NGN NCLEX MASTER INFOGRAPHIC · DIAGNOSTIC PROCEDURES

LUMBAR PUNCTURE

Spinal tap for cerebrospinal fluid (CSF) sampling, pressure measurement, and intrathecal access — performed at L3–L4 or L4–L5 interspace, below the conus medullaris.

#LumbarPuncture #SpinalTap #CSF #Meningitis #NeuroNursing #L3-L4 #PostLPHeadache #NGN

Critical · Pathophys · Expected · Complications · NCLEX Trap · Procedure · Pt Education

01 · PATHOPHYSIOLOGY & PROCEDURE FLOW

HOW A LUMBAR PUNCTURE WORKS — STEP-BY-STEP

STEP 01
Position Patient
Lateral recumbent, knees-to-chest (fetal) — opens lumbar interspaces

STEP 02
Identify L3–L4
Below conus medullaris (ends at L1–L2); avoids spinal cord injury

STEP 03
Local Anesthetic
Lidocaine infiltrated; sterile prep & drape

STEP 04
Spinal Needle In
Through dura into subarachnoid space; measure opening pressure

STEP 05
Collect CSF
3–4 tubes drip-collected; sent for cell count, glucose, protein, C&S, Gram stain

OPTIMAL POSITIONING — LATERAL RECUMBENT

Why this position?

Maximally flexes the lumbar spine, opens the interspinous spaces, and lets the provider enter the subarachnoid space safely from the side.

Alternative:

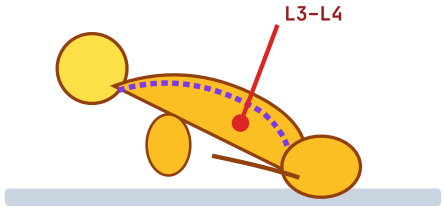
Sitting upright leaning over a bedside table (used if obese or anatomy is difficult) — but bed rest is required *after*, not during.

Nurse's role:

Hold patient in position, support behind knees and neck, encourage slow breathing, monitor for vasovagal response.

Landmark:

Iliac crests align with L4; needle enters L3–L4 or L4–L5.



Lateral Recumbent · Knees to Chest

02 · CSF FINDINGS — EXPECTED VS CRITICAL

EXPECTED (NORMAL CSF)

- ✓ **Clear & colorless** — like water
- ✓ Opening pressure `50–180 mmH₂O`
- ✓ WBC `0–5 cells/µL` (lymphocytes only)
- ✓ Glucose `40–70 mg/dL` (~⅔ of serum glucose)
- ✓ Protein `15–45 mg/dL`
- ✓ RBC `0 (none)`
- ✓ Negative Gram stain & culture

CRITICAL / REPORT IMMEDIATELY

- ⚠ **Cloudy / turbid CSF** — suggests bacterial infection
- ⚠ RBCs present — traumatic tap or subarachnoid hemorrhage
- ⚠ Glucose `< 40 mg/dL` — bacteria consume glucose
- ⚠ Protein `> 45 mg/dL` — infection or bleed
- ⚠ Opening pressure `> 200 mmH₂O` — ↑ICP risk
- ⚠ Severe HA unrelieved by lying flat & fluids
- ⚠ Nuchal rigidity, fever, photophobia post-procedure

✓ Mild post-procedure headache that improves when lying flat

⚠ Numbness, weakness, or loss of bowel/bladder control

03 · LAB VALUES — CSF INTERPRETATION

CSF PARAMETER	NORMAL RANGE	ABNORMAL FINDING	NCLEX SIGNIFICANCE
Appearance	`Clear, colorless`	Cloudy / xanthochromic / bloody	Cloudy = bacterial infection. Yellow (xanthochromia) = old blood / SAH. Bloody = traumatic tap or active hemorrhage.
Opening Pressure	`50–180 mmH₂O`	> 200 mmH_2O	Elevated = ↑ICP, meningitis, hydrocephalus, or mass — never perform LP if ↑ICP suspected (herniation risk).
WBC	`0–5 cells/µL`	↑ neutrophils (bacterial) / ↑ lymphocytes (viral)	Neutrophil predominance = bacterial meningitis (treat NOW). Lymphocyte predominance = viral or TB.
Glucose	`40–70 mg/dL (≈ ⅔ serum)`	< 40 mg/dL	Low glucose = bacteria are *eating* the glucose to grow. Strong indicator of bacterial meningitis.
Protein	`15–45 mg/dL`	> 45 mg/dL	Bacteria themselves contain protein — elevation supports bacterial cause. Mild ↑ also seen in viral / GBS.
RBC	`0 cells/µL`	Any RBCs present	RBCs in CSF are **never normal** — report. Differentiate traumatic tap (clears tube-to-tube) from SAH (uniform).
Gram Stain & Culture	`Negative`	Organism identified	Confirms diagnosis & guides antibiotic selection — start empiric IV antibiotics BEFORE results

CSF PARAMETER	NORMAL RANGE	ABNORMAL FINDING	NCLEX SIGNIFICANCE
			return.
Pre-Procedure Platelets	150,000–400,000/µL	< 50,000/µL	**HOLD the procedure & notify provider** — bleeding into spinal canal can cause epidural hematoma & cord compression.

04 · BACTERIAL VS VIRAL MENINGITIS — CSF SIGNATURE

BACTERIAL MENINGITIS

APPEARANCE
Cloudy / turbid

WBC
↑↑↑ **Neutrophils** (1,000–5,000)

PROTEIN
↑ Elevated (> 45)

GLUCOSE
↓ **Decreased** (< 40)

PRESSURE
↑ Elevated

GRAM STAIN
Often **positive**

URGENCY
Medical EMERGENCY — IV antibiotics within 1 hour

VIRAL MENINGITIS

APPEARANCE
Clear

WBC
↑ **Lymphocytes** (10–500)

PROTEIN
Normal or mildly ↑

GLUCOSE
Normal

PRESSURE
Normal or mildly ↑

GRAM STAIN
Negative

URGENCY
Supportive care; usually self-limiting

MNEMONIC — "C-L-E-A-R" FOR POST-LP CARE

C

Check

Neuro status, site for leak/hematoma, vitals q15min × 1h

L

Lie flat

Supine 6–12 hours to prevent post-LP headache

E

Encourage

PO & IV fluids — replace withdrawn CSF volume

A

Analgesic

Acetaminophen for HA; caffeine helps spinal HA

R

Report

Severe HA, fever, drainage, weakness, numbness

05 · PRIORITY NURSING LADDER

SEQUENCE OF NURSING PRIORITIES — PRE, INTRA, POST LP

1 **Verify consent & coagulation labs**

Confirm signed consent. Check platelets (> 50,000), PT/INR, aPTT. Hold anticoagulants per provider order. Report platelets < 50,000 immediately.

2 **Empty bladder & baseline assessment**

Have patient void before procedure. Record baseline neuro check, vital signs, pain level. NPO is *not* required.

3 **Position & support during procedure**

Lateral recumbent with knees drawn to chest (fetal position). Support patient, encourage slow breathing, monitor for vasovagal response.

4 **Label & transport CSF tubes**

Tubes labeled in order collected (1, 2, 3, 4). Send to lab promptly — do NOT refrigerate culture specimens.

5 **Maintain bed rest 6–12 hours**

Keep patient supine/flat to prevent post-dural-puncture headache from CSF leak.

6 **Push fluids (PO + IV)**

Encourage 2–3 L fluid intake (unless contraindicated) to replace CSF and reduce HA.

7 **Monitor for complications**

Assess site for bleeding/leak, neuro checks, signs of infection (fever, nuchal rigidity), severe HA, numbness, weakness.

8 **Document & report findings**

Document CSF appearance, opening pressure, volume removed, patient response. Notify provider of any abnormalities.

06 · CLINICAL DECISION RULES — IF / THEN

IF THIS HAPPENS → THEN YOU DO THIS

IF	THEN
Platelets are 38,000/µL pre-procedure	HOLD procedure & notify provider — bleeding into spinal canal risk; may need platelet transfusion.
Patient has signs of ↑ICP (papilledema, projectile vomiting, focal deficit)	HOLD — obtain CT first. LP can cause brain herniation if ↑ICP present.
CSF appears cloudy with low glucose	Suspect bacterial meningitis — initiate droplet isolation & expect IV antibiotics within 1 hour.

IF	THEN
Patient reports HA worse sitting up, better lying flat post-LP	Expected post-dural-puncture HA — keep flat, push fluids, give analgesic + caffeine.
HA is severe, persists despite fluids/flat position, or includes fever & nuchal rigidity	Notify provider — possible meningitis or persistent CSF leak (may need blood patch).
Clear fluid leaks from puncture site	Suspect CSF leak — apply sterile dressing, keep flat, notify provider STAT (infection & HA risk).
Patient develops new lower extremity weakness or loss of bladder control after LP	Suspect epidural hematoma — neuro emergency; notify provider immediately, prepare for imaging.
RBCs decrease across collection tubes 1 → 4	Likely traumatic tap (not pathologic). If RBCs uniform across all tubes, suspect SAH — report.

07 · NCLEX TRAPS — 8 CLASSIC PITFALLS

TRAP 01

"NPO BEFORE LP"

Many test-takers assume LP requires NPO like other invasive

TRAP 02

"SIT UPRIGHT AFTER LP"

Sounds like a way to "drain" or recover faster — but it causes

TRAP 03

"RESTRICT FLUIDS"

Because it's a "spinal" procedure, learners assume fluid restriction.

TRAP 04

"GLUCOSE 60 MG/DL IS ABNORMAL"

Looks low compared to serum glucose.

procedures.

✓ TRUTH: NPO is NOT required for lumbar puncture — patient may eat/drink normally beforehand.

severe spinal HA.

✓ TRUTH: Lie FLAT supine for 6–12 hours post-LP to prevent CSF leak headache.

✓ TRUTH: PUSH fluids (2–3 L) to replace withdrawn CSF and reduce post-LP headache.

✓ TRUTH: CSF glucose is normally ~⅔ of serum (40–70 mg/dL) — 60 is normal.

TRAP 05

"NOTIFY PROVIDER FOR ANY POST-LP HA"

HA is so common students panic and report all of them.

✓ TRUTH: Mild HA improving when supine = expected. Give analgesic, push fluids, keep flat first.

TRAP 06

"PLACE IN TRENDELENBURG"

Sounds therapeutic for "spinal" issues.

✓ TRUTH: Trendelenburg is NOT used. Keep patient flat/supine, not head-down.

TRAP 07

"PRONE WITH PILLOW UNDER ABDOMEN"

Seems logical for back access.

✓ TRUTH: Lateral recumbent with knees-to-chest (fetal) is the correct position — opens interspaces.

TRAP 08

"HGB 12.5 MUST BE REPORTED"

Distractor — students confuse Hgb with platelets when bleeding risk is mentioned.

✓ TRUTH: Platelets < 50,000 is the critical pre-LP value, not hemoglobin.

08 · NCLEX QUESTION PATTERNS

PATTERN 1 · "WHICH FINDING IS ABNORMAL?"

Look for the option that violates a hard rule: cloudy CSF, RBCs present, opening pressure > 200, or platelets < 50,000. Distractors give normal values that "sound" abnormal (glucose 60, opening pressure 100).

`CLEAR = GOOD · CLOUDY = BAD`

PATTERN 2 · "WHICH POSITION IS CORRECT?"

Always pick **lateral recumbent with knees drawn to chest**. Distractors include prone, supine, Trendelenburg, sitting upright with legs extended.

`FETAL POSITION · LATERAL`

PATTERN 3 · "BEST POST-LP ACTION?"

Default to: keep flat 6–12h, push fluids, give analgesic. Avoid options that say "notify provider immediately" for expected post-LP HA that improves when supine.

`FLAT + FLUIDS + ANALGESIC`

PATTERN 4 · "WHICH LAB TO REPORT PRE-PROCEDURE?"

Pick the coagulation/bleeding marker — platelets, INR, or aPTT. Hgb, Na+, BUN are usually distractors.

PATTERN 5 · "BACTERIAL VS VIRAL CSF"

Bacterial = cloudy + ↑ protein + ↓ glucose + neutrophils. Viral = clear + normal glucose + lymphocytes.

PATTERN 6 · "BEST TEACHING RESPONSE"

"It measures the pressure around your brain and spinal cord" or "samples fluid for testing." Avoid: "routine for all admitted pts," "relieve muscle pain."

`PLATELETS < 50K = HOLD`

`BACTERIA EAT GLUCOSE`

`PRESSURE + DIAGNOSTIC`

09 · NGN BOW-TIE — CLINICAL JUDGMENT SUMMARY

NGN BOW-TIE · LUMBAR PUNCTURE CLINICAL JUDGMENT

↩ ACTIONS TO TAKE

- Position lateral recumbent, knees-to-chest
- Have patient void before procedure
- Verify platelets > 50,000 & consent signed
- Maintain supine bed rest 6–12 hours after
- Push PO & IV fluids; offer caffeine
- Administer prescribed analgesic
- Label CSF tubes 1–4 in order collected

⚕ POTENTIAL CONDITION

- **Suspected meningitis** (bacterial vs viral)
- **↑ ICP evaluation**
- **Subarachnoid hemorrhage**
- **Multiple sclerosis dx** (oligoclonal bands)
- **Guillain-Barré** (↑ protein, normal cells)
- **Therapeutic CSF removal** (NPH, pseudotumor cerebri)
- **Intrathecal medication** delivery

📊 PARAMETERS TO MONITOR

- Vital signs q15min × 1h, then q30min × 2h
- Neuro checks (LOC, motor, sensory) q1h × 4h
- Headache severity & relationship to position
- Puncture site for bleeding or CSF leak
- Bowel/bladder function
- Lower extremity strength & sensation
- Temperature q4h × 24h (infection)

10 · PATIENT & FAMILY EDUCATION

PATIENT & FAMILY TEACHING CHECKLIST

- ☑ "You'll lie on your side, curled up like a ball — this opens your back to make the procedure safer."
- ☑ "You can eat and drink normally before the procedure — no fasting needed."

- ☑ "Empty your bladder before we start — you'll need to lie flat afterward."
- ☑ "Tell us right away if you feel sharp pain, tingling, or shooting sensations down your legs."
- ☑ "Drink plenty of fluids (water, juice, caffeinated drinks help) — your body will replace the fluid we removed."
- ☑ "Avoid heavy lifting or strenuous activity for 24 hours."
- ☑ "Call right away if you have severe headache, fever, neck stiffness, or fluid leaking from the site."
- ☑ "Results of the spinal fluid test usually come back within hours to a few days."
- ☑ "You may feel pressure or a brief sting when the numbing medicine goes in."
- ☑ "After the procedure, lie flat for 6–12 hours — this prevents headaches."
- ☑ "A mild headache is common — Tylenol and lying flat usually help."
- ☑ "Keep the bandage clean and dry; you can usually remove it after 24 hours."
- ☑ "Report any numbness, weakness, or trouble controlling your bladder or bowels."
- ☑ "You won't be paralyzed by this — the needle goes in below where the spinal cord ends."

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