



Study Investigates the Impact of Masimo Continuous SpHb® and PVI® on Anesthesia-Related Mortality



[Masimo](#) has announced the findings of an abstract presented at the American Society of Anesthesiologists' (ASA) Annual Meeting in Chicago. In the study, researchers at Hôpital Dupuytren, part of the Centre Hospitalier Universitaire of Limoges, France (CHU Limoges), investigated the clinical utility of noninvasive, continuous hemoglobin (SpHb®) and PVI® (a measure of the dynamic changes in perfusion index that occur during the respiratory cycle), two Masimorainbow SET™ measurements. The researchers' goal was to determine, at the scale of a whole hospital, improvement in mortality and transfusion needs.¹

In the prospective, single-center, observational study, Professor Nathalie Nathan and colleagues reviewed two sets of patients over two eleven-month periods, before (2013) and after (2014) implementation of a clinical algorithm to guide transfusion and fluid administration. Anesthesiologists, nurses, and residents were trained on the implementation of the clinical algorithm. Masimo Radical-7® Pulse CO-Oximeters® were installed in all operating rooms, recovery rooms, and intensive care units. The Radical-7s were connected to Masimo Patient SafetyNet™* for trend data collection. All surgical patients presenting to the hospital were accepted, with these exceptions: EMT, ophthalmology, odontology, radiology, neurosurgery, and patients less than 18 years of age.

The study included 18,867 patients (in the two groups), of whom 3450 underwent SpHb and PVI monitoring via Radical-7. The patients in the monitoring group received vascular filling with crystalloids or blood, according to the clinical algorithm. Demographic, anesthesia, surgical, and transfusion data were collected in electronic medical records. The researchers compared the percentage of patients in the monitored group who received transfusions within the first postoperative 48 hours to the percentage in the non-monitored group. They also compared mortality rates for each group at 30 days and 90 days following surgery.

Using the cox-proportional hazard model, the researchers found that the patients in the group monitored with SpHb and PVI had a 30% reduction in mortality at 30 days and a 25% reduction in mortality at 90 days. The proportion of patients receiving transfusions did not change significantly between the two groups (7.9% in 2013, 8.5% in 2014, $p=0.1323$), nor did the number of blood units transfused within 48 hours (3.4 ± 2.7 in 2013, 3.4 ± 2.0 in 2014, $p>0.05$). However, in non-cardiac surgery, patients were transfused sooner in the operative or recovery room (72.9% vs 56.1%, $p=0.0002$).

The researchers concluded that “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.”

“Access to continuous monitoring of Hb levels and fluid responsiveness has changed the way we address blood and fluid management. By lowering inadequate fluid filling at the beginning of anesthesia, we are able to avoid diluting patients inadequately and this data helps us to guide precisely the amount of fluids or blood that must be given to patients on a case by case basis,” stated Professor Nathan, Head of the Department of Anesthesiology at CHU Limoges. “Patients are transfused earlier when needed and hypovolemia is precisely treated with crystalloid. These two facts may explain the decrease in mortality at one and three months that we observed in this study. We strongly believe that surgeries of intermediate severity such as hip or knee replacement procedures as well as severe surgery will benefit from this technology. Because it is easy to use, quick to administer, provides continuous data, and does not harm the patient in any way, it is more applicable to common clinical practice.”

Joe Kiani, Founder and CEO of Masimo, commented, “We have created technologies that have been shown to save babies’ eyesight², screen for CCHD in newborns³, and reliably monitor patients in post-surgical wards^{4,5,6}, but this is the first time a study has shown that one of our technologies has such a big impact on mortality. Needless to say, we are excited and thank Dr. Nathan for her and her colleagues’ research. We look forward to more studies like this that investigate the impact of SpHb and PVI on other patients at other hospitals, and hope to see similar results.”

SpHb monitoring may provide additional insight to the directional trend of hemoglobin between invasive blood samplings – when the SpHb trend is stable and the clinician may otherwise think hemoglobin is decreasing; when the SpHb trend is rising and the clinician may otherwise think hemoglobin is not rising fast enough; or when the SpHb trend is decreasing and the clinician may otherwise think hemoglobin is stable. SpHb monitoring, accompanied by laboratory diagnostic testing, may thus help clinicians make more timely and informed decisions, and has been shown to help clinicians provide more timely blood transfusions** and reduce blood transfusions in cases such as neurosurgery and orthopedic surgery.^{7,8}

*The use of the trademark SafetyNet is under license from University HealthSystem Consortium.

**Clinical decisions regarding red blood cell transfusions should be based on the clinician’s judgment considering, among other factors: patient condition, continuous SpHb monitoring, and laboratory diagnostic tests using blood samples.

References

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