

## **PVI Decreases Following a Fluid Bolus Administered in the PACU to Treat Hypotension**

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### **Introduction**

Pleth variability Index<sup>1</sup> (PVI, Masimo Corporation, Irvine CA) is a metric derived from the variation in height of the plethysmography caused by respiration. In the anesthetized, mechanically ventilated patient it has been demonstrated to have utility in predicting which patients would respond to a fluid bolus with a 15% increase in cardiac output.<sup>2</sup> As there are variations to the plethysmographic wave during spontaneous ventilation in the awake, non-ventilated patient, it is possible that PVI might have utility in decisions about fluid management in this group. A database from an ongoing observational study of PVI in our PACU was queried to identify fluid boluses given to treat hypotension to see if this therapy had a discernable effect on PVI.

### **Methods**

Patients scheduled for surgeries expected to require at least a 24-hour post-operative hospitalization were invited to enroll in an observational study of oximetric and respiratory parameters during routine PACU care and signed informed consent was obtained. The study was designed and powered to detect a difference in these parameters during “normal” and “non-normal” PACU care. The need for fluid bolus to treat hypotension was considered a “non-normal” event. On arrival to the PACU a rainbow<sup>®</sup> ReSposable<sup>™</sup> oximeter probe (Masimo, Irvine CA) and an Acoustic Respiratory Rate sensor (RRa<sup>™</sup>, Masimo, Irvine CA) were placed on the patient. Both sensors were connected to a Rad-87<sup>™</sup> monitor (Masimo, Irvine CA) and data collected and archived by a SafetyNet<sup>™</sup> monitoring system (Masimo, Irvine CA). Fluid boluses were ordered at the discretion of caregivers as a therapy for hypotension, there was no proscribed definition of hypotension or guidelines for choice of fluid or size of the bolus. Boluses were administered over a 30 minute period. In patients whom received a bolus the PVI was extracted and averaged at 5 minute intervals from 20 minutes to 5 minutes before the bolus and from 30 to 45 minutes following the start of the bolus. These averaged values were compared by Wilcoxon rank sum testing; a p value of less than 0.05 was considered significant.

### **Results**

Of 467 patients enrolled in the study 14 received fluid boluses for hypotension. One patient was excluded as they received multiple doses of phenylephrine during the fluid bolus leaving 13 patients who received fluid without the accompanying administration of vasopressors. 7 patients received lactated ringer (LR) 500 cc, 5 received LR 1000cc and one received LR 500 cc and 12.5 gr of 25% albumin. In 11 of 13 patients the PVI decreased following the fluid bolus. The data from an individual patient is also presented (Figure 2). Overall, the bolus administration of fluids in spontaneously breathing patients was found to have resulted in a significant decrease in PVI from an average of 20.8% (+/- 12.3) before fluid administration dropping to an average of 15.4% (+/-9.1) after (p=0.01).

### **Discussion**

In most patients, PVI decreased following a fluid bolus when given to treat hypotension in awake, spontaneously ventilating patients in the PACU. PVI may have utility in this setting and further studies could be designed to test the hypothesis that PVI provides benefit to help guide PACU fluid management decisions.

1 Pleth Variability Index: A Dynamic Measurement to Help Assess Physiology and Fluid Responsiveness. Tech. Masimo Corporation, n.d. Web.

<[http://www.masimo.com/pdf/pvi/LAB4583B\\_Technical\\_Bulletin\\_Pleth\\_Variability\\_Index.pdf](http://www.masimo.com/pdf/pvi/LAB4583B_Technical_Bulletin_Pleth_Variability_Index.pdf)>.

2 Cannesson M et al, *Br J Anaesth* 2008;106:1195-2100