Standard Swan-Ganz Catheter

Set-up and Operation
Types of Hemodynamic Monitoring

• Standard Swan-Ganz Catheter
  - PA Catheter
  - Cardiac Output thermodilution determined by injection of NaCl (thermodilution)
• Advanced Technology Swan-Ganz Catheter
  - Vigilance II monitor (Refox)
• Vigeleo
  - Continuous Cardiac Output (CCO) monitor
Standard Swan-Ganz Catheter Set-up and Procedure

- Determine the phlebostatic axis
  - located at the 4\textsuperscript{th} intercostal space, mid-point A-P chest wall.
- Zero the transducer for all lines including: PAP, CVP and Arterial.
Thermodilution Cardiac Output

• Supplies needed
  - **C.O. Box and Cable**: found in the RT storage room in the SICU (locked room)
  - 500ml or 1000ml NaCl bag found on PAR (this is a charge item)
  - **C.O. setup** (in SICU locked room with bronchs.) This is a charge item, and includes tubing and syringe
Thermodilution Cardiac Output

• Supplies needed
Thermodilution Cardiac Output Procedure

OBTAINING CARDIAC OUTPUTS (DOUBLE SET):

- Place an ABG Plus order panel, and select the following:
  - ABG, Hemoglobin, Hematocrit, and Venous O2 Sat
- Obtain the venous blood gas sample from the PA distal port (yellow) on the Swan-Ganz catheter. This will give you a mixed SvO2, which is used in oxygenation calculations.
- Obtain an arterial blood gas sample from A-line for ABG, Hgb, and Hct. These numbers will also be used in oxygenation calculations.
- Send both samples to the blood gas lab (tube station 306).
Obtain Wedge (PAWP)

- On the Phillip’s Monitor, arrow over until you see ‘WEDGE’
- Click ‘WEDGE’ and you will see a box with a PA waveform (Figure A)
- Obtain the wedge by unlocking the balloon syringe on the PA catheter and slowly inflating the balloon until you see a waveform (Figure B)
Obtain Wedge (PAWP)

- Inflation of the balloon should be a slow process, and the balloon should be in the wedge position for no longer than 15 seconds.
- The value reflects Left Atrium pressure/volume
  - High: LV failure, hypervolemia
  - Low: hypovolemia
Thermodilution Cardiac Output Procedure

- Connect CO set syringe to the Proximal Injectate port
Thermodilution Cardiac Output Procedure

1. Connect the thermistor to the syringe to measure the temperature change from your injectate to the patients heart
2. Verify that the injectate amount is set to 10ml and catheter size is set to 7.5 French.
3. Leaving port closed to the CO set syringe, draw back 10mL NaCl from the CO set bag into syringe (unless other amount is specified).
4. Press Cardiac Output.
5. Open the port to the patient (this will make it closed to the transducer).
6. Press “Start” on the Phillip’s monitor.
7. When monitor beeps, or says “inject now”, inject the full amount of fluid in the syringe, at end-inspiration, at a steady pace over approximately 2 seconds.
8. When complete, close the port to the syringe. The CO will appear on the screen.
9. When the monitor says “Ready for new measurement”, repeat steps 3-8 until you obtain 3 CO’s that are within 10% of each other for accuracy.
Thermodilution Cardiac Output Procedure
Thermodilution Cardiac Output Procedure

- Next, you must average the 3 CO’s closest to one another.
- Select the CO’s that you want to discard by touching the waveform on the screen. This will tell the monitor that you would like to discard that measurement (the waveform will turn red).
- Press Save CO. This will automatically average out the three CO you obtained.
Thermodilution Cardiac Output Procedure

- Proceed to the hemodynamic calculation screen
- Fill in any vital sign values which are blank, and be sure that height and weight are accurate (top right of the screen)
- Press ‘Perform Calc’
- Record the Hemodynamic calculations or print them using the print function on the screen
- Go to the Oxygenation screen and enter the appropriate data from ABG and Mixed SvO2 labs. (PVO2=40, PB=742)
- Press ‘Perform Calc’
- Record oxygenation calculations in the notes section in Epic as a progress note.
Troubleshooting

• Changes in pressure measurements inappropriate to the patient’s condition
  - Make sure the transducer is at phlebostatic axis
  - Make sure to establish a zero reference point by turning the transducer stopcock off to the patient and open to air.

• Inability to obtain a wedge
  - Usually caused by a balloon rupture or retrograde slippage of the catheter in the right ventricle or pulmonary trunk. Obtain chest X-ray (CXR.)
Troubleshooting Contd.

• **Damped PA waveform**
  - Air in tubing
  - Clotted blood at catheter tip
  - Kinking or knotting of the catheter
  - Loose connection with a small leak in the system
  - Loose or cracked transducer dome
  - Amplifier setting in the wrong pressure range

• **No waveform**
  - PA transducer improperly engaged in the monitor outlet or in wrong outlet
  - Defective transducer
  - Large leak in system
  - Loose or cracked transducer dome
  - Stopcock turned to wrong position
  - Amplifier on zero or off
  - Defective cable connecting the pressure transducer to the monitor/amplifier