

Continuous Noninvasive Hemoglobin Monitoring: A Measured Response to a Critical

Review.

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The measurement of hemoglobin concentration in the blood (Hb) plays a central role in the detection, evaluation, and management of chronic and acute anemia. The gold standard for laboratory determination of Hb is hemoglobin cyanide (HiCN).¹ HiCN testing is not routinely used in hospitals due to its complexity, so cyanide-free central laboratory hematology analyzers (e.g., Coulter, Sysmex) have become the clinical standard.² It is tempting to assume that satellite CO-Oximeters (e.g., ABL, Radiometer, Denmark; Nova, Nova Biomedical, Waltham, MA) used for arterial blood gas measurement in the operating room or critical care unit are interchangeable with hematology analyzers, but in fact they are not.

Pulse CO-Oximetry is the multiwavelength technology contained in the first devices to have received Food and Drug Administration 510(k) clearance for the continuous, noninvasive monitoring of total hemoglobin (SpHb; Masimo, Irvine, CA). Generally speaking, SpHb monitoring is not yet as accurate as laboratory hemoglobin (lab-Hb), and it is therefore not intended today as a replacement for lab-Hb. The focus should instead be on the value-added benefits of supplementing intermittent, delayed lab-Hb values with continuous, real-time visibility of whether Hb is stable, increasing, or decreasing.

The purpose of this article is to provide a perspective on the appropriate role and evaluation of SpHb and the value-added benefits of continuous Hb monitoring. We offer an alternative viewpoint to balance the 3 separate but similar opinions published earlier in *Anesthesia & Analgesia* by Drs. Rice, Gravenstein, and Morey.^{3–5} These authors propose “what is required of a noninvasive hemoglobin monitor and whether the conventional statistics adequately answer our questions about clinical accuracy.” In doing so, Rice et al. concluded that the accuracy of SpHb monitoring “is not good enough to make the (a) transfusion decision.” In the present article, clinical advisors to Masimo Corporation respond to these evaluations with a measured perspective on the value-added clinical decision process that this technology will bring to patient management and safety.

It is also time to review and reassess the fundamental assumptions regarding lab-Hb and its use in making clinical decisions. Given that it is noninvasive and its ability to provide continuous, real-time data that can be correlated at bedside with events happening to the patient, SpHb monitoring offers a new paradigm and opens up new possibilities for improved patient care.