I. KEY PERFORMANCE ELEMENTS

<table>
<thead>
<tr>
<th>Procedural Element (Step)</th>
<th>Description of Satisfactory Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Checks solution</td>
<td>Checks for proper concentration of anticoagulant and checks that solution is not expired.</td>
</tr>
<tr>
<td>10. Pressurizes device</td>
<td>Pumps air into pressure bag to recommended pressure level or cranks Tyco device until crank handle spins freely.</td>
</tr>
<tr>
<td>16. Turns calibration off to patient and removes cap from calibration port.</td>
<td>For this and following steps the stopcock caps must be removed. The student must not contaminate the caps.</td>
</tr>
<tr>
<td>18. Makes sure transducer zeros</td>
<td>Reads zero on monitor and/or follows prompts on monitor for zeroing.</td>
</tr>
<tr>
<td>23. Makes sure pressure on manometer correlates with monitor.</td>
<td>Reads recommended pressure on monitor follows prompts on monitor to correlate pressure on mercury manometer with bedside pressure monitor screen.</td>
</tr>
</tbody>
</table>

II. REQUISITE PERFORMANCE VARIABLES

The student will be able to change pulmonary artery monitoring line set-ups and calibrate transducers and monitors found at any clinical affiliate.

III. ADDITIONAL EVALUATION CRITERIA:

None

IV. ORAL REVIEW QUESTIONS:

1. What are the effects of changing transducer position after calibration on the pressure read on the monitor?

2. Describe how the following problems associated with pulmonary artery monitoring can be recognized and how to correct the problem:
   a. catheter fling
   b. respiratory deflections
   c. migration of catheter
   d. failure to wedge
   e. dampened waveform

3. What are common hazards associated with invasive pulmonary artery pressure monitoring.

4. What measured values can be obtained from a pulmonary artery catheter?
5. Describe how to position stopcocks and/or manipulate monitoring lines/devices to obtain the following:
   a. Pulmonary artery pressure
   b. Right arterial or central venous pressure
   c. Thermodilution cardiac output
   d. Mixed venous PO2 and saturation

V. SCENARIO QUESTIONS:

1. Given the necessary information calculate the following:
   a. Mean Pulmonary Artery Pressure
   b. Mean Arterial Pressure
   c. Systemic Vascular Resistance
   d. Pulmonary Vascular Resistance
   e. Cardiac index
   f. a-vO2 difference
   g. Oxygen delivery
   h. Oxygen consumption
   i. Shunts (estimate, clinical and classical)

2. A patient has a pulmonary arterial waveform, the nurse states that she is going to flush the catheter to remove any clots. What would you recommend to the nurse?

3. Patients in a critical care unit have the following hemodynamic values

<table>
<thead>
<tr>
<th>Bed 1</th>
<th>Bed 2</th>
<th>Bed 3</th>
<th>Bed 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCWP</td>
<td>8 mmHg</td>
<td>24 mmHg</td>
<td>22 mmHg</td>
</tr>
<tr>
<td>C.O.</td>
<td>3.2 L/min</td>
<td>3.4 L/min</td>
<td>3.8 L/min</td>
</tr>
<tr>
<td>C.I.</td>
<td>1.6 L/min/m2</td>
<td>1.71 L/min/m2</td>
<td>1.8L/min/m2</td>
</tr>
<tr>
<td>SVR</td>
<td>1200 dynes</td>
<td>1250 dynes</td>
<td>2000 dynes</td>
</tr>
<tr>
<td>RAP</td>
<td>4.0 mmHg</td>
<td>10 mmHg</td>
<td>15 mmHg</td>
</tr>
<tr>
<td>B.P.</td>
<td>68/44 mmHg</td>
<td>91/52 mmHg</td>
<td>140/95 mmHg</td>
</tr>
<tr>
<td>PVO2</td>
<td>NA</td>
<td>35 torr</td>
<td>32 torr</td>
</tr>
<tr>
<td>SVO2</td>
<td>51%</td>
<td>68%</td>
<td>62%</td>
</tr>
<tr>
<td>Hb</td>
<td>9.2 gm/dl</td>
<td>15 gm/dl</td>
<td>16 gm/dl</td>
</tr>
<tr>
<td>CaO2</td>
<td>12.2 vol%</td>
<td>19.7 vol%</td>
<td>21.1 vol%</td>
</tr>
<tr>
<td>CVO2</td>
<td>6.1 vol%</td>
<td>13.8 vol%</td>
<td>13.2 Vol%</td>
</tr>
</tbody>
</table>

For each of the above problems identify the underlying hemodynamic abnormality and make recommendations for changes in therapy that could correct the problem.
## PROFESSIONAL EVALUATION

**PROCEDURE (TASK):** SWAN-GANZ EQUIPMENT CHANGE AND CALIBRATION

**CLINICAL COLLEGE LABORATORY**

**NEW PATIENT**

**REPEAT PROCEDURE**

**MANIKIN/ANALOG**

**EQUIPMENT UTILIZED:**

**STEPS IN PROCEDURE OR TASK:**

**EQUIPMENT AND PATIENT PREPARATION**

1. Gathers, and assembles necessary equipment. (solution, tubing, transducer, stopcocks, etc.)
2. Checks solution (expiration date and correct solution, removes air as necessary).
3. Holds solution upside-down and punctures solution with IV tubing spike.
4. Hangs solution in pressure mechanism (tyco or pressure bag)
5. Positions stopcocks to allow flow through transducer to distal end of tubing
6. Opens IV tubing clamps.
7. Squeezes and releases drip chamber to fill drip chamber to proper level.
8. Holds distal end of tubing vertical and activates rapid flush device until solution completely fills all tubing (removes all air bubbles).
9. Flushes side ports of each stopcock.
10. Pressurizes pressure device.
11. Takes equipment to patient’s bedside.
12. Informs patient.
13. Turns distal and proximal sampling stopcock off to patient.
14. Removes old tubing from distal and proximal stopcocks back.
15. Attaches new tubing.
16. Turns calibration stopcock off to patient and open to air.
17. Presses zero mechanism on monitor.
19. Assembles syringe and stopcock to blood pressure manometer.
20. Pressurizes blood pressure manometer to proper level.
21. Attaches syringe from blood pressure monitor to venting port on the calibrating stopcock.
22. Opens stopcock on syringe to all 3 ports.
23. Makes sure pressure on monitor correlates with blood pressure manometer.
24. Turns stopcock on syringe off to venting port and removes syringe and stopcock.
25. Flushes calibration port, replaces cap.
26. Positions stopcocks for reading appropriate pressure.
27. Checks quality of waveform and properly documents procedure.

**FOLLOW-UP**

28. Maintains and processes equipment, insures asepsis
29. Records pertinent data in chart and departmental records
30. Notifies appropriate personnel

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**Proficiency Eval. #55 (Swan-Ganz Equipment Change & Calibration) -53**
Upon completion the student will be able to answer oral review questions and discuss clinical scenarios related to the following cognitive objectives:

1. Describe the effect of changes in transducer position on pressure readings.
2. Recognize common mechanical problems and hazards associated with hemodynamic monitoring equipment and describe methods for correcting these problems.
3. Perform common hemodynamic calculations.
4. List the measured values that can be obtained from a pulmonary artery catheter and describe how to manipulate monitoring lines and equipment to obtain these values.
5. Given hemodynamic data, recognize common hemodynamic abnormalities and describe methods to correct these problems.

<table>
<thead>
<tr>
<th>Skill evaluation</th>
<th>Oral Review</th>
<th>Specify Deficiencies:</th>
<th>Evaluator Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to perform applicable steps in procedure as listed on the front of form without error or omission.</td>
<td>Knowledge of the cognitive objectives listed above.</td>
<td>Specify applicable skill steps that were omitted or done erroneously. Also note any errors in discussing cognitive objectives. Please give enough detail to allow the student to work on specific remediation.</td>
<td>Please sign your name and state your affiliate name.</td>
</tr>
<tr>
<td>Date</td>
<td>Satisfactory</td>
<td>Unsatisfactory</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>Ready for minimally supervised clinical application</td>
<td>Requires additional clinical practice. Repeat skill evaluation. See deficiencies.</td>
<td>Answers oral review and other theory questions correctly</td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>Ready for minimally supervised clinical application</td>
<td>Requires additional clinical practice. Repeat skill evaluation. See deficiencies.</td>
<td>Requires repeat oral review. See deficiencies</td>
</tr>
<tr>
<td>Signature</td>
<td>Affiliate</td>
<td>Signature</td>
<td>Affiliate</td>
</tr>
</tbody>
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Proficiency Eval. #55 (Swan-Ganz Equipment Change & Calibration) -54