



AT THE FOREFRONT  
**UChicago**  
**Medicine**

## *The Center for Nursing Professional Practice and Research*

### **Neuro Checks**

#### **Question:**

**How frequently are neuro checks performed on stroke patients and what is the process for performing a neuro check?**

#### **Answer:**

**Neuro checks are performed every four hours on a typical floor**

- **Neuro checks are conducted every four hours or more often as condition warrants on patients who present with a diagnosis of TIA, r/o stroke or stroke**
- You must get the order changed if the condition improves or worsens warranting a change in the intervals of the neuro check

**A proper neuro check includes:**

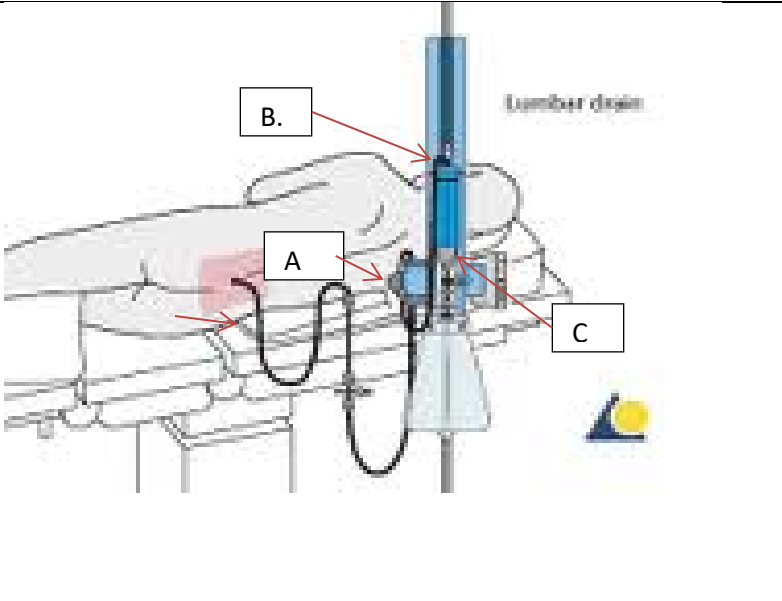
- Assessment of level of consciousness and orientation- ask patient to identify name, location day of week and year
- Use assessment tool, such as Glasgow Coma Scale to score LOC
- Assess cranial nerve function
  - a) Olfactory (I) – sense of smell
  - b) Optic (II) – visual fields and acuity testing
  - c) Oculomotor (III, IV, VI) - ask patient to follow movement of nurse’s finger through six cardinal positions of gaze
  - d) Trigeminal (V)- apply light sensation (cotton ball) to symmetric areas on face
  - e) Facial (VII)- observe for symmetry. Have patient smile, frown, puff out cheeks
  - f) Vestibulocochlear (VIII) – Hearing tests
  - g) Glossopharyngeal/Vagus (IX, X)- have patient speak and swallow, say “ahh”
  - h) Accessory (XI) – apply resistance with shrugging shoulders, then with turning head side to side
  - i) Hypoglossal (XII) – stick out tongue move side to side
- Assess extremities for sensation
  - a) Have patient close eyes
  - b) Pain- while gently applying sharp and dull sensations to extremities, as patient to differentiate between the two
  - c) Light touch- apply wisp of cotton to different points along skin’s surface
- Motor and cerebellar function
  - a) Gait- have patient walk across the room, turn and come back.
- Muscle strength
  - a) Strength assessed on right and left, upper and lower extremities



## Lumbar Drain Device (LDD) Clinical Guidelines Care Map

Activity	Background	Assessment/Documentation Daily Until D/C'd
<b>Definition</b>	Lumbar Drain is a closed, sterile system that allows the continuous drainage of cerebrospinal fluid (CSF) from the Subarachnoid space.	
<b>Indications</b>	Medical therapy for treatment of postoperative or traumatic Dural fistula, CSF leak, Treatment of shunt infections, Diagnostic evaluation of idiopathic normal pressure hydrocephalus. Also used in some neuro-surgeries (craniotomy) to reduce ICP and vascular surgeries (thoracic abdominal aortic aneurysm) to improve perfusion to the spinal cord. Additional situations indicated to manage ICP	
<b>Outcomes</b>	Patient is neurologically stable. Patient verbalizes pain control. Patient shows no signs of infection, bleeding or over drainage of cerebrospinal fluid. Improvement of neurologic symptoms, i.e. gait, incontinence, level of consciousness.	Initiate Care Plan and Patient Education Activity in EMR
<b>Assessments</b>	<p>Check physician's orders related to lumbar drain and drain management protocols:</p> <ul style="list-style-type: none"> <li>a) Draining at a specific anatomical level identified by MD (i.e. red port at ear level)</li> <li>b) Draining at a specific pressure level as ordered by MD (i.e. pressure level at 10 mmHg).</li> <li>c) Draining to a specific volume as ordered by MD (i.e. drain at 10 cc per hour)</li> </ul> <p style="text-align: center;">See diagram below</p>	<ol style="list-style-type: none"> <li>1. Check provider orders</li> <li>2. Perform Hand hygiene and use gloves anytime the drain is manipulated.</li> <li>3. Assess/document the following <b>every hour in the ICU and every 2 hours on the floor and prn</b>: <ul style="list-style-type: none"> <li>• CSF- amount, color, and clarity.</li> <li>• Zero point, pressure setting, patient position: LOC, pupil size/reactivity, visual fields and any associated changes. Identify presence of headache, signs of meningeal irritation such as photophobia, nuchal rigidity, and irritability.</li> <li>• Notify physician of any patient complaint of headache and/or any changes in: neurological assessment findings from baseline, site</li> </ul> </li> </ol>

## Lumbar Drain Device (LDD) Clinical Guidelines Care Map

	 <p>The diagram illustrates a lumbar drain device (LDD) setup. A patient is lying on their side. A blue tube, labeled 'Lumbar drain', is inserted into the lower back. Label 'A' points to the insertion site on the patient's back. Label 'B' points to the tubing connected to the drain. Label 'C' points to a drainage chamber or collection bag connected to the tubing. A small logo is visible in the bottom right corner of the diagram.</p>	<p>assessment, compromise in the system, changes in drainage: over drainage, decreased or no drainage of the CSF, change in color and clarity.</p> <p>4. Assess and Document <b>every 8 hours and prn</b>:</p> <ul style="list-style-type: none"> <li>• Insertion site and dressing. Check for any leakage. Dressing should be Transparent. Dressing changed as needed by MD/APN.</li> </ul>
<p><b>Labs</b></p>	<p>Routine admission labs including PT/PTT and platelet count.</p> <p>CSF sample is collected when ordered.</p> <p><b>*CSF sample obtained by MD/provider/ICU RN</b></p>	<p>Antibiotic peak and trough.</p> <p>Labs per order.</p> <p>CSF only when ordered (Provider or ICU RN)</p> <p>CSF panels are ordered by the practitioner and done with 0200 labs.</p> <p>A CSF panel consists of glucose, protein, cell count, and culture of CSF.</p> <p>Perform Hand hygiene and use gloves anytime the drain is manipulated.</p> <p><b>CSF Sampling Procedure MD/MLP/ICU RN ONLY</b></p>



## Lumbar Drain Device (LDD) Clinical Guidelines Care Map

		<p>To obtain, CSF is taken from the drainage chamber. Obtain a sample using aseptic technique, sterile gloves and mask. Supplies needed are a 10cc syringe, 3 sterile collection containers, and a povidone-iodine solution swab. There must be at least 10cc of CSF in the drainage chamber. Swab with povidone –iodine solution the CSF collection port located below drainage chamber for 3 minutes and let dry. Obtain the CSF by placing the 10cc syringe on the CSF sampling port. Turn stopcock off to the drainage bag. Obtain CSF sample by drawing 10cc of CSF into the syringe. Turn stopcock off to the drainage chamber. Inject at least 3cc of CSF into each of the three specimen containers, label properly, and send to lab.</p> <p><b>If using Becker EVD:</b> Same procedure except, place 25 gauge needle on syringe and puncture port between drainage chamber and drainage bag to obtain CSF. Assure that the clamp closest to the drainage bag is clamped and unclamp the clamp closest to the drainage chamber. Reclamp upper clamp once CSF sample obtained.</p>
<b>Medications/IV</b>	Prophylactic IV antibiotics therapy when LDD is in place. Antibiotics are usually discontinued when the drain is discontinued	Assess and document medication administration with appropriate follow-up per policy



## Lumbar Drain Device (LDD) Clinical Guidelines Care Map

<p><b>Treatments</b></p>	<p>Turn stopcocks off/clamp the drain when:</p> <ul style="list-style-type: none"> <li>• Moving patient (getting out of bed, transferring from stretcher to bed, getting to a chair, leaving the unit)</li> <li>• Emptying CSF from the buretrol into the drainage bag</li> </ul>	<p><b>Perform Hand hygiene and use gloves anytime the drain is manipulated.</b></p> <p>Close stopcocks and clamp all areas on the drain if patient is getting out of bed or needs to go off-unit.</p> <p>To empty CSF from buretrol into the drainage bag with each assessment:</p> <ol style="list-style-type: none"> <li>1. close stopcocks to patient</li> <li>2. Measure and document drainage amount</li> <li>3. Open slide clamps</li> <li>4. Empty buretrol</li> <li>5. Close slide clamps</li> <li>6. Open stopcocks</li> </ol> <p>Check pressure level and zero point with each assessment.</p> <p><b><u>DO NOT CHANGE THE DRAINAGE BAG.</u> Only the MD or providers are authorized to change the bags. The bag should be changed when ¾ full.</b></p>
<p><b>System Changes</b></p>	<p>Systems are not routinely changed</p>	<p>Systems would be changed by the provider</p> <p><b>Note: if drain breaks, turn stopcocks off to the patient and close slide clamps, cover end with sterile gauze and call service.</b></p> <p><b>If drain comes out, cover insertion site with sterile gauze, ensure catheter is intact, call service</b></p>



## Lumbar Drain Device (LDD) Clinical Guidelines Care Map

<b>Pain management</b>	Pain management per provider order and institution policy.	Assess pain and interventions. Document pain assessment, reassessment, and intervention, per order. <ul style="list-style-type: none"> <li>Note if pain is unrelieved or increasing, such as headache, notify provider.</li> </ul>
<b>Activity</b>	Activity per order.	<b>Stopcocks should be off to patient when the patient is getting out of bed.</b>
<b>Nutrition</b>	Diet as ordered.	No restrictions on diet. Address safety if HOB is flat.
<b>Patient Education</b>	Instruct patient on rationale for drain insertion. Address any activity restrictions: HOB, turning, bathing, and getting out of bed. Instruct to call nurse to clamp drain if patient is allowed to get out of bed Call nurse to raise or lower head of bed as drain must be adjusted to level of the ear. Immediately report any headache or pain/numbness in one or both legs. Avoid coughing, sneezing, or straining.	Instruct and document patient education: <ul style="list-style-type: none"> <li>Rationale for drain insertion.</li> <li>Activity restrictions: HOB, turning, and getting out of bed.</li> <li>Safety instructions to call nurse to clamp drain, if patient is allowed to get out of bed.</li> <li>Call nurse with any position change (raising/lowering of HOB), so that the RN can reposition the level.</li> <li>Signs &amp; Symptoms to report: any headache or pain/numbness in one or both legs.</li> <li>Avoid coughing, sneezing, or straining.</li> </ul>
<b>Removal of the LLD</b>	Vital signs, site and neuro assessment prior to removal. Post removal, site assessment, vital signs and neuro exam. Instruct patient to lay flat for 2 hours post removal or per order.	Instruct patient to maintain activity per MD order post removal. Monitor vs. and neuro checks per routine. Look for any changes in neuro status and any reports of increased pain. Assess site for drainage. Report changes to service. Patient education of sign & symptoms to report: Headache, increased pain or numbness, drainage and fever. May remove dressing in 24 hours and shower.
<b>Discharge Planning</b>		Monitor vital signs and neuro checks per routine. Look for any changes in neuro status and any reports of



## Lumbar Drain Device (LDD) Clinical Guidelines Care Map

		<p>increased pain. Assess site for drainage. Report changes to service.</p> <p>Patient education of sign &amp; symptoms to report: Headache, increased pain or numbness, drainage and fever. May remove dressing in 24 hours and shower. Instruct patient when to follow-up with MD</p> <p>Document:</p> <ul style="list-style-type: none"> <li>a). Assessment/vs. per policy</li> <li>b). Site in WALDO.</li> <li>c). Communication with service</li> <li>d) Patient education</li> </ul>
<p><b>LDD troubleshooting</b></p>		<ul style="list-style-type: none"> <li>A. Break in the sterile system: Consider the system is no longer sterile. Turn the stop cock off towards the patient. Cover the end with sterile gauze. Notify service. Document in the EMR.</li> <li>B. Occlusion of tubing: If the blockage is proximal to the patient, notify service. If the blockage is located distal to port closest to the patient, consider flushing the system through the first port closest to the patient and <b>flush away from the patient with preservative-free saline required and <u>in the ICU only</u></b>.</li> <li>C. No CSF drainage in collection chamber: Assess the CSF through the drainage system. You may lower the drain briefly to assess flow.</li> </ul>



## Lumbar Drain Device (LDD) Clinical Guidelines Care Map

		<p>Assess the integrity of the drainage system.  Check for drainage at the site.  Check to make sure stopcocks is open from patient to drain and that the tubing is not kinked.  Monitor the patient's neurological status and report any changes  <b>Notify the MD/APN.</b></p> <p>D. Excessive CSF drainage:  Make sure that the system is set to the correct zero reference level. If draining at a specific rate, raise the system and evaluate the rate of drainage.  Monitor the patient's neurological status and report any changes.  Notify MD/APN if excessive drainage persists and if patient complains of a severe headache.  Provide the patient with education on the effects of position changes on lumbar drainage. Mild symptoms include transient headaches, nausea and vomiting.  Over drainage can result in tension pneumocranium, central herniation, or subdural hematoma by causing a collapse of the ventricles and increased negative pressure leading to rupture of the veins in the dura.</p>
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## Lumbar Drain Device (LDD) Clinical Guidelines Care Map

### Complications of LDD

Type/Cause	Symptoms/Monitoring	Recommendations/Treatment
Bacterial colonization and infections. LLD 5-10 days Increase in frequency with the increased frequency of access.	Symptoms- redness, fever, swelling, drainage, or pain at insertion site.	Recommendations-removal of the drain and provide antibiotics
Meningeal irritation: Monitor for fever and early signs of infections.	Symptoms: nuchal rigidity, headache, nausea, vomiting, photophobia, and decreased level of consciousness.	Recommendations: Notify MD/APN immediately
Nerve root irritation: Irritation may be related to catheter positioning.	Symptoms: radicular leg pain, numbness, and tingling and changes in the deep tendon reflexes.	Notify MD/APN May receive an order to change patient's position. MD/APN may reposition the catheter
Tension pneumocranium. Life threatening.	Symptoms: sudden decreased level of consciousness and focal neurological deficit.	Treatment: occlusion of drainage tube, place patient supine , high flow O2 (100%) order MD order and perform ongoing assessment
Herniation Inadequate drainage of the csf resulting in increased intracranial pressure.	Symptoms: decreased level of consciousness, irritability, changes in neuro status (paresis pupil size and reactivity.)	Treatment: occlusion of the drain, hyperventilation, lowering of head of bed per MD order.
Subdural hemorrhage Over drainage of CSF can cause ventricular collapse due to negative pressure and tearing to the veins.	Observe neuro status- notify MD/APN. Symptoms: change LOC, and change in neuro status. CSF fluid changes to bloody.	Treatment: notify provider occlusion of the drain per MD order.



## Lumbar Drain Device (LDD) Clinical Guidelines Care Map

<p>Intradural hematoma: Complication at the insertion at LD site in thoracic abdominal aortic aneurysm repair.</p>	<p>Symptoms: progressive lower extremity weakness, loss of reflexes, decreased muscle tone. Treatment: immediate notification of healthcare provider and ongoing assessment.</p>	<p>Treatment: immediate notification of MD/APN and ongoing assessment.</p>
<p>Retained catheter</p>	<p>Assess for intact catheter tip at removal</p>	<p>Notify MD/APN</p>
<p>Intracranial venous thrombosis</p>	<p>Symptoms: post-procedural headache that intensify and persists.</p>	<p>Treatment venous ultrasound and anticoagulation- consider IVC filter</p>

Reference: Thompson, H. (Ed), 2012. Care of the Patient Undergoing Intracranial Monitoring/External Ventricular Drainage or Lumbar Drainage: American Association Neuroscience Nurse Clinical Practice Guideline Series. Retrieved from <http://www.aann.org/pubs/content/guidelines.html>.

## University of Chicago Medical Center

**TITLE:** Protocol for Insertion and Management of Lumbar Drain in Adult Patients

**Issue Date:** October 2020

**Review Date:** February 2023

**Purpose of Protocol:** To provide safe care of adult patients with lumbar drains

**Background:** Lumbar drainage devices (LDDs) are closed sterile systems that allow the drainage of cerebrospinal fluid from the subarachnoid space. LDDs are inserted via a specialized spinal needle, into the lumbar subarachnoid space at L2–L3 level or below, thus avoiding injury to the spinal cord.

**Inclusion Criteria:** Patients with diagnoses including, but not limited to,

- Idiopathic normal pressure hydrocephalus
- Traumatic brain injury
- Non-traumatic subarachnoid hemorrhage
- Postoperative or traumatic dural fistulae
- Craniotomy
- Shunt infections
- Thoraco-abdominal aortic aneurysm

**Exclusion Criteria:** Patients with diagnoses including, but not limited to,

- Coagulopathies, active bleeding, severe thrombocytopenia
- Unequal pressures between the supratentorial and infratentorial compartments
- Brain/spinal/epidural abscess
- History of lumbar-spine surgery
- History of lumbar vertebral fracture

**Additional Information:**

Patients requiring lumbar drain insertions will be placed in procedural settings, ED, PACU, ICUs, Interventional Radiology or Operating Room where nursing staff have achieved this competency.

Patients requiring care after lumbar drain insertion, drainage from the lumbar drain will be placed on nursing units (8N and/or 8E) where nursing staff have achieved this competency.

Direct any deviations from this protocol to the Clinical Director of Neurosciences or designee.

**Protocol Type:** Patient Care Protocol: Requires Medical Order

**Departments:** Neurology and Neurosurgery

**Procedure:** Refer to Elsevier Skill Lumbar Catheter Insertion, Care and Removal –CE for detailed procedural steps in preparation of the patient, needed equipment and post procedural care.

**Interpretation, Implementation and Revision:** The Departments of Neurology/Neurosurgery in collaboration with the Clinical Director of Neurosciences are responsible for this protocol.

**Attachments:**

Lumbar Drain Tip Sheet

Lumbar Drain Device (LDD) Clinical Guidelines Care Map

Capped Spinal Drain Pre-Operative Care Map

**References:**

American Association of Neuroscience Nurses (AANN). (2014). *Care of the patient undergoing intracranial pressure monitoring/external ventricular drainage or lumbar drainage*. AANN clinical practice guideline series.

Vince Witt, PCM 8E Neuroscience/ Neurology/ Epilepsy

Kris LeJune, PCM Adult Neuro ICU

Dr. Fernando Goldenberg, Department of Neurology

Dr. Peleg Horowitz, Department of Neurosurgery

**ATTACHMENT: Lumbar Drain Tip Sheet**

1. Review MD order for key information:
  - Level of the drain (tragus of the ear, or as per MD order)
  - Pressure level \_\_\_mmHg mercury or \_\_cm H2O
  - CSF drainage: amount \_\_ml and frequency every \_\_ hours
  - Activity order (Lumbar drain is clamped when patient is up)
2. Patient is drained in the flat position, or as per MD order, using the above order parameters.
3. Key parameters with frequency according to location

<b>Parameter</b>	<b>Floor</b>	<b>ICU</b>
<b>Documentation</b>		
Initiation of Lumbar drain	Add drain into WALDO	Add drain into WALDO
System set up: <ul style="list-style-type: none"> <li>• Level of Drain</li> <li>• Prescribed Pressure level, if appropriate</li> </ul>	Every 2 hours and prn	Every hour and prn
CSF description: color and amount, presence of flux	Every 2 hours and prn	Every hour and prn
Neuro checks- assess for changes and complications: Headache, changes in level of conscious, unrelieved pain.	Every 2 hours and prn	Every hour and prn
Vital signs	Every 4 hours and prn	Every hour and prn
Dressing: intact and presence/absence of drainage	Every 8 hours and prn	Every 8 hours and prn
<b>Complications</b>		
Drainage: no drainage, inadequate drainage, over drainage  and/or  Changes in neuro status	Assess drain for kinks in tubing, and stopcock position.  Refer to troubleshooting and complication portion of the Lumbar Drain Clinical guidelines.  <b>Notify Provider</b>	Assess drain for kinks in tubing, and stopcock position.  Refer to troubleshooting and complication portion of the Lumbar Drain Clinical guidelines.  <b>Notify Provider</b>
<b>Safety</b>		
Hand-off communication	Provide information on lumbar drain orders, drainage, activity, neuro status, and presence of complications at hand-off	Provide information on lumbar drain orders, drainage, activity, neuro status and presence of complications at hand-off

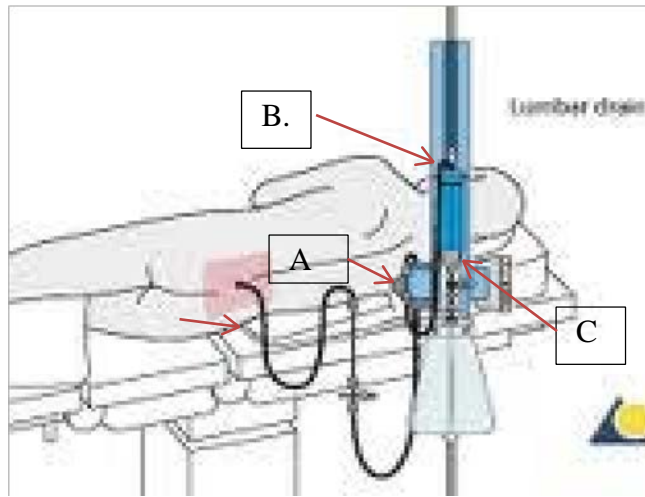
Standard precautions	Hand hygiene and gloves whenever lumbar drain is manipulated. HOB flat when drain is open.	Hand hygiene and gloves whenever lumbar drain is manipulated. HOB flat when drain is open.
System changes	Not routinely changed Changed by provider as needed <b><u>only</u></b>	Not routinely changed Changed by provider as needed <b><u>only.</u></b>
Labs	Per order provider Admission PT/INR, PTT, CBC Cultures and drug levels per provider order. Cultures are obtained by <b><u>provider only.</u></b>	Per order provider Admission PT/INR, PTT, CBC Cultures and drug levels per provider order. Cultures are obtained by <b><u>provider or ICU RN only.</u></b>
Medications	Prophylactic IV antibiotics while the drain is in place and discontinued when drain removed generally	Prophylactic IV antibiotics while the drain is in place and discontinued when drain removed generally
Education	Provide patient and family with information regarding the lumbar drain: including activity/HOB, frequency of drainage/assessment, Signs & Symptoms to report.	Provide patient and family with information regarding the lumbar drain: including activity/HOB, frequency of drainage/assessment, Signs & Symptoms to report.

Revised 10.2020, Reviewed 11.2021, 11.2022

**Attachment: Lumbar Drain Device (LDD) Clinical Guidelines Care Map**

Activity	Background	Assessment/Documentation Daily Until D/Cd
<b>Definition</b>	Lumbar Drain is a closed, sterile system that allows the continuous drainage of cerebrospinal fluid (CSF) from the lumbar subarachnoid space.	
<b>Indications</b>	Medical therapy for treatment of postoperative thoracoabdominal aortic aneurysms, postoperative or traumatic dural fistula, CSF leak, treatment of shunt infections, diagnostic evaluation of idiopathic normal pressure hydrocephalus. Also used in some neuro-surgeries (craniotomy) to reduce ICP and vascular surgeries (thoracic abdominal aortic aneurysm) to improve perfusion to the spinal cord. Additional situations indicated to manage ICP	
<b>Outcomes</b>	Patient is neurologically stable. Patient verbalizes pain control. Patient shows no signs of infection, bleeding or over drainage of cerebrospinal fluid. Improvement of neurologic symptoms, i.e. gait, incontinence, level of consciousness.	Initiate Care Plan and Patient Education Activity in EMR
<b>Assessments</b>	Check physician's orders related to lumbar drain and drain management protocols: a) Draining at a specific anatomical level identified by MD (i.e. red port at ear level) b) Draining at a specific pressure level as ordered by MD (i.e. pressure level at 10 mmHg). c) Draining to a specific volume as ordered by MD (i.e. drain at 10 cc of CSF per hour)	<ol style="list-style-type: none"> <li>1. Check provider orders</li> <li>2. Perform Hand hygiene and use gloves anytime the drain is manipulated.</li> <li>3. Assess/document the following <b>every hour in the ICU and every 2 hours on the floor and prn</b>: <ul style="list-style-type: none"> <li>• CSF- amount, color, and clarity.</li> <li>• Zero point, pressure setting, patient position: LOC, pupil size/reactivity, visual fields, motor exam, respiratory rate and pattern, and any associated changes. Identify presence of headache, signs of meningeal irritation such as photophobia, nuchal rigidity, and irritability.</li> </ul> </li> </ol>

See diagram below



- Notify physician of any patient complaint of headache and/or any changes in: neurological assessment findings from baseline, site assessment, compromise in the system, changes in drainage: over drainage, decreased or no drainage of the CSF, change in color and clarity.

4. Assess and Document **every 8hours and prn:**

- Insertion site and dressing.
- Check for any leakage.
- Dressing should be transparent. Dressing changed as needed by MD/APP.



<p><b>Labs</b></p>	<p>Routine admission labs including PT/PTT and platelet count.</p> <p>CSF sample is collected when ordered.  <b>*CSF sample obtained by MD/provider/ICU RN</b></p>	<p>Antibiotic peak and trough.  Labs per order.  CSF only when ordered (Provider or ICU RN)  CSF panels are ordered by the practitioner and done with 0200 labs.  A CSF panel consists of glucose, protein, cell count, and culture of CSF.  Perform Hand hygiene and use gloves anytime the drain is manipulated.</p> <p><b><u>CSF Sampling Procedure MD/MLP/ICU RN ONLY</u></b></p> <p>To obtain, CSF is taken from the drainage chamber. Obtain a sample using aseptic technique, sterile gloves and mask. Supplies needed are a 10cc syringe, 3 sterile collection containers, and a povidone-iodine solution swab. There must be at least 10cc of CSF in the drainage chamber. Swab with povidone –iodine solution the CSF collection port located below drainage chamber for 3 minutes and let dry.</p>
		<p>Obtain the CSF by placing the 10cc syringe on the CSF sampling port. Turn stopcock off to the drainage bag. Obtain CSF sample by drawing 10cc of CSF into the syringe. Turn stopcock off to the drainage chamber. Inject at least 3cc of CSF into each of the three specimen containers, label properly, and send to lab.</p> <p><b>If using Becker EVD:</b> Same procedure except, place 25 gauge needle on syringe and puncture port between drainage chamber and drainage bag to obtain CSF. Assure that the clamp closest to the drainage bag is clamped and unclamp the clamp closest to the drainage chamber. Reclamp upper clamp once CSF sample obtained.</p>

<b>Medications/IV</b>	Prophylactic IV antibiotics therapy when LDD is in place. Antibiotics are usually discontinued when the drain is discontinued	Assess and document medication administration with appropriate follow-up per policy
<b>Treatments</b>	Turn stopcocks off/clamp the drain when: <ul style="list-style-type: none"> <li>• Moving patient (getting out of bed, transferring from stretcher to bed, getting to a chair, leaving the unit)</li> <li>• Emptying CSF from the buretrol into the drainage bag</li> <li>• Contact provider to consider temporarily clamping the drain during bouts of coughing or emesis to prevent overdrainage.</li> </ul>	<p><b>Perform hand hygiene and use gloves anytime the drain is manipulated.</b></p> <p>Close stopcocks and clamp all areas on the drain if patient is getting out of bed or needs to go off-unit.</p> <p>To empty CSF from buretrol into the drainage bag with each assessment:</p> <ol style="list-style-type: none"> <li>1. close stopcocks to patient</li> <li>2. Measure and document drainage amount</li> <li>3. Open slide clamps</li> <li>4. Empty buretrol</li> <li>5. Close slide clamps</li> <li>6. Open stopcocks</li> </ol> <p>Check pressure level and zero point with each assessment.</p>
		<b><u>DO NOT CHANGE THE DRAINAGE BAG.</u> Only the MD or providers are authorized to change the bags. The bag should be changed when ¾ full.</b>
<b>System Changes</b>	Systems are not routinely changed	<p>Systems would be changed by the provider</p> <p><b>Note: if drain breaks, turn stopcocks off to the patient and close slide clamps, cover end with sterile gauze and call service.</b></p> <p><b>If drain comes out, cover insertion site with sterile gauze, ensure catheter is intact, call service</b></p>

<b>Pain management</b>	Pain management per provider order and institution policy.	Assess pain and interventions. Document pain assessment, reassessment, and intervention, per order. <ul style="list-style-type: none"> <li>Note if pain is unrelieved or increasing, such as headache, notify provider.</li> </ul>
<b>Activity</b>	Activity per order.	<b>Stopcocks should be off to patient when the patient is getting out of bed.</b>
<b>Nutrition</b>	Diet as ordered.	No restrictions on diet. Address safety if HOB is flat.
<b>Patient Education</b>	Instruct patient on rationale for drain insertion. Address any activity restrictions: HOB, turning, bathing, and getting out of bed. Instruct to call nurse to clamp drain if patient is allowed to get out of bed. Call nurse to raise or lower head of bed as drain must be adjusted to level of the ear. Immediately report any headache or pain/numbness in one or both legs. Avoid coughing, sneezing, or straining.	Instruct and document patient education: <ul style="list-style-type: none"> <li>Rationale for drain insertion.</li> <li>Activity restrictions: HOB, turning, and getting out of bed.</li> <li>Safety instructions to call nurse to clamp drain, if patient is allowed to get out of bed.</li> <li>Call nurse with any position change (raising/lowering of HOB), so that the RN can reposition the level.</li> <li>Signs &amp; Symptoms to report: any headache or pain/numbness in one or both legs.</li> <li>Avoid coughing, sneezing, or straining.</li> </ul>
<b>Removal of the LLD</b>	Vital signs, site and neuro assessment prior to removal. Post removal, site assessment, vital signs and neuro exam.	Instruct patient to maintain activity per MD order post removal.

	Instruct patient to lay flat for 2 hours post removal or per order.	Monitor vs. and neuro checks per routine. Look for any changes in neuro status and any reports of increased pain. Assess site for drainage. Report changes to service. Patient education of sign & symptoms to report: Headache, increased pain or numbness, drainage and fever. May remove dressing in 24 hours and shower.
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<p><b>Discharge Planning</b></p>		<p>Monitor vital signs and neuro checks per routine. Look for any changes in neuro status and any reports of increased pain. Assess site for drainage. Report changes to service. Patient education of sign &amp; symptoms to report: Headache, increased pain or numbness, drainage and fever. May remove dressing in 24 hours and shower.</p> <p>Instruct patient when to follow-up with MD</p> <p>Document:</p> <ul style="list-style-type: none"> <li>a). Assessment/vs. per policy</li> <li>b). Site in WALDO.</li> <li>c). Communication with service</li> <li>d) Patient education</li> </ul>
<p><b>LDD troubleshooting</b></p>		<ul style="list-style-type: none"> <li>A. Break in the sterile system: Consider the system is no longer sterile. Turn the stop cock off towards the patient. Cover the end with sterile gauze. Notify service. Document in the EMR.</li>   <li>B. Occlusion of tubing: If the blockage is proximal to the patient, notify service. If the blockage is located distal to port closest to the patient, consider flushing the system through the first port closest to the patient and <b>flush away from the patient with preservative-free saline required and <u>in the ICU only.</u></b></li> </ul>

		<p>C. No CSF drainage in collection chamber:  Assess the CSF through the drainage system.  You may lower the drain briefly to assess flow. Assess the integrity of the drainage system. Check for drainage at the site.  Check to make sure stopcocks is open from patient to drain and that the tubing is not kinked.  Monitor the patient’s neurological status and report any changes.  <b>Notify the MD/APP.</b></p> <p>D. Excessive CSF drainage:  Make sure that the system is set to the correct zero reference level. If draining at a specific rate, raise the system and evaluate the rate of drainage.  Monitor the patient’s neurological status and report any changes.</p> <p>E. Notify MD/APP if excessive drainage persists and if patient complains of a severe headache.  Provide the patient with education on the effect of position changes on lumbar drainage.</p> <p>F. Mild symptoms include transient headaches, nausea and vomiting.</p> <p>G. Over drainage can result in tension pneumocranium, central herniation, or subdural hematoma by causing a collapse of the ventricles and increased negative pressure, leading to rupture of the veins in the dura.</p>
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Revised 10.2020, 11.2022. Reviewed 11.2021

### Complications of Lumbar Drain Device (LDD)

Type/Cause	Symptoms/Monitoring	Recommendations/Treatment
Bacterial colonization and infections. LLD 5-10 days Increase in frequency with the increased frequency of access.	Symptoms-redness, fever, swelling, drainage, or pain at insertion site.	Recommendations-removal of the drain and provide antibiotics
Meningeal irritation: Monitor for fever and early signs of infections.	Symptoms: nuchal rigidity, headache, nausea, vomiting, photophobia, and decreased level of consciousness.	Recommendations: Notify MD/APP immediately
Nerve root irritation: Irritation may be related to catheter positioning.	Symptoms: radicular leg pain, numbness, and tingling and changes in the deep tendon reflexes.	Notify MD/APP May receive an order to change patient's position. MD/APP may reposition the catheter
Tension pneumocranium. Life threatening.	Symptoms: sudden decreased level of consciousness and focal neurological deficit.	Treatment: occlusion of drainage tube, place patient supine, high flow O2 (100%) order MD order and perform ongoing assessment
Herniation Inadequate drainage of the CSF resulting in increased intracranial pressure.	Symptoms: decreased level of consciousness, irritability, changes in neuro status (paresis pupil size and reactivity.)	Treatment: occlusion of the drain, hyperventilation, lowering of head of bed per MD order.
Subdural hemorrhage Over drainage of CSF can cause ventricular collapse due to negative pressure and tearing to the veins.	Observe neuro status- notify MD/APP. Symptoms: change LOC, and change in neuro status. CSF fluid changes to bloody.	Treatment: notify provider occlusion of the drain per MD order.
Intradural hematoma: Complication at the insertion at LD site in thoracic abdominal aortic aneurysm repair.	Symptoms: progressive lower extremity weakness, loss of reflexes, decreased muscle tone. Treatment: immediate notification of healthcare provider and ongoing assessment.	Treatment: immediate notification of MD/APP and ongoing assessment.
Retained catheter	Assess for intact catheter tip at removal	Notify MD/APP
Intracranial venous thrombosis	Symptoms: post-procedural headache that intensify and persists.	Treatment is commonly anticoagulation

Reference: Thompson, H. (Ed), 2012. Care of the Patient Undergoing Intracranial Monitoring/External Ventricular Drainage or Lumbar Drainage: American Association Neuroscience Nurse Clinical Practice Guideline Series. Retrieved from <http://www.aann.org/pubs/content/guidelines.html>.

**Attachment: Capped Spinal Drain Pre-Operative Care Map**

ACTIVITY	On Admission	Daily to Surgery
OUTCOMES	Patient neurologic baseline documented. Patient is neurologically stable. Patient verbalizes pain control.	<ul style="list-style-type: none"> <li>• Patient is neurologically stable.</li> <li>• Patient verbalizes pain control.</li> <li>• Patient show no sign of infection, bleeding, drain displacement, or leaking of cerebrospinal fluid (CSF).</li> </ul>
DEFINITION	Patients having open or endovascular abdominal or thoracic aortic aneurysm repairs may have spinal drainage catheters placed to decrease the risk of paralysis from spinal cord ischemia during the operative and post-operative period. Patients are admitted the day before surgery to facilitate placement of the spinal catheter and to decrease risk of epidural hematoma with administration of heparin during the surgery. Patients are admitted to the general floor for monitoring with a capped spinal drain until surgery.	
ASSESSMENTS	<ul style="list-style-type: none"> <li>• Check physician’s orders (Anesthesia and Vascular Team) related to capped spinal drain.</li> <li>• Check drain site and add to WALDO for documentation.</li> <li>• Perform baseline neurological exam.</li> </ul>	<ul style="list-style-type: none"> <li>• Check insertion site and dressing every 4 hours.</li> <li>• Perform neurological examination every 4 hours.</li> <li>• Monitor for signs and symptoms of infection. Administer antibiotics as ordered</li> <li>• Notify physician for patient complaint of headache and any changes in neuro assessment findings from baseline.</li> <li>• Notify physician of any leaking from catheter insertion site or signs of catheter displacement.</li> </ul>

Reviewed 10.2020, 11.2021, 11.2022

## Lumbar Drain Care Tip Sheet

1. Review MD order for key information:
  - Level of the drain (tragus of the ear)
  - Pressure level \_\_\_mmHg mercury or \_\_\_cm H2O
  - CSF drainage: amount \_\_\_ml and frequency every \_\_\_ hours
  - Activity order (Lumbar drain is clamped when patient is up)
2. Patient is drained in the flat position using the above order parameters.
3. Key parameters with frequency according to location

Parameter	Floor	ICU
<b>Documentation</b>		
Initiation of Lumbar drain	Add drain into WALDO	Add drain into WALDO
System set up: <ul style="list-style-type: none"> <li>• Level of Drain</li> <li>• Prescribed Pressure level, if appropriate</li> </ul>	Every 2 hours and prn	Every hour and prn
CSF description: color and amount, presence of flux	Every 2 hours and prn	Every hour and prn
Neuro checks- assess for changes and complications: Headache, changes in level of conscious, unrelieved pain.	Every 2 hours and prn	Every hour and prn
Vital signs	Every 4 hours and prn	Every hour and prn
Dressing: intact and presence/absence of drainage	Every 8 hours and prn	Every 8 hours and prn
<b>Complications</b>		
Drainage: no drainage, inadequate drainage, over drainage  and/or  Changes in neuro status	Assess drain for kinks in tubing, and stopcock position.  Refer to troubleshooting and complication portion of the Lumbar Drain Clinical guidelines.  <b>Notify Provider</b>	Assess drain for kinks in tubing, and stopcock position.  Refer to troubleshooting and complication portion of the Lumbar Drain Clinical guidelines.  <b>Notify Provider</b>



## Lumbar Drain Care Tip Sheet

Safety		
Hand-off communication	Provide information on lumbar drain orders, drainage, activity, neuro status, and presence of complications at hand-off	Provide information on lumbar drain orders, drainage, activity, neuro status and presence of complications at hand-off
Standard precautions	Hand hygiene and gloves whenever lumbar drain is manipulated. HOB flat when drain is open.	Hand hygiene and gloves whenever lumbar drain is manipulated. HOB flat when drain is open.
System changes	Not routinely changed Changed by provider as needed <b><u>only</u></b>	Not routinely changed Changed by provider as needed <b><u>only.</u></b>
Labs	Per order provider Admission PT/INR, PTT, CBC Cultures and drug levels per provider order. Cultures are obtained by <b><u>provider only.</u></b>	Per order provider Admission PT/INR, PTT, CBC Cultures and drug levels per provider order. Cultures are obtained by <b><u>provider or ICU RN only.</u></b>
Medications	Prophylactic IV antibiotics while the drain is in place and discontinued when drain removed generally	Prophylactic IV antibiotics while the drain is in place and discontinued when drain removed generally
Education	Provide patient and family with information regarding the lumbar drain: including activity/HOB, frequency of drainage/assessment, Signs & Symptoms to report.	Provide patient and family with information regarding the lumbar drain: including activity/HOB, frequency of drainage/assessment, Signs & Symptoms to report.

*Instructions for Administering MGH-SST (Swallow Screening Tool)*

Gather these items at the bedside: flashlight, long cotton-tipped swab, tongue depressor, cup of water, teaspoon, rubber gloves.

**Part 1**

1. **Wakefulness: Is patient able to remain awake for at least 5 minutes?**
  - a. If yes, continue
  - b. If no, fail Part 1 and defer Part 2. Maintain NPO until re-screened when alertness maintained for a minimum of 5 minutes
2. **Head of Bed: Can the patient tolerate head of bed elevation to at least 30 degrees (as upright as possible is ideal)**
  - a. If yes, continue
  - b. If no, fail Part 1 and defer Part 2. Maintain NPO until head of bed can be elevated and patient can be re-screened.
3. **Breathing: Can the patient maintain reasonable oxygen saturation at rest with O<sub>2</sub> via nasal cannula?**
  - a. If yes, continue
  - b. If no, fail Part 1 and defer Part 2. Maintain NPO until stable breathing and acceptable O<sub>2</sub> sats and patient can be re-screened.
4. **Clean Mouth: Does patient meet standards of oral hygiene? Inspect entire oral cavity.**
  - a. If yes, continue
  - b. If no, clean oral cavity before proceeding to Part 2. If unable to fully clean, fail Part 1 and defer Part 2. Maintain NPO with ongoing oral care. Re-screen.

If all four items in Part 1 are present, proceed to Part 2. Otherwise, maintain NPO, determine alternate route of nutrition, hydration and meds. Defer part 2 and re-screen when able.

**Part 2**

1. **Tongue Movement: Does patient have adequate tongue range of motion and strength for moving and controlling food and liquid in the mouth?**
  - a. TASK: Ask or demonstrate “Stick out your tongue beyond your lips” and “Lick all the way around your lips.”
  - b. SCORE: 1 point if tongue protrudes past lips and to both sides fully. 0 points if incomplete or absent.
2. **Cough: Does patient have a cough strong enough for clearing the airway?**
  - a. TASK: Ask or demonstrate “Cough as hard as you can.”
  - b. SCORE: 1 point if sharp, audible cough is present. 0 points if cough is weak, breathy or absent.
3. **Vocal Quality: Does patient have a strong, clear voice indicating ability to close and protect airway?**
  - a. TASK: Ask or demonstrate “Say ha-ha-ha-ha.”
  - b. SCORE: 1 point if voice is loud, clear and dry. 0 points if voice is wet/gurgly, hoarse, breathy or absent.
4. **Pharyngeal Sensation: Can patient sense when pharynx is touched?** Reduced sensation means a greater likelihood of aspiration.
  - a. TASK: Have patient close his eyes and open mouth. Gently stroke right pharyngeal wall with cotton-tipped swab. Ask patient to indicate which side was stroked. Repeat on left side of pharynx. If patient gags before you reach

the pharyngeal wall, you may stop as patient has adequate pharyngeal sensation.

- b. SCORE: 1 point if patient can indicate that he felt stroking. 0 points if unable to detect stroking on one or both sides of pharynx.
5. **Swallowing Water: *Can the patient drink water without aspirating?***
- a. TASK: Provide 3 single teaspoons of water. After each teaspoonful, assess for aspiration including presence of cough, throat clearing, wet or congested vocal quality, or shortness of breath. *If any present, STOP and fail item.* If none of the above are present, give patient half a cup of water to drink and assess for cough, throat clearing, wet/congested voice quality, or shortness of breath.
  - b. SCORE: 2 points if able to drink ½ cup of water without signs of aspiration; 0 points if signs of aspiration present when drinking water either by teaspoon or cup.

### **Scoring**

Add up points on Part Two (maximum total of 6 points).

**PASS:** A score of 5 or 6 is needed to PASS the MGH-SST. Initiate a regular diet with a consistency that is appropriate to dentition and thin liquids. Patient should be observed at first meal to ensure safety. Ongoing monitoring is critical to ensure that patient's status does not deteriorate.

**FAIL:** A score of 4 or less results in a FAIL. If at any time during the screening there is concern for aspiration, you may score the patient a FAIL based on clinical judgment. Maintain NPO, including medications. A consult to the speech-language pathologist should be initiated for a comprehensive swallow evaluation. Determine non-oral route of nutrition, hydration and medications. Nutrition consult as indicated.

## **External Ventricular Drains & Intra Cranial Pressure Monitoring**

1. The anatomical reference or zero point, is the foramen of Monro, estimated at the external auditory meatus in the supine patient
2. The flow chamber must be positioned at a prescribed distance above the zero level. If the tubing or flow chamber are too high, you will have less drainage. If they are too low, you will have too much drainage.
3. The EVD system should be securely clamped to an IV pole at the head of the bed.
4. Upon change of shift, both the on-coming and the off-going RNs should check the patient's actual level to the prescribed level.
5. Upon beginning of shift and with every assessment, the RN should complete a thorough neurological exam of the patient, document the ICP with the tubing OFF to drainage, as well as check the :
  - a. *EVD site*
  - b. *Dressing*
  - c. *Tubing – for kinks*
  - d. *Stopcocks and clamps*
  - e. *Zero point & setting*
  - f. *Drainage consistency & color*
  - g. *Level of drainage bag*

### **Report any changes to the neurosurgery team**

6. Record CSF output and neuro status every **2 hours minimally**, every 1 hour in critically ill 1:1 status patients
7. If a patient is trial clamped it is imperative that ICP's and neuro checks be done and documented hourly in order to see if patient is tolerating the trial.
8. Empty the flow chamber every time you measure the CSF output (every 1-2 hours)
9. Change the drainage bag with sterile technique every time the bag is  $\frac{3}{4}$  full.
10. The EVD should only be clamped temporarily, no greater than 30 minutes. Clamp less than this if the patient becomes symptomatic (signs and symptoms of increased ICP) and notify the neurosurgery team.
11. To reposition the patient

- a. Clamp the EVD off to the patient
  - b. Keep the EVD at the head of the bed, near the insertion site
  - c. Reposition the patient
  - d. Level the EVD and ensure it is at the appropriate setting
  - e. Unclamp the EVD
12. Only change the EVD dressing if it is no longer intact (soiled or loose)
13. Report CSF leakage at the site to neurosurgery, monitor system for occlusion/loss of catheter.
14. If drain becomes disconnected from tubing:
- a. Clamp closest to the patient
  - b. If tubing is no longer sterile, call neurosurgery immediately to change the system
15. If drain becomes dislodged:
- a. Place sterile dressing on site
  - b. Place patient in supine position
  - c. Complete frequent neuro checks
  - d. Call neurosurgery
16. Children make approximately 0.5-1ml CSF/kg/hr. Be sure to find out what a normal CSF output is for your patient.
17. Call neurosurgery for large volume of drainage. Overdrainage from an EVD can lead to ventricular collapse as well as hemorrhage. Symptoms of overdrainage include:
- a. Change in LOC including: irritability, lethargy, drowsiness
  - b. Apnea
  - c. Severe headache
  - d. Sluggish pupillary responses
18. For children who have significant CSF output it is imperative that sodium levels are monitored closely as sodium is lost in CSF. Fluid replacement to replenish sodium levels may be necessary.
19. EVDs are removed by the neurosurgery team. Neurochecks and site checks should be performed hourly for 4 hours minimally following removal.