


Edwards Lifesciences™

**Edwards *FloTrac* Sensor
&
Edwards *Vigileo* Monitor**

*FloTrac Sensor and
Edwards PreSep Oximetry Catheter*

Case Presentations

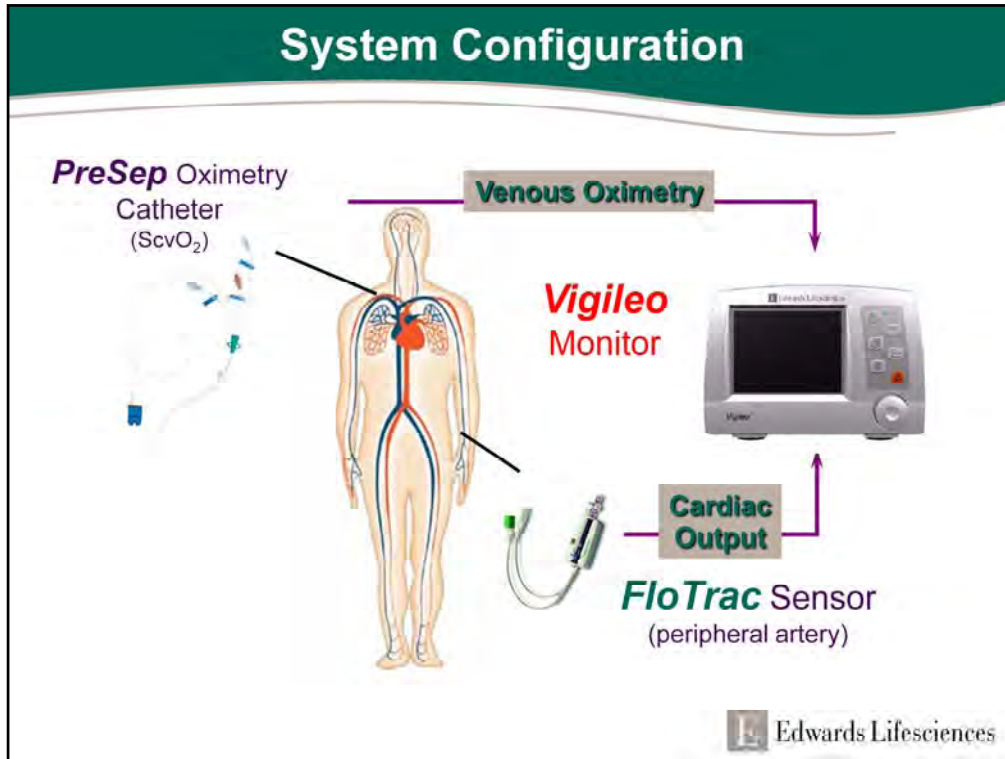
Edwards FloTrac System



The image shows a white medical monitor on the left with a screen displaying a large purple number '82' and a waveform. To the right is a white FloTrac sensor with a blue and white cable. The background is a light, neutral color with a decorative green wavy line separating the top and bottom sections.

Topics

- **System Configuration**
- **FloTrac Sensor and PreSep Oximetry Catheter – Thoracotomy**
 - Central venous saturation (ScvO₂) & ventilation changes
 - Cardiac output & ventilation changes
 - Cardiac output & volume resuscitation
- **FloTrac Sensor and PreSep Oximetry Catheter – Exp Laparotomy**
 - Cardiac output and surgical blood loss
 - Stroke volume variation – volume resuscitation guide
 - ScvO₂ & cardiac output



The Vigileo monitor by Edwards Lifesciences supports both the FloTrac Sensor for continuous cardiac output and the PreSep oximetry catheter for continuous central venous oximetry (ScvO₂)

Vigileo Monitor

- **Continuously computes stroke volume from the patients arterial pressure signal**
- **Displays key hemodynamic parameters on a continuous basis (every 20 sec)**
- **Requires NO manual calibration**
 - The user simply enters patient age, gender, height and weight to initiate monitoring
 - Advanced waveform analysis compensates for:
 - Patient-to-patient differences in vasculature
 - Real time changes in vascular tone
 - Differing arterial sites
- **Venous oximetry available when used with appropriate Edwards oximetry technology**



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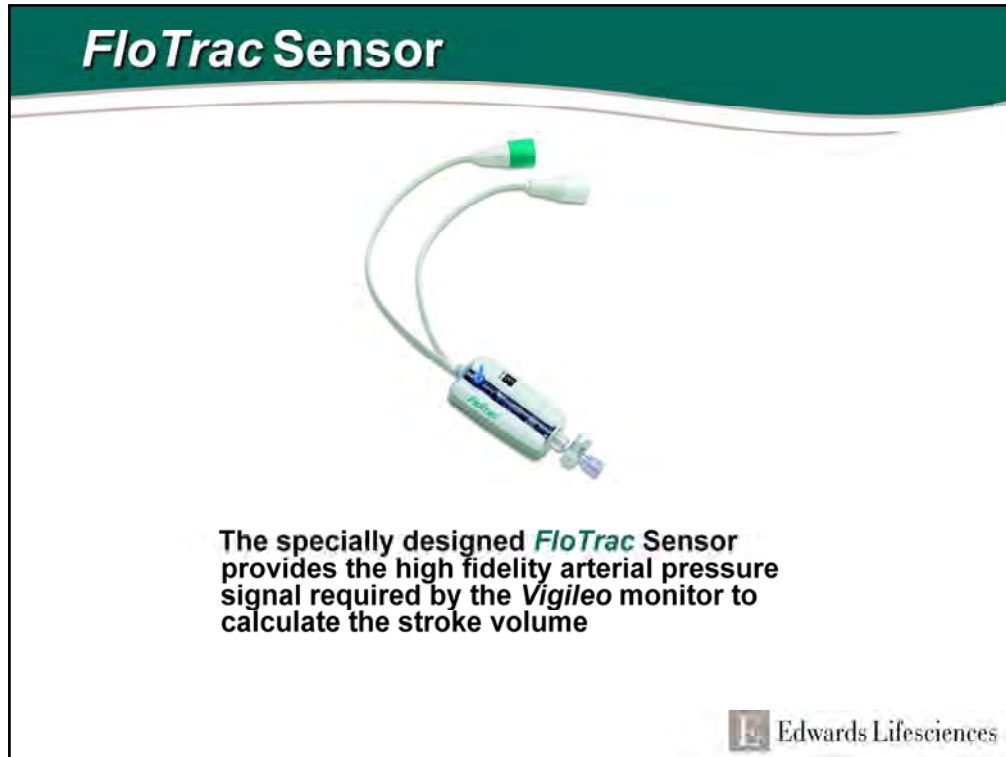
The Vigileo monitor continuously displays and updates Continuous Cardiac Output, Cardiac Index, Stroke Volume, Stroke Volume Index, Systemic Vascular Resistance*, Systemic Vascular Resistance Index*, and Stroke Volume Variation every 20 seconds when used with the FloTrac Sensor. DO_2 and DO_{2I} are also available for intermittent calculation.** These parameters help guide the clinician in optimizing stroke volume through precision guided management of preload, afterload, and contractility.

Vascular tone = vessel compliance and resistance

Vigileo then helps identify the adequacy of cardiac output by monitoring central venous ($ScvO_2$) or mixed venous (SvO_2) oxygen saturation when used with Edwards venous Oximetry technologies.

* *These parameters require the CVP value to be slaved from bedside monitor for continuous monitoring. SVR/SVRI can also be assessed on the Derived Value Calculator for intermittent calculations using either slaved or manually entered MAP, CVP, and CO values.*

** *These parameters require the SpO_2 and PaO_2 values to be manually entered. If CO is being continuously monitored, the calculator will default to the existing CO value. Otherwise, the user may override the continuous value to manually enter CO.*

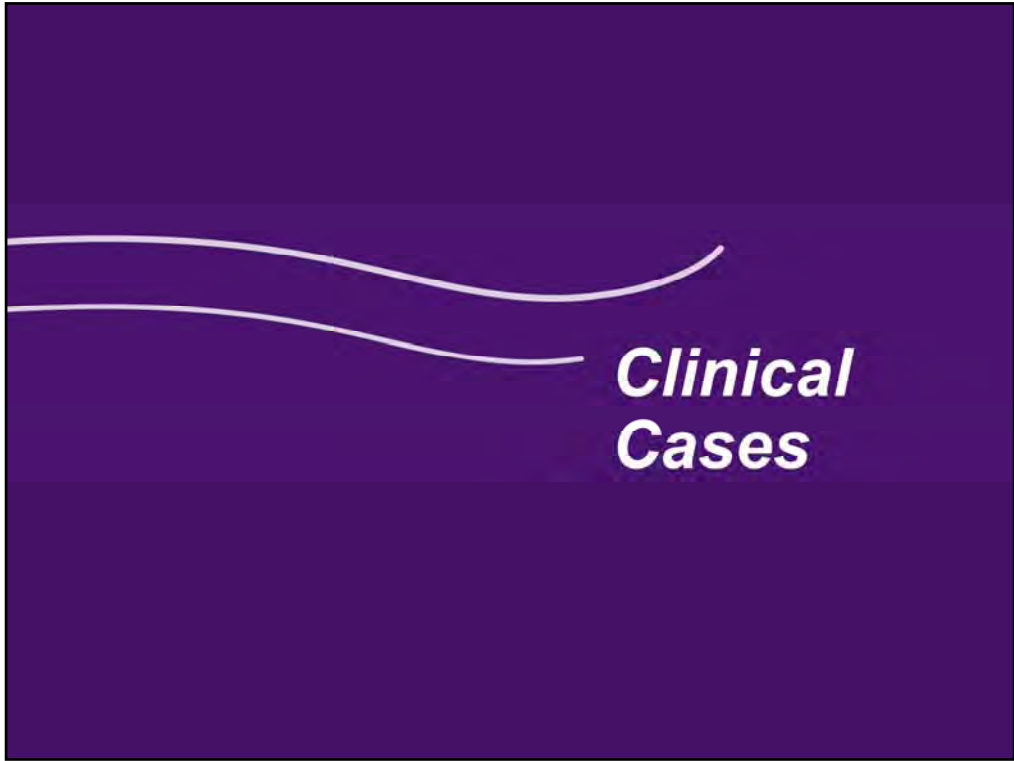


The Vigileo monitor uses the patient's arterial pressure waveform to continuously measure cardiac output. With inputs of height, weight, age and gender, patient-specific vascular compliance is determined.

The FloTrac Sensor measures the variations of the arterial pressure which is proportional to stroke volume. Vascular compliance and changes in vascular resistance are internally compensated for.

Cardiac output is displayed on a continuous basis by multiplying the pulse rate and calculated stroke volume as determined from the pressure waveform.

The FloTrac Sensor is easily setup and calibrated at the bedside using the familiar skills used in pressure monitoring.



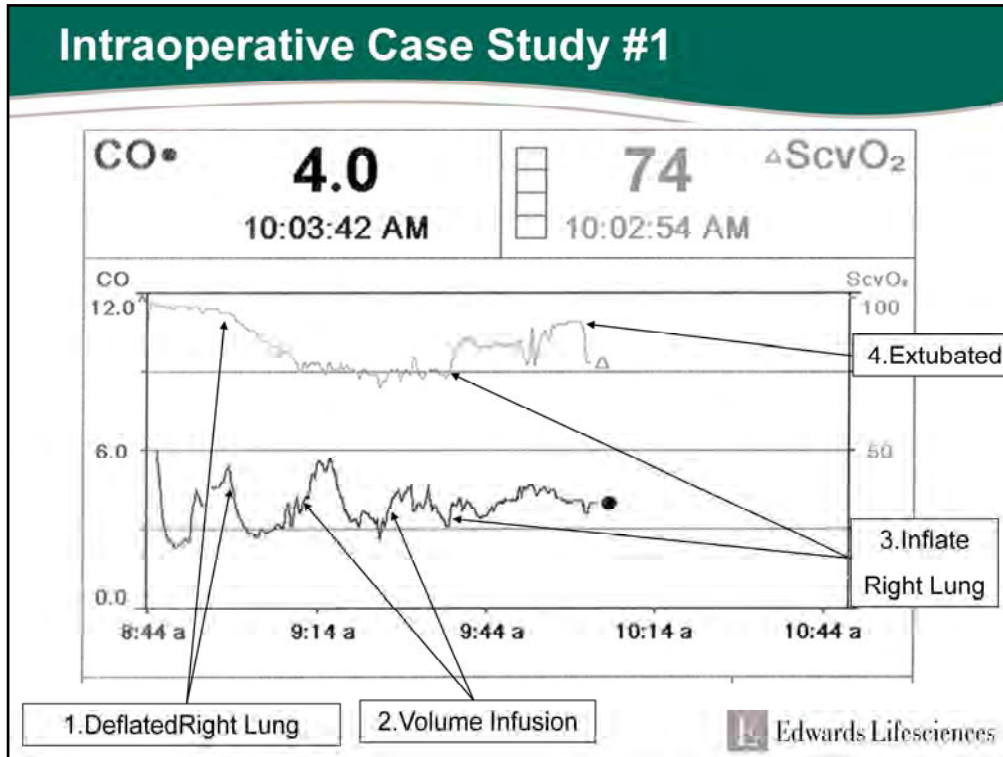
Intraoperative Case Study #1

68-year-old female
Right thoracotomy
FloTrac Sensor and PreSep
Oximetry Catheter

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68-year-old female undergoing a right thoracotomy for a lobectomy. The patient was intubated with a bifurcated endotracheal tube to allow for ventilation of the right and/or left lung.

The following slides illustrate the effects of independent lung ventilation on CO and ScvO₂.



Events noted on the graph:

Light line on top is ScvO₂. Dark line below is cardiac output.

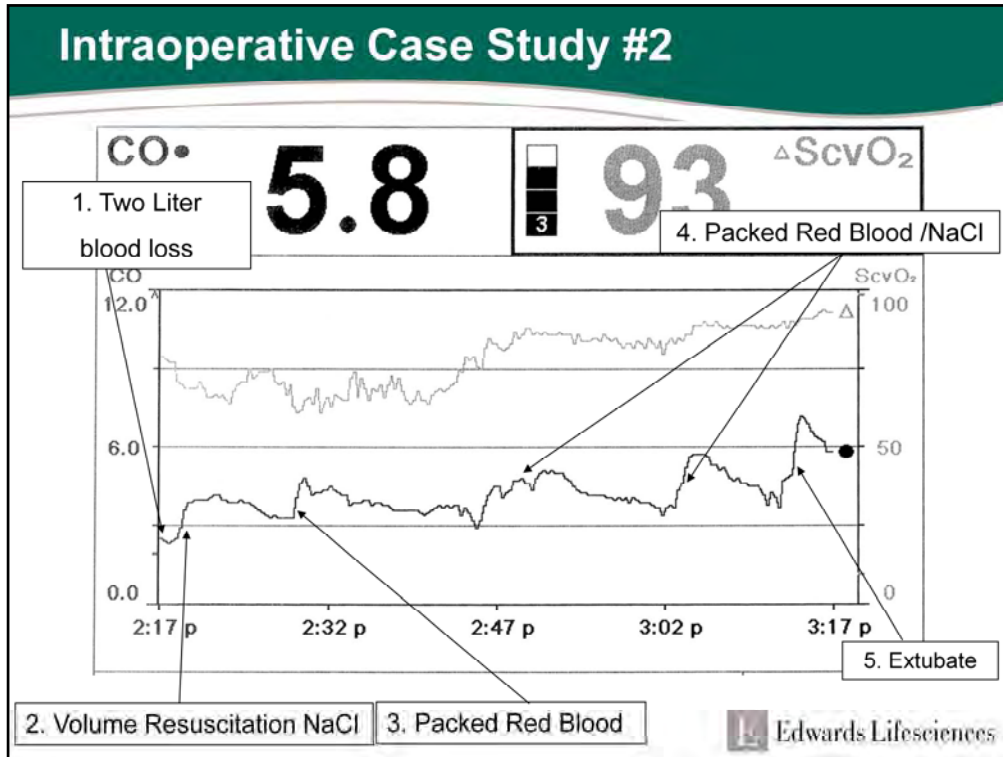
- After deflation of the Right Lung, ScvO₂ falls followed shortly thereafter by a drop in cardiac output signal. ScvO₂ decreases due to both decreasing arterial oxygenation and decreasing cardiac output. Cardiac output falls due to an increase in PVR, increasing right ventricular afterload, impeding right ventricular ejection and thus decreasing left ventricular preload.
- Changes in cardiac output due to volume resuscitation. ScvO₂ did not rise as the lung was still deflated. In many cases ScvO₂ trends with CO. However, since the changes in cardiac output with volume challenges were probably transient and not associated with decreases in intrapulmonary shunt, ScvO₂ would not be expected to increase. This is an example of CO increasing while there is no effect on ScvO₂.
- After re-inflation of the collapsed lung, pulmonary vascular resistance decreased, decreasing right ventricular afterload and allowing cardiac output to increase slowly., Presumably right

Intraoperative Case Study #2

72-year-old female
Laparotomy for tumor removal
FloTrac Sensor and PreSep Oximetry Catheter

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This is an example of a case involving a sudden exsanguination. The clinician used the FloTrac Sensor to measure CO, SV and SVV to help guide volume resuscitation.

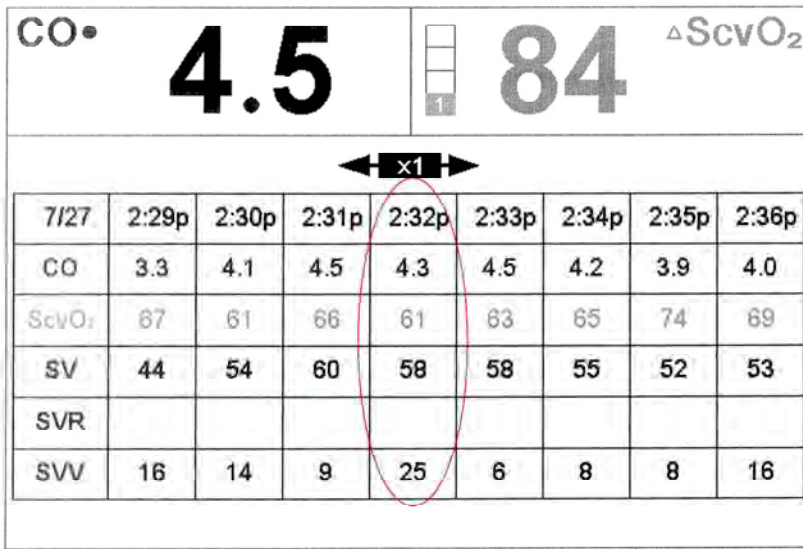


The above case is an exploratory laparotomy with tumor removal. Both the FloTrac Sensor and the PreSep oximetry catheter were used in addition to traditional vital signs.

- 1) 2:17p The patient experienced a sudden loss of blood during the procedure. Note the low CO and decreasing ScvO₂.
- 2) 2:23p Saline volume resuscitated and 3. packed red blood cells were rapidly infused. Note the step up increases in CO but still persistent under-resuscitation, as noted by the persistently low ScvO₂. Stroke volume variation (SVV) was used as a guide for starting and stopping volume resuscitation at the points shown by the arrows.
- 3) 2:54p and 3:08p To address the inadequate O₂ delivery more packed red blood cells were infused which increased both CO and ScvO₂.
- 4) 3:15p Once stable following surgery, the patient was extubated.

The following slides demonstrate the patient's response to resuscitation at the point highlighted by the second arrow above.

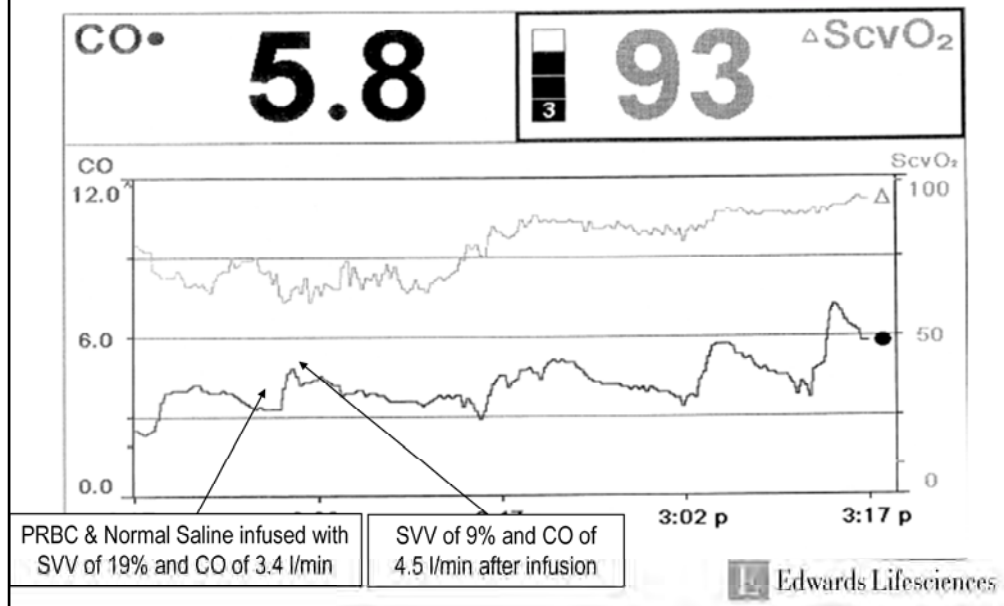
Intraoperative Case Study #2



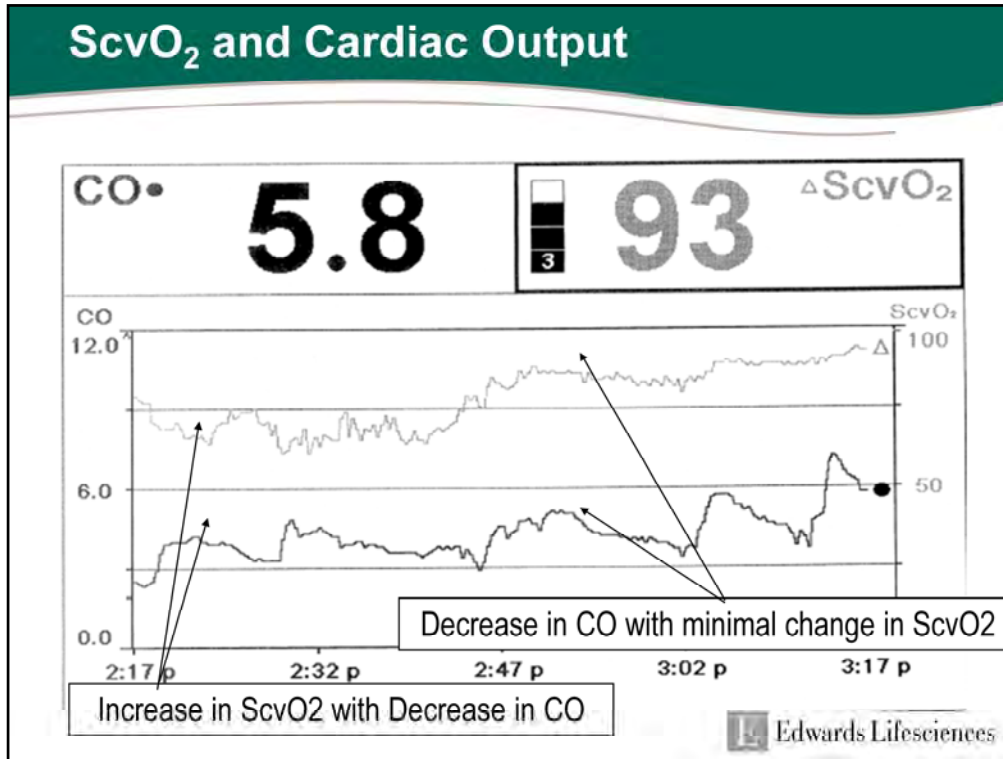
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After resuscitation the SVV decreased to between 9 - 6% with a Stroke Volume increase to approximately 60 ml/beat. One aberrant reading of 25% (at 2:32 p) was due to an arrhythmia.

How Can One Use SVV?



As displayed in the numerical trend screen, the graphical trend screen an increase in CO in response to volume resuscitation in a hypovolemic patient.



This same screen shot also shows that central venous oxygenation (ScvO₂) does not always follow cardiac output. This is an important example of how these two parameters can be independent of each other. These paired trends show an parallel though not tightly linked increase in CO and ScvO₂ in a hypovolemic patient in response to volume resuscitation.

Cardiac output is a major component of oxygen delivery ($DO_2 = \text{Cardiac Output} \times \text{Oxygen Content}$)

ScvO₂, like SvO₂ is affected by Oxygenation, Hemoglobin, Cardiac Output and Oxygen Consumption

ScvO₂ and cardiac output together are powerful tools in monitoring both oxygen delivery and its balance with oxygen consumption.

$DO_2 = \text{Oxygen Delivery}$

Summary

- **CO and ScvO₂ are useful in understanding the effects of mechanical ventilation**
- **Blood loss is quickly demonstrated by changes in cardiac output**
- **Volume resuscitation is effectively guided by SVV and stroke volume changes**
- **ScvO₂ and CO can be independent**
- **ScvO₂ and CO together is a powerful tool**

Rx only. See instructions for use for full prescribing information.

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Helping patients is our life's work, and

life is now