (platelet count < 80), (INR > 1.5) with an increased risk of bleeding.
5. Haemodynamically unstable patients
6. Warfarin, Heparin, Low Molecular Weight Heparin, New Oral Anticoagulants (NOACs) and Antiplatelet agents (Clopidogrel, Prasugrel or Ticagrelor)

These drugs present a risk of bleeding, which might cause spinal cord compression.

Patients on these drugs will require discussion with a senior doctor prior to performing a lumbar puncture. If it is felt that the risk vs. benefit ratio is in favour of performing an LP this should be discussed with the patient (or relatives if they are unable to consent).

See guidance on intranet for more information on these drugs. (e.g. Clopidogrel does not wear off for 1 week)

See associated documents (page 1) for further information on these drugs
Low dose aspirin therapy in the presence of normal clotting is not usually considered a major bleeding risk.

4. Anatomy

The spinal cord lies within the spinal column, beginning at the foramen magnum and terminating at the level of the 1st lumbar vertebra. Like the brain, the spinal cord is enclosed and protected by the meninges; dura mater, arachnoid mater, pia mater.

The dura and arachnoid mater are separated by a potential space which contains cerebrospinal fluid (CSF). The spinal cord terminates at the level of below the level of the 1st lumbar vertebra which contains the cauda equina, arachnoid space and CSF.

To avoid any damage to the spinal cord, it is imperative that the lumbar puncture is therefore performed below the level of the 1st lumbar vertebra.

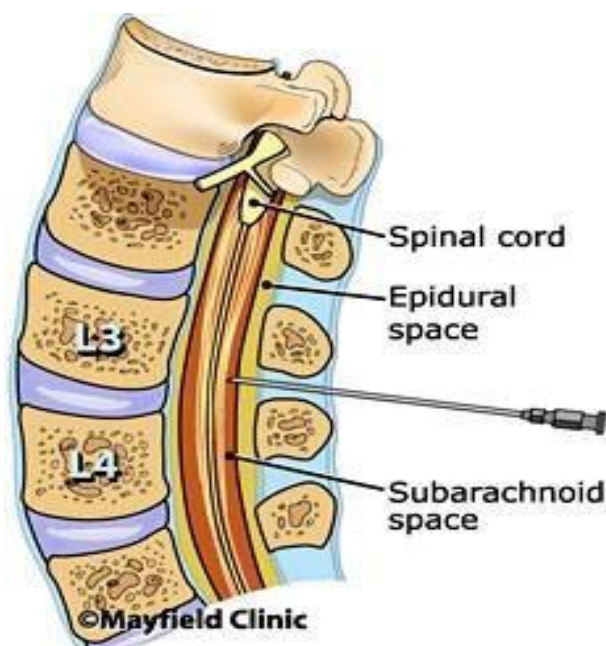


Figure.1

Lateral view of spinal column and vertebrae, showing correct needle entry site for lumbar puncture.

5. Equipment

1. Antiseptic skin cleansing agent: ChloroPrep 2% 3ml Applicators.
2. Selection of needles, filter needles and syringes.
3. Local anaesthetic: lidocaine 1% 10mls or 2% 5mls
4. Sterile gloves.
5. Sterile dressing pack.
6. Lumbar puncture needles.
7. Disposable manometer.
8. Laminated fenestrated sterile drape.
9. CSF Collection pack- available on AMU or Clinical Laboratories Specimen Reception
10. Sterile dressing to place over site after the spinal needle has been removed.

6. Sterile Procedure

Explain the procedure and discuss with the patient, to ensure the patient understands the procedure and gives informed consent. Wherever possible complete a trust written consent form, keeping a signed copy within the medical notes and one copy with the patient.

A patient information leaflet for lumbar puncture can be found on the trust intranet (see appendix page 11). Establish capacity for all vulnerable patient groups especially patients with learning disabilities, autism and mental health issues.

For fluoroscopic guided procedures: all females of childbearing age will be asked their last menstrual period (LMP) prior to any radiation exposure.

Correctly position the patient

- Assist patient into position onto a firm surface.
- To ensure maximum widening of the intervertebral spaces for ease of access into the subarachnoid space.
- For accurate identification of the spinous processes.
- To avoid sudden movements by the patient as this could cause trauma.

(a) Lying

- One pillow under the patients head.
- Lie the patient on one side with knees drawn up to stomach.
- Use pillow between knees for comfort and support.
- Support patient by holding and supporting the position.

(b) Sitting

For patients who may be unable to tolerate and maintain the lying position, or where the lying position has been unsuccessful)

- Patient sitting across straight backed chair with back to person carrying out procedure
- Patient leans forwards over back of the chair to maintain and support the position.
- Patient sitting on the bed, leaning over a pillow on a bedside table, with their back to the person carrying out the procedure.

1. Continuous support, encouragement and observation of the patient.

- To facilitate psychological and physical well-being.
- To monitor any physical or psychological changes.

2. Antiseptic preparation of skin:

Expose the patients back. Prepare the skin using the ChloroPrep 3ml sponge applicators. Cleanse the full area of the exposed skin, from the centre outwards, with ever widening circles.

Repeat this procedure at least once, disposing of the used applicators after each time. Wait for the ChloroPrep to dry. This is in order to maintain an aseptic technique throughout the procedure.

3. Procedure:

- Apply the laminated fenestrated sterile drape, with the fenestration exposing the area identified for the procedure.
- Identify the intervertebral space in the midline perpendicular to the iliac crests. (This intervertebral space may vary in individuals, it may relate to L4- 5, L3-4 or L5-S1 [Broadbent et al, 2000])

- Infiltrate the skin and subcutaneous layers with local anaesthetic. Introduce the spinal needle with stylet, between the second and third lumbar vertebrae and into the subarachnoid space to avoid the spinal cord.
- Ensure that the subarachnoid space has been entered by the flow of CSF and attach the disposable spinal manometer to obtain a CSF pressure reading.

NB: Normal pressure 6 – 18 cmH₂O; Note the colour of the CSF (eg colourless, red).

- Obtain the appropriate CSF specimens (see detailed sheet in the CSF collection pack- page 9 of this document). Additional requests may be required (eg oligoclonal bands, which also require a paired blood sample)
- Once the specimens have been obtained and appropriate pressure measurements taken, re-introduce the stylet into the spinal needle before withdrawing. This is to minimise the risks of the procedure.
- **REMEMBER** blood samples for both liver function and glucose analysis **MUST** be taken directly following the procedure and taken to the clinical laboratories reception together with the CSF samples.

4. Dressing the puncture site:

- Apply pressure over the lumbar puncture site using a sterile topical swab after the needle has been withdrawn to maintain asepsis and to stop blood and cerebrospinal fluid flow.
- Apply sterile occlusive dressing over the puncture site when leakage from the puncture site has ceased to prevent secondary infection.

5. Difficult LP

- For unsuccessful LP attempts, please contact the Interventional Radiology Department on extension 2368 for a fluoroscopic guided-lumbar puncture procedure.
- For all out-of hours requests, please discuss with the Consultant Interventional Radiologist on-call.

6. Ensure the patient is comfortable lying flat for approximately 2 hours immediately following the procedure to avoid post lumbar puncture headache due to the loss of CSF & consequent fall in CSF pressure.

7. Observe the patient for:

- Leakage from the puncture site
- Headache
- Backache
- Vital signs & neurological observations.

It is normal to expect a small amount of blood stained leakage from the puncture site: the presence of clear fluid should be reported to a senior medical doctor with close observation of the patients neurological status at all times.

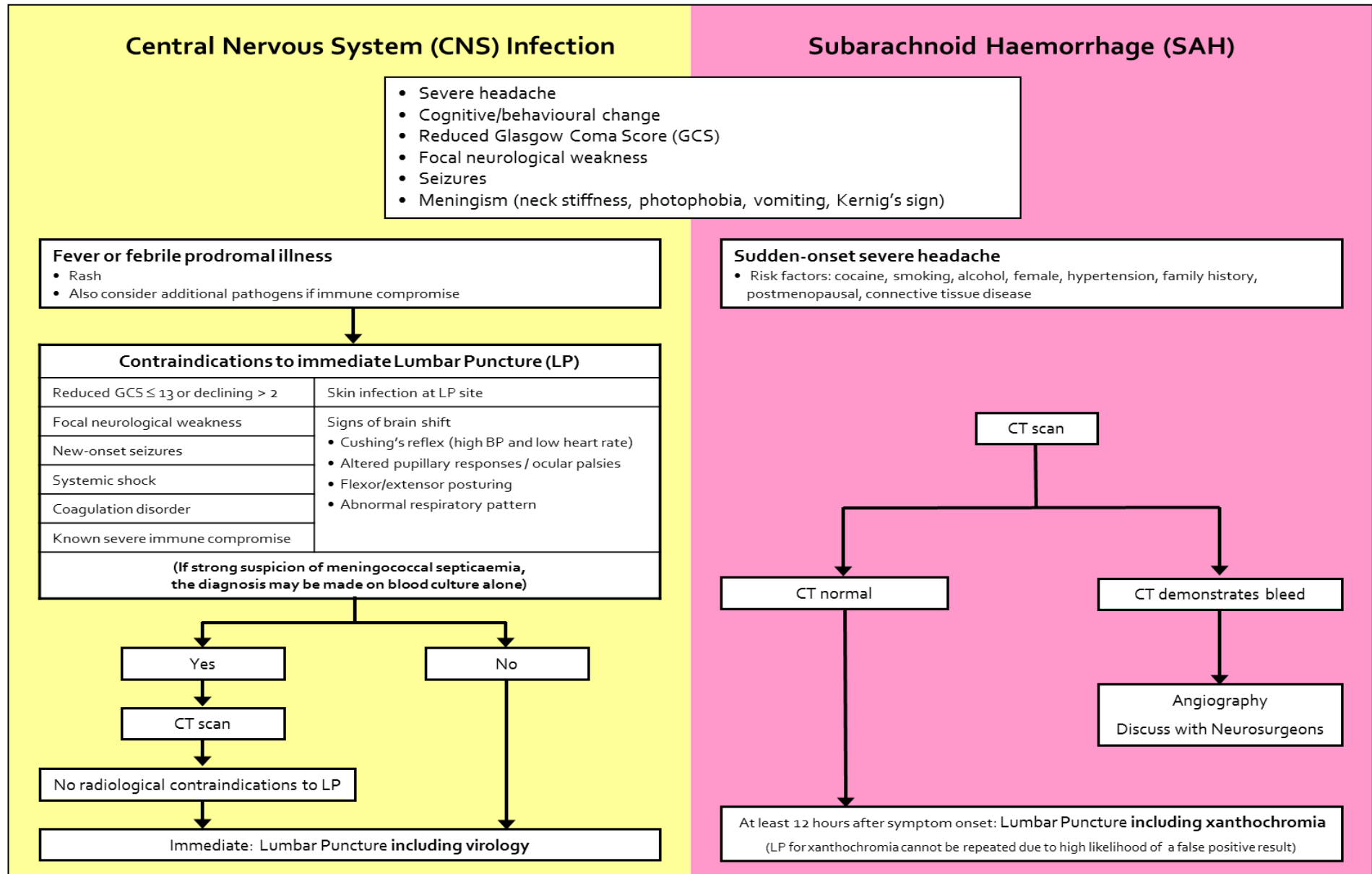
8. Encourage oral fluid intake of 2-3 litres in 24 hours. To help replace the CSF removed during the procedure.


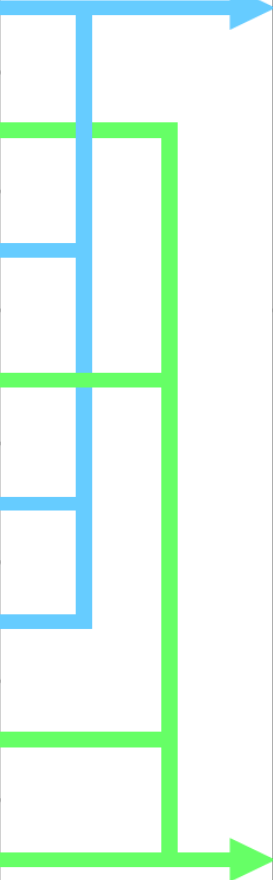







9. Remove all equipment and dispose of appropriately to prevent cross infection and needle stick injury.

10. Label all CSF samples correctly and take to the clinical laboratory for the required investigations, using the correct paper request forms provided within the LP pack. This includes the xanthochromia sample which, after placing in the paper request form, **MUST** be sealed in its own envelope (provided within the LP pack).

11. This is to protect the CSF sample from degradation by light. For xanthochromia analysis, the time of onset of headache **MUST** also be documented on both the WCNN (orange) and the Biochemistry (red) paper request form.
12. Follow LP pack details for contacting laboratory services, especially out of hours. Details and numbers are all enclosed in the LP packs from the lab.
13. All samples must be delivered to the Clinical Laboratories Specimen Reception in the CSF collection envelope (do not use the pneumatic tube system). All samples and paper request forms should be handed to a laboratory technician, informing them that it is a CSF sample and not left in the basket provided.
14. Wherever possible LP's should be performed before 5pm. When not possible, for out of hours samples, always contact the relevant laboratories to alert them.
15. Record the details of the consent and procedure in the medical notes using the LP checklist provided within the LP pack (see appendix page 10) and the yellow trust consent forms.

Appendix - Guide to sample collection:



Diagnostic Question							
? CNS infection only		Immediate lumbar puncture: collect samples 1 to 3 (CSF), 5 (CSF) , 6 (blood) and 8 (blood) only					
? SAH and CNS infection		Collect samples 1 to 5 (CSF) and 6 to 8 (blood)					
? SAH only		CT scan normal and ≥ 12 hours after symptom onset: collect samples 1 to 4 (CSF) and 7 (blood) only					
Order	Sample	Container	Volume	Tests	Specimen Transport		
1st	CSF	Conical tube 	2.5 mL	Microbiology		Microbiology/Virology Make an electronic request <u>or</u> write tests required + clinical details on Microbiology form Pneumatic tube (RLH only) Routine dial: 4410 (RLH) / 4900 (AUH) OOH: Microbiologist on-call via switch	
2nd	CSF	Paediatric F/Oxalate 	0.5 mL	Glucose + Protein			
3rd	CSF	Conical tube 	2.5 mL	Microbiology			
4th	CSF	Minicollect and carrier 	1 mL (Fill to ↑)	Xanthochromia			
5th	CSF	Conical tube 	2 mL	Virology			
6th	Blood	Serum (RLH 'white' <u>or</u> AUH 'mustard') 	4 mL	Virology			
7th	Blood	Serum Gel (RLH 'brown' <u>or</u> AUH 'mustard') 	4 mL	Liver Profile			
8th	Blood	Fluoride EDTA (RLH 'yellow' <u>or</u> AUH 'grey') 	3 mL	Glucose			

Lumbar Puncture Checklist

Indication..... Date:/...../..... Time::.....

MRI/CT Brain performed? Yes No Date:/...../.....

Images reported/reviewed? Yes No

Contraindications (see trust clinical guidelines)? Yes No

Platelet count >80 Yes INR<1.5 or clotting normal Yes

Patient on clopidogrel or anticoagulant treatment discussed with senior? Yes N/A

Allergies.....

Does patient have capacity to consent? Yes No

Informed verbal consent obtained / Written consent / Best interests

Procedure explained and risks (headache, bleeding, infection, failure, back pain, nerve injury)?

Yes No (give patient information leaflet)

Others present during procedure.....

Aseptic technique throughout? Yes No

Position: Lateral Sitting Lidocaine instilled:mL of.....%

Spinal needle gauge: 22G (best practice) other.....

Number of attempts:..... Successful space: L2/3 L3/4 L4/5

For unsuccessful LP attempts, please contact the Interventional Radiology Department on extension 2368 for a fluoroscopic guided-lumbar puncture procedure

CSF Appearance: Clear and colourless Other.....

Opening pressure:cmH₂O

Estimated volume of CSF taken:mL

SAMPLE Requests (ALWAYS Contact Micro Lab **x4900 (diverts to RLH). OUT OF HOURS call switchboard and ask for the Microbiologist on-call if required and contact AUH **Biochem bleep 4663**. Xanthochromia is referred internally from AUH to RLH Biochem lab **0151 706 4235** (24/7 service)**

MCS **Protein, glucose** **Xanthochromia** **Viral PCR** **TB** **Cytology**

Additional requests e.g. Plasma Oligoclonal bands (Mustard tube - Walton Lab).....

Paired serum protein and glucose sent at same time as LP? Yes No

If procedure complications state.....

.....

Advised staff: Lie patient flat 1 hour / neuro obs / vital signs / fluids / analgesia for headache or backache / observe puncture site

Acute Medical Unit Patient information: Lumbar puncture

NHS
Aintree University Hospital
NHS Foundation Trust

Acute Medicine Unit
Lower Lane
Liverpool L9 7AL
Tel:0151-525-5980

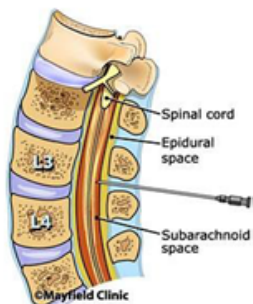
Who is this leaflet for?

This is for patients requiring a lumbar puncture (LP).

What is a lumbar puncture (LP)?

A lumbar puncture is a procedure used to obtain a sample of cerebrospinal fluid (CSF).

This happens by the insertion of a hollow needle into the spinal canal.



Cerebrospinal fluid (CSF) is a clear, colourless fluid that supports the brain and spinal cord.

It is produced by our bodies constantly and the small amount removed during an LP is rapidly replaced.

The changes in the CSF can help doctors diagnose diseases of the brain and nervous system.

Why do I need a lumbar puncture?

Your doctor may require an LP to help diagnose or exclude a serious medical condition.

For example, a bleed on the brain otherwise known as a sub arachnoid haemorrhage, or infections such as meningitis, encephalitis, or another neurological condition.

You may have had a CT/MRI scan which may not have given all the information required to support a diagnosis, as some conditions cannot be diagnosed by a scan alone.

How is it performed?

A doctor or an advanced nurse practitioner (ANP) will perform the procedure.

- You may be asked to lie on your side at the edge of the bed and curl your legs up towards your stomach.
- Alternatively you may be able to sit up with your head resting on a pillow supported by a table.

Leaflet Name: Patient Information: Lumbar puncture
Leaflet Lead Name: Joanna Levey, Advanced Nurse practitioner
Acute Medical unit, sleep S401
Date Leaflet Developed: November 2015

Date Leaflet Approved: April 2019
Issue Date: April 2019
Review Date: April 2022

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Version No: 2

The procedure –

- 1) Firstly, the skin is cleaned to make the area sterile.
- 2) The area required is numbed with local anaesthetic.
- 3) The needle is inserted and there may be a pushing sensation.
- 4) The Dr or ANP may need some time to find the correct positioning of the needle.
You must stay still whilst this is happening. If you feel any pain please tell the person performing the procedure.
- 5) The Dr or ANP may need to measure the pressure before collecting samples of CSF to send to the laboratories for analysis.

The process usually takes approximately 30-40 minutes to perform.

What are the risks?

There are risks as with any invasive procedure.

These can include:

- Problems obtaining the samples of CSF
- Bleeding at the site of the needle insertion.
- More commonly a post lumbar puncture headache can occur.
- Back ache can occur which usually settles after a few days
- Rarely, a risk of infection
- Very rarely there can be nerve damage

What happens afterwards?

You will be asked to lie flat for a minimum of an hour.

You will be asked to drink plenty of fluids and caffeinated drinks as this can help to prevent a post LP headache.

You will be given pain relief if you require it.

The sample may take up to 24 hours to be analysed and your Dr will discuss the results with you when they are available.

Please contact your GP if you have any new concerns or continued symptoms of headache, limb weakness/numbness which does not resolve after you have been discharged home.

Acute medical unit contact details:

0151-529-4493

0151-529-5233

For further information you can also visit the NHS Choices website:

<http://www.nhs.uk/Conditions/Lumbar-puncture>



If you require a special edition of this leaflet

This leaflet is available in large print, Braille, on audio tape or disk and in other languages on request. Please contact:

Tel No: 0151 529 2906

Email: interpretationandtranslation@aintree.nhs.uk

Leaflet Name: Patient Information: Lumbar puncture
Leaflet Lead Name: Joanna Levey, Advanced Nurse practitioner
Acute Medical unit, sleep S401
Date Leaflet Developed: November 2015

Date Leaflet Approved: April 2019
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You can obtain a copy of this leaflet by using the link to the Document Management System below:

<http://intranet.aintree.nhs.uk/sites/dms/Documents/Lumbar%20Puncture.pdf>