

# **STANDARDIZED PROCEDURE**

## **NEONATAL LUMBAR PUNCTURE (Neonatal)**

### **I. Definition**

The lumbar puncture is used to sample the cerebral spinal fluid (CSF) to determine if an infection exists, to diagnose certain disease states, or (with order of Attending/Fellow) to drain CSF in cases of hydrocephalus.

### **II. Background Information**

#### **A. Setting**

Inpatient neonatal patients or outpatient during Emergency Transport of neonatal patients. If appropriate, implement procedural support, if available- make sure Child Life is involved, and use age appropriate language and age appropriate developmental needs with care of children.

#### **B. Supervision**

The necessity of the procedure will be determined by the Advanced Health Practitioner (AHP) in verbal collaboration with the attending physician or his/her designee. Direct supervision is necessary until competency is determined and the minimum number of procedures is successfully completed, as provided for in the protocol. After that time, the attending physician or his/her designee must be available.

Designee is defined as another attending physician who works directly with the supervising physician and is authorized to oversee the procedures being done by the AHP.

#### **C. Indications**

1. To diagnose central nervous system (CNS) infection. A lumbar puncture is a routine part of a septic work-up if an infant is stable. Starting antibiotics will not be postponed until the lumbar puncture is completed.
2. To monitor efficacy of antimicrobial therapy in the presence of CNS infection
3. To diagnose subarachnoid hemorrhage
4. To diagnose CNS involvement with leukemia
5. Some infants with metabolic disease or encephalopathy of unclear etiology will also require examination of the CSF for diagnosis.
6. To drain CSF in communicating hydrocephalus associated with intraventricular hemorrhage

#### **D. Precautions/Contraindications**

1. Coagulopathy
2. Superficial infections at or near puncture site.

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3. Known or suspected increased intracranial pressure
4. Lumbosacral anomalies
5. Respiratory instability.
6. Cardiovascular instability

The AHP will notify the physician immediately under the following circumstances:

1. Patient decompensation or intolerance to the procedure
2. CSF drainage that is not resolved.
3. Outcome of the procedure other than expected

**III. Materials**

1. Hat
2. Mask
3. Sterile gloves
4. LP tray
5. ChloroPrep
6. Extra LP needle (#22 gauge)
7. 4x4's
8. Morphine Sulfate or other pain medication

**IV. Neonatal Lumbar Puncture**

**A. Pre-treatment evaluation**

1. Check appropriate labs as necessary

**B. Set up (if applicable)**

1. Don mask and hat. Wash hands. Open LP tray, add ChloroPrep, extra needle, and 4x4's.
2. Don sterile gloves.

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**C. Patient Preparation**

1. Attempt to inform the patient/family of the treatment plan ahead of time, otherwise notify them after the procedure is completed. A consent must first be obtained for patients on Newborn Services
2. Monitor the infant's cardiac and respiratory status throughout the procedure, as airway obstruction may occur from positioning for the procedure.
3. Premedicate infant for pain control and assess need for further pain medication throughout procedure.

**D. Procedure**

1. Perform time out with all appropriate steps.
2. The most important step is positioning the patient. Have assistant hold infant in a sitting or lateral position with spine flexed.
3. Scrub site with ChloroPrep. Allow to dry.
4. Place sterile towel under infant.
5. Drape infant with sterile towels, or place sterile 4x4 on iliac crest.
6. At the level of the iliac crest, palpate the third intervertebral space (between L3-L4 or L4-L5).
7. Insert a #22- or #23-gauge spinal needle slowly with stylet in place into the intervertebral space, toward the umbilicus. Use two fingers to guide the needle and thumbs to slowly advance. Advance several millimeters at a time and withdraw stylet frequently to check for CSF flow. In small infants, one may not feel a "pop" as the dura is penetrated.
8. If resistance is met, withdraw the needle to the skin surface and redirect the angle slightly.
9. Allow fluid to drip by gravity. Collect the fluid (1/2 – 1 ml per tube), reinsert the stylet, and remove the needle.
10. Apply pressure, clean antiseptic from the skin, and place bandaid over site.

**E. Follow-up treatment**

1. Send CSF for:
  - Tube 1 - culture
  - Tube 2 - glucose and protein
  - Tube 3 - cell count and differential

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**F. Termination of treatment**

The procedure will be discontinued in the event of cardiac or respiratory compromise, hematoma at site, or if bloody CSF fluid does not clear.

**G. Potential Complications:**

1. Hypoxemia from positioning.
2. Aspiration.
3. Contamination of CSF with blood due to puncture of vein on posterior surface of vertebral body.
4. Infection.
5. Intraspinal dermoid tumor formed from epithelial tissue introduced into spinal canal by needle (without stylet).
6. Spinal cord puncture and nerve damage if puncture site is above L<sub>2</sub>.
7. Spinal subdural / epidural hematoma in patient with a bleeding disorder.

**IV. Documentation**

**A. Documentation is in the electronic medical record**

1. Documentation of the pretreatment evaluation and any abnormal physical findings.
2. Record the time out, indication for the procedure, procedure, type and size of needle used, amount of CSF removed, color and clarity of CSF, EBL, how the patient tolerated the procedure, medications (drug, dose, route, & time) given, complications, and the plan in the note, as well as what labs were sent on CSF.

**B. All abnormal findings are reviewed with Attending or supervising physician**

**CSF NORMAL VALUES**

**Protein**

Preterm	65-150 mg/dl
Term	20-170 mg/dl
Child	5-40 mg/dl

**Glucose**

It is important to compare the CSF glucose to the serum glucose, so a serum glucose should be sent at the same time.

Preterm	24-63 mg/dl
Term	34-119 mg/dl

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Child	40-80 mg/dl	
<b>CSF Glucose/Blood Glucose (%)</b>		
Preterm	55-105	
Term	44-128	
Child	about 50	
<b>Cell Count</b>		<b>% PMN's</b>
Preterm	0-25.4 WBC/mm <sup>3</sup>	57
Term	0-22.4 WBC/mm <sup>3</sup>	61
> 1 month	0-7	0

**V. Competency Assessment**

**A. Initial Competence**

1. The AHP will observe the procedure in its entirety at least once. Under the direct supervision of the attending physician the AHP will perform neonatal lumbar puncture successfully **three** times and will be evaluated for competence and technical skill.
2. The AHP will demonstrate knowledge of the following:
  - a. Medical indication and contraindications of neonatal lumbar puncture
  - b. Risks and benefits of the procedure
  - c. Related anatomy and physiology
  - d. Consent process (if applicable)
  - e. Steps in performing the procedure
  - f. Documentation of the procedure
  - g. Ability to interpret results and implications in management.
3. The AHP will ensure the completion of competency sign off documents and send them directly to the medical staff office.

**B. Continued proficiency**

1. The AHP will demonstrate competence by successful completion of the initial competency.
2. Each candidate will be initially proctored and signed off by an attending physician. AHPs must perform this procedure at least **three** times per year. In cases where this minimum is not met, the AHP must demonstrate skill with this procedure in a simulation or skills lab, or the attending, must again sign off the procedure for the AHP. The AHP will be signed off after demonstrating 100% accuracy in completing the procedure.
3. Demonstration of continued proficiency shall be monitored through the annual evaluation.

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4. A clinical practice outcomes log is to be submitted with each renewal of credentials. It will include the number of procedures performed per year and any adverse outcomes. If an adverse outcome occurred, a copy of the procedure note will be submitted.

**VII. RESPONSIBILITY**

Questions about this procedure should be directed to the Chief Nursing and Patient Care Services Officer at 353-4380.

**VIII. HISTORY OF POLICY**

Initial policy approved 1986 by CIDP and EMB

Revised 4/89, 1/93, 5/01, 7/03, 12/05, 6/08, 2/11

Revised most recently July 2012 by Subcommittee of the Committee for Interdisciplinary Practice

Reviewed most recently July 2012 by the Committee on Interdisciplinary Practice

Approved most recently July 2012 by the Executive Medical Board and the Governance Advisory Council.

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