**Guidelines: Intracranial Pressure (ICP) Monitoring and Extraventricular Drains (EVD)**

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**GUIDELINES:**
These guidelines should be read in conjunction with the
- Bayside Clinical Care Standards Policy
- Mutual Obligations for Patient Safety and Quality of Services at Bayside Health

**PURPOSE/EXPECTED OUTCOME:**
Details of procedures that will be followed in the Medical and Nursing management of Intracranial Pressure (ICP) monitoring and Extraventricular Drains (EVD) for patients in ICU

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**REFERENCES:**
- Codman ICP Express Manual
- Medtronic Instructions for Use leaflet for Becker External Drainage and Monitoring System
- Ventrux ICP monitor inservice CD-ROM. Global Scientific

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Intracranial Pressure (ICP) Monitoring and Extraventricular Drains (EVD)

Extra-ventricular Drain (EVD)

An extra-ventricular drainage system allows for
- Drainage of CSF from the lateral ventricles
- Monitoring of CSF pressure

1. INSERTION

**Equipment required**

- Cranial drill and drill bit
- ICP catheter – Neurosurgeon preference
  - (1) Combined ICP monitor / EVD or,
  - (2) Plain EVD (Traumacath Ventricular set)
- EVD drainage system
- transducer (with no attached flush system)
- x 2 non-injectable caps
- Sterile gown and gloves
- Mask & goggles or face-shield
- Betadine
- Standard tray
- Suture material
- Tegaderm
- 10ml 0.9% saline
- x 2 10 ml syringes
- Local anaesthetic: Lignocaine with Adrenaline
- Hair clipper/razor
- Pressure cable
- Pressure module
- Spirit level

**Procedure**

Neurosurgeon/Registrar to insert EVD catheter wearing sterile gown, gloves and mask.

If a Combined EVD with Codman’s or Ventrix ICP is used, the Ventrix or Codman’s monitor must be zero calibrated prior to insertion (see pages 11 or 13 respectively)

Maintain Infection Control precautions and minimise cubicle traffic during insertion. **All** staff present to wear a mask during insertion
2. EVD drainage system and Transducer set-up

Procedure

Neurosurgeon/Registrar to remain sterile for setup, priming and connection of the drain and transducer

Setup and Priming

- Nursing staff to pass the EVD system to the Neurosurgeon/Registrar who discards the cap from the 3-way tap positioned on the zero level of the drainage system. (See Figure 1a).
- Connect the unprimed transducer to this 3 way tap, with the cable end exiting the transducer distal to the drain (see Figure 1b). Leave the end cap off the transducer to allow priming solution to flow through the transducer.
- Draw up 10mls saline.
- Connect the syringe to the 3-way tap at the patient end (see Figure 1c) of the EVD tubing and back-prime the system with saline:
  1. To the opening of the drip chamber by turning the 3-way tap off to the transducer (see Figure 1d)
  2. Through the transducer by turning the 3-way tap off to the drip chamber.
- Once primed, attach a sterile non-injectable cap to the EVD transducer.
- Remove the 3 way tap used to prime the drain and the blue extension line from the patient end of the EVD drain (see Figure 1c). Keep the tip sterile until connection to the EVD catheter (see below).
- Raise/lower the EVD drip chamber pressure level arrow, to a height of 5 mmHg (the standard height for trauma patients), or as prescribed by the Neurosurgeon/Registrar. (see Figure 1e)
- The EVD drain is now ready for connection to the EVD catheter.

Connecting EVD catheter to drainage system

- Ensure the 3-way tap on the EVD is ‘off to drainage’ so that inadvertent drainage will not occur until the drain has been appropriately levelled.
- Use Betadine only (due to proximity to the brain), clean the EVD catheter and cap. Allow to dry.
- Remove the cap and discard.
- Connect the primed drainage system to the catheter.
- Connect the bedside monitor pressure cable to the transducer.
- The EVD can now be hung from an IV pole, be levelled and zeroed (see Section 3).

Figure 1

a. Remove the cap from this tap and connect the transducer here.
b. Note the cable end of the transducer is distal to the drain and the cap attached after priming

c. Back-Prime from here, then remove 3-way tap and blue extension tubing
d. Back-Prime with saline to this point.
e. Raise/lower the pressure level arrow on the drip chamber, to 5 mmHg
3. Zeroing

On initial setup the neurosurgeon should remain gowned, gloved and masked to perform the initial zeroing procedure.

Procedure for initial setup zero

- Nursing staff to level the EVD transducer to the external auditory meatus using a spirit level (see Figure 2 & 3). Patient should be in supine position, (either head-up or tilted according to any position restrictions).
- Neurosurgeon/Registrar to use a ‘non-touch technique’ (single use of sterile gauze to handle non-sterile items) turning the 3-way tap to the ‘45 degree’ position (see Figure 4), and remove the cap from the transducer (see Figure 5).
- Nursing staff to zero the bedside monitor, and confirm ‘0’ displayed on the bedside monitor.
- Using Betadine or Chlorhexidine, Neurosurgeon to clean the transducer connection and allow to dry. Chlorhexidine with Alcohol may be used to clean connections at the EVD due to its distance from the brain.
- Attach a sterile non-injectable cap to the transducer.

Zero Reference Point using the External Auditory Meatus

Figure 2

Figure 3
Following initial setup, nursing staff perform a zero procedure once per shift, or whenever concern over the accuracy of the zero exists.

**Equipment required**

- Dressing pack
- Sterile gown and gloves
- Mask and goggles
- Chlorhexidine in 70% Alcohol
- Spirit Level
- Sterile non-injectable cap

**Procedure for routine zero**

- Level the EVD transducer to the external auditory meatus using a spirit level (*see Figure 2 & 3*).
- Wearing non-sterile gloves, turn the 3-way tap to the ‘45-degree position’ (*see Figure 4*).
- Don mask and goggles and open the above equipment onto the dressing pack.
- Wash hands and put on sterile gown & gloves.
- Using a ‘non-touch technique’ (single use of sterile gauze to handle non-sterile items) remove the cap from the transducer (*see Figure 5*). Confirm the monitor now displays ‘0’. (This confirms the accuracy of the previous zero procedure).
- Any ‘drift’ in the zero value that would impact on patient care should be documented on the ICU flow chart and reported to the ICU/Neurosurgical Registrar.
- Using a ‘non-touch technique’ zero the bedside monitor, and confirm zero displayed on the monitor (The ICP should now read ‘0’).
- Using a ‘non-touch technique’ clean the transducer connection with Chlorhexidine and allow to dry.
- Attach a sterile non-injectable cap to the transducer.
- Zeroing should be performed once a shift, or if concern over the ICP accuracy exists.
4. Monitoring

- Add primed extension tubing to the arterial line transducer and level the transducer to the external auditory meatus (i.e. use a towel to raise the transducer height to the E.A.M.)
- To obtain an ICP measurement, turn the 3-way tap to the monitoring position (see Figure 6).
- Prior to recording the ICP measurement ensure the 3-way tap has been in the monitoring position for 1-2 minutes, to allow the pressures to equilibrate. This is particularly relevant when the EVD has been continuously venting.
- When continuously venting, ascertain the ICP hourly, more frequently if the patient is unstable or parameters affecting ICP change.

Figure 6: Monitoring position

5. Intermittent Venting

- The standard protocol for traumatic brain injury patients is for Intermittent Venting to occur when: ICP sustained > 20mmHg for a period of 5 minutes. The standard EVD drain height is 5 mmHg.
- The neurosurgeons may order deviations from the standard drip chamber height or prescribe continuous venting, particularly for patients with Intraventricular Haemorrhage. All drip chamber heights should be prescribed by the Neurosurgeons/Registrars in mmHg.
- During any venting, avoid ‘dumping’ of CSF by ceasing all interventions which may either:
  1. Stimulate the patient (raising ICP) or
  2. Alter the drip chamber height (potentially changing the pressure gradient).
  This includes, but is not limited to: suctioning, changing the patient’s position, neurological observations, stimulation by visitors, altering the bed height, CXR. If spontaneous coughing causes dumping of CSF, the drain must be switched ‘off to vent’ during these episodes.
- During venting, observe the EVD drip chamber to ensure that CSF is actually draining. If not, then problems such as catheter blockage may have occurred. If the drain is not venting appropriately, notify the ICU Registrar immediately.
- During venting, ICP is not monitored.
Intracranial Pressure (ICP) Monitoring and Extraventricular Drains (EVD)

Procedure for Intermittent Venting: ICP > 20mmHg for 5 minutes

- Using a spirit level, ensure the EVD transducer is levelled to the external auditory meatus (see figures 2 & 3).
- Wearing non-sterile gloves, turn the 3-way tap off to the transducer, allowing CSF to vent from the patient to the drip chamber (see Figure 7).
- Venting should occur for 5 minutes. Observe drip chamber to ensure drainage of CSF is occurring. Avoid any interventions that may increase ICP.
- After 5 minutes, (wearing non-sterile gloves) return the 3-way tap back to the monitoring position (see Figure 6) to establish the ICP post venting.
- Monitor for a further 5 minutes prior to any repeat drainage. i.e. monitor for 5 / drain for 5.
- If the ICP remains persistently elevated, drainage may be increased to a period of 10 minutes. i.e. monitor for 5 / drain for 10.
- Empty the EVD drip chamber hourly and record the amount of drainage on the fluid balance chart.
- Notify ICU Registrar if ICP is persistently elevated.

Figure 7 Venting Position

6. Continuous Venting

- In patients with Intraventricular Haemorrhage and in traumatic brain injury patients with persistently high ICP, the Neurosurgeon/Registrar may occasionally prescribe continuous venting.
- ICP is not monitored during venting and the 3-way tap needs to be turned from the venting position (see Figure 7) to the monitoring position (see Figure 6) to obtain ICP. If the ICP is unstable or parameters affecting ICP change, the ICP needs to be monitored more frequently.
- Prior to recording the ICP, leave the 3-way tap in the monitoring position for 1-2 minutes, allowing the pressures to equilibrate.
- The risk of rapid dumping of CSF is greater with the EVD continuously venting and requires greater vigilance by nursing staff to minimise this risk. Observe the drip chamber frequently and if rapid drainage of CSF is occurring due to a transient spike in ICP, immediately turn the 3-way tap ‘off to vent’. If interventions such as: suctioning, changing the patient’s position, neurological observations, stimulation by visitors, altering the bed height, CXR and spontaneous coughing cause rapid dumping of CSF, the drain must be switched ‘off to vent’ during these episodes.
7. Dressings

Dressings should only be changed when no longer intact.

**Equipment required**

- Dressing pack
- Chlorhexidine in 70% Alcohol
- Sterile gown and gloves
- Mask and goggles
- Tegaderm
- Hair clipper / razor

**Procedure**

- Don mask and goggles and open the above equipment onto the dressing pack.
- Wearing non-sterile gloves remove the old dressing, ensuring EVD catheter is not moved at the insertion point.
- Ensure the catheter is stitched to the scalp. Staples alone will not adequately secure an EVD. If no stitch is present, notify the Neurosurgeon/Registrar.
- Carefully clip any hair growth around the insertion site which prevents dressing from sealing. Use razor if necessary.
- Wash hands and put on sterile gown and gloves.
- Clean around the insertion site and allow to dry.
- Apply tegaderm. If there is difficulty achieving a seal, apply a border of skin prep, without contacting the EVD catheter.

8. Documentation

An EVD checklist is to be completed by nursing staff on insertion and then at the beginning of each shift. *(See appendix 1).*

The following observations should be recorded on the ICU chart hourly:

- ICP
- CPP
- EVD drain height
- Number of times the drain is vented
- Volume of CSF drainage
9. Taking CSF specimens

- Specimens should be taken for culture on Monday, Wednesday and Friday.

**Equipment required**

- Sterile gown and gloves.
- Mask and goggles.
- Dressing Pack.
- Chlorhexidine in 70% Alcohol.
- 10ml syringe.
- 21 gauge needle.
- Sterile specimen pot.

**Procedure**

- Drain CSF from EVD drip chamber into drainage bag.
- Allow a fresh sample of approx 10mls of CSF to collect in the burette.
- Unclamp the drain clip closest to the drip chamber allowing CSF to collect between the two drain clips.
- Don mask and goggles and open the above equipment onto the dressing pack.
- Wash hands and put on sterile gown and sterile gloves.
- Using a ‘non-touch technique’ (single use of sterile gauze to handle non-sterile items), clean the drainage line injection port with chlorhexidine solution, allowing port to thoroughly dry (see figure 8).
- Aspirate a sample of up to 10mls from the tubing and expel the sample into the sterile sample pot.

**Figure 8**

CSF sampling
10. Changing the Drainage Bag

This bag should only be changed when full.

**Equipment required**

- Dressing Pack
- Chlorhexidine in 70% Alcohol
- Drainage Bag (Compactor A)
- Sterile gown and gloves
- Mask and goggles
- Sterile non-injectable cap

**Procedure**

- Ensure drainage clamps are applied.
- Put on mask and open the above equipment onto the dressing pack.
- Wash hands and put on sterile gown and gloves.
- Cleanse thoroughly around the drainage bag connection site.
- Using a non-touch technique, remove the old drainage bag and cap off.
- Attach the new drainage bag.
- Dispose of the old bag in Infectious Waste.

11. Removal of ICP / EVD

**Equipment Required**

- Huck Towel
- Sterile gown and gloves
- Mask and goggles
- Dressing Pack
- Suture Cutter
- Suture material
- Needle holder
- Betadine
- Tegaderm

**Procedure**

Procedure to be performed by Neurosurgical Registrar/ RMO.

Once the catheter is removed, the site should be covered with tegaderm.

Monitor the site for any inflammation or excessive CSF leakage and notify Neurosurgery unit if these occur.
12. Change of EVD

Currently there is no evidence to support use of routine change of EVD or antibiotic prophylaxis.

13. Transporting / Repositioning of patient

- When repositioning patients or changing the height of the bed, the EVD 3-way tap must be turned off to the patient. Once the patient is re-positioned, the EVD should be re-levelled and the 3-way tap returned to its original position.
- When side-lying the patient the EAM no longer reflects a central point within the brain, (the L and R) EAM are now at different heights). To locate the zero reference point, halve the vertical distance between the L) and R) EAM. This is the zero reference point whilst the patient is side-lying. Remember the arterial transducer must also be re-positioned to this point.
- If an EVD drain is placed on a patient’s chest i.e. during a CT scan or for moving a patient from the ED trolley to the ICU bed, ensure the drain is turned off to the patient and drain any CSF in the EVD drip chamber into the drainage collection bag. This is to prevent the air filter in the top of the EVD drip chamber becoming wet, which may otherwise impede drainage of CSF from the patient into the burette.
- The catheter and EVD drain is MRI compatible however the transducer is not. Remove the transducer using a sterile technique prior to entering the scanning room. Following MRI a new sterile transducer should be attached to facilitate monitoring ICP (see Section 14).
- Both the Ventrix catheter and Codman’s catheter are MRI compatible however, the display monitors and cables are not. These are to be disconnected and removed prior to entering the MRI. Both the Ventrix and Codman’s catheters are to be carefully coiled and taped to the patient’s head to prevent accidental dislodgement and heat transference during the MRI (along the Codman’s catheter). On completion of MRI, reconnect to monitor and perform zero procedure.
14. Replacing the transducer

This is required if the EVD has no transducer attached and the ICP needs to be monitored, or there is a suspicion of inaccuracy with the current transducer.

**Equipment required**

- Dressing Pack
- Chlorhexidine in 70% Alcohol
- Pressure transducer (Compactor A)
- Sterile gown and gloves
- Mask and goggles
- 3-way tap
- 5 ml syringe
- 10 ml 0.9% saline
- Sterile non-injectable cap

**Procedure (set up and priming)**

- Level the EVD transducer to the external auditory meatus using a spirit level *(see Figure 2 & 3).*
- Wearing non-sterile gloves turn the 3-way tap to the ‘45-degree position’ *(see Figure 4).*
- Don mask and goggles and open the above equipment onto the dressing pack.
- Wash hands and put on sterile gown & gloves.
- Attach the 3-way tap to the end of the transducer where the cable doesn’t exit *(see Figure 1b).*
- Prime transducer with 0.9% saline.
- Attach sterile non-injectable cap to cable end of the transducer.

**Procedure (connecting transducer to EVD drain)**

- Using a ‘non-touch technique’ (single use of sterile gauze to handle non-sterile items) remove the old cap from the EVD drain (if adding a transducer post-MRI) or the whole transducer (if replacing a faulty transducer).
- Using a ‘non-touch technique’ clean the connection and allow to dry.
- Remove the 3-way tap used for priming the new transducer and attach the primed transducer to the EVD drain.
- Have an assistant connect the bedside monitor pressure cable (allowing the operator to remain sterile for the zero procedure).
- Proceed to zero the EVD (see page 5).
- Attach a sterile non-injectable cap.
Codman

The Codman’s catheter is a strain-gauge catheter which allows continuous monitoring of ICP. It is available as either: a parenchymal catheter, or combined with an extra-ventricular drain in the Combined Codman’s /EVD.

1. Insertion

**Equipment Required**

- Self contained ICP catheter kit
- Drill kit with drill bit
- Codman’s Express monitor (respiratory store)
- Sterile gown and gloves
- Mask & goggles or face shield
- Betadine
- Standard tray
- Scalpel blade No.11
- Suture Material
- Tegaderm
- Local anaesthetic
- 10ml 0.9% saline

**Prior to insertion:** the Codman’s catheter must be zeroed as follows:

**Procedure**

- Turn on the Codman Express, the LED screen will read “No transducer connected”.
- The Neurosurgeon/Registrar will hand off the catheter connection for the nurse to attach the Codman Express cable.
- The Neurosurgeon/Registrar will lay approximately 7.6cm of the tip of the ICP catheter into the marked well of the catheter pack, containing enough sterile saline/water to just cover the catheter tip. Do not submerge the tip of the catheter in a cup of sterile water as this will result in an inaccurate zero.
- While keeping the tip of the ICP catheter in the sterile saline/water, nursing staff press the “P→0” button on the Codman Express.
- The message “Transducer zeroing in process (please wait)” will appear on the screen.
- Once zeroed, a three-digit reference value will appear on the screen. This should be documented on the observation chart and on the catheter transducer.
- Press the “Menu” key to proceed. (Menu key also acts as “Enter” key).

Codman’s catheter is now ready for placement by the Neurosurgeon/Registrar.

Note: Each catheter generates a different zero reference number. Documenting this number allows a different Codman Express Monitor to be attached in the event of a monitor malfunction. If the zero reference number is not documented, changing the Codman Express Monitor is not possible.
2. Zeroing the bedside monitor to the Codman Express

Procedure

- Connect the Codman Express monitor to the bedside monitor using the appropriate cable.
- Press ‘0’ button on the Express box.
- Zero the bedside pressure module, confirm the bedside monitor reads “0”.
- Press the “20” calibration key on the Codman Express and confirm that the bedside monitor reads 20mmHg.
- Repeat with “100” calibration key and verify that the bedside monitor displays 98 – 102mmHg.
- Once calibration is completed, press the “Menu” key to proceed. (Menu key also acts as “Enter” key). The display now reads the current ICP value.
- This procedure should be performed once per shift: any drift in the zero value that would impact on patient care should be documented on the ICU flow chart and reported to the ICU/Neurosurgical Registrar.

Figure 10

A  Bedside monitor  
B  Pressure transducer cable  
C  Codman Express  
D  Codman Express cable  
E  Codman ICP catheter

3. Changing to a new Codman Express Unit

This can only be done if the zero reference number is known.

- Attach the new Codman Express cable to the catheter.
- The message ‘Accept or Adjust’ the zero reference number will be displayed. Check the catheter’s zero reference number: this will have been documented when the catheter was inserted and should be on the ICU flowchart and also on the catheter transducer.
- If the reference numbers match: move the cursor to the ‘Accept reference number’ and push the ‘Menu’ key to proceed to ICP monitoring.
- If the reference numbers do not match: move the cursor to the ‘Adjust reference number’ and push the ‘Menu’ key. Use the ↑ key or the ↓ key to enter the correct reference number and push the ‘Menu’ key to proceed to ICP monitoring.
4. Transporting

- Power supply for the Codman Express monitor is by AC power and also via internal battery. The battery life approximately 3 hours and takes 12 hours to fully charge when connected to AC power.
- The Codman’s catheter is MRI compatible, however, the display monitor and cables are not. These are to be disconnected and removed prior to entering the MRI.
- The Codman’s catheter is to be carefully coiled and taped to the patient’s head: to prevent accidental dislodgement and heat transference during the MRI (along the Codman’s catheter).
- Reconnect the display monitors and cables on completion of MRI and rezero.
Ventrix

The Ventrix catheter is a fibre-optic catheter, which allows for continuous monitoring of ICP. It is available as either: a parenchymal catheter, or combined with an extra-ventricular drain in the Combined Ventrix/EVD.

Power supply for the Ventrix ICP monitor is by 9v disposable battery, replace when low battery indicator is lit.

1. Insertion

**Equipment Required**

- Ventrix catheter
- Drill kit with drill bit
- Ventrix monitor (respiratory store)
- Sterile gown and gloves
- Mask & goggles or face-shield
- Betadine
- Standard tray
- Scalpel blade No.11
- Suture Material
- Tegaderm
- Local anaesthetic
- 10ml 0.9% saline
- Hair clipper and razor

**Prior to insertion:** the Ventrix catheter must be calibrated to the Ventrix monitor as follows:

**Setup Calibration & Insertion Procedure**

- Turn on the Ventrix ICP monitor by depressing the on button.
- The Neurosurgeon/Registrar will hand off the catheter connections to attach to the monitor cables.
- Connect grey fibreoptic connections to each other (arrow to arrow) and the white, round catheter ID tag to the white monitor cable. *(See figure 9).*
- Monitor should now read H----
- The catheter is zeroed in room air (as distinct from the Codman’s ICP catheter) and should not be pointing directly into a light source during zeroing. When the Neurosurgeon/Registrar is ready to zero the ICP catheter, hold the “0” zero button down until the H marches across the screen and then “0” is displayed.
- Once zeroed, the Ventrix monitor retains the zero for that specific catheter. This means the same monitor could be disconnected and then reconnected without losing the zero calibration. It also means that a different monitor to the one used on the initial calibration cannot be used.
- **Neurosurgeon/Registrar to insert ICP catheter.**
2. Zeroing the bedside monitor to the Ventrix monitor

- Once the catheter has been inserted, connect the bedside monitor to the Ventrix monitor, with the supplied pressure cable.
- Press the calibration button (downward arrow on the Ventrix monitor) – the Ventrix display should flash “0”.
- Press bedside monitor’s pressure module zero button, and the bedside monitor should display “0”.
- Press the Ventrix calibration button again, it will read 25. Wait for bedside monitor to display 25.
- Press the calibration button a third time, it will read 50. Wait till bedside monitor displays 50.
- Pressing the calibration button a final time will return the ICP monitor to the current ICP reading.
- This procedure should be performed once per shift: any drift in the zero value that would impact on patient care should be documented on the ICU flow chart and reported to the ICU/Neurosurgical Registrar.

3. MRI Transport

- The Ventrix catheter is MRI compatible. The cables and monitor box are not. Disconnect cables and display monitor from the catheter prior to entering the scanning room. (See figure 9).
- Carefully coil and tape the catheter to the patient’s head to prevent accidental dislodgement.
- Reconnect the display monitors and cables on completion of MRI and rezero.

Figure 9

Disconnect the Ventrix monitor from catheter at these two points prior to MRI
4. Troubleshooting

If the Ventrix monitor displays the following codes:

**EO1** - Fibreoptic receptacle isn’t fully connected  
Action: Check connections.  
Change the fibreoptic receptacle (see Respiratory Room).

**EO2** – Catheter is connected to a monitor that it wasn’t zeroed to on insertion.  
Action: Catheter must be connected to the monitor that was used on insertion.

**EO4** – Catheter has already been zeroed to the monitor  
Action: Catheter can be zeroed once only, prior to insertion.

**EO6** – Problem with the fibreoptic receptacle  
Action: Check connections.  
Change fibreoptic receptacle (see Respiratory Room).

**E12** – Ventrix monitor is slaved to a bedside monitor and the battery is dead  
Action: Prior to this code the low battery indicator would have illuminated.  
Turn off the monitor and replace the battery (9v).

**EEE** – Pressure is out of range  
Action: This can sometimes be seen as the catheter is being inserted through brain tissue.  
The pressure range is -10 – 105 mmHg.
# Appendix 1: Nursing Management of EVD Checklist

Preamble: Read in conjunction with EVD protocol found on ICUnet under Guidelines / Procedure / Neurological.

- Checklist to be completed on insertion and commencement of shift
- Update “Prescribed target pressure aims” section if changes occur

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<td>Insertion time / date documented on brown chart</td>
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<tr>
<td>Check for signs of infection (report)</td>
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<td>Leakage of CSF (test for glucose and report)</td>
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<td>Dressing intact</td>
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<th>EVD Transducer</th>
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<td>Transducer attached to 3-way tap on the EVD drain, at the zero point</td>
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<tr>
<td>Level with external auditory meatus</td>
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<tr>
<td>No flush bag attached to transducer</td>
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<tr>
<td>ICP waveform present on monitor</td>
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<tr>
<td>Transducer contains fluid &amp; no air bubbles or clots</td>
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<tr>
<td>Zero EVD transducer (see protocol)</td>
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<tr>
<td>Arterial Transducer extended to External Auditory Meatus</td>
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<th>Venting</th>
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<td>Duration (typically 5 mins followed by 5 mins of monitoring)</td>
<td></td>
</tr>
<tr>
<td>Drain Height (mmHg)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prescribed Target Pressure Aims</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ICP &lt;</td>
<td></td>
</tr>
<tr>
<td>CPP &gt;</td>
<td></td>
</tr>
<tr>
<td>Neuro Management Sticker on Flow chart</td>
<td></td>
</tr>
<tr>
<td>Treating Pressure (EVD or Ventrix / Codman)</td>
<td></td>
</tr>
<tr>
<td>Treating Pressure module labelled as ICP (to enable CPP calculation)</td>
<td></td>
</tr>
<tr>
<td>SBP Range (if prescribed)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drainage</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td></td>
</tr>
<tr>
<td>Hourly burette empties (assess frequency if less acute)</td>
<td></td>
</tr>
<tr>
<td>Specimen routinely sent Mon, Wed, Fri.</td>
<td></td>
</tr>
</tbody>
</table>

Nurses Initials

Linda Wight and Theo Kossart July 2004