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Room W474b

Impact of Continuous Perioperative SpHb Monitoring

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Background: Anemia and inadequate volume filling are two important factors that contribute to anesthesia-related mortality. The use of adequate monitoring of vascular filling predictive responsiveness has been proved to reduce mortality in prospective randomized studies. This may not be true if used in an uncontrolled setting such as found in common clinical practice. This study aimed to determine at a scale of a whole hospital if continuous monitoring of hemoglobin (SpHb) and PVI (plethysmography variability index) integrated in an algorithm could improve mortality and transfusion needs.

Methods: After ethical committee approval, this prospective single center observational study compared the % of patients receiving transfusion during the first postoperative 48H (primary criterion of judgement) and the mortality at 30 days and 90 days (secondary criteria) between two same periods in 2013 and 2014 (February 7 to December 31). During the 2014 period, all operating rooms (OR), recovery rooms and intensive care units were equipped with Radical 7® (Masimo, Irvine, USA) to monitor SpHb and PVI. Patients received vascular filling with crystalloids or blood according to an algorithm. The Operating Room and Intensive Care Clinical Team was trained to use the monitor and algorithm. Demographic, anesthesia, surgical and transfusion data were available from electronic files. When a patient had several surgeries during the same stay, only the first surgery was used for statistical analysis. Data issued from Radical-7® monitors was collected from SafetyNet™ (Masimo, Irvine, USA) secure system. Data were compared between the 2 years with statistical appropriate tests (SAS 9.1.3). The influence of different factors on mortality was analyzed with a cox-proportional hazard model. $P < 0.05$ was considered statistically significant.

Table: Adjusted mortality according to the cox-proportional hazard model (Wald: $p = 0.0001$).

Results: Among the 18 867 patients included, SpHb and PVI data of 3540 patients were collected by the SafetyNet™ system in 2014. Proportion of transfused patients at 48H did not change between the 2 periods (7.9 % vs 8.5 %, 2013 vs 2014 $p = 0.1323$). It was also proportionality same for the number of blood units in transfused patients at 48H (3.4 ± 2.7 vs 3.4 ± 2.9 , $p > 0.05$). Among them, patients were transfused in the operating room and thus earlier when SpHb was used in non-cardiac surgery (72.9 % vs 56.1 %, $p = 0.0002$). According to the cox proportional hazard ratio, patients who were given blood or vascular filling according to the results of SpHb and PVI had a lower risk of death at 30 days (table 1).

Discussion: Monitoring SpHb and PVI integrated in a vascular filling algorithm allowed earlier transfusion and reduces mortality at a scale of a whole hospital with different clinical practices (and practitioners) and unselected patients.

Figure 1

Table: Adjusted mortality according to the cox-proportional hazard model (Wald: $p = 0.0001$).

	J 30		J 90	
	P	OR [IC 95 %]	P	OR [IC 95 %]
SpHb/PVI monitoring	0.0426	0.7 [0.50 – 0.99]	0.0366	0.75 [0.58-0.98]
Ages	0.0319 (61 - 70 years)	4.92 [1.15 – 21.13]	0.0001	15.99 [3.87-66.1]
	0.0004 (71 - 80 years)	13.4 [3.19 – 56.22]	< 0.0001	24.58 [5.95-101.57]
	0.0001 (81 - 90 years)	16.14 [3.84 – 67.76]	< 0.0001	36.19 [8.79-149.03]
Emergency surgery	< 0.0001	2.76 [1.93-3.95]	< 0.0001	2.21 [1.66-2.94]
Length of surgery	0.0029 (4h - 6h)	4.58 [1.68-12.46]	0.1994	1.45 [0.82-2.55]
	< 0.0001 (> 6h)	10.35 [3.81-29.20]	0.0005	2.89 [1.59-5.26]
Transfusion at 48 H	< 0.0001	3.71 [2.53-5.44]	< 0.0001	3.48 [2.57-4.72]