

Assessment of the Agreement between Photoplethysmographic and Arterial Waveform Respiratory Variation in Patients Undergoing Spine Surgery.

Thiele R.H., Colquhoun D.A., Forkin K.T., Durieux M.E. *J Med Eng Technol.* 2013 Aug 14

Respiratory variation in the arterial blood pressure and photoplethysmographic (PPG) waveforms have both been shown to predict the haemodynamic response to volume administration. Whether or not the two can be considered interchangeable is controversial.

Twenty-three patients undergoing spine surgery received both a 20 gauge intra-arterial catheter and a Masimo adult adhesive SpHb sensor connected to a Radical-7 monitor. Pulse pressure variation (PPV) was calculated off-line at 1-min intervals. Pleth Variability Index (PVI) and Perfusion Index data were recorded. After exclusion of outliers, agreement between PPV and PVI was assessed using a repeated measures Bland-Altman approach. Concordance between changes in PPV and PVI was assessed using a four-quadrant plot with a 20% zone of exclusion.

In total, 6549 min of data were collected. Repeated measures Bland-Altman analysis identified a bias of 2.2% and 95% confidence intervals of $\pm 15.3\%$ (limits of agreement -13.1 and +17.6%). The concordance rate between changes in PPV and changes in PVI was 51%.

The agreement between respiratory variation in the arterial blood pressure and PPG waveforms is poor and these two should not be considered interchangeable. Changes in PPV are unrelated to changes in PVI. The data, combined with recently published work from other authors, suggests that the low frequency oscillations in the PPG waveform are not related to the low frequency oscillation in the systemic arterial blood pressure tracing and may be related to changes in venous pressure, peripheral tone or other physiologic phenomena yet to be described.