

EXTERNAL VENTRICULAR DRAIN

Indications

- Temporary relief of elevated intracranial pressure (ICP) due to tumor, bleed, or infection
- Allows for removal of Infected shunt/reservoir
- Can be used to measure ICP (when used with transducer) – see adult protocol on Intranet

Key points

- **When you empty the flow chamber** into the drainage bag you must turn the main system stopcock to **OFF** position. This is due to a momentary reduction in system pressure during emptying of the flow chamber.
- Ensure the system is leveled – the drain works by gravity, **so level is KEY**
- Document pressure setting at each check (always in cm H₂O)
- You **MUST** turn the main system stopcock to the off position during:
 - Suctioning
 - Feeding by bottle
 - Moving
 - Weighing
 - Obtaining CSF specimens
 - If altering the angle of the HOB
 - If there is greater than 20 cc of CSF drainage in 1 hour (must also notify neuro if this happens)
 - Any procedure or care that would increase the ICP

Assessment

- Drainage – quantity and quality, q hour
 - Monitor drainage for volume, color, and clarity; document hourly volume in ‘excreta’ section of flowsheet (normal production of CSF is 0.35 mL/kg/hour in children)
 - Monitor and document drainage fluctuation in tubing – indicates patency of EVD
- Set-up of apparatus and level q “check” (see procedure section)
 - Check that bag is hung at correct pressure as ordered (ruler should read ‘ventricular cm H₂O’ at top - can be turned accidentally for other measures, so important to ensure correct ruler used)
- Signs and symptoms of increased intracranial pressure (ICP)
 - Decreased level of consciousness
 - Vomiting
 - Lethargy
 - Agitation
- Consider sedation and/or restraints
 - To prevent accidental removal of the EVD

- Dressing (must be occlusive)

- Monitor and document integrity q “check”
- Notify physician and neurosurgery of CSF leakage
- If dressing needs to be changed, notify physician and neurosurgery

- Signs of infection

- Temperature instability (fever or inability to maintain temp)
- Lethargy
- Apneas and bradys
- Change in FIO2 demands
- Change in perfusion

- Neuro Vital Signs (NVS)

- What?

- Assess pupil size, reaction to light
- Assess motor skills of arms and legs
- Assess level of consciousness. Always mark the best response
- Verbal response is impossible to assess therefore write C if baby cries, T for trach or E for ET tube
- Under motor response assess response to pain. Best response in neonate is flexion to pain.

- When?

- Q 15 min X4 (for 1 hr) after insertion
- Q 30 min X6 (for 3 hr) after insertion
- Then Q check while patient has a ventricular drain in place (filled out in 24h flow sheet)
- If pressure setting is changed by physician, do neuro vital signs Q1H x 4 (changes in drainage level can affect ICP and thus neurosigns)
- Do NVS more frequently if any deterioration occurs. Report any major changes to doctor

- Head circumference

- When?

- Q 12 h (or as ordered)

Procedure – Leveling of EVD

○ Why?

- To ensure correct pressure for drainage

○ When?

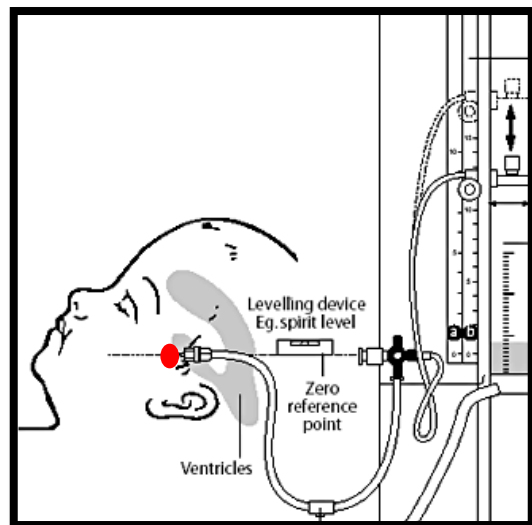
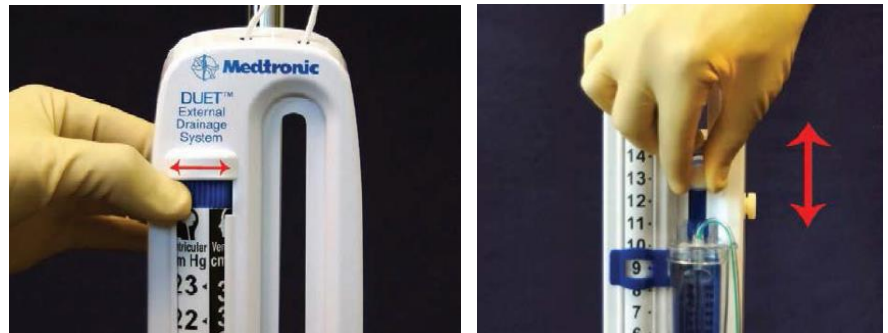
- Q check
- After each position change

○ Materials

- Laser level attached to EVD system

○ How?

- Ensure ruler on “ventricular cm H₂O” side and blue “window” set at ordered pressure setting
- CLOSE main system stopcock to patient to prevent accidental spillage of CSF
- Using laser level, set main system stopcock at same level as ventricles – this corresponds to midway between patient’s ear tragus and corner of eye (see picture). You may need to move the entire apparatus either up or down on the pole to ensure level correct.
- Once level set, reopen main system stopcock to patient



Procedure - Taking specimens of CSF

○ Why?

- To monitor for infection in all patients with EVD (high risk)
- ****Samples may only be taken by nursing if uninfected; if infected, samples must be drawn by neurosurgery**

○ When?

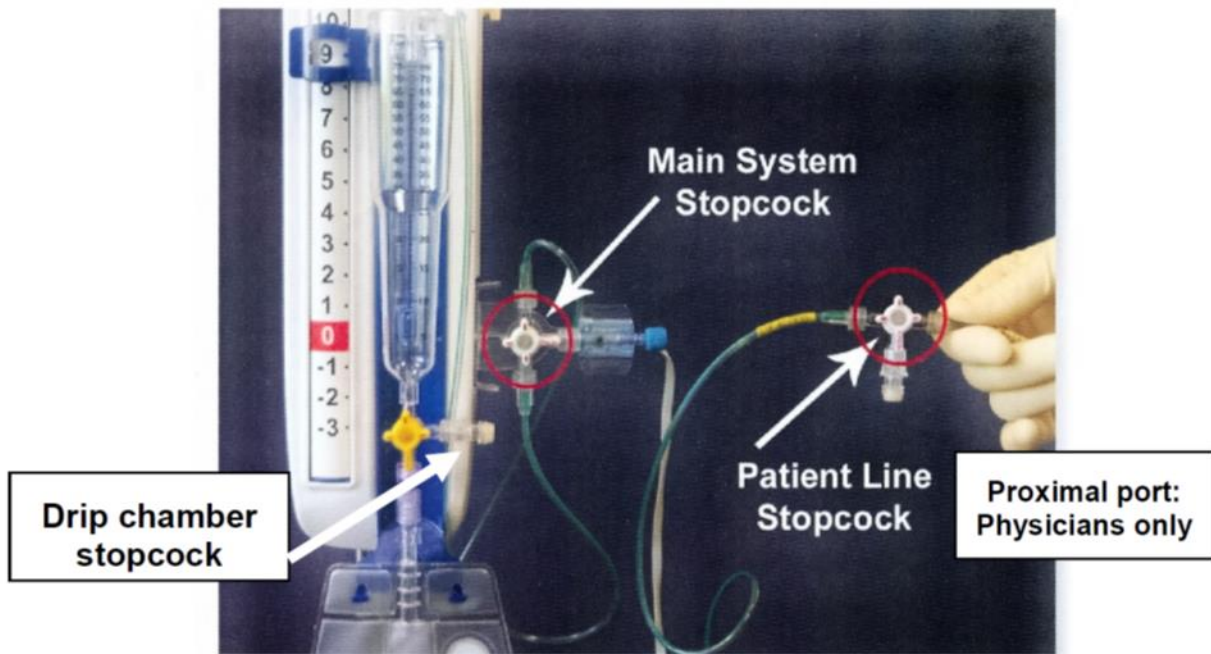
- Q 2 days for cultures and cell count (must be done before 10 AM)
- Protein and glucose at neurosurgery/neonatology team’s discretion

○ Materials

- 70% alcohol 0.5% Chlorhexidine swabs x2
- Sterile 2 X 2
- Sterile mask and clean gloves
- 3cc syringe
- Blunt syringe cannula
- CSF specimen tubes (1 for each test; protein and glucose can be sent together)
- Appropriate labels
- Clean gloves

○ How?

** Note: Fresh CSF specimen should be obtained (i.e. less than 1 hour of collection in the drip chamber). Assess hourly CSF drainage to determine timing of specimen collection. For patients draining less than 1ml/hour of CSF: Procure and send microbiology (routine culture) specimen (0.5 ml) first and then obtain cell count (0.5 ml) as soon as the CSF quantity is available. If cell count specimen remains in the drip chamber too long (i.e., greater than 1 hour) there is increased risk of cell destruction. If drainage remains insufficient consult the physician



1. Empty drip chamber prior to specimen collection and ensure the drip chamber stopcock is OFF towards the drainage bag once drip chamber is empty.
2. Allow time to ensure fresh CSF fluid to be collected.
3. Gather equipment for specimen procurement
4. Close the system to patient by turning the main system stopcock OFF towards the patient.
5. Clean table with disinfectant wipe and allow to dry.
6. Wash hands according to MUHC Hand Hygiene protocol.
7. Put on clean gloves/mask.
8. Vigorously scrub the beige port on yellow drip chamber stopcock x15 seconds with 70% alcohol 0.5% CHG swabs. Let dry (15-30 seconds).
9. Using aseptic technique, take the 3 mL syringe with the syringe cannula and puncture beige port on yellow drip chamber stopcock and withdraw required amount (0.5ml for each test).
10. Instill specified amounts of CSF into CSF specimen tubes using aseptic technique, and cap.
11. Label containers and send immediately to the lab using STAT specimen bags. **Do not refrigerate specimens.** (If specimen tubes are made of glass, do NOT send in pneumatic tube system – you must call a porter stat).
12. Re-level system and re-open main system stopcock to allow drainage.
13. Dispose of equipment appropriately.
14. Document the procedure and volume withdrawn in patient's medical record

****NEVER EVER DRAW SPECIMENS FROM THE PATIENT LINE STOPCOCK – HIGH RISK OF ASPIRATING BRAIN MATTER****

Procedure – Transport of Patient Off Unit

- Verify with physician that EVD can be closed for duration of test. If not, patient cannot have test.
- If physician agrees that EVD can be closed for duration of test, turn BOTH main system stopcock and patient line stopcock “off” to patient
- Nurse MUST remain with patient for duration of test
- When patient returns from test, re-level EVD based on patient’s new position and OPEN stopcocks

Procedure – Troubleshooting EVD

○ Break in sterile system

- Consider the system no longer sterile if leakage or disconnection occurs.
- Turn the stopcock closest to the patient to close off the drainage of CSF, or clamp with hemostat.
- Scrub the stopcock with 0.5% Chlorhexidine and 70% alcohol swab for 15 seconds.
- Notify physician. Physician may decide to stop EVD and not reconnect.
- If continuing, replace the system, using aseptic technique and following protocol.

○ Occlusion of the tubing (blood or tissue)

- If blockage is distal to a port that may be used for flushing, then flush according to protocol.
- If blockage is proximal to the port, notify physician.

○ No CSF drainage

- Check all stopcocks for correct positions.
- Check correct drip chamber height.
- Check tubing at site and at suture sites for kinking of the tubing.
- Check for loose connections.
- Verify system for air bubbles, clots or brain tissue in tubing.
- Check patency of the catheter by observing for flow of CSF and fluctuation of the meniscus.
- Re-level.
- Notify physician.

○ Excessive drainage (continuous drainage mode)

- Check level of drip chamber.
- Monitor neuro status and report changes to physician.
- Observe for transient increases in ICP with patient activity or nursing care (e.g. suctioning, turning)
- If excessive drainage persists, notify physician

○ EVD pulled from insertion site

- Cover insertion site with sterile gauze and secure with Hypafix.
- Place sterile towel under patient’s head.
- Notify physician immediately.
- Complete an incident report.