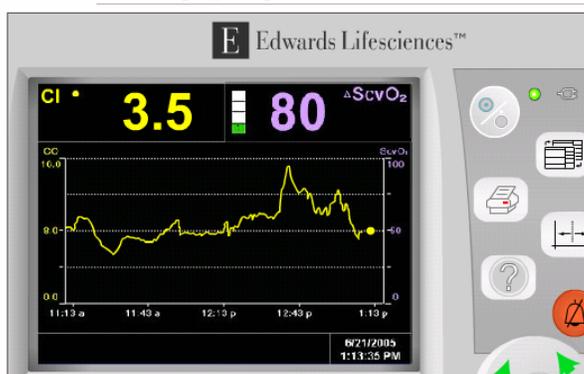


## USE OF THE FLOTRAC CONTINUOUS CARDIAC OUTPUT: QUICK TIPS

- The FloTrac™ is a fancy transducer that can be hooked up to any arterial line (e.g., radial or femoral), *that has a good arterial pressure waveform*.
- The Vigileo™ monitor can be used to monitor continuous cardiac output (with the FloTrac) or continuous central venous oxygen saturation (using the PreSep™ triple lumen oximetry catheter). You can use one or both of these technologies in the same patient.

### Set-Up

- The FloTrac™ transducer fits in the regular pole mounted holder. Place in holder with stopcock above transducer.
- The white cable is connected to the Datex™ monitor. Level and zero as for any other transducer. The green cable is connected to the portable Vigileo™ monitor (we only have two monitors).
- Turn the Vigileo™ monitor on. Turn the knob to highlight the box to the left side of the screen (it will highlight as yellow). This accesses the continuous cardiac output module. Press the knob in to enter the cardiac output module. (Turning the knob to the right and highlighting the purple box enters the continuous venous oxygen saturation module.)
- Choose “new patient” to delete old data.
- YOU MUST ENTER THE PATIENTS AGE, GENDER, HEIGHT AND WEIGHT. This information is needed to correctly estimate baseline vascular resistance.
- Choose “Zero” from the main menu. Open stopcock (as per usual), and confirm “zero”. You have to select this twice. Zeroing has occurred when you hear a quick beep.
- You are all set!



Select this button to change the screen.

### Basic Principles, Cardiac Index:

- The FloTrac™ samples 2,000 pressure points along the arterial pressure curve every 20 seconds, and averages these pressure points to produce a mean BP.
- The FloTrac™ uses baseline vascular resistance data (determined from age, gender and BSA data), and analyzes the shape of the waveform for change.
- This combined data is used to calculate the stroke volume. Stroke Volume is divided by body surface area to calculate Stroke Volume Index.
- The pulse rate (derived from the upstrokes of the arterial pressure tracing, not the ECG), is multiplied by the Stroke Volume Index to calculate Cardiac Index (note, this is opposite to the pulmonary artery thermo-dilution method for calculating cardiac output/index).

- Because the FloTrac™ updates every 20 seconds, it provide more immediate results.
- The CI data should be accurate, providing that:
  - You have a good arterial tracing (wait one minute after return of the waveform following blood withdrawal).
  - The patient is not on a balloon pump (the monitor cannot differentiate the diastolic augmentation wave from a second heart beat).
  - Severe aortic valve disease
- To determine if the displayed CI and SVI is meeting the patient's needs, measure the ScvO2 and lactate.
- If the ScvO2 is >70% and the lactate normal, the CI is meeting the patient's needs.
- The ScvO2 should be measured hourly until normal, to reassess interventions aimed at improving cardiac output and QID once stable. Measure on the GEM.
- Record ScvO2 on the nursing graphic, not the RRT record (ScvO2 is a cardiovascular assessment).
- Record the CI, SVI and SVV at the moment when you DRAW the blood for venous gases. Record the ScvO2 in the same vertical alignment as these values. This shows the ScvO2 at the same point in time.

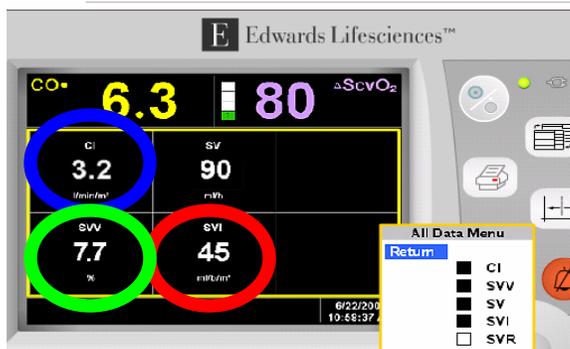


Chart the following hourly and monitor ongoing:

**SVI:** This is the amount of blood being pumped with each beat, indexed to body surface area (normal is 35-40 ml/M<sup>2</sup>)

**CI:** This is the cardiac index (normal is 2.5-4.0 L/min/M<sup>2</sup>)

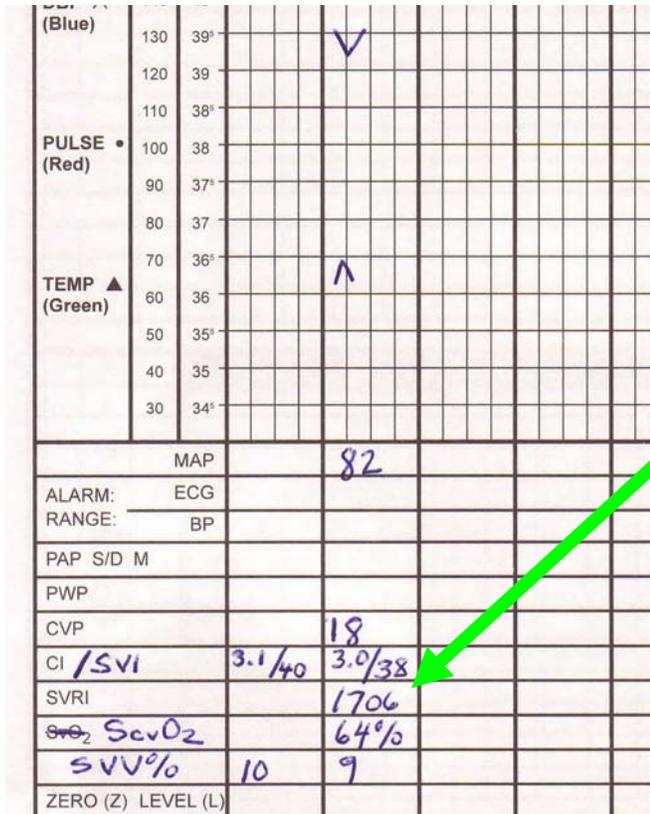
**SVV:** This is percentage of variability in the stroke volume between inspiration and expiration. Note that if a small heart is flashing, the patient also has heart rate variability (e.g., with arrhythmias). Heart rate variability will make the SVV less reliable.

### Basic Principles, Stroke Volume Variability:

- The SVV or Stroke Volume Variability is the degree of variability in Stroke Volume during inspiration and expiration.
- In a fully ventilated patient (on AC), with normal lung compliance, with a regular heart rate, a SVV of > 13 % (more than 13% variance in the stroke volume between inspiration and expiration) suggests that the patient might be dry.
- If SVV is > 13%, you can try giving fluid. If the patient is volume responsive, the SVI (Stroke Volume Index) should increase (along with the CI).
- If the patient has non-compliant lungs, they could still be dry with an SVV of < 13%. The only way to know for certain is to try fluid. The advantage of the FloTrac is that you can quickly see if the SVI is rising with volume.
- There are a number of reasons why the SVV might not be predictive of volume, including: arrhythmias (stroke volume variability), very low ejection fractions, non-compliant lungs, other modes of ventilation than AC). The bottom line...SVV might not be predictive of volume, but the CI/SVI should remain useful.

**Charting:**

The following graphic shows how to chart data on the graphic. The first example displays charting of Flowtrac™ data and ScvO2 (venous gases from a jugular or subclavian line).



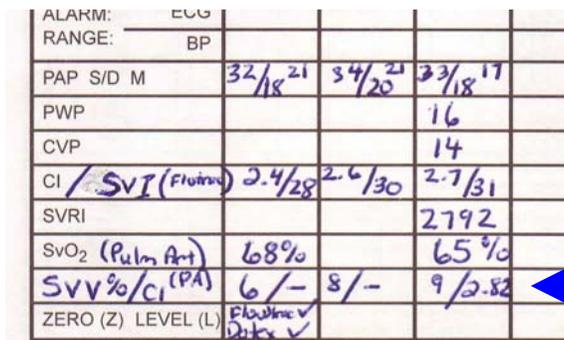
You can enter the patients CVP into the Flowtrac™ calculator to determine **SVRI**.  
(N 1700-2600 dynes/sec/cm-5/M<sup>2</sup>)

Note that SVRI is not saved. Once calculated, record here.

Chart indexed values only

Central Venous (SC/IJ). Chart CI/SVI/SVV at the moment when blood is drawn.

The following graphic shows how to chart data on the graphic if the patient also has a pulmonary artery catheter. Note that this is a new technology. If you measure CI with a SwanGanz™, chart the Flowtrac™ data at the same time when the SwanGanz™ catheter results are obtained. Note that if the patient has a pulmonary artery catheter, the venous gases should be drawn from the pulmonary artery catheter tip and are called SvO2 (mixed venous). The normal SvO2 is >60-70% and reflects venous blood after tissue extraction from all areas of the body.



Don't forget to chart PAPs. Be sure resident checks position of ganz on xray. Repeat xray if SwanGanz™ is advanced.

Chart the Flowtrac™ data at the moment when the CI is measured with the SwanGanz™. This allows comparison of findings. Chart only indexed values.