PURPOSE

A Lumbar Puncture (LP) is a procedure that is performed to obtain information about the Cerebral Spinal Fluid (CSF). It is usually done for diagnosis of disease or infection but is also done for therapeutic reasons.

STANDARDS

A lumbar puncture is performed by a physician who is experienced in performing lumbar punctures.

If patient is receiving IT chemotherapy, no other drugs, other than those required for sedation/analgesia, are to be taken into the treatment room.

INDICATIONS

- **Diagnosis**:
  - meningitis
  - subarachnoid hemorrhage
  - central nervous system diseases (such as Guillain-Barre syndrome)
  - central nervous system infiltration of malignancy (leukemia, lymphoma)
- **Therapeutics:**
  - instillation of chemotherapy
  - spinal anesthesia/analgesia
  - instillation of contrast media for spinal cord imaging
  - removal of CSF in the treatment of idiopathic intracranial hypertension (pseudotumor cerebri

CONTRA-INDICATIONS/PRECAUTIONS

- Increased Intracranial Pressure (ICP) - patients with increased ICP are at risk for cerebral herniation when LP performed. CT of the head must be obtained in patients suspected of having increased ICP before attempting an LP.
- Infected skin over the needle entry site.
- Platelet transfusion to increase platelet count above 50 X 10^9/litre is recommended prior to a diagnostic LP for newly diagnosed patients with leukemia to minimize the risk of a traumatic LP. Threshold for stable patients requiring an LP to receive prophylactic platelet transfusions is 20 x10^9/L or at discretion of physician. Transfusions at a higher level **may** be required for patients with signs of bleeding, high fever, rapid fall in platelet count, concomitant coagulation abnormality, critically ill patients, and those with impaired platelet function (including drug induced).

Severe sepsis - an unstable patient who may have bacterial meningitis should have blood cultures done and receive antibiotics immediately. The LP can be performed when the child's condition stabilizes.

- Cardiopulmonary instability - the position in which the patient must be placed may result in further cardiopulmonary compromise.
- Coagulopathy - correct abnormality before performing LP.

EQUIPMENT

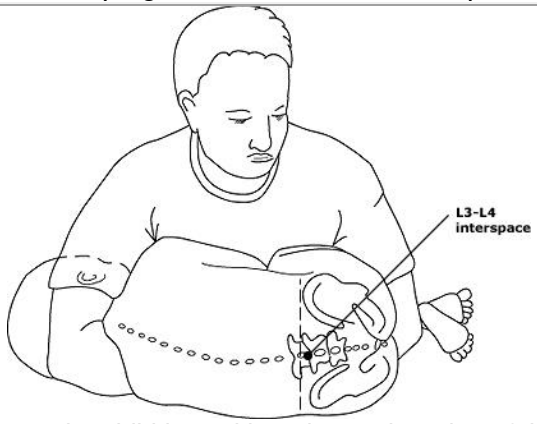
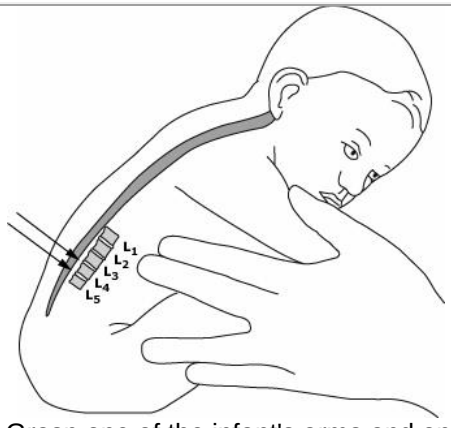
- **LP tray** – (FIGURE 1) Adult or pediatric trays contain syringe and needle, 3-4 numbered specimen tubes with cap (10mL), prep cup, 3 sponge swab sticks, 3 gauze sponges, towel, fenestrated drape, spinal needle and puncture site band-aid. In addition the adult tray contains manometer and stopcock)
- vial lidocaine hydrochloride 1% or 2% per physician's preference
- sterile gloves
- chlorhexidine gluconate (CHG) 2% with 70% alcohol solution or CHG 2% with 70% alcohol swabsticks x 3
  - *For areas that do not use CHG solution frequently it is best to use swabsticks as bottle of CHG 2% with 70% alcohol has a short shelf life once opened. Once the solution bottle has been opened for the first time, there is a risk of contamination and it must be discarded after 30 days.*

- *Label bottled solution with date and time opened. If bottle not dated, do not use.*
- additional spinal needle if needle in tray not appropriate size
- stamped requisitions and CSF labels
- sedation medications as required
- refer to equipment checklist on reverse of sedation record for additional equipment needed if sedation used
- intrathecal medications as ordered: see Intrathecal Chemotherapy Administration Procedure and Process



FIGURE 1

PROCEDURE	***Rationale***
1. **IDENTIFY** patient and **EXPLAIN** procedure.	*Failure to correctly identify patients prior to procedures may result in errors.*
2. **PROVIDE** patient/family teaching as required**. OBTAIN** assistance of child life therapist to help prepare child for procedure as appropriate. **PLAN** non-pharmacological strategies with patient/family. Consider sucrose analgesia for infants.	*Reduces child and family's anxiety. Evaluates and reinforces understanding of previously taught information and confirms consent for procedure.*
3. **APPLY** local anesthetic cream to LP site as required. **Apply lidocaine/prilocaine (EMLA) 45 minutes before procedure OR tetracaine (Ametop) 30 minutes before procedure**.	*Provides superficial sensory analgesia.*
4. **ADMINISTER** oral sedation if ordered. **If midazolam ordered, administer 15 minutes before procedure unless otherwise indicated by physician. MONITOR** patient as per Procedural Sedation and Analgesia Guidelines for Oral Sedation.	
5. Physician (or RN and physician) will **PREPARE** IV sedation/analgesia medications if using and **LABEL** syringe(s) with drug name, dose and dilution. **NOTE:** IV sedation restricted to Critical Care areas and Oncology Clinic.	*Labeling ensures correct drug is being administered.*
6. **PERFORM** hand hygiene and **ASSIST** physician to prepare LP tray as needed.	*Routine infection control practices; Prevents transmission of micro-organisms.*
7. **OBTAIN** assistance of 2nd RN and child life specialist as needed.	*2 RNs are usually required: 1 to assist with positioning/holding and 1 to monitor patient and document vital signs.*
8. **ESCORT** patient and parent/caregiver (if wishes to be present) into the treatment room.	*Family member presence during invasive pediatric procedures reduces patient anxiety.*
9. **COMPLETE** a **"Time-out"** procedure with all that	*The "Time Out" is a momentary pause taken by the*

are present in the procedure room (i.e. physicians, RNs, patient and parents) before the sedation is given or before procedure is initiated if no sedation is given by verbally confirming the following: a. correct patient (by verifying information on ID band along with parent/adult confirmation) b. correct site c. correct procedure(s) d. medication allergies e. NPO status (if using sedation) f. Informed consent g. pre-meds have been given h. that IT medications are in the room as appropriate (i.e. IT chemotherapy)	*team just before the procedure in order to confirm that several essential safety checks are undertaken and involves everyone on the team.*
10. **ASSESS** neurovital signs if ordered or indicated.	
11. Physician will **ADMINISTER** IV sedation and analgesia as required. **MONITOR** patient as per Sedation/Analgesia Guidelines.	
12. **POSITION** patient in the **lateral recumbent** (FIGURE 2) position with hips, knees and shoulders curled toward chest, keeping the back as relaxed as possible. A small pillow can be used to support the head. It is recommended that patients be held at the level of the shoulders to avoid neck flexion and prevent possible airway obstruction. **OR** **POSITION** patient in the **sitting** (FIGURE 3) position on the side of the stretcher with feet raised on a chair if needed, and leaning forward to flex the hips and cuddling a pillow or hunching over another person keeping the back as relaxed as possible.	*Placing the patient in the correct position is one of the most important parts of the procedure and can often make the difference between a successful and unsuccessful LP.* *These positions assist in opening the intervertebral spaces.* *Neck flexion does not increase the intervertebral space and may increase morbidity.*
 **FIGURE 2:** The child is positioned near the edge of the examining table. Place one arm around the posterior aspect of the child's neck at the shoulder level and the other arm under the child's knees to hold the child in optimal position. The child's hips and shoulders should be kept perpendicular to the table in order to maintain spinal alignment without rotation. Adequate restraint is maintained by holding onto your own wrists.	 **FIGURE 3:** Grasp one of the infant's arms and one of the legs in each hand while supporting the head to prevent excessive flexion at the neck. Older children should be asked to sit with their legs hanging over the edge of the examining table. They can be flexed over a pillow with the elbows resting on the knees. An assistant may be helpful, even in a cooperative child, in maintaining alignment throughout the procedure.
13. **PROVIDE** non-pharmacological strategies as	

planned (music, movies, books, sucrose analgesia for infants, etc) in collaboration with child life if present.	
14. Physician will **PERFORM** lumbar puncture. **ENSURE** chlorhexidine solution is allowed to air dry completely before LP needle insertion. During procedure, **OBSERVE** the patient for symptoms of respiratory distress, pain, nausea and headache and **MONITOR** IV site (if applicable).	*CHG is neurotoxic.*
15. After needle removal, **APPLY** firm pressure to site with sterile gauze for at least 30 seconds and then apply a small sterile band-aid to the site.	*To prevent CSF leakage.*
16. **LABEL** CSF specimens and **COMPLETE** appropriate requisitions before leaving treatment room. **PLACE** specimens in plastic transport bags and arrange for transport to laboratory immediately. Usually 2-4 tubes are filled with approximately 1 mL in each tube. ○ #1: protein and glucose levels ○ #2: gram stain, C&S ○ #3: cell count and differential ○ #4: other as indicated **NOTE:** Ensure person transporting specimen knows that CSF specimens MUST be handed to a technician in the lab.	*Mislabeled specimens or incomplete requisitions can lead to unacceptance of specimens.*
17. **REMOVE** equipment and **DISPOSE** of appropriately. **PERFORM** hand hygiene.	*Routine infection control practices; Prevents transmission of micro-organisms.*
18. **RETURN** patient to room and **ENCOURAGE** patient who has received chemotherapy to lie flat (supine or prone) for at least 15 minutes. **CONTINUE** to monitor sedated patient until arousal score greater than 2 per Procedural Sedation and Analgesia Guidelines.	*There is no need for the patient to lie supine as studies have shown no benefit in preventing headache.* *Patient position may play a role in the circulation of intrathecal medications in the CSF.*
19. **MONITOR** patient for side effects of LP: ○ observe LP site for leakage, bleeding, swelling at 1 hr and 3 hrs post LP (band-aid to be removed within 24 hours post procedure) ○ monitor for headache, backache	*Leakage of CSF may cause post LP headache.*

DOCUMENTATION

DOCUMENT in appropriate record(s):

- procedure and time
- time-out procedure
- sedation and analgesia given and effectiveness, including vital sign recording pre, during and post procedure
- non-pharmacological strategies used and effectiveness
- name of physician performing LP
- specimens obtained
- chemotherapy or other intrathecal drugs administered if any
- assessment of puncture site post procedure
- patient's response to procedure

- unexpected outcomes and related treatment
- patient/family education
- any other pertinent actions or observations

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