

Continuous Hb and plethysmography variability index (PVI) monitoring is associated to a decreased mortality at the scale of a whole hospital

Ponsonnard S.1 , Yonnet S.2 , Marin B.3 , Cros J.1 , Ben Miled S.1 , Nathan N.1 1 CHU Limoges, Dept of Anaesthesiology & Intensive Care, Limoges, France, 2 CHU Limoges, Medical Information, Limoges, France, 3 CHU Limoges, UFRCB, Limoges, France

Background and Goal of Study: Hypovolemia and anemia are the main factor of morbidity and mortality directly attributable to anaesthesia (1). Optimization of volemia on a patient-basis decreases both morbidity and mortality but requires invasive assessment (2). This is why too few patients benefit from such a monitoring (3). Measurement of both continuous hemoglobin levels (SpHb) and response to fluid loading by plethysmography variability index (PVI) is possible with the Radical7 (Masimo). The aim of this study was to measure the impact on mortality and morbidity of introducing such a monitoring in all the patients at the scale of a whole hospital.

Materials and Methods: After ethical committee approval, operating rooms and intensive care units were equipped with monitors over a 6 month period and the whole team was educated to its use with an algorithm. From February 6th to August 7th 2014, all the patients under general anaesthesia should be connected with a specific probe to the monitor and had to receive crystalloid infusion and/or packed red blood cells (RBC) if $PVI > 15\%$ and/or $Hb < 8g/dL$. All the results given by the monitor were registered on computer. Administrative data base were used to collect comorbidities, complications, in-hospital deaths and at 1-month. Results were compared between 2013 and 2014 during the 2 same periods with Chi-2 tests or ANOVA. Results are expressed as numbers of patients or mean [confidence interval].

Results: During the period approximately 65% of the patients received the probe. In-hospital mortality was not different between the 2 years (not shown). Death in cardiothoracic surgery was slightly lower ($p = 0.07$). At one month, mortality decreased in 2014 (vs $84/5123 = 1.64\%$ vs $121/5478 = 2.2\%$, $p = 0.024$, Odds ratio = 0.69 [0.83-0.91]). The difference results from a lower mortality after cardiothoracic (3.06% vs 4.59% $p = 0.01$) and orthopedic surgery (0.37% vs 0.88% $p = 0.015$). Severity and number of comorbidities and complications were not significantly different (not shown).

Conclusion(s): These results suggest that by using a non-invasive monitor, measuring SpHb and fluid loading responsiveness is possible on a large scale. The observed reduction of mortality agrees with multicentric randomized studies using more invasive monitoring systems (2) and support the large use of such a device. References: 1: Lienhart et al Anesthesiology 2006. 2: Hamilton et al. AnesthAnalg. 2011. 3: Canesson et al Crit Care. 2011.