Checklist: Insertion and Setup Codman Microsensor™ (intraparenchymal of ventricular drain)

Before you begin:

1. Contact neurosurgery to identify the type of catheter they plan to insert (i.e. Codman EVD Microsensor™, Codman Intraparenchymal Microsensor™ or a straight EVD catheter). Obtain the correct catheter (see Checklist Selection of ICP Catheter and Monitoring Equipment).

2. If a ventricular drain will be inserted, you will also need to setup a drainage collection unit. Obtain a Codman EDS 3™ CSF drainage collection unit and set it up as per Checklist: Setup of Codman EDS 3™ CSF Drainage Unit .

The catheter type will define the equipment requirements and preparation needed.

Assist with Insertion and Setup of Codman Microsensor™ and Codman Express™.

The initial setup of the Codman Express™ is the same for either Microsensor device. A drainage collecting unit is not needed for an intraparencyhmal catheter.

1. Obtain supplies for insertion and setup of Codman Microsensor™ catheter

Procedural

- ☐ Ventricular Insertion Drainage Tray with drill (ensure drill is packaged with tray)
- ☐ Hair clipper with clipper head
- ☐ Line cart
- ☐ Sterile gowns
- ☐ Large sterile drape and sterile towels
- ☐ Local anaesthetic
- ☐ Tegaderm™ dressing

Microsensor and Bedside Display

- ☐ Correct Codman Microsensor™ catheter (intraparenchymal or ventricular)
- ☐ Codman Express™ with microsensor cable attached to front and bedside monitor cable attached to back
- ☐ Philips bedside pressure module for displaying ICP (this can be any available module; an add on module may be required if the 3 standard modules are in use)

Ventricular Drainage

- ☐ If an external ventricular drain (EVD) is being inserted, prime a Codman EDS 3™ as per Checklist: Setup of Codman EDS 3™ CSF Drainage Unit .

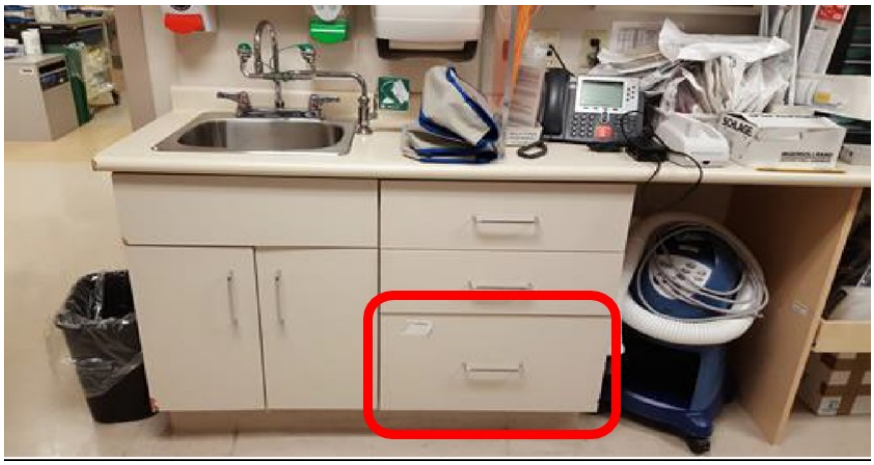


Figure 1: Location of Codman Express in Bay 1 Supply Room

PART A: HOW TO ZERO THE CODMAN MICROSENSOR™ *PRIOR TO INSERTION*

For both Codman Microsensor™ Catheters

1. Turn on the Codman Express™

- ☐ Place Codman Express™ on IV pole and plug into red electrical outlet**.**
- ☐ Turn the Codman Express™ on . Listen for audio beep.
- ☐ Be sure to remove any label with previous reference code from device (reference codes should be written on the white Microsensor™ connector, not attached to the Codman Express™.

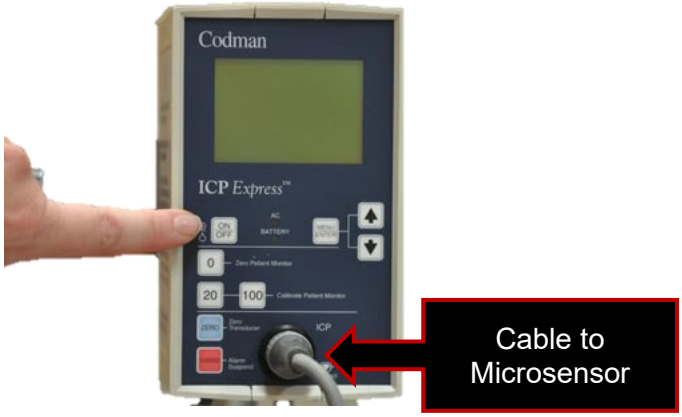


Figure 2: Turn on Codman Express

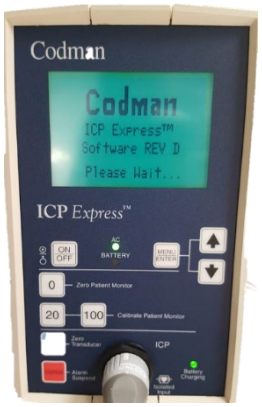


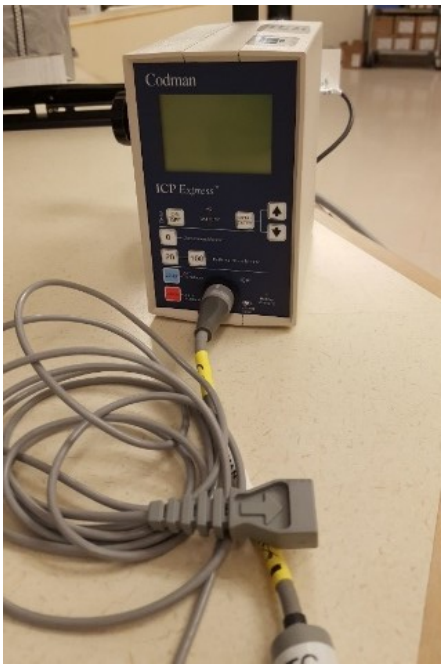
Figure 3: Codman Express Boot Up

2. Connect the Codman Microsensor™

- ☐ Assist neurosurgeon to prepare sterile field and open Codman Microsensor™ catheter
- ☐ Neurosurgeon passes the white microsensor connector for connection to the grey Codman Express™ cable (Figures 4, 5). This cable should remain attached to the Codman Express™ at all times.

Figure 4:
Connect Microsensor™ (white) to Codman Express cable (grey)

Figure 5:
Microsensor cable connected to front of Codman Express™.



- As soon as the Microsensor™ is connected, “Transducer Detected” will appear on the screen (Figure 6).

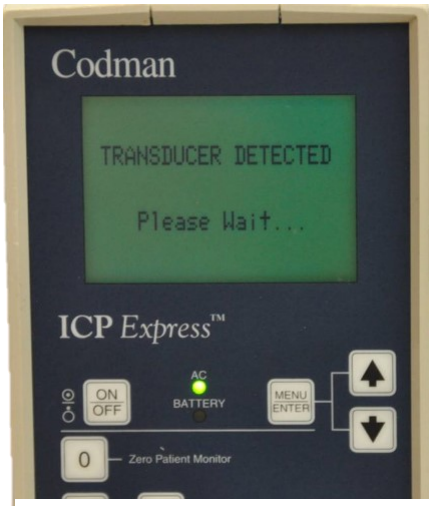


Figure 6: Transducer has been detected

- Provide physician with a syringe of sterile saline for sterile fields. This will be used to fill the catheter tray and submerge the tip of the catheter during zeroing.
- Neurosurgeon holds the catheter steady in a **horizontal** position, submerged in 3 inches of sterile saline (Figure 7).

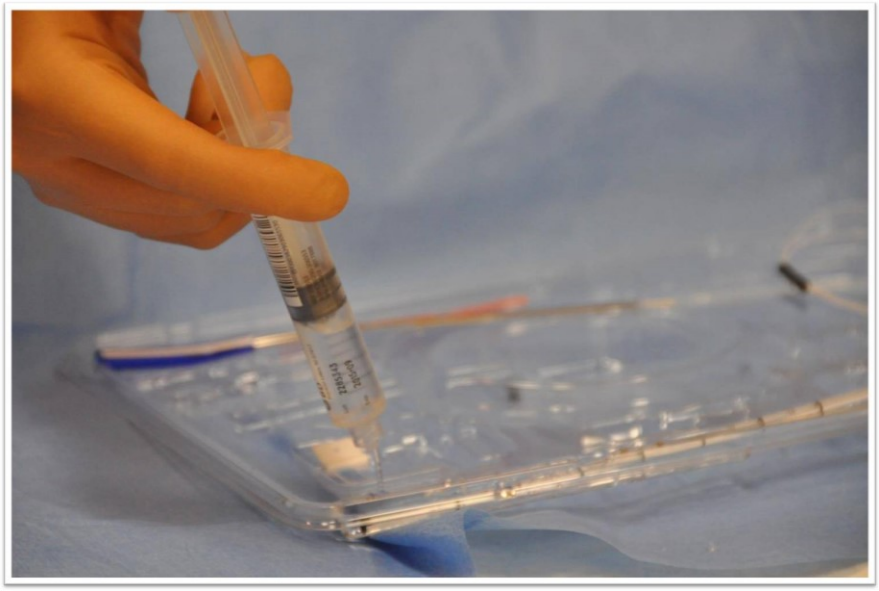


Figure 7: Physician submerges catheter horizontally under sterile saline and sterile field

- While catheter is held steady, nurse presses the blue “Zero Transducer” button when prompted (Figure 8). Remember blue for water. **THIS IS THE ONLY TIME THAT THE BLUE ZERO BUTTON SHOULD BE PRESSED!**

Figure 8: Press blue "Zero Transducer" button. ONLY EVER SELECTED DURING INSERTION

- When zeroing is completed, a 3 digit reference number will display (Figure 9).

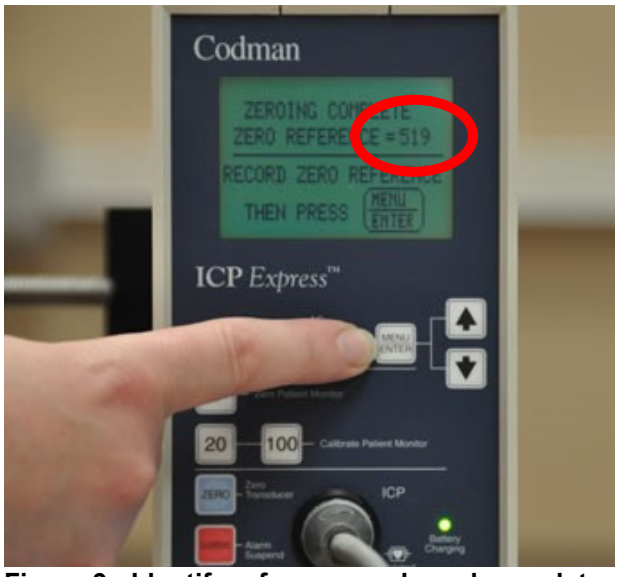


Figure 9: Identify reference code and complete zeroing

- **Document the 3 digit reference number on the white Microsensor™ using a permanent black marker.** Record this reference number in the ICP monitoring grouper of the EPR.
- Do not affix a label or record the reference number on the Codman Express™. The reference number is specific to the catheter, not the Codman Express™. You can use a different Codman Express for the same patient as long as you have the reference number.
- Press "MENU/ENTER" to complete the zeroing. ***The physician can now insert the catheter***.

PART B: PROCEDURE FOR CONNECTING THE CODMAN EXPRESS™ TO PHILIPS™ MONITOR:

The Codman Express™ can be connected to the bedside monitor prior to insertion as shown in Part B.

For both Codman Microsensor™ Catheters (EVD and Intraparenchymal)

ICP is measured by the Codman Express™. This pressure is duplicated on the Philips™ monitor for the purpose of generating an ICP waveform.

If there is a discrepancy between the pressures on the 2 devices, the Codman Express™ is the source of truth.

1. **Select a pressure module** for ICP monitoring. Use a spare pressure module on the MMX Extension (highlighted in green) or a single pressure add-on. Label the module as ICP.

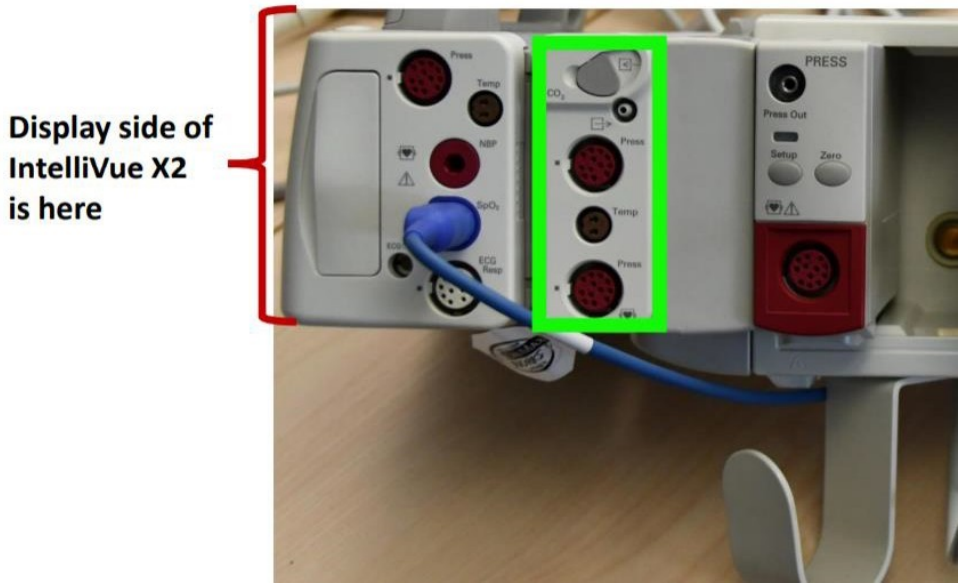


Figure 10: Identify a spare module

2. **Connect the Codman Express™ to the Philips™ monitor**

Ensure that the Philips™ cable is connected to the back of the Codman Express™. This cable should always remain attached to the back of the Codman Express™.

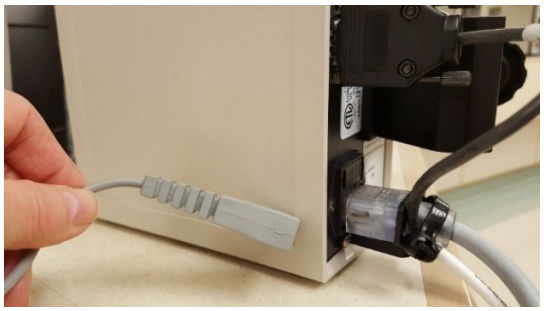


Figure 11: The monitor cable should remain attached to the back of the Codman Express

Figure 12: Philips™ end of the ICP monitoring cable plugged into single module. The pressure cable has a different coloured connection (white) than other Philips cables (grey).

The Philips™ end of the Codman Express™ cable should be permanently attached to the back of the monitor (Figure 12).

3. Activate/enable the pressure module.

Touch the “xylophone” keys (Figure 13).

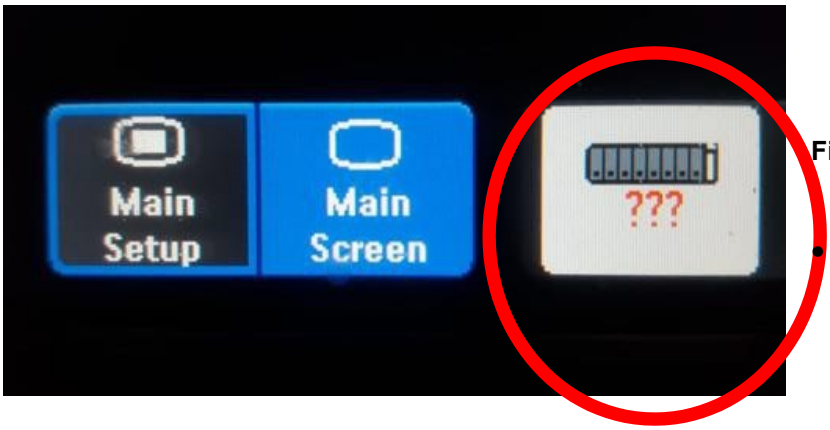


Figure 13: Select the xylophone key

- Examine the labels for each pressure module. The same label can only be active on one module at a time. To make the module live, it must have a unique label.
- To change the label, touch on the module. If two modules have the same label, you have to disable one and give it a new name.

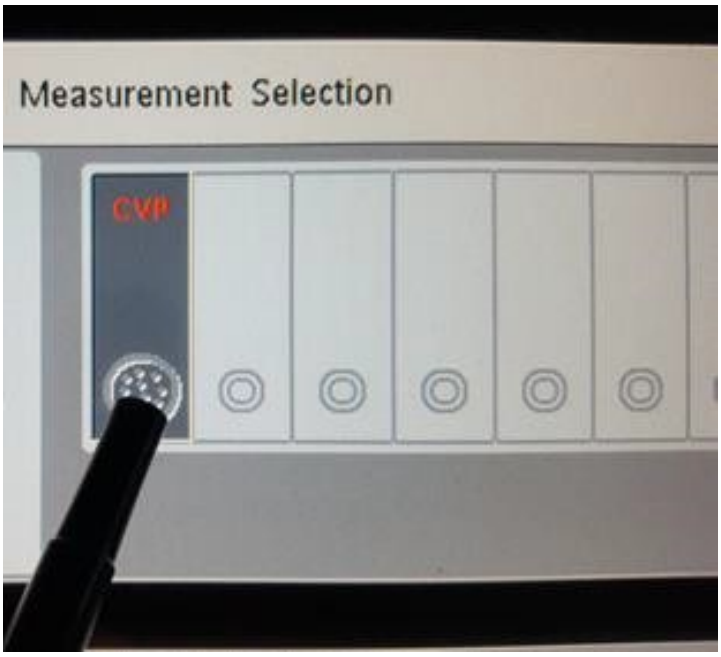


Figure 14: Touch the module that you want to label

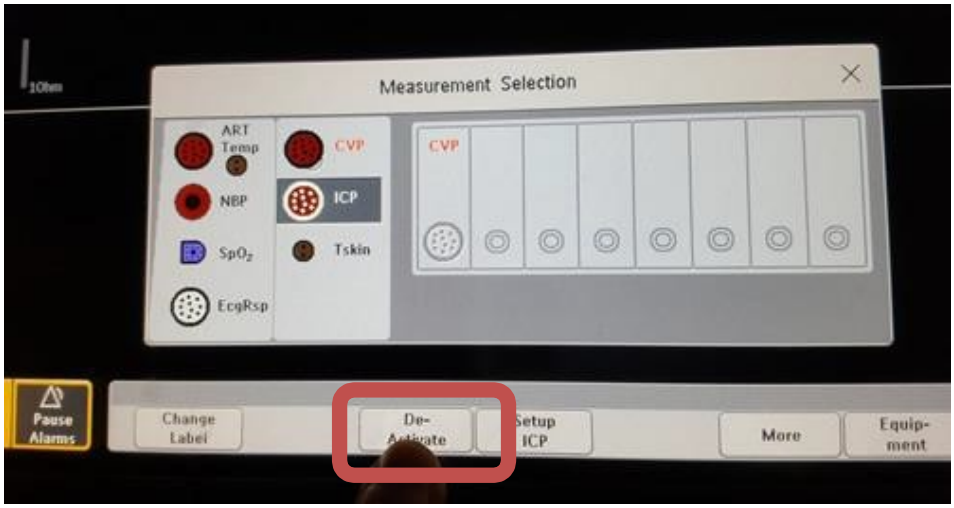


Figure 15: Deactivate old label

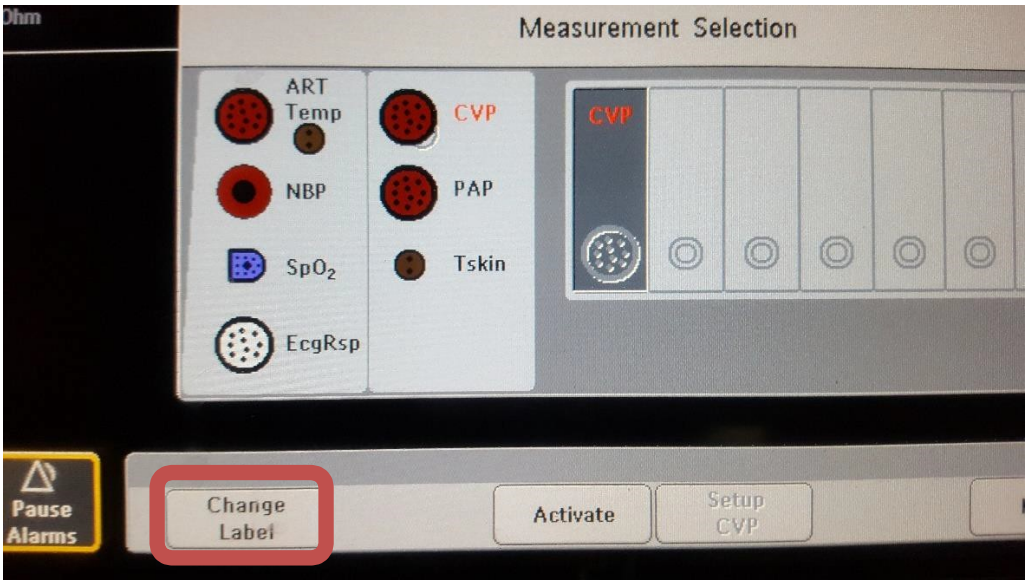


Figure 16: Choose change label

Figure 17: Scroll to the desired label and select, then choose activate

4. When the following prompt appears, press the zero **on the Phillips pressure module.** (Note that **you do not need to open any stopcocks or adjust the position of any tubing or devices**). You do not need to level any aspect of the Codman Express™ or priming circuit to any reference point such as the patient's head – this is not a fluid filled pressure monitoring circuit. This prompt should appear as soon as the cable is connected. If it does not, press the **WHITE "0 zero patient monitor"** button on the Codman Express™. **DO NOT PRESS THE BLUE ZERO BUTTON – It is only selected before insertion when the catheter tip is under water (blue for water).**

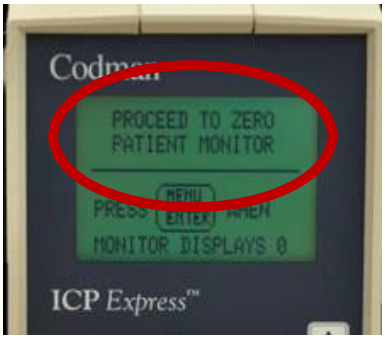


Figure 18: This prompt tells you to select the zero on the pressure module

5. Press the zero on the Philips™ pressure module that is being used for ICP measurements. Confirm that the reference line for the ICP waveform is displaying zero and the reference line is along the zero baseline This can take a few minutes. If zero is not achieve, try again.

Figure 19: Zeroing

Figure 20: Confirm when "zero" is displayed on the bedside monitor, confirm by selecting Menu/Enter.

6. The following calibration screen will appear. Press “20” to send a calibration signal of 20 mmHg to the Philips™ monitor (do not use 100, this is a European calibration code).

Figure 21: Send calibration signal “20” to the Philips monitor.

7. Observe the bedside monitor until the pressure reaches 20. This can take several minutes. If the pressure doesn’t reach 20, repeat the procedure. If the monitor does not calibrate, notify Biomedical Engineering and obtain another Codman Express™.

Figure 22: When pressure reaches 20, calibration has been achieved.

7. Press the **white menu button** to confirm that the monitor displays 20 mmHg. This will complete the calibration. If the monitor does not display 20 mmHg, use the arrows to adjust the value before completing.

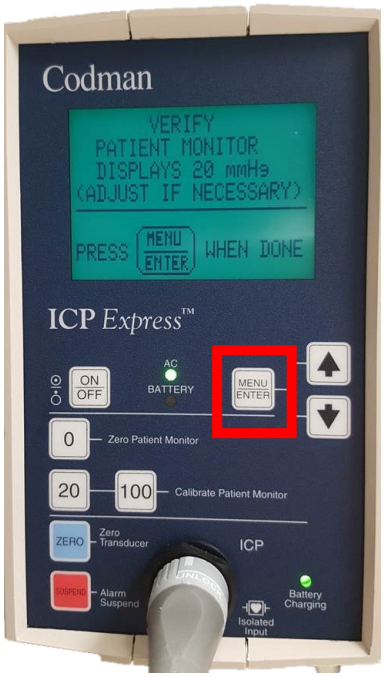


Figure 22: Confirm calibration and select "Menu"

Codman Express Operation:

- An LCD switch is located on the back of the ICP Express to see screen in the dark
- Alarms are automatically off when ICP express is turned on. To activate alarms go to menu/enter button, choose on/off alarm limits option and activate alarm option by arrowing up or down for required limits. You only need to set the Codman Express™ alarms if the patient is not connected to the bedside monitor. Set the bedside alarms when connected.

Troubleshooting

- When zeroing the ICP Express monitor, if the value -99 appears this means the grey cable that connects to the front of the ICP Express monitor needs to be replaced
- *If you attempt to zero the bedside monitor by selecting the white "zero patient monitor" button on the Codman Express™ and nothing changes, check to ensure the cable from the Codman Express™ is connected into a Philips™ pressure module*
- If a zero reference number appears before zeroing, turn ICP Express off and restart steps

Transporting Patients with a Microsensor™ or External Ventricular Drain

- See Checklist for Transporting a Patient With a Microsensor™ and/or EVD
- When reconnecting catheter to ICP Express, you must confirm that the reference number is correct. If it is not, use arrows to adjust the reference until it is correct. **NEVER PRESS THE BLUE REFERENCE OPTION after insertion.**
- The Codman Microsensor™ is MRI conditional. The Codman Express™ must be disconnected and the Microsensor™must be coiled as shown in this link.
- Do not close the drain for transport. Keep the drainage unit upright and at the correct level during transport. The Codman EDS 3™ drain should only be turned off briefly if the drain must be dropped below the level of the patient's head. Reposition as quickly as possible to restore the correct drain

position and reopen the drain. This should be done as soon as the patient is transferred to the CT or MRI table and before starting the test. Movement and repositioning may cause an additional rise in the ICP, making drainage very important.

FLUID FILLED PRESSURE MONITORING

See **Procedure: Measurement of ICP Using Fluid Filled EVD Monitoring System (standard transducer)**

There are two situations where fluid filled pressure monitoring may be used. The first is when a straight non-Microsensor Cather has been inserted. The second is to confirm erroneous readings from the Codman Express™.

The Codman Express™ is a more reliable pressure measurements as it is not influenced by the location of the tip of the catheter (it can be out of the ventricle) or any obstruction within the fluid filled path. However, if during reconnection of the Microsensor™ the blue zero button was incorrectly selectedsel the Codman Express™ will irreversibly display an incorrect pressure measurement equal to the true pressure at the time the blue zero button was incorrectly selected, minus “zero”.

Pressure monitoring through a fluid filled circuit is subject to error due to blood or tissue that disrupts waveform transmission. Unlike a vascular device, nurses cannot flush the system toward the patient catheter. Flushing distal to the patient stopcock can be performed, but flushing between the patient stopcock and the catheter is done by the Neurosurgical team only.

Always ensure the stopcock is turned off to the patient before flushing distally toward drainage collection chamber.

Essential Practice

- Never flush proximal to patient stopcock
- Always turn the patient stopcock (nearest patient) off toward patient’s head before flushing.
- Unlike the Codman Microsensor™, the pressure transducer MUST also be level with the patient’s external auditory canal to ensure that the pressure measurement is accurate.
- Unlike the Codman Microsensor™ pressure is measured directly by the Philips™ monitor (not a “copy” of a pressure measured by another device).
- Fluid filled ICP pressure monitoring can be limited by debris or clot within the drainage catheter and will only produce a pressure if the tip is within a fluid filled ventricle. The Codman Microsensor™ measures pressure independent of the fluid filled pathway and will provide pressures even if the tip of the catheter is not in the ventricle.
- When measuring pressure using a fluid filled system, you **MUST TURN THE 4-WAY PATIENT STOPCOCK “OFF” TO DRAINAGE FOR 1 MINUTE TO OBTAIN AN ACCURATE PRESSURE.**
- Although you can open the stopcock to drainage and pressure monitoring at the same time to trend pressure, the pressure you obtain will be a blend of the two directions (and therefore inaccurate). You MUST TURN THE STOPCOCK OFF TO DRAINAGE FOR 1 MINUTE TO OBTAIN AN ACCURATE PRESSURE MEASUREMENT.

Last Revised: September 22, 2023
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