

# Checklist for Performing Cardiac Outputs

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## Standards of Care:

A pulmonary artery thermodilution catheter (PAC) permits the continuous display of cardiac hemodynamic pressures and the intermittent measurement of cardiac outputs.

- A Critical Care Registered Nurse (RN) may perform the procedure of cardiac outputs as ordered from the MRP/delegate
- The thermodilution equipment is set up and maintained (zeroing, leveling) by the critical care RN.
- The critical care RN is responsible to ensure continuous monitoring of the pulmonary artery waveform. Notifications of changes in waveform are to be communicated to the MRP team. The critical care RN from CCTC may perform the action of partial withdrawal of a pulmonary artery catheter from a wedged or RV position, following the linked procedure.  
<https://www.lhsc.on.ca/critical-care-trauma-centre/partial-withdrawal-of-a-pulmonary-artery-catheter-from-a-wedged-or>
- The critical care RN may draw mixed venous gases from the PA catheter.
- The critical care RN is required to document hemodynamic calculations, interventions, concerns and outcomes within the clinical record according to the standards of documentation.

## Equipment Required:

- Cardiac output (CO) module
- Cardiac output trunk cable
- Closed injectate delivery system (syringe, luer-lock stopcock, coiled tubing)
- 500mL IV bag of 5% Dextrose in Water

## Procedure:

1. Ensure that patient and health care provider safety standards [patient and healthcare provider safety standards](#) are met throughout the procedure include:
  - 2 patient identification policy [LHSC Client Identification Policy](#)
  - Risk assessment and donning of appropriate personal protective equipment (PPE)
  - 4 moments of hand hygiene
  - Safe patient handling practices
  - Biomedical waste disposal policies
2. Obtain an order for cardiac outputs in PowerChart from the MRP
3. Notify patient of intent and ensure patient demographics are accurate in the bedside monitor.
4. Ensure the patient's height and weight, are entered into the demographics section of the monitor. This is required for the hemocalculation of Cardiac Index (CI)
5. Place the patient in supine position with head of bed less than or equal to 30 degrees
6. Ensure equipment was properly set up on insertion:
  - 5% Dextrose in Water at room temperature is the injectate solution

- CO set (injectate temperature probe, injectate syringe and injectate temperature probe) is attached to a luer-lock stopcock, then directly placed on the blue proximal port (right atrium) of the pulmonary artery catheter (PAC) with no micro-clave present.
  - CO cable is attached to the cardiac output module
  - The injectate temperature probe is attached to the CO cable
  - The PAC thermistor connection is connected to the thermistor connector
7. Standard of practice is there are no vasoactive medications infusing into the proximal blue port. This is to avoid inadvertent bolus of vasoactive medications and pausing of vasoactive infusions. If present move infusion to VIP port or Introducer.
  8. Ensure the correct computation constant is entered.

NOTE \*\*Each catheter has its own constant; if the catheter is **NOT** the usual one used in the unit, (changed to a #7 or a pediatric catheter etc.) then the constant needs to be changed. Each PAC comes with an instruction book with a list of the computation constants and the variables that would require it to be changed. The current default of 0.592, on the bedside monitor is the correct computation constant for our VIP and UH Pacer Port PAC.

To change the value in the procedure window, select Computation Constant and use the pop-up keypad to enter the correct value.

9. Prior to beginning the procedure, ZERO and LEVEL all hemodynamic waves.
10. Ensure an adequate pulmonary artery waveform is present on the cardiac monitor to confirm the tip of the catheter is in the correct position.
11. Collect hemodynamic reading of a Central Venous Pressure (CVP)
12. Collect a hemodynamic reading of Pulmonary Wedge Pressure (PWP)\*\*Note PWP readings require an order from the MRP/delegate to obtain. PWP readings may not always be required when completing cardiac outputs.
13. The following parameters will be automatically transferred from the monitor into the calculation menu: heart rate, arterial blood pressure, pulmonary artery pressure. Values are taken one minute prior to the first injection.
- 14. Thermodilution output Procedure:**
  - a. Touch **Cardiac Output**
  - b. Pull back on the syringe on the closed system to allow filling of the 10mls of room temperature 5% Dextrose in Water
  - c. Adjust the stopcocks so there is direct passage from stopcock injection port to the lumen's terminal point at the blue proximal port
  - d. Touch **Start C.O.**
  - e. Observe the patient's respiratory pattern. Injection should be at the end of expiration for consistent measurements. To achieve this, wait until chest rises and time the injection to begin at end of inspiration (or as expiration begins).
  - f. When prompted by **Inject Now**, rapidly and smoothly inject the solution into the blue proximal port– not slower than 10mL in 4 seconds. Adjust stopcock to original position once injection is complete.
  - g. If necessary, **Reject Trial** by touching on the specific trial (touching toggles on and off). The rejected trial will turn red in colour. Green trials will be calculated
  - h. When the measurement is done, the monitor will display **Wait before starting new measurement** to equilibrate.

- i. When prompted **Prepare for next injection**, prepare to perform at least 2-3 more injections following the same steps, in order to achieve 3 values within 10% of each other.
  - j. Once a minimum of 3 values within 10% of each other is achieved, touch **Save CO** to save the values.
  - k. Touch **Hemo Calcs** (found on second page of screen menu) and fill in content, by touching the desired field. Manually enter the CVP *determined from the right atrial waveform*. PWP should not be routinely measured and should only be measure by an experienced provider; if PWP is not entered into the hemodynamics protocol, you will have a calculated PVR/PVRI.
  - l. Touch **Perform Calcs** to complete the cardiac output calculation.
  - m. Touch **Print Record**
  - n. Touch **Print** to print results.
15. Obtain arterial and a mixed venous gas (SVO<sub>2</sub>). Mixed venous is drawn from the pulmonary artery port (distal PA). If the pulmonary artery catheter is going to be removed after the last hemodynamics, draw a mixed venous (SvO<sub>2</sub>) and a central venous gas (ScvO<sub>2</sub>). While using a PA, inotrope titration is done to the mixed venous; once the pulmonary artery catheter is removed, titration can consider using the ScvO<sub>2</sub>. However, these 2 measures of extraction will be different values (usually ~10%). Measuring prior to catheter removal enables determination of future central venous target.
16. Ensures all infusions are running as previously ordered
17. Assesses PA waveform is present on bedside monitor
18. Documentation required on each CO printed results:
- Patient identification
  - Head of bed position
  - Inotropes and vasoactive medications infusing (should be in introducer)
  - Distance marker of pulmonary artery catheter
  - Core temperature
  - Ventilator settings INCLUDING PEEP
  - Nitric oxide parts per million, if applicable
  - Sign with professional designation
  - Communicate CO results to the critical care team and document as needed within the clinical record.

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