SESLHD PROCEDURE COVER SHEET

NAME OF DOCUMENT	Lumbar Puncture - Adult
TYPE OF DOCUMENT	Procedure
DOCUMENT NUMBER	SESLHDPR/613
DATE OF PUBLICATION	September 2025
RISK RATING	Medium
LEVEL OF EVIDENCE	National Safety and Quality Health Service Standards: Standard 1 – Clinical Governance Standard 4 – Medication Safety Standard 6 – Communicating for Safety
REVIEW DATE	September 2028
FORMER REFERENCE(S)	St George/Sutherland Hospital Lumbar Puncture Clinical Business Rule Prince of Wales Hospital Lumbar Puncture Clinical Business Rule
EXECUTIVE SPONSOR	Clinical Stream Director, Medicine
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FUNCTIONAL GROUP(S)	Critical Care and Emergency Medicine, Medicine
KEY TERMS	Lumbar puncture - Adult Procedure
SUMMARY OF DOCUMENT	This SESLHD procedure applies to all clinical staff involved in the care of patients who are undergoing a lumbar puncture. It covers the performance of and pre and post- procedural management of patients undergoing lumbar puncture. It incorporates all adult inpatients and outpatients undergoing lumbar puncture for either diagnostic or therapeutic purpose

1. POLICY STATEMENT

Lumbar puncture is routinely used to access cerebrospinal fluid (CSF) and is a critical procedure in the diagnosis of Central Nervous System (CNS) infections; subarachnoid haemorrhage; inflammatory diseases and the management of CNS malignancy[3,12,13].

Serious complications associated with lumbar puncture, although rare, are potentially life threatening. Adherence to correct technique and protocol is essential to ensure patient safety and to prevent adverse events. The expected outcome is that the lumbar puncture is successful and is performed in a safe manner, with minimal discomfort to the patient.

This procedure applies to adult patients only. Paediatric and neonatal lumbar puncture policies, procedure and guidelines are located on local policy sites.

2. BACKGROUND

This SESLHD procedure applies to all clinical staff involved in the care of patients who are undergoing a lumbar puncture. It covers the performance of and pre and post-procedural management of patients undergoing lumbar puncture. It incorporates all adult inpatients and outpatients undergoing lumbar puncture for either diagnostic or therapeutic purpose.

3. DEFINITIONS

Lumbar puncture (LP) - a diagnostic/therapeutic test, which involves the insertion of a spinal needle into the lumbar subarachnoid space below the level of the second lumbar vertebra, usually L3/4 or L4/5 for removal and examination of cerebrospinal fluid[4].

Prion - an infective agent thought to be a misfolded protein implicated in a group of rare neurodegenerative diseases. Prions are resistant to normal methods of instrument processing/sterilisation.

4. SKILL LEVEL

Only Medical Officers competent to perform lumbar puncture should undertake the procedure unsupervised. All medical specialties who undertake lumbar punctures should have a process for ensuring that junior doctors under their supervision are competent prior to undertaking the procedure unsupervised. This should include, at a minimum, a direct observation of the junior doctor undertaking the procedure by a Senior Medical Officer from within the department to assure the Head of Department and Term Supervisor that the junior doctor is competent to perform the procedure unsupervised[16].

Any junior doctor who requests supervision to undertake a lumbar puncture should be afforded it as practicable, regardless of their perceived level of competency.

Teaching of lumbar punctures should only be undertaken by a consultant in an appropriate specialty who is personally competent to undertake the procedure if required, unless specifically delegated to a senior trainee who has been assessed as competent.

A Nurse Practitioner (NP) may perform a lumbar puncture when able to demonstrate

competency in the procedure at the facility where they practice. The procedure must appear within the individual's Scope of Practice, which is endorsed by their local Multi-Disciplinary Steering committee[27].

5. RESPONSIBILITIES

5.1 Medical staff will:

- Complete a comprehensive assessment of the patient prior to the procedure
- Escalate and refer patients appropriately to specialists (e.g. Neurology, Neurosurgery, Haematology, Medical Imaging, Infectious Diseases)
- Documentation of the episode of care, consent, and relevant procedural safety checklist[22].
- Ensure they have the relevant training and senior supervision (where required) prior to performing an LP.

5.2 Clinical Staff will:

- All staff involved with the performing of lumbar punctures (LP) will comply with this policy and ensure escalation occurs to a Senior Medical Officer where appropriate.

5.3 District Managers/Service Managers will:

- Review existing procedure annually
- Present local audit results and ims+ data relevant to this procedure to the SESLHD Emergency and Medicine Stream Committee when required.

6. INDICATIONS

Patients with possible contraindications to LP must not have LP performed before consultation with a Senior Medical Officer as specified in 6.2.

LP may be for either diagnostic (to obtain a specimen of CSF) or therapeutic purposes:

Diagnostic

Examples include (but not restricted to) the following:

- Myelography: The administration of intrathecal Iodinated contrast media for assessment of the nervous system. This is a Radiological guided procedure. Please refer to Medical Imaging Department for specific guidelines or protocols.
- Investigation of the central nervous system (CNS) for infection e.g. Meningitis[21,33].
- Investigation of CNS malignancies (e.g. Leukaemia, lymphoma[18] and suspected leptomeningeal metastases in solid tumours).
- Investigation of demyelinating diseases e.g. Multiple Sclerosis[18].
- Suspected Subarachnoid Haemorrhage[21,25].
- Measurement of CSF pressure.
- Evaluating peripheral neuropathy, carcinomatous meningitis[21], Benign Intracranial Hypertension (BIH)[3] and inflammatory disorders

Therapeutic

Examples include (but are not restricted to) the following:

- Spinal anaesthesia

- Administration of intrathecal medications e.g. antibiotics, antineoplastic agents, analgesic agents
- Treatment of CSF leak following spinal or transsphenoidal or intracranial procedures
- Removal of CSF in Benign Intracranial Hypertension (BIH), Normal Pressure Hydrocephalus (NPH)[3] and Cryptococcal meningitis

Intrathecal chemotherapy administration requires specific safety precautions – refer to local policies for guidance.

6.1 CONTRAINDICATIONS

LP is potentially dangerous in certain situations. A Senior Medical Officer must determine whether the potential benefits of LP outweigh the risks. **Documentation** by a MO in the clinical notes must specify the risks of the procedure as explained to the patient or the person responsible consenting on the patient's behalf. This list is not exhaustive:

Brain herniation

Patients with raised intra cranial pressure (ICP) due to the risk of brain herniation. If there are clinical or radiological indications of raised ICP, LP must not be performed without the documented consent of a neurologist, neurosurgeon, or ED staff specialist.

Coagulopathy and Anti-coagulation Therapy

Before performing a LP on patients receiving anti-coagulants or with a coagulopathy consult or seek advice from haematology about procedural timing, optimisation or reversal agents if required/available . Consider monitoring full blood count and coagulation profile prior to procedure.

Ultimately the risk versus benefit decision lies with the treating team.

Sepsis

Patients with local sepsis; concerns about approach sepsis should be raised with a Senior Medical Officer e.g. Admitting MO or Registrar.

6.2 SPECIAL CONSIDERATIONS

If the Medical Officer fails to enter the lumbar subarachnoid space following two attempts the procedure must be aborted and the assistance/advice sought from a Senior Medical Officer who meets the criteria in Point 4. At this point consideration should be given following consultation with the AMO, to referring the patient to the Medical Imaging Department and the procedure attended under either fluoroscopy or CT guidance

If procedural sedation is required to improve comfort and manage agitation, arrangements must be sought to ensure patient safety and compliance with SESLHDPR/528 - Procedural Sedation (Adults, Ward, Clinic and Imaging areas) during a clinical procedure.

In patients with clinical signs or clinical suspicion of increased intracranial pressure (ICP) a lumbar puncture should only be performed following a computerised tomography (CT) scan and after consultation with the AMO of the treating teams to discuss the risks vs the benefits of the procedure due to potentially fatal complications.

The sitting position has been shown to improve success rates for LP by increasing the interspinous process space and improving the identification of landmarks and maintaining

planes. It should be noted that an accurate opening pressure can only be measured in the lying position. Difficult lumbar punctures may need to undergo the procedure with ultrasound guidance or fluoroscopic guidance.

Lumbar puncture must not be performed in the presence of local skin infection over the proposed puncture site.

Additional infection control precautions must be used for patients with known or suspected prion disease including Creutzfeld-Jacob disease (CJD), Gerstmann-Scheinker syndrome (GSS), fatal familial insomnia (FFI) or variant Creutzfeld-Jacob disease (vCJD). Items that have been used during a LP that have been exposed to CSF from patients with known or suspected prion disease must be either single use and then incinerated or, if reusable, must be reprocessed separately and quarantined for the exclusive use of that individual patient then incinerated when no longer required. The local sterilizing services manager must be notified prior to sending these instruments for reprocessing.

6.2.1 Thrombocytopenia

It is recommended that blood count be performed immediately prior to a planned lumbar puncture. Procedure can proceed provided platelet count > than 50 x 10^9/L and no clinical platelet dysfunction. If patient is taking anti-platelet medications refer to 6.2.2 below. Consider administration of platelets if significant thrombocytopenia or on antiplatelet medications or at risk of significant platelet dysfunction.

6.2.2 Patient taking antiplatelet medications prior to lumbar puncture.

There may be risks to the patient of both ceasing or continuing antiplatelet therapy prior to lumbar puncture. Antiplatelet strategy must be authorised by the AMO or SMO, tailored to the clinical indication.

For guidelines and management of patients taking antiplatelet therapy prior to lumbar puncture please refer to the CEC Guidelines on Periprocedural Management of Anticoagulant and Antiplatelet Agents Version 2.0 March 2025[8] link below:

Guidelines on Perioperative Management of Anticoagulant and Antiplatelet Agents[8]

Check with the on-call Haematologist if clarification is required or site-specific Clinical Business Rules.

For additional resources - POWH Services Haematology Antithrombotic Management[14] and surgical guidelines[19,20]

7. POTENTIAL COMPLICATIONS

Common:

- Post lumbar puncture low pressure headache has been associated with large bore needles[4, 5, 10, 13]

  Per Therapeutic Guidelines, conservative treatment in the first 24 hours may include rehydration, analgesia, strictly horizontal (head not raised) bed rest for 24 hours, and caffeine. If symptoms do not resolve consider referral to a neurologist (Therapeutic Guidelines Limited (2017) - Low cerebrospinal fluid pressure headache[28]).

Rare:

- Meningitis/Infection
- Back/leg pain/paraesthesia
- Epidural Haematoma[2,4]
- Tentorial herniation[6]
- Cauda equina compression due to epidural haemorrhage[2]
- Abscess formation
- Sinus tract formation
- Diplopia secondary to extraocular muscle paralysis
- Complete spinal block/cord compression[4]

8. PRE PROCEDURE

8.1 Consent and Preparation Prior to Lumbar Puncture

- A MO must explain the procedure, risks and potential complications (refer to Section 7) and obtain written consent according to NSW Health Consent to Medical and Healthcare Treatment Manual[9]
- A Level 2 procedure safety checklist (unless procedural sedation is required it becomes a level 3) must be completed prior to the commencement of the procedure as per NSW Health Policy Directive PD2025_006 - Clinical Procedure Safety[23].
- Advise patient to empty bladder.
- Perform baseline observations, blood pressure (BP), pulse rate (PR), respiratory rate (RR), oxygen saturations, temperature, and Glasgow Coma Score (GCS).
- Activate emergency response call as per local site procedures if observations breach normal observation parameters prior to proceeding[24]
- Ensure patient is adequately hydrated.
- Ensure patient privacy.
- Position patient Refer to Section 9.
- Light sedation e.g. lorazepam 1mg orally should be considered in patients requiring serial lumbar punctures or who are extremely anxious.

9. PROCEDURE

Strong evidence[26] supports that the preferred needle type should be the atraumatic (pencil-point) needle with introducer, and the smallest gauge possible to successfully perform the required procedure be used[10,11,12,13]. It is thought that rather than cutting the elastic fibres in the dura (like the bevelled needle), the atraumatic needle temporarily separates the fibres allowing them to more easily close on withdrawal of the needle. The use of the atraumatic needle may minimise the risk of persisting CSF leak and subsequent post puncture headache.

Alternatively, a beveled tip needle may be preferred by clinicians.

A beveled needle may be required in obese patients where the introducer may be too short to penetrate subcutaneous tissues and reach the supra-spinus/interspinous ligaments.

9.1 Equipment (Diagnostic and Therapeutic)

1. Trolley with waste disposal bag and sharps container
2. Protective sheet
3. Dressing pack
4. Chlorhexidine 2% in 70% alcohol pre-packaged swabs (non-sterile). **Bottled antiseptic, poured into containers, on the procedure set-up trolley is strictly forbidden.**
5. Sterile gloves (appropriate size)
6. Sterile gown x one
7. Protective eyewear
8. Protective mask
9. Sterile fenestrated drape
10. Spinal needles x two, 22 gauge (or smaller if clinically indicated) nine cm in length- Atraumatic needle or bevelled needle and/or introducer
11. Disposable manometer
12. Collection tubes x three (if PCRs are requested then a fourth separate dedicated tube is required), blue topped tube (Sarstedt, 2.5 mL Low bind false bottom tube) required for Alzheimer's Disease testing.
13. Local anaesthetic e.g. 1% lignocaine (prescribed by MO)
14. 10ml syringe Needles - one x blunt drawing up needle: one x 23 gauge and 25 gauge
15. Transparent dressing e.g. Opsite

9.2 Method

a) Patient Positioning

Positioning of the patient is one of the most critical aspects of the procedure.[1] A primary reason for a dry tap is poor positioning.
There are two primary positions: sitting and lying.

Sitting: Preferred position for dehydrated or obese patients.

The patient sits with their lower back towards the clinician and the patient must be allowed to "slump" over a pillow on their lap, To optimize opening the space the patient can place their feet on a chair so that the thigh is greater than 90 degrees, this makes the space much better and enhances success. This position assists in determining if the spine is straight and maintains the lumbar needle at midline when it is being inserted.

Lying: Preferred position for measuring opening and closing pressures

1. Place patient in the left lateral position with the lumbosacral region close to the edge of the bed.
2. Ensure the shoulders and hips are parallel to each other and perpendicular to the bed.
3. Ask the patient to curl up to the maximum extent possible and clasp hands around knees and hug them as close to the chest as possible (fetal position).
4. Place a pillow under the head and another between the legs.

Procedure (Diagnostic)

NOTE: This procedure is a high-risk procedure and requires strict adherence to aseptic technique and the maintenance of a sterile field:

1. Carry out applicable general preparation.
2. Perform hand hygiene (hand wash or hand rub).
3. Prepare sterile work field and open up all equipment.
4. Perform hand hygiene (hand wash or hand rub).
5. Prepare patient, ensuring they are in an appropriate position as per 9.2. If CSF pressure monitoring is required, the patient must be lying.
6. Locate the interspace between L3 and L4, which lies at the intercristal line (across the tops of the iliac crests) with the patient in the flexed position. The needle is inserted at this level or one level below, between L4 and L5. (Refer to Diagram 1)[29]. An ultrasound can identify landmarks in patients who are difficult to assess, such as obese patients[17].
7. Clean the region of the spine using Chlorhexidine 2% in 70% alcohol **pre-packaged swabs**, working outward in concentric circles. Discard the swabs.
   Note: chlorhexidine is toxic to neurologic tissues. Do not allow antiseptic swabs to come in contact with LP equipment. Do not allow swabs to come in contact with the sterile work field. Ensure that the skin in the sterile field completely dry before inserting the LP needle through the skin.
8. Perform hand hygiene (hand wash or hand rub).
9. Don protective eyewear and mask.
10. Wash hands for a minimum of four minutes with surgical hand wash.
11. Don sterile gown.
12. Don sterile gloves.
13. Apply sterile fenestrated drape.
14. Draw up the local anesthetic directly from its original packaging (i.e.do not decanter into receptacle on sterile field) and inject into the area allowing adequate time to take effect.

    NB: Once drawn up do not place the syringe back onto the sterile field. The contents must be immediately injected. If the syringe with its contents is placed back on to the sterile field it must have a sterile label applied identifying the content. Refer to NSW Health Policy Directive PD2022_032 - Medication Handling[21].

15. Assemble the atraumatic (pencil-point) needle.
16. Insertion of the atraumatic (pencil-point) spinal needle:
    a) Insert the introducer needle orientated towards the umbilicus (Refer to Diagram 2)[30] and not so deep as to puncture the ligamentum flavum (only a risk in the very small or young patient);
    b) Then insert the LP needle through the introducer needle. You will feel resistance as the LP needle leaves the introducer needle and then a slight give. Slowly remove the stylet and wait for CSF flow.
    If no flow then further insertion of the LP needle without the stylette can occur until flow. If no flow or a hard point is encountered reinsert the

stylette and remove LP needle leaving the introducer in situ. Then pull the introducer needle back until in the subcutaneous tissue and re-orientate either caudally or cephalad and repeat[1,3].

Insertion of the bevel point spinal needle or atraumatic needle without introducer:

The spinal needle is inserted orientated towards the umbilicus. Firm resistance and an inability to advance needle is likely due bony obstruction and requires withdrawal of the needle and repositioning. Advance the needle into the spinous/interspinous ligament, where there will be increased resistance. Continue to advance needle slowly within ligament until there is a fall in resistance. Slowly remove the stylet and wait for CSF flow. If no flow then, re-insert the stylette, advance the needle and remove the stylette again waiting for CSF flow. Always have the stylette fully inserted when repositioning the needle otherwise the lumen may become occluded with debris.

17. Remove the stylet from the needle slowly to avoid sucking a nerve rootlet into the lumen and subsequent radicular pain[6].
18. With initiation of CSF flow attach the manometer if required.
19. Ask patient to uncurl their legs to reduce abdominal pressure and increase CSF pressure[1] (if in the lateral recumbent position).
20. Measure the CSF opening pressure and record in the medical record in cm H_20.
21. Remove the manometer and collect three specimens of CSF with a minimum of CSF 10- 15 drops per tube. More CSF or specimens may be required in some circumstances e.g. treating BIH.
22. For Alzheimer's disease testing - use special blue capped PP tube (Sarstedt, 2.5 mL Low bind false bottom tube)
23. After collection replace the stylet and remove needle and stylet together. This has been shown to reduce the likelihood of post LP headache.
24. Apply appropriate occlusive dressing e.g. Opsite®, Tegaderm®
25. Doff PPE and perform hand hygiene (hand wash or hand rub).
26. Document the procedure including the position of patient, opening pressure if indicated and clarity/colour of the CSF.
27. Send the CSF specimens with the correct request form to the laboratory immediately.

NOTE: CSF pressure should be measured with the patient in the horizontal lateral decubital position. The pressure reading will be inaccurate if the patient is in the sitting position.

Diagrams of relevant anatomy:

- Diagram 1: Level of most superior aspect of iliac crests[29]
- Diagram 2: Lumbar spine anatomy[30]

10. POST-PROCEDURE MANAGEMENT

- The aim of management post lumbar puncture is to minimise post-dural puncture headache.
- Bed rest is not required[15, 17, 21]
- Repeat, blood pressure (BP), pulse rate (PR), respiratory rate (RR), oxygen saturations, temperature and Glasgow Coma Score (GCS) on completion of procedure and then one hour post procedure. Observations should then be attended at a minimum 4th hourly or repeated as required, based on the patient's clinical condition; or post sedation monitoring if sedation was used for the procedure; or until serious pathology is excluded.
- Follow normal escalation procedures such as a clinical review or emergency response call if observations breach normal parameters on the Standard Adult Observation chart.
- Hydration should be maintained. Encourage oral fluids. If a patient is Nil by Mouth (NBM) then intravenous therapy should be considered[5,7].
- Avoid strenuous activity for 24 hours post procedure.
- If a patient is having a lumbar puncture in an Outpatient setting, they should remain in for at least four hours post puncture for observation but can leave earlier as directed by a medical officer.
- Advise patient to report any new or increasing headache (particularly on arising), numbness, tingling, involuntary lower limb movement or leakage of fluid or blood from puncture site.
- The presence of any of these symptoms and/or raised temperature must be immediately reported to a Medical Officer. If a patient does exhibit any of these symptoms they must not be discharged prior to authorisation by the relevant Medical Officer.

11. CEREBROSPINAL FLUID ANALYSIS

CSF fluid collection guide:

Label specimens sequentially:

- First specimen: 0.5mL CSF (approximately 10 drops) placed in a sterile universal CSF container for measurement of glucose and protein
- Second/third specimens: 5mL of CSF divided into two sterile universal containers collected sequentially for microbiology. This volume is provided as a guide and is sufficient for commonly required tests, however for more specialised tests, or where this volume is not able to be collected please refer to the required volume for individual tests (Appendix 1) or contact microbiology.
- Fourth specimen (if xanthochromia testing required): 1mL CSF (approximately 20 drops) in a sterile universal container for xanthochromia and protect it from light (wrap sample in aluminium foil).

Examination of CSF should include the following where required[4]:

- Cell count (2mL)
- Protein and glucose analysis (2mL)
- Gram Stain and culture (2mL)
- Polymerase chain reaction (PCR) (dedicated tube - 1mL)

- Cytology for malignant cells (at time of diagnosis or to monitor progress following chemotherapy) (1mL)
- Flow cytometry for Haematology patients, pre- and post-treatment (1mL), see NOTE below.
- See Appendix 1 for expanded test list and required volumes of CSF.

NOTE:

Haematology patients:

Flow Cytometry

SGH: samples from haematology patients should be sent to the haematology laboratory for cytospin examination and, if flow cytometry is requested, RPMI should be added to the tube and clearly marked as "RPMI added for flow cytometry".
POWH- send standard CSF tubes- no addition of preserving solution is required

Flow Cytometry samples must be processed within 8 hours of collection to avoid sample degradation, and samples must be received 3 hours prior to end of working hours.
Samples that require flow cytometry analysis should be **collected Monday-Friday morning**s, received in the laboratory prior to 2pm and **marked as 'urgent'** to ensure timely receipt by the flow cytometry laboratory.

Xanthochromia testing for suspected subarachnoid haemorrhage:

- CSF for xanthochromia testing should be collected a minimum of 12 hours after suspected event.
- To avoid contamination from red cells as a result of the trauma from the lumbar puncture, CSF taken for xanthochromia should be collected into a separate container to those in which the first few mL of fluid is placed. This should be at least the third, or ideally the fourth sample. Protect this sample from the light.
- A simultaneous blood specimen should be taken for serum bilirubin and total protein measurement as these are needed to assist in interpretation.
- Additional investigations are determined by clinical presentation and provisional diagnosis. Check with the laboratory at the time of the procedure if unclear.

Neurofilament Light (NFL) are assayed in Immunology POWH and require 200 microlitres min volume.

Free Kappa Light Chains

- Are in process of method validation at POWH, and the volume of CSF required is 150 microlitres. Immunology at POWH is currently freezing the samples until validation of test is complete.
- No other NSW Health Pathology laboratory performs these CSF tests except for Immunology at POWH

12. DOCUMENTATION

- Patient healthcare record and electronic medical record (eMR)
- SESLHD consent form
- MOH clinical procedure safety checklist (electronic level 2 checklist for inpatients and level 2 checklist sticker for outpatients) Include level 3 if procedural sedation has been used
- NSW Health standard observation/ eMR
- SESLHD neurological observation chart/ eMR
- National inpatient medication chart – eMR
- eMR request for specimen investigation/analysis.

13. MONITORING and COMPLIANCE

- ims+ recording and investigation as required.

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15. VERSION AND APPROVAL HISTORY

Date	Version	Version and approval notes
September 2018	DRAFT	Catherine Molihan
October 2018	DRAFT	Draft for Comment period.
November 2018	DRAFT	Final draft endorsed by Executive Sponsor.
November 2018	DRAFT	Processed by Executive Services prior to Clinical and Quality Council approval.
December 2018	0	Approved by Clinical and Quality Council
April 2019	0	Updated information included in Section 4. Approved by Clinical and Quality Council
May 2019	0	Updated information regarding Chlorhexidine included in Section 9. Formatted by Executive Services and published.
April - December 2022	1	Section 5: Medical staff will; added dot point: • Ensure they have the relevant training and senior supervision (where required) prior to performing an LP • Section 6: diagnostic and the references reviewed and updated Updated information in 6.1, 6.2.1, 9.2 Method and Post Procedure Management. Section 6.2.2; Asasantin SR, Ticlopidine and Cangrelor discontinued and deleted from the table. Section 7; added Per eTG, initial treatment may include rehydration with intravenous fluids, strictly horizontal (head not raised) bed rest for 24 hours, and caffeine (300 mg orally) eTG - Low Cerebrospinal Fluid Pressure Headache & Guideline. Section 9 – confirmed with IPC, CEC & SGH Anaesthetics that best practice is 0.5% chlorhexidine gluconate in 70% isopropyl alcohol swab sticks as skin asepsis Section 9.2 Method Procedure (Diagnostic), minor changes to 15(b) **Deleted** *with stylet feeling initial resistance and then give and* **added** *through the introducer needle. You will feel resistance as the LP needle leaves the introducer needle and then a slight give* and Deleted previous point number 20 *If CSF flow is not evident or you strike bone, withdraw the* *needle partially, recheck the landmarks and re advance.* References updated.

Date	Version	Version and approval notes
April 2023	1	Approved by Executive Sponsor.
May 2023	1	Approved at SESLHD Drug and Therapeutics Committee.
18 December 2024	1.1	Update to wording to Section 10 Post Procedure Management: *Repeat routine observations, blood pressure (BP), pulse rate (PR), respiratory rate (RR), oxygen saturations, temperature and Glasgow Coma Score (GCS) on completion of procedure for 1 hour, repeated as required, based on the patient's clinical condition; or post sedation monitoring if sedation was used for the procedure; or until serious pathology is excluded.* Added Alzheimer's disease Beta Amyloid testing to Appendix 1.
5 September 2025	2.0	Major review coordinated by the Medicine stream: formatting updates; section 5.1 Medical imaging added; section 6.2 Imaging intensifier (II) replaced with either fluoroscopy or CT guidance; added reference to Guidelines on Perioperative Management of Anticoagulant and Antiplatelet Agents in section 6.2.2; additional information included in section 9.1 regarding equipment for Alzheimer's disease testing; additional information included in section 11 and Appendix 1 regarding Neurofilament Light (NFL) and Free Kappa Light Chains; added to section 9.1.12 - Sarstedt, 2.5 mL Low bind False bottom tube to identify required tube; added to section 9- use of bevel spinal needle and introducer; section 9.2 -Positioning of patient reworded; images in section 9.2 removed and replaced with hyperlinks; references updated; link to NSW Health Pathology catalogue added; confirmation of tests and volumes of CSF approved; CEC recommends 2% chlorhexidine in 70% alcohol for skin asepsis. Approved at SESLHD Drug and Therapeutics Committee, SESLHD Patient Safety and Quality Committee and by Chief Executive.

APPENDIX 1

Volumes of CSF required by test requested and testing laboratory.
Please refer to NSW Health Pathology Catalogue as required:

	Volume (50µL~1 drop)	Testing site	Comment
ACE	300µL	RPAH	
Adenovirus PCR	250µL	POWH	
Alzheimer's disease Beta Amyloid	250µL	Concord Hospital	Collection tube Sarstedt 2.5ml low bind false bottom tube. Gravity feed CSF directly into tube to prevent loss of the sticky protein beta amyloid. Do not spin, store in refrigerator, do not freeze.
Amino Acid	250µL	CHW	CSF and plasma must be a paired collection within one hour. CSF must be red cell free and frozen within 20 minutes.
AMPA Receptor	400µL	RBH	
Anti-Neuronal Ab	250µL	RPAH	
Anti-VGKC	200µL	RBH	
CJD 14-3-3 Protein	2500µL	The Florey, Melbourne University	Only tested if CSF RBC< 500, WBC <10 and not macroscopically blood-stained nor xanthochromic.
Cryptococcal Ag	250µL	SGH or POWH	
Culture, Gram stain, India ink & cell count	500µL	SGH or POWH	
Cytology	1000µL	SGH or POWH	
Cytospin - Haematology	200µL	SGH or POWH	
Flow Cytometry	1000µL	SGH or POWH	Deliver to lab ASAP. Must be processed within 4hrs.
GABA (Gamma-aminobutyric acid)	400µL	RBH	
Glucose	200µL	SGH or POWH	
HIV Viral Load	500µL	POWH	Must have a positive serum HIV antigen/antibody.
JC Polyoma virus PCR	250µL	POWH	
IgG Albumin ratio	150µL	POWH	
Kappa Light chains	150µL	POWH	Free Kappa Light Chains are in process of method validation at POWH, and the volume of CSF required is 150 microlitres. Immunology at POWH is currently freezing the samples until validation of test is complete. No other NSW Health Pathology laboratory performs these CSF tests except for Immunology at POWH.
Lactate	100µL	POWH	Collect on ice. Lab must centrifuge and freeze immediately.

	Volume (50µL~1 drop)	Testing site	Comment
Listeria monocytogenes PCR	250µL	SGH	
Meningococcal PCR	250µL	SGH	
Neurofilament Light	200µL	POWH	Are assayed in Immunology POWH
Neurotransmitters	200µL	CHW	Obtain special collection tubes & protocol from Pathology. Deliver to Pathology within 5 min. on ice.
NMDA Receptor Ab (N-methyl-D-aspartate Ab)	200µL	RBH	
Oligoclonal bands Protein EPG (CSF)	300µL	POWH	300µL of serum must be sent at same time.
Parechovirus PCR	250µL	POWH	
Pneumococcal antigen Strep pneumo antigen	100µL	SGH or POWH	
Pneumococcal PCR Strep pneumo PCR	250µL	SGH	
Protein	200µL	SGH or POWH	
Syphilis serology CSF	500µL	Westmead	Only if reactive blood syphilis serology.
Syphilis PCR	250µL	Westmead	Only if reactive blood syphilis serology.
TB or AFB (Microscopy/Culture)	As much as possible	SGH	Ideally 6mL
TB PCR	250µL	SGH	
Toxoplasma PCR	250µL	POWH	
Tropheryma whippelii (Whipple's Disease)PCR	500µL	Westmead	
Viral PCRs (Enterovirus, HSV, VZV, CMV, EBV)	250µL	POWH	
Xanthochromia	1000µL	SGH or POWH	Tube 4 - Protect from light by wrapping in aluminium foil.

Recommended minimum volumes for each test requested determined by on-site and referral laboratories within NSW Health Pathology. All samples should be delivered to the Central Specimen Reception at each facility for distribution to the relevant laboratory.

If a combination of tests is required, then the volumes listed in Appendix 1 are additive.

If the volume of CSF collected is restricted, then the priority of the tests should be clearly stated on the request