SVV: stroke volume variation

PiCCO: Stroke Volume Variation (SVV)

Stoke Volume Variation
This is the measure of “swing” in the art line trace; the measurements are compared over 30 seconds.

\[ SVV = SV_{max} - \frac{SV_{min}}{SV_{mean}} \]

This only works in positive-pressure-ventilated patients; the theory is that the lower on the Frank-Starling Curve you are, the more stroke volume will vary depending on the phase of ventilation.

**I.e. the decrease in preload from mechanical inspiration = decrease in stretch = decrease in stroke volume.**

You aim for an SVV of under 10%; any greater variation than this warrants a fluid bolus.

**Why does Stroke Volume Variation only apply to positive pressure ventilated patients?**

It still applies in spontaneously breathing patients; however it is a poorer predictor of fluid responsiveness. Why?

- **The sensitivity is decreased: its only 63%.** The spontaneous breathing efforts draw a smaller tidal volume, and from such minor changes in thoracic pressure there would insufficient change in ventricle loading; so there may still be changes to stroke volume, but they would be tiny and difficult to measure.

- **If there is profound hypovolemia, the IVC can collapse on inspiration.** Obviously this decreases preload, and confuses your SVV. You cannot predict fluid responsiveness this way, because you never get an accurate impression of preload.

- **In spontaneous respiration, inspiration increases the right ventricular preload,** which means the right ventricular filling is likely still appear adequate even if there is some hypovolemia. In spite of low overall volume, the right ventricular preload remains adequate, and thus at least one of the ventricles is likely to be operating in the preload-independent straight part of the Frank-Starling curve.


Another valuable primary resource is [http://www.creaghbrown.co.uk/anae/hdmon.htm#PiCCO](http://www.creaghbrown.co.uk/anae/hdmon.htm#PiCCO) And I give many thanks to Dr Kamaljit Parmar, who explained this to me using this article.