

## **Comparison of Optimised Stroke Volume and Fluid Responsiveness Measurements from Commonly Used Technologies for Perioperative Goal Directed Fluid Therapy**

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### **Background and Goal of Study**

Goal directed therapy using cardiac output monitoring has been shown to improve postoperative outcomes in surgical patients.

We prospectively compared perioperative stroke volume and preload responsiveness measurements from different cardiac output measurement technologies against concurrent measurements from the oesophageal Doppler.

### **Material and Methods**

Twenty ASA 3 patients undergoing major surgery were fluid optimised using a standard Doppler protocol of 250ml of colloid administered until stroke volume no longer increased by >10%, and again when the measured stroke volume decreased by 10%. Simultaneous readings of stroke volume (SV), stroke volume variation (SVV) and pulse pressure variation (PPV) from the LiDCO rapid, and SVV from the FloTrac/Vigileo were compared to the ODM measurements. The pleth variability index was also recorded. Patients were classified as responders if a 10% increase in SV Doppler was observed following the administration of a fluid bolus. Agreement, concordance and correlation of two methods of measuring cardiac output through arterial waveform analyses were assessed against measurements derived from the oesophageal doppler, and we also examined the ability of SVV, PPV, and PVI to predict fluid responsiveness.

### **Results and Discussion**

No correlation was seen in percentage stroke volume change as measured by either the Lidco ( $r=0.05$ ,  $p=0.616$ ) or FloTrac ( $r=0.09$ ,  $p=0.363$ ) systems compared to the ODM. Correlation was present between the LiDCO and FloTrac ( $r=0.515$ ,  $p<0.0001$ ). Concordance between the systems was poor as shown on concordance plots. Percentage error compared to the ODM was 81% for the FloTrac and 90% for the LiDCO. SVV measured by LiDCO differed for responders and non-responders (10% vs. 7%.  $p=0.021$ ), and area under the curve AUC for ROC analysis to predict a 10% rise in stroke volume was 0.57 (95% CI 0.43-0.72) SVVFloTrac, 0.64 (95% CI 0.52-0.78) SVVLiDCO, 0.61 (95% CI 0.46 -0.76) PPV and 0.59 (95% CI 0.46 -0.71) PVI.

### **Conclusions**

Stroke volume measurements from the FloTrac and LiDCO rapid systems do not correlate with the ODM. They have poor concordance, and a clinically unacceptable percentage error. The predictive value of the fluid responsiveness parameters is low. Only SVV measured by the LiDCO rapid has clinical utility replicating a Doppler optimisation protocol.