



## MLREMS Advanced Practice Paramedic Clinical Competency Invasive Hemodynamic Monitoring

**At the end of this skills session, the Paramedic will be able to:**

1. Discuss the indications for hemodynamic monitoring
2. Discuss complications of:
  - a. Central Venous Lines
  - b. Arterial Lines
  - c. Pulmonary Catheters

Action	Complete
Dons appropriate PPE	
Discuss the indications for Hemodynamic Monitoring: <ul style="list-style-type: none"><li>■ Hypovolemia</li><li>■ Shock</li><li>■ Fluid management</li><li>■ Mechanical ventilation with high pressures, ARDS</li><li>■ CVP – fluid management, right heart failure</li><li>■ Arterial line – blood pressure monitoring, frequent blood draws</li></ul>	
Discuss the following complications of central lines and identify signs, symptoms and interventions for each: <ul style="list-style-type: none"><li>■ Pneumothorax</li><li>■ Bleeding</li><li>■ Carotid artery puncture</li><li>■ Air embolism</li><li>■ Infection</li><li>■ Dysrhythmias</li></ul>	
Discuss the following complications of arterial line monitoring and identify signs, symptoms and interventions for each: <ul style="list-style-type: none"><li>■ Bleeding</li><li>■ Infection</li><li>■ Occlusion of artery and/or subsequent loss of perfusion distal to site</li></ul>	
Discuss with preceptor the following complications specific to PA catheters and identify signs, symptoms and interventions for each: <ul style="list-style-type: none"><li>■ Pulmonary artery rupture</li><li>■ Lung infarction</li></ul>	



<ul style="list-style-type: none"> <li>■ Ventricular dysrhythmia</li> <li>■ Spontaneous/permanent wedge</li> <li>■ Balloon rupture</li> </ul>	
<b>Transducing an Invasive Line</b>	
Assess and evaluates line to be transduced	
If not already completed: <ul style="list-style-type: none"> <li>■ Assembles supplies to construct a transducer system <ul style="list-style-type: none"> <li>■ 250-500 mL bag of 0.9% of NaCl Solution</li> <li>■ Transducer setup</li> <li>■ Pressure infuser</li> <li>■ Pressure Cable</li> </ul> </li> <li>■ "Spikes" bag with transducer setup and bleeds all air from bag of solution and tubing</li> <li>■ Places pressure bag on IV solution and inflates to 300 mmHg</li> <li>■ Ensures that all roller clamps and 3-way stopcocks are completely open</li> <li>■ Flushes the system to expel air from the tubing. Make sure the stopcocks and transducer are also free of air bubbles.</li> </ul>	
<p>Note: This setup describes the setup for managing arterial/venous catheters.</p> <p>Intracranial pressure monitors do <b>NOT</b> utilize a pressure based transducer system.</p> <p>The system is flushed with preservative free Saline Solution.</p>	
Attaches transducer system directly to port of catheter to be transduced. <ul style="list-style-type: none"> <li>■ Ensure that there are no clavies at the point of access</li> </ul>	
Attaches monitoring cable to transducer and Philips monitor in the P1 or P2 port	
Label the pressure to be transduced on the Philips monitor <ul style="list-style-type: none"> <li>■ To select a pressure label: <ul style="list-style-type: none"> <li>■ Press the Menu Select button.</li> <li>■ Using the Navigation buttons, select Measurements/Alarms and press Menu Select.</li> <li>■ Select Press 1 (or Press 2) and press Menu Select.</li> <li>■ Select Label and press Menu Select.</li> <li>■ Select the appropriate label from the list provided (see pressure label list below) and press Menu Select.</li> <li>■ Verify and change the size of your scale, as appropriate. (Reference the "Pressure Waves" topic, as needed).</li> <li>■ Verify and change the alarm source type, as appropriate. (Reference the "Alarms" topic, as needed).</li> <li>■ Set the high and low alarm limits.</li> </ul> </li> </ul>	



Place the transducer to phlebostatic axis by attaching to the patient's arm, stretcher IV pole or sides of patients chest.

NOTE: For intracranial pressure monitoring, the leveling axis is the external auditory canal

Zero the transducer

- Close the transducer stopcock to the patient and vent the transducer stopcock to atmospheric pressure
- Press the Menu Select button
- Using the Navigation buttons, select Measurements/Alarms and press Menu Select
- Select the pressure label you wish to zero
- Press Zero and press Menu Select
- Zeroing begins
- When zeroing is complete, open the stopcock to the patient and transducer and replace the cap to the transducer stopcock

Uses transducer pig tail or squeeze clamp to flush the system and create a square wave

Evaluates square wave for under-dampening and over-dampening

Correctly identifies and analyzes Arterial, CVP, RV, PA, PAWP and ICP waveforms from both monitor and graphic printout.

- Identify anatomic and physiologic source of each waveform.
- Differentiate between venous (CVP, PAW) and arterial (SA, PA) waveforms.
- Identify a, c and v waves in CVP and PAW tracings.
- Identify abnormal waveforms; i.e. over and under damping.

**Paramedic Name:**

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**Evaluator Name:**

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**Evaluator Signature:**

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**Date:** \_\_\_\_\_