Checklist for Insertion and Setup of an ICP Monitoring Device

Before proceeding, contact neurosurgery to identify the type of catheter to be inserted. The catheter type will define the equipment requirements and preparation needed.

1. Obtain the Catheter (choose one of 3 types below):

   A. Codman Microsensors™ (two types):

   Codman Microsensors™ are catheters that measure intracranial pressure via a strain gauge microchip located at the tip of the catheter. Both Microsensor™ catheters below are connected to the Codman Express™ for pressure monitoring. Unlike fluid filled pressure monitoring, pressure transmission is unaffected by obstructed fluid paths (e.g., from clot or tissue).

   I. **Codman Microsensor™ Intraparenchymal Catheter (pressure only, no drainage):**
   This catheter is inserted into superficial brain tissue. It measures pressure only, it does not drain CSF. It may be used for monitoring when ventricles are too small to access, or in patients with normal intracranial pressure who are at risk to develop elevated pressures. If ICP rises, it may be changed to an external ventricular drain (EVD). This catheter monitors pressure ONLY. It cannot be used for drainage.

   ![Figure 1: Codman Subdural/Intraparenchymal Monitoring Device](image1)

   II. **Codman Microsensor™ and External Ventricular Drainage Catheter (pressure is measured by microsensor independently of fluid filled channel).** This is an intraventricular catheter. It is used to measure ICP and to drain CSF.

   ![Figure 2: Codman Subdural/Intraparenchymal Monitoring Device](image2)
B. Standard Intraventricular Drainage Catheter (fluid filled pressure monitoring):

The standard ventricular catheter is used to measure ICP and to drain CSF. Pressure is measured using a standard transducer, picking up pressure that is transmitted through the fluid filled channel of the catheter.

Figure 3: Standard (non-microsensor) External Ventricular Drainage catheter

2. Obtain supplies to insert ICP Catheter:
   - Ventricular Drainage Tray (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

3. Do you need a CSF drainage unit (Codman EDS 3)?

Both the Codman Microsensor™ External Ventricular Drainage catheter and the standard ventricular drainage catheter requires a CSF drainage unit. CSF cannot be drained using an intraparenchymal catheter.

Supplies Needed:
   - Codman EDS 3™
   - Saline syringe for sterile field
   - Standard pressure transducer kit (used to flush drainage unit)
   - 500 ml bag of normal saline
   - Codman laser level
   - Portable IV pole

4. Obtain supplies for pressure monitoring:

Microsensor™ catheters (intraparenchymal or intraventricular):
   - Codman Express™ monitor
   - Codman Express™ cable (should be attached to the front of the Codman Express™)
   - Codman™ - Philips™ pressure cable for copying the pressure from the Codman Express™ to the Philips™ monitor
   - Philips™ pressure module (e.g., unused module on MMX extension or a separate single pressure module).

Alternative EVD (Standard Intraventricular Drainage Catheter for fluid filled monitoring):
• Philips™ pressure module (e.g., P3, P4 or an unused P2)
• Regular Philips pressure cable
• Pressure transducer (also used to prime Codman EDS3™ drainage unit)

The Codman Express™ is kept in the drawer below the sink in the Bay 3 supply room.

Figure 4: Drawer where Codman Express™ is stored

PROCEDURE FOR PRIMING CODMAN EDS3 (CSF collection unit):

For Codman Microsensor™ ventricular drainage catheter and standard ventricular drainage catheter.

• Perform hand hygiene
• Hang the Codman EDS3 on IV pole
• Prime pressure tubing with normal saline (do not pressurize saline bag)

Figure 5: Hang 500 mL bag of normal saline
- Connect pressure tubing to the Codman EDS3 stopcock that is closest to the patient catheter.

![Figure 6: Connection point for pressure tubing](image)

**Figure 6:** Connection point for pressure tubing

- Flush drainage tubing toward patient. Turn stopcock and flush remainder of tubing until fluid collects in the drainage collection chamber.

- Turn patient stopcock to 45 degrees (off in all directions) until ready to hook up

- Using laser level, adjust position of drainage unit until “0” on drainage panel is level with external auditory canal.

![Figure 7: Stopcock off to patient. Open to allows priming of system.](image)

**Figure 7:** Stopcock off to patient. Open to allows priming of system.

![Figure 8: Level drainage collection system](image)

**Figure 8:** Level drainage collection system
Position the drip chamber to the ordered level in cmH20.

**Figure 9:** Position red line at the appropriate level on the green \((\text{cmH}_2)\) scale.
PROCEDURE FOR SETUP UP OF CODMAN EXPRESS™

PART A: HOW TO ZERO THE CODMAN MICROSENSOR DURING INSERTION

For both Codman Microsensor™ Catheters (intraparenchymal or EVD)

- Perform hand hygiene
- Place Codman Express™ on IV pole and plug into red electrical outlet
- Turn Codman Express™ on and listen for audio beep

![Figure 10: Turn the Codman Express™ on](image)

The Codman Express™ will boot up.

![Figure 11: Boot up screen](image)
• Assist physician to prepare sterile field and open Codman Microsensor™ catheter

• Have physician pass the Microsensor™ connection. Maintain sterility. Connect to cable on the Codman Express™

![Figure 12a: Connect microsensor cable](image1)

**Figure 12a:** Connect microsensor cable

![Figure 12b: Microsensor cable located at front of device](image2)

**Figure 12b:** Microsensor cable located at front of device

• As soon as cable is connected, “Transducer Detected” will appear on the screen

• Provide physician with a syringe of sterile saline. This will be used to fill the catheter tray and submerge the tip of the catheter during zeroing.

• While physician submerges the catheter and holds it horizontal under 3 inches of sterile saline, press the blue “Zero” button when prompted

![Figure 13: Press blue zero button](image3)

**Figure 13:** Press blue zero button
• When zeroing is completed, a 3 digit reference number will display

Figure 14: Record the 3 Zero Reference Numbers then press the menu key

• Document the 3 digit reference number in the Kardex and AI record. Record the number on the Microsensor™ with a Sharpie

• Press “MENU/ENTER

• The catheter can now be inserted; the pressure will automatically display on the Codman Express™
PART B: PROCEDURE FOR CONNECTING CODMAN EXPRESS™ TO PHILIPS™ MONITOR

For both Codman Microsensor™ Catheters

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

![Figure 15: Identify a spare module](image)

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

Connect the Philips cable. The cable is kept connected to the back of the Codman Express™. The grey wire of the cable is a different color than the standard Philips pressure cables.

![Figure 16: The back of the monitor has the pressure cable and power cord plugged in.](image)
3. **Activate/enable the pressure module.**

   Touch the “xylophone” keys.

![Figure 17: Philips ICP cable plugged into single module](image)

![Figure 17: Select the xylophone key](image)
• 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 18: Touch the module that you want to label

Figure 19: Deactivate old label
**Figure 20:** Choose change label

**Figure 21:** 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).

![Image of pressure module](image1)

**Figure 22:** This prompt tells you to select the zero on the pressure module

5. 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 achieved, try again.

![Image of ICP waveform](image2)

**Figure 23:** Zeroing

![Image of pressure module](image3)

**Figure 24:** Confirm Zero
6. The following screen will appear. Press “20” to send a calibration signal to the monitor (do not use 100, this is a European calibration code). Select the white “20” box on the monitor.

![Figure 25: Send calibration signal “20”](image1)

7. Observe the bedside monitor until the pressure reaches 20. This can take several minutes. If the pressure doesn’t reach 20, repeat.

![Figure 26: When pressure reaches 20, calibration has been achieved.](image2)
8. Press the **white menu button** to confirm that calibration was completed.

![Image of ICP Express monitor](image)

**Figure 27:** Select menu

9. If the pressure is not correct, use the arrow keys to adjust the reference line before pressing “MENU/ENTER”.

**Please note the following:**
- 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.

**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 “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

**Traveling**
- Disconnect catheter from grey cable attached to ICP Express
- When reconnecting catheter to ICP Express, the reference number on the monitor must match the number written on the catheter. Either accept the displayed reference number (if they match) or adjust using arrow keys.
- The Codman Microsensor™ is MRI compatible
PROCEDURE FOR MONITORING ICP WITH STANDARD VENTRICULAR CATHETER:

ICP is measured with standard transducer and fluid filled circuit.

- Perform hand hygiene
- After priming the Codman EDS3, connect the pressure transducer cable to a spare bedside Philips™ module
- Change the Module label to “ICP” as previously described
- Tape the pressure transducer to the back of the Codman EDS3 aligning the stopcock from the transducer with the zero reference stopcock on the Codman EDS3.
- Confirm that the stopcocks are level with the patient’s external auditory canal using a laser level
- Zero the Philips transducer as you would zero an arterial pressure line
- Fluid filled monitoring will be affected by blood or particles in the drainage tubing

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