	<p>Policies and Procedures</p> <p><b>RNSP: Advanced RN Intervention LPN Additional Competency</b></p> <p>Title: <b>CEREBROSPINAL (CSF) DRAINAGE – EXTERNAL LUMBAR DRAIN – ASSISTING WITH INSERTION, CARE OF, ASSISTING WITH REMOVAL</b></p> <p>ID Number: <b>1126</b></p>
<p>Authorization</p> <p>[x] SHR Hospital Nursing Practice Committee</p>	<p>Source: Nursing</p> <p>Date Revised: Jan 2017</p> <p>Date Effective: June 2000</p> <p>Scope: <b>SHR Acute Care: RUH</b></p>

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**DEFINITIONS:**

**External Lumbar Drain**-This is a device that diverts cerebro-spinal fluid (CSF) from the subarachnoid space into a closed drainage system. It is used to shunt CSF away from a dural-cutaneous fistula or dural tear decreasing the fluid pressure and allowing the defect to contract or approximate to a size that is conducive to healing.

**Intrathecal** - within a sheath; through the theca of the spinal cord into the subarachnoid space.

**Neurosurgeon** refers to the Neurosurgeon or neurosurgical residents or intensivist

**ROLES:**

**Graduate Nurses (GNs)** – GNs identified by their manager in targeted practice settings will be certified in this RN Speciality Practice; Advanced RN Intervention of External Cerebrospinal (CSF) Drainage - External Lumbar Drain - Assisting with the Insertion, Care of , Assisting with Removal. With direct supervision of a certified RN for patients requiring an external lumbar drain for CSF drainage.

**Licensed Practical Nurses (LPNs) LPN** certification for this additional competency is under review by the SHR Nursing Practice Committee. As assigned, LPNs currently educated in external lumbar drains for CSF drainage may continue to care for patients requiring a lumbar drain. LPNs requiring initial certification or education will not be certified or educated until the review is completed.

**Registered Nurses (RNs)** – RNs identified by their manager in targeted practice settings will be certified in this RN Speciality Practice; Advanced RN Intervention of External Cerebrospinal (CSF) Drainage - External Lumbar Drain - Assisting with the Insertion, care of, Assisting with Removal.

## 1. PURPOSE

- 1.1 To describe the set-up and maintenance of the External CSF Drainage system used as an external lumbar drainage system.
- 1.2 To maintain consistent standards for monitoring CSF drainage and the patients neurological status.
- 1.3 To minimize the risk of infection, damage, displacement and other complications associated with the care and use of an External Lumbar Drainage system.

## 2. POLICY

- 2.1 The RN certified in this RNSP will have first completed the following learning modules/activities prior to assisting with insertion, care of, assisting with removal of External Cerebrospinal (CSF) Drainage - External Lumbar Drains independently:
  - Attended an educational session on External Lumbar Drains,
  - Completed the learning package and quiz and returned it to the CNE
  - Complete skills checklist with a certified RN during first insertion, to validate and ensure safety checks are followed appropriately.
- 2.2 Neurosurgeon Order Required
  - For the position of the external lumbar drainage system by ordering a pressure level (cmH<sub>2</sub>O) in relation to the zero reference point (PICU: pressure level is always in mmHg)
  - For any pressure level adjustments. In addition an hourly volume to be drained may be ordered
  - For the frequency of monitoring the patient's neurological status and vital signs
  - For sampling CSF
  - Patient activity while the lumbar drain is in situ.
  - For clamping of lumbar drainage system in relation to activity or trial of clamping
- 2.3 Special Considerations
  - Insertion and removal are performed using strict aseptic technique. When caring for the external drainage system, maintain a sterile, closed system to prevent infection
  - Chlorhexidine is the antiseptic of choice.
  - For inadvertent tubing disconnections a padded forcep and sterile dead ender cap is required to be with the patient at all times
- 2.4 Neurosurgeon Responsibilities
  - Will obtain consent for the procedure
  - Will apply the Initial dressing. Subsequent dressing changes can be performed by the nurse
  - Will flush an obstructed lumbar catheter and drainage system as needed
  - Will access the drain tubing patient stopcock for administering intrathecal medications
  - Will access the patient line stopcock for CSF sampling
  - Will remove the lumbar catheter and drainage system
- 2.5 Certified RN/certified LPN Responsibilities
  - Will monitor the patient position, head of bed and bed height to maintain the ordered zero reference and pressure level

- Must clamp lumbar drainage system when changing patient position or during transport (patient specific orders may be written)
- Will monitor lumbar drainage system q1h and patient temperature q4h unless otherwise ordered.
- Will monitor the patient's neurological status as ordered by the Neurosurgeon
- Will access the drip chamber stopcock only for CSF sampling
- Must accompany the patient when transported off the ward

### 3. PROCEDURE

#### 3.1 Assisting with Insertion (insertion procedure can be done on the unit)

##### 3.1.1 Supplies

- Disposable Epidural tray SKU#51006  
or
- Lumbar puncture tray SKU#51040 if sampling CSF or checking opening pressure
- Epidural catheter of appropriate size
- External drainage and monitoring system SKU #43300
- Laser level SKU #43301
- Surgical Clipper and disposable head
- Dedicated IV pole
- Padded Forcep
- Sterile Dead Ender
- Requisitions and sterile specimen containers for CSF sampling
- Alcohol based hand rub (ABHR)
- Mask with shield (s)
- Sterile gown(s)
- Sterile gloves
- Sterile towels & drape (with centre hole)
- Antiseptic Solution (Chlorhexidine)
- Incontinent pad(s)
- 1% Lidocaine Hydrochloride without Epinephrine Injection
- Syringes 6 ml and 12 ml
- 25 gauge needle
- Sodium Chloride Injection, 10 ml (system flush)
- Surgical stapler
- Curved needle suture package (2.0 Prolene, 3.0 Vicryl)
- Chlorhexidine 2% with 70% Alcohol swabs
- Sterile occlusive transparent dressing

3.1.2 Verify correct patient with 2 identifiers

3.1.3 Ensure informed consent is obtained. Document.

3.1.4 Perform baseline neurological assessment and vital signs. Record data on appropriate record.

3.1.5 Position patient in lateral position with the patient's back to the edge of the bed, head and neck flexed and knees drawn up to the chest. It will be necessary to support the patient in this position by holding him/her behind the shoulders during the procedure.

3.1.6 Assist Neurosurgeon with the following as required

3.1.6.1 Neurosurgeon to assemble CSF drainage system according to manufacturer's instructions (Certified RN does in ICU and PICU)

**Note: Ensure Neurosurgeon has flushed system prior to connecting to patient**

- 3.1.6.2 Hand Hygiene
- 3.1.6.3 Clip hair using the surgical clipper, prepare skin with antiseptic solution
- 3.1.6.4 Drape
- 3.1.6.5 Open sterile trays
- 3.1.6.6 Hand Hygiene and don sterile gloves and PPE
- 3.1.6.7 Neurosurgeon infiltrates site with local anesthetic, inserts the lumbar catheter, secures the catheter with sutures and connects the catheter to the primed drainage system tubing.

**Note:** An opening CSF pressure may be done prior to the tube being connected.

- 3.1.6.8 Observe CSF color and clarity
  - 3.1.6.9 Neurosurgeon applies a sterile occlusive transparent dressing which will remain in place until the catheter is removed or dressing becomes soiled or displaced.
  - 3.1.6.10 Ensure the tubing is secure
  - 3.1.6.11 Ensure CSF drainage system is mounted on dedicated IV pole. (See Appendix A Figure 1)
  - 3.1.6.12 Attach the laser level ( Appendix A Figure 2)
- 3.1.7 Level the lumbar drainage system in relation to the floor. (See Appendix A Figure 3)
- 3.1.8 Level the lumbar drainage system in relation to the patient. (See Appendix A Figures 4 & 5) Loosen the screw and adjust the height of the drainage system centering the laser pointer to the patient's lumbar insertion site, or bed surface as ordered. This represents the zero reference point.
- 3.1.9 Positioning the Drip/collection Chamber. (See Appendix A Figure 6) Loosen the screw and slide the colored drip chamber pressure reference line to the ordered pressure setting in cm H<sub>2</sub>O or mm HG. Tighten screw to secure. The pressure level line may be ordered as zero or a negative value for lumbar drainage.  
Open system stopcock to allow CSF to drain from patient and observe for CSF dripping into the drip chamber or movement of fluid in the tubing. Assess status of slide clamps and stopcocks.
- 3.1.10 Send CSF specimens as ordered.
- 3.1.11 Documentation for insertion:
- 3.1.11.1 Nurse's Progress Notes/Flow Sheet
    - date and time of insertion
    - name of physician
    - how patient tolerated the procedure
    - color, consistency and amount of CSF drainage
    - baseline and post procedure neurological assessment and vital signs
    - height of head of bed and pressure level of drip chamber (cmH<sub>2</sub>O)
    - condition of dressing
    - specimens sent
  - 3.1.11.2 Nursing Care Plan
    - date of insertion
    - ordered pressure level of drip chamber
    - ordered patient position and activity
    - specimens sent
    - frequency of neurological signs and vital signs

- range of hourly CSF drainage ordered
  - frequency of dressing assessment
  - when and/or if to clamp tubing
- 3.1.11.3 MAR
- Any medications administered, including 2% Lidocaine

### 3.2 Care of External CSF Lumbar Drainage System (For additional information please see learning package)

- 3.2.1 Supplies to be kept at bedside
- Designated IV pole
  - Laser level (SPD# 43301)
  - Sterile dead ender to apply to drip chamber stopcock/sampling port or lumbar catheter
  - Padded forcep
  - Chlorhexidine 2% with 70% Alcohol swabs
- 3.2.2 Leveling the external CSF drainage system
- 3.2.2.1 Ensure external CSF drainage system is mounted on designated IV pole.
- 3.2.2.2 Attach laser level if not already attached (Appendix A figure 2)
- 3.2.2.3 Level the lumbar drainage system in relation to the floor. (See Appendix A figure 3)
- 3.2.2.4 Level the lumbar drainage system in relation to the patient. (See Appendix A Figures 4 & 5) Loosen the screw and adjust the height of the drainage system centering the laser pointer to the patient's lumbar insertion site, or bed surface as ordered. This represents the zero reference point.
- 3.2.2.5 Open system stopcock to allow CSF to drain from patient and observe for CSF dripping into the drip chamber or movement of fluid in the tubing. Assess status of slide clamps and stopcocks.
- 3.2.2.6 If the patient position changes the system has to be leveled to the ordered zero reference point again. The drip chamber is not adjusted unless the Neurosurgeon changes the order for the pressure level line in relation to the zero reference point.
- 3.2.2.7 Utilize 'lock out' on the bed controls to avoid inadvertent bed position changes. Place signage "Do Not Adjust Bed" appropriately.
- 3.2.3 Monitor the following parameters:
- 3.2.3.1 The patient's **neurological status** utilizing the Glasgow Coma Scale q2h or as ordered. Notify Neurosurgeon of any change in neurological status.
- Signs/symptoms of over drainage include:
    - Headache - worse when head of bed raised
    - Decreased level of consciousness
    - Nausea, vomiting
    - Visual disturbances
    - Limb weakness
    - Hyponatremia
    - in infants -sunken fontanel, irritability, tachycardia
    - Low Intracranial pressure (ICP) reading (ICP monitoring performed in Critical care unit only)
  - Signs/symptoms of under drainage include:
    - Continued CSF leak (otorrhea or rhinorrhea)
    - Decreased level of consciousness
    - Headache – worse when head of bed lowered
    - Change in motor response
    - Pupillary changes

- Visual disturbances
  - Irregular or decreased respiratory rate
  - Nausea, vomiting in infants-bulging fontanel, irritability and lethargy, hypertension, bradycardia, apnea, sun setting eyes, poor feeding
  - Increased ICP reading (ICP monitoring performed in Critical care areas only)
    - Changes in sensation of upper and lower extremities
    - Changes in motor function of upper and lower extremities
    - Changes in bowel and bladder function
- 3.2.3.2 Patient's **vital signs** as ordered. **Temperature** should be monitored q4h. Record on appropriate clinical record. Report elevated temperature to the neurosurgeon. (CSF may be ordered for C&S).
- 3.2.3.3 The **external CSF drainage system** q1-2h and as necessary for patency by observing for CSF dripping into the drip chamber, appropriate position of slide clamps and stopcocks, and for kinks or disconnects in tubing.
- Note:** *If lumbar catheter inadvertently disconnects from the CSF drainage system tubing, clamp the catheter with a padded forcep and apply a sterile dead ender cap. Notify the Neurosurgeon and obtain a new CSF drainage system for the Neurosurgeon (Certified RN does in ICU and PICU) to reconnect.*
- 3.2.3.4 **CSF** volume, color and clarity q1-2h or as ordered. Record amount of CSF drainage on appropriate fluid balance record.
- Note:** *Reassess patient and notify Neurosurgeon immediately if drainage begins to accumulate very rapidly (i.e. greater than 20mls/hr for adults, 10-15mls/hr for pediatrics) or notify neurosurgeon if there is no drainage in tubing as there could be possible catheter occlusion.*
- 3.2.3.5 The **lumbar dressing** should remain occlusive and transparent. If it becomes soiled or wet, notify the Neurosurgeon. Observe for signs of infection, redness, swelling, and discharge around the insertion site.
- 3.2.4 Emptying the Drip chamber into the Collection Bag
- 3.2.4.1 Record amount of CSF in the drip chamber on appropriate record
  - 3.2.4.2 Position the system stopcock with 'off' to the patient line
  - 3.2.4.3 Position the drip chamber stopcock with 'off' to the sampling port.
  - 3.2.4.4 Drain the CSF into the collection bag
  - 3.2.4.5 Position the drip chamber stopcock with 'off' to the drip chamber (See Appendix B Figure 4).
  - 3.2.4.6 Position the system stopcock with 'off' to the dead ender to open patient line
- 3.2.5 Clamping of the external CSF drainage system for patient activity/mobility and patient transport
- 3.2.5.1 Obtain Neurosurgeon order to clamp external drain indicating appropriate amount of time allowable for activity or transporting patient (i.e. for toileting purposes). The neurosurgeon may order the external CSF lumbar drainage system to be repositioned to a different zero reference point rather than clamping the drain.
  - 3.2.5.2 For patient activity/mobility -- Clamp by positioning system stopcock with 'off' to the patient line (see appendix B). Reposition patient in bed or up to a chair, level to the zero reference point and rotate the stopcock with 'off' to the dead ender. This opens the line to the patient.

- 3.2.5.3 For patient transport--Record CSF volume in drip chamber then drain CSF into collection bag. (See 3.2.4 above).While clamped the drainage system can be left hanging on designated IV pole or added to another IV pole.
- 3.2.5.4 Certified RN/LPN accompanies patient off the unit.

### 3.2.6 CSF Sampling

- 3.2.6.1 Physician order required. Generate computer requisitions.

**Note:** *If sampling for "Suspect Creutzfeldt-Jakob Disease (CJD)" please follow protocols listed in Infection Prevention and Control Policy #40-40*

#### 3.2.6.2 Supplies

- Requisitions
- Sterile specimen containers
- Chlorhexidine 2% with 70% Alcohol swabs
- 6ml Syringe
- Sterile dead ender
- Alcohol based hand rub (ABHR)
- Face shield/mask or goggles
- Sterile gloves

- 3.2.6.3 Perform hand hygiene and don PPE

- 3.2.6.4 Position system stopcock with 'off' to the patient line (see appendix B)

- 3.2.6.5 Remove dead ender

- 3.2.6.6 Vigorously scrub sampling port with chlorhexidine/alcohol swab. Allow to air dry for 1 minute.

- 3.2.6.7 Attach sterile syringe to sampling port

- 3.2.6.8 Position the drip chamber stopcock with 'off' to the collection bag' (see appendix B figure 4).

- 3.2.6.9 Aspirate 3-5 ml of CSF or available amount

- 3.2.6.10 Position the drip chamber stopcock with 'off' to drip chamber

- 3.2.6.11 Remove syringe and apply sterile dead ender

- 3.2.6.12 Confirm CSF drainage system is leveled and open system stopcock to patient

- 3.2.6.13 Maintaining sterile technique transfer the CSF from syringe into specimen tube(s). Label tube(s). (samples will be discarded by lab if incorrectly labeled or requisition(s) not signed)

**Note:** *CSF specimens cannot be sent to the hospital lab via the pneumatic tube system as it destroys cells. Have the unit support worker or lab porter transport.*

**Note:** *Only the neurosurgeon may sample CSF from the patient stopcock (closest to the insertion site) on the CSF drainage tubing*

### 3.2.7 Replacing the Collection Bag

- 3.2.7.1 Supplies

- 3.2.7.2 Obtain collection bag from SPD SKU#43310

- 3.2.7.3 Chlorhexidine 2% with 70% Alcohol swabs

- 3.2.7.4 Sterile gloves

- 3.2.7.5 Face shield/mask or goggles

- 3.2.7.6 Maintain sterile technique when replacing the collection bag. Face shield/mask and sterile gloves are worn.

- 3.2.7.7 Ensure the drip chamber stopcock is positioned with 'off' to the drip chamber. (see appendix B) (This stops the flow of CSF to the collection bag and allows the bag to be changed.)

- 3.2.7.8 Using the clamp on the collection bag, occlude the tubing leading to the collection bag.
- 3.2.7.9 Scrub the connection. Twist the connector on the bag counter clockwise to disengage.
- 3.2.7.10 Connect the new bag to the tubing and hang collection bag on built in hooks.
- 3.2.7.11 Open clamp on the collection bag.
- 3.2.7.12 Dispose of the used collection bag in biohazardous waste as per hospital policy.
  
- 3.2.8 Injecting Medication into the System
  - 3.2.8.1 Only a neurosurgeon may inject medication into the CSF drainage system tubing.
  - 3.2.8.2 Administration of medication to the patient can be accomplished via the injection site on the Y-connector next to the Patient Line stopcock.
  - 3.2.8.3 Leave line clamped post medication infusion for 1 hour or as per Neurosurgeon order.
  
- 3.2.9 Irrigating the Lumbar Catheter
  - 3.2.9.1 If there is no drainage of CSF or fluctuation with coughing or straining the catheter may be occluded. Obstruction of the catheter can cause increases in ICP which places the patient at greater risk for secondary brain injury.
  - 3.2.9.2 Notify neurosurgeon. Only a neurosurgeon may irrigate the lumbar catheter.
  
- 3.2.10 Documentation for care of:
  - 3.2.10.1 Nurse's Progress Notes/Flow Sheet
    - Neurological assessments on Clinical record
    - Vital signs and temperature on Clinical record
    - Presence or absence of CSF leak (rhinorrhea or otorrhea)
    - Patency of drainage system
    - Color, volume and clarity of CSF
    - CSF specimens sent to lab
    - Appearance of dressing, insertion site
    - Dressing changes
    - Replacement of collection bag
    - Reason for notifying the Neurosurgeon
    - Response of patient to drain being clamped during transport
    - Inadvertent line disconnect
    - Irrigation of the lumbar catheter and/or drainage system (Neurosurgeon documents procedural note).
  - 3.2.10.2 Nursing Care Plan
    - Ordered pressure level of drip/collection chamber
    - Frequency of monitoring Neurological assessment, Vital signs Temperature
    - Time parameters for clamping of the external CSF drainage system
    - CSF sampling
  - 3.2.10.3 Fluid Balance Record
    - Hourly CSF drainage volumes
  - 3.2.10.4 MAR
    - Neurosurgeon must sign for medications given intrathecally
  
- 3.3 **Assisting with Removal of the Lumbar Catheter**
  - 3.3.1 Prior to removal of the CSF lumbar drainage system and the lumbar catheter the Neurosurgeon may order a trial of drain clamping. During this process the RN/LPN increases monitoring of the patient observing for CSF leak (otorrhea or rhinorrhea) as well as signs and symptoms of increased intracranial pressure. Notify the Neurosurgeon if patient condition deteriorates.



- 3.3.2 Obtain supplies for removal
  - sterile gloves and clean for assistant
  - Alcohol based hand rub (ABHR)
  - mask/face shield for all involved
  - suture material (3.0 Novafil or 2.0 Silk)
  - Suture removal kit or sterile suture scissors and sterile forcep
  - Sterile dressing tray
  - Sterile needle driver
  - Sterile 10 ml syringe (for specimen)
  - Sterile specimen tube SKU#86626 (Black top)
  - absorbent/incontinent pad
  - normal saline to cleanse site
  - Chlorhexidine 2% with 70% Alcohol swabs
  - Transparent occlusive dressing
  - sterile specimen cup and sterile scissors (if tip C&S required)
- 3.3.3 Position patient as requested
- 3.3.4 Neurosurgeon removes dressing, preps skin, removes suture(s)/staples and removes ventricular catheter
- 3.3.5 Neurosurgeon applies suture and occlusive transparent dressing to site.
- 3.3.6 Complete requisition and send tip for culture and sensitivity if ordered
- 3.3.7 Monitor site for swelling, CSF leakage, signs and symptoms of infection and report to Neurosurgeon if any noted.
- 3.3.8 Monitor patient for CSF leak (otorrhea or rhinorrhea) or change in neurological status related to an increase in intracranial pressure (ICP).
- 3.3.9 Documentation for removal:
  - 3.3.9.1 Nurses Progress Notes
    - patient response to trial of clamping drain if done
    - date and time of lumbar catheter and CSF drainage system removal
    - condition of insertion site
    - physician's name
    - type of dressing applied
    - how patient tolerated procedure
  - 3.3.9.2 Nursing Care Plan
    - trial of lumbar drain clamping
    - date of removal
    - if catheter tip sent for C&S
    - type of dressing applied
    - frequency of dressing/site assessment
    - date of suture removal (if applicable)

#### 4. REFERENCES:

American Association of Critical Care Nurses (AACN) Procedure Manual for Critical Care 6<sup>th</sup> edition (2011). Edited by Debra Lynn-McHale Wiegand. Saunders, an imprint of Elsevier Inc.

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Care of the Patient Undergoing Intracranial Pressure Monitoring/External Ventricular Drainage or Lumbar Drainage AANN Clinical Practice Guideline Series Copyright 2011 revised December 2011

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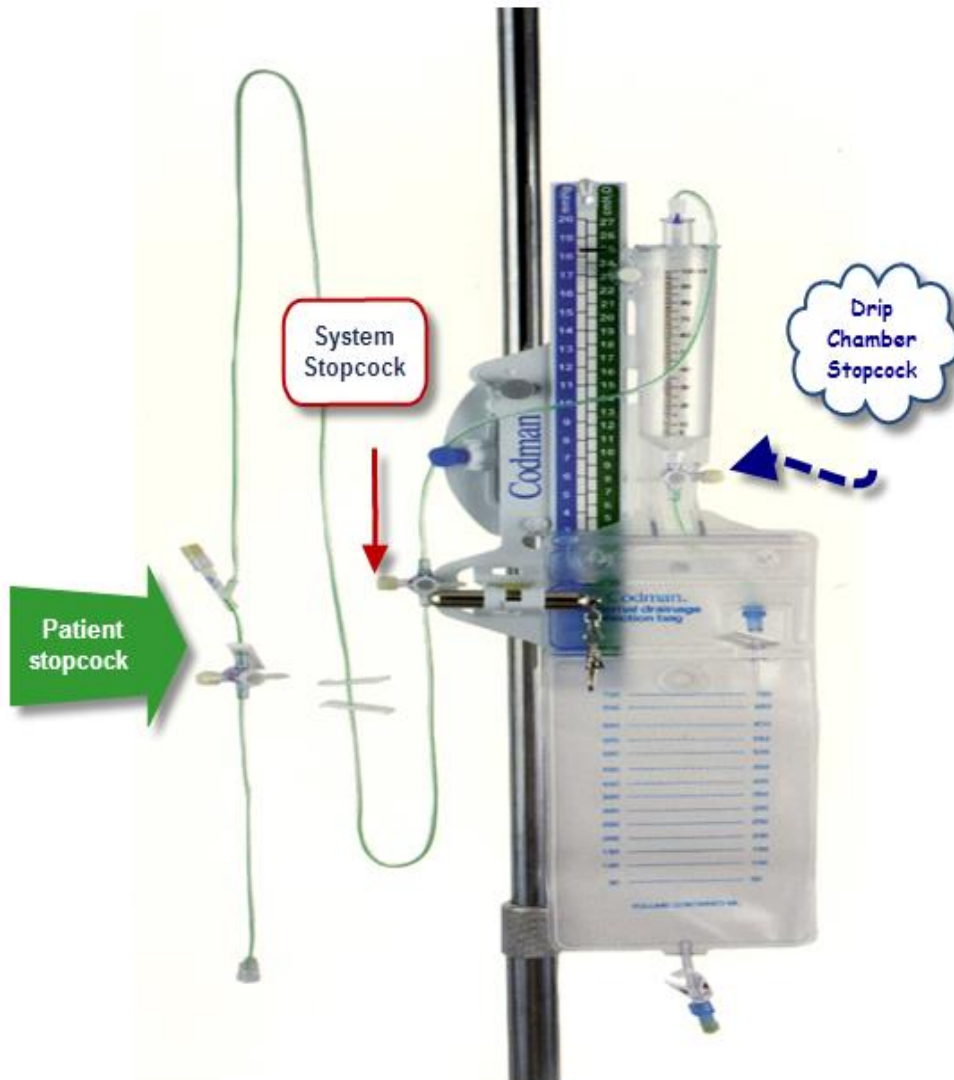
NHS Greater Glasgow and Clyde: External Ventricular Device guideline (EVD) Royal Hospital for Sick children PICU Neurosurgery: Author;J. Richardson, S. Forsyth, L. Todd, J. Grady, J. Brown, March 2014

[http://home.smh.com/sections/services-procedures/medlib/nursing/NursPandP/crc10\\_intracranial\\_062916.pdf](http://home.smh.com/sections/services-procedures/medlib/nursing/NursPandP/crc10_intracranial_062916.pdf) reviewed 6/16

**Appendix A**

**Codman System**

\*\*Priming the system is done **only** by the neurosurgeon or resident prior to connecting to the patient. ICU nurses are certified to prime the system.

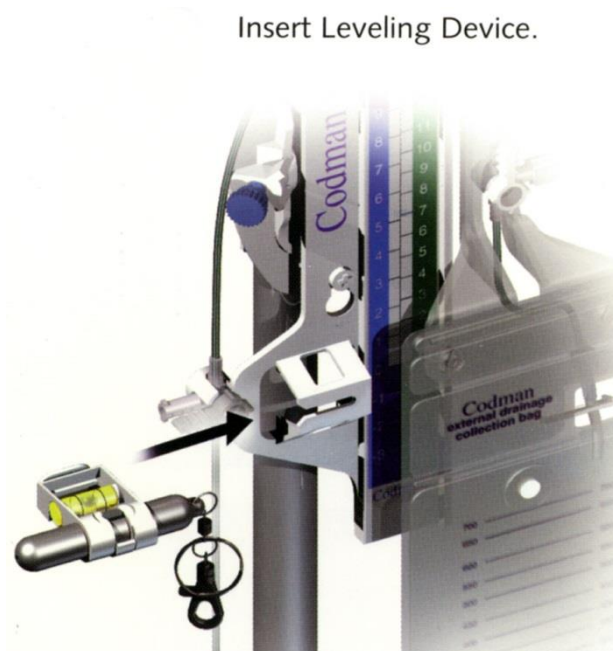


**Patient stopcock** (on tubing closest to patient) is **accessed or adjusted only by the Neurosurgeon** with specific order i.e. for sampling, medication administration or drain removal



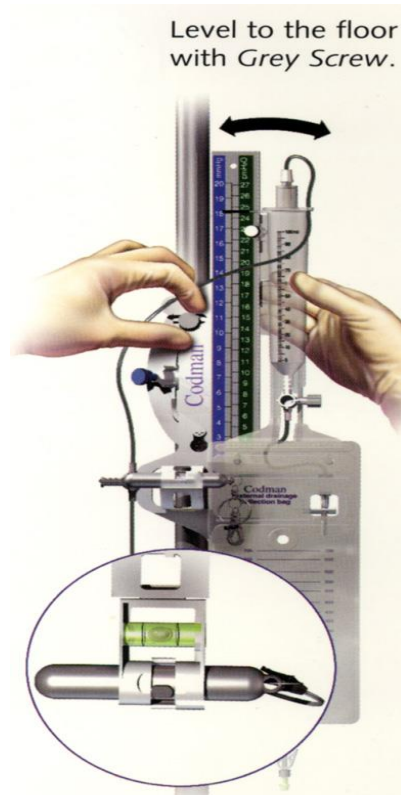
**Figure 1**

**1)** Secure the Codman system to the IV pole by fitting the clamp over the pole and tightening the blue screw. **(See Figure 1)**



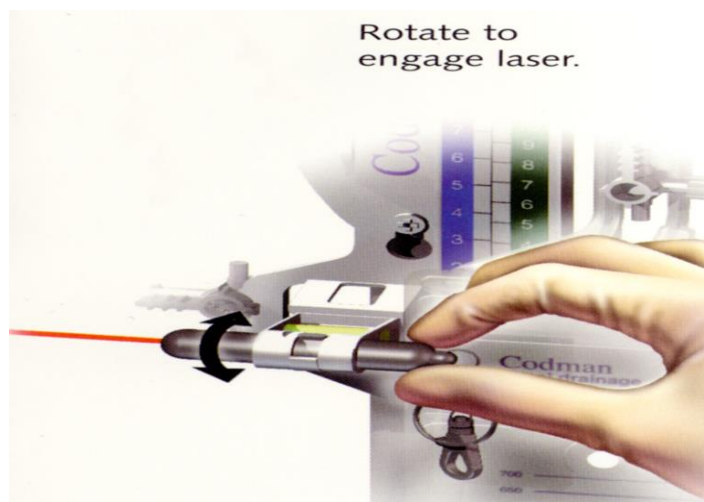
**Figure 2**

**2)** Attach leveling device. Point the laser towards the patient. **(See Figure 2)**



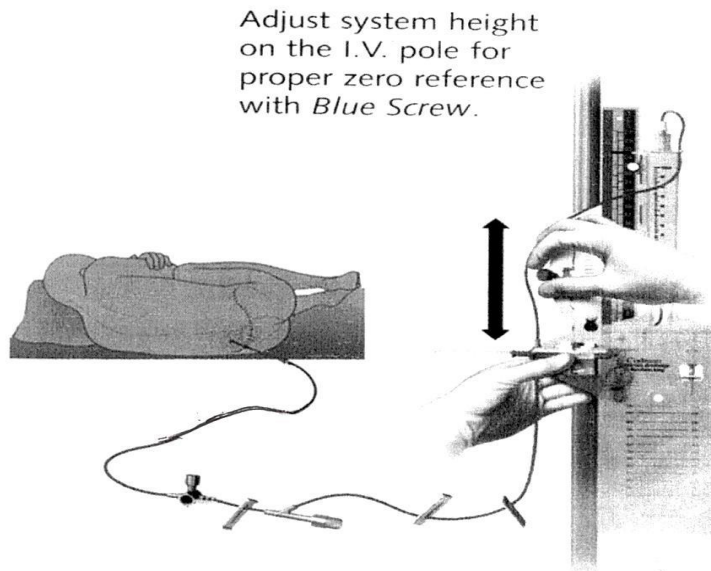
**Figure 3**

3) Level the unit to the floor by adjusting the grey screw. Adjust the system sideways keeping the air bubble in the level centered between the 2 dark lines. **(See Figure 3)**



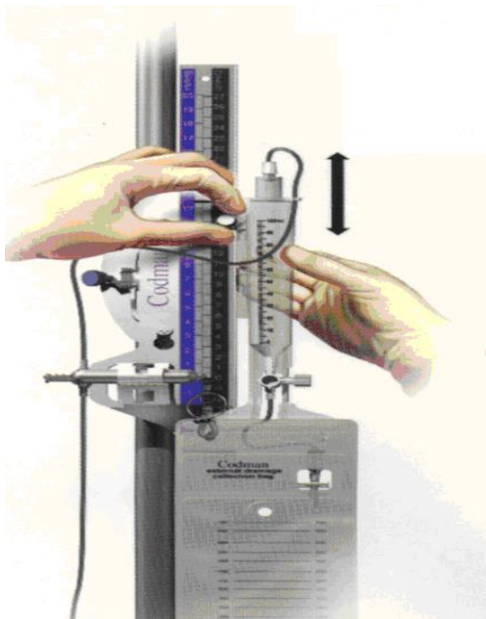
**Figure 4**

4) Rotate the laser pointer until the laser emits from the pointer. **(See Figure 4)**



**Figure 5**

- 5) a. Loosen the blue screw and adjust the height of the unit centering the laser pointer to the patient's external auditory meatus (ventricular drainage) or to the lumbar catheter exit site (lumbar drainage). This represents the "zero" reference point
- b. Rotate the laser pointer until laser is extinguished

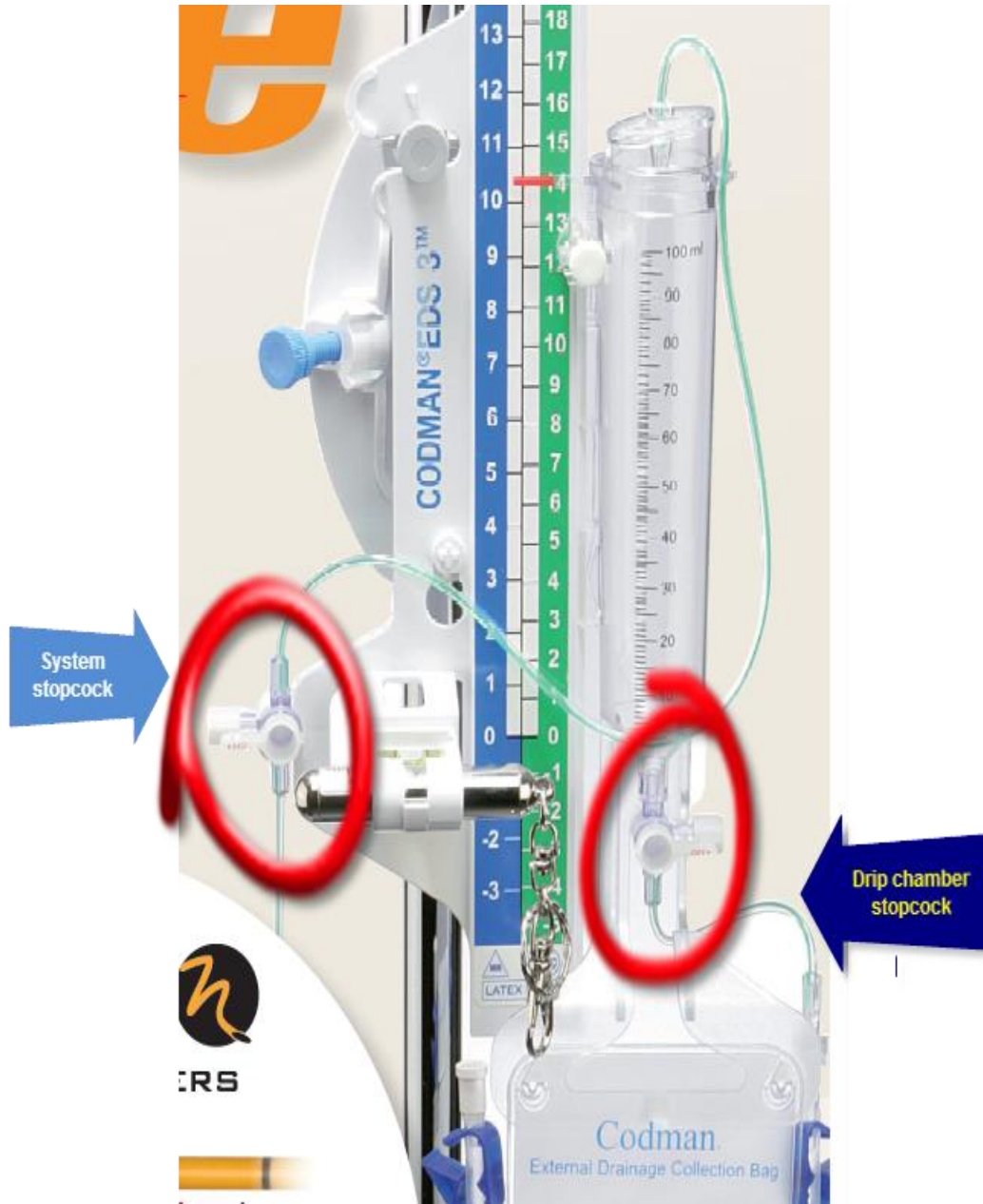


**Figure 6**

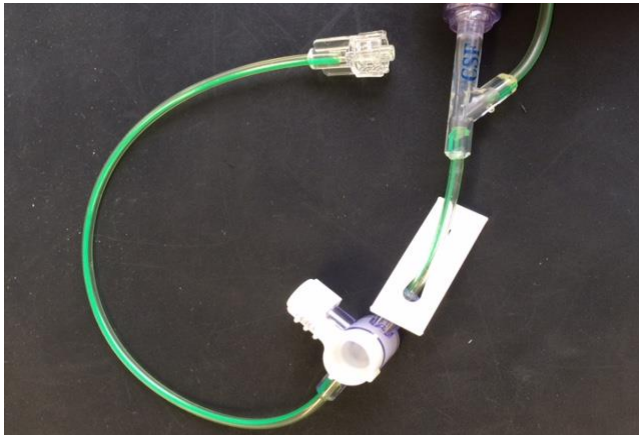
- Tighten all connections and make sure there are no kinks
- Position the drip chamber stopcock with 'off' to the drip chamber
- Place a needleless adapter on the port below the drip chamber

**Appendix B**

**CSF External Drainage System**

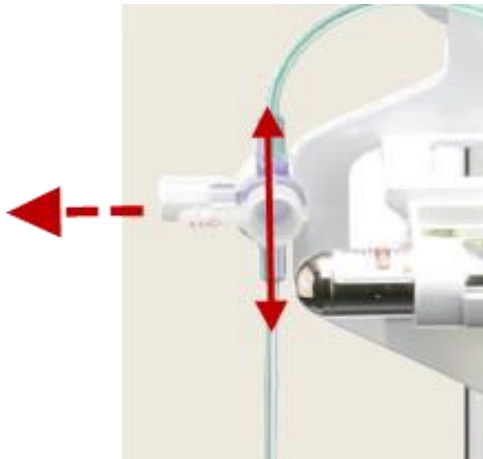


## Patient Stopcock



- Controls the flow of CSF from the patient line to the other components of the drainage system.
- only closed to patient** with specific physician order (following medication infusion or prior to removal)

## System Stopcock



- Controls the flow of CSF to the drip chamber
- “OFF” stops the flow of CSF in the direction it is pointed
- this stopcock position** allows CSF to drain into the drip chamber

## Drip Chamber Stopcock



- Controls whether the CSF flows into the collection bag or accumulates in the drip chamber
- sampling by RN is done here
- this stopcock position** allows CSF to drain into the collection bag