

# MASIMO Total Hemoglobin

**SpHb** Continuous and noninvasive hemoglobin may enable more efficient blood transfusion management and earlier detection of bleeding



Earlier and better clinical decisions > Improved patient safety > Decreased costs



# Transfusion Management Challenges

## GROWING CLINICAL EVIDENCE POINTS TO THE NEED FOR MORE RESTRICTIVE BLOOD TRANSFUSION MANAGEMENT PRACTICES TO IMPROVE PATIENT SAFETY AND REDUCE COSTS

- > **Blood transfusions are common**, with up to 20% of surgical patients and 35% of ICU patients receiving one or more units of blood.<sup>1,2</sup>
- > **Transfusions increase morbidity and mortality**<sup>3,4,5</sup>
  - > As much as 40% increase in 30-day morbidity due to nosocomial infections, sepsis, pneumonia, wound infections and transfusion related injuries.
  - > As much as 38% increase in 30-day mortality and 67% increase in 6-month mortality.
- > **Blood transfusions are costly**, with blood being one of the largest cost centers in a hospital.
  - > \$500 to \$1,000 per unit,<sup>6</sup> linked to an increase of two or more ICU days per transfusion.<sup>7</sup>
- > **Some blood transfusions are unnecessary**, especially when given in stable anemia or when bleeding is perceived but not significant.<sup>8</sup> Inappropriate transfusions account for between 9 and 44% of all transfusion costs.<sup>9</sup>
- > **Experts advocate implementing restrictive transfusion practices** and use of appropriate indicators for blood transfusion.<sup>10,11,12</sup>

# Opportunity for Enhanced Transfusion Management

## CONTINUOUS SpHb MONITORING MAY ALLOW YOU TO:

- > Avoid giving unnecessary transfusions.
- > Initiate more timely transfusions, when appropriate.
- > Decrease costs by more effectively titrating blood.



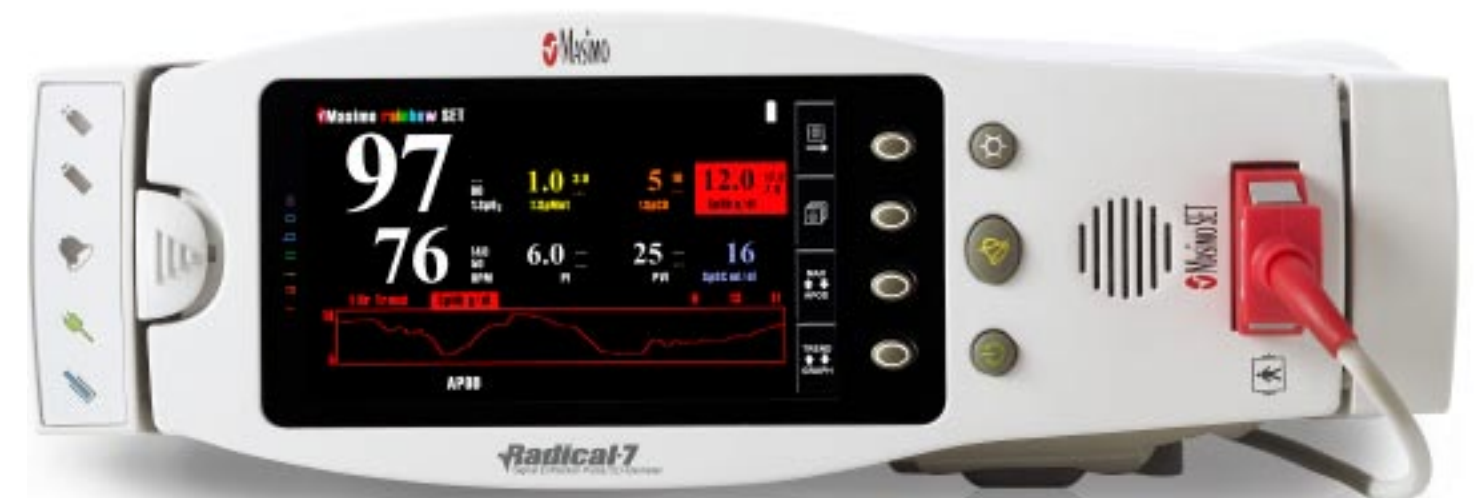
**“The current practice of using intermittent, invasive measurements of hemoglobin to help guide transfusion decisions may contribute to unnecessary blood transfusions. Blood transfusion should not simply be based on any particular level of hemoglobin but rather a thorough evaluation of the patient, including whether hemoglobin levels are stable or changing.”**

Aryeh Shander, MD, Clinical Professor of Anesthesiology, Medicine and Surgery at Mt. Sinai School of Medicine, New York, NY

**Continuous monitoring with Masimo SpHb may allow you to initiate timely blood transfusions and avoid giving unnecessary transfusions**

**SpHb could contribute to \$93,600 in net annual cost savings in a typical surgical department.**

Cappemini Report, 2009: *Using Noninvasive Pulse CO-Oximetry to Help Improve Patient Safety, Reduce Costs and Increase Hospital Revenues.*



<sup>1</sup> DeFrances et al. 2006 National Hospital Discharge Survey. *Advance Data*. 2008;351:20. <sup>2</sup> Von Ahsehn N et al. *Crit Care Med*. 1999;12:2630-2639. <sup>3</sup> Taylor RW et al. *Crit Care Med*. 2006;34(9):2302-8. <sup>4</sup> Bernard AC et al. *Journal of the American College of Surgeons*. 2009;208:931-937. <sup>5</sup> Surgenor SD et al. for the Northern New England Cardiovascular Disease Study Group. *Anesthesia & Analgesia* 2009;108:1741-1746. <sup>6</sup> A New Look at Blood Transfusion. *Joint Commission Perspectives on Patient Safety*. 2007;1:1-12. <sup>7</sup> Hill SR et al. *Cochrane Database of Systematic Reviews* 2000, Issue 1. <sup>8</sup> Shander A. *Surgery*. 2007;142:S20-S25. <sup>9</sup> Goodnough LT et al. *The American Journal of Medicine*. 1993;94:509-514. <sup>10</sup> Hebert, et al. Transfusion Requirements in Critical Care Investigators, Canadian Critical Care Trials Group. *N Engl J Med*. 1999;340:409-17. <sup>11</sup> Corwin HL et al. *Crit Care Med*. 2004;32(1):39-52. <sup>12</sup> Taylor RW et al. *Crit Care Med*. 2006;34(9):2302-8.

The Masimo Radical-7 provides real-time SpHb trending on its full-color screen

# Undetected Bleeding Challenges

## POST-SURGICAL AND CRITICAL CARE PATIENTS FACE REAL DANGERS FROM UNDETECTED BLEEDING

- > Significant bleeding occurs in up to 35% of surgical and critical care patients.<sup>1</sup>
- > Low hemoglobin identifies almost 90% of patients with bleeding, but traditional laboratory measurements are infrequent and delayed.<sup>2</sup>
- > Bleeding significantly increases the cost of treatment.<sup>2</sup>

Continuous monitoring with Masimo SpHb may allow you to identify hemorrhaging and initiate appropriate treatment earlier



**"In the past, we've only received glimpses of our patients' hemoglobin levels from lab measurements, but now we have complete and real-time hemoglobin visibility. This is vital in the ICU, where post-operative monitoring of internal bleeding is critical to patient recovery."**

Randy Marcel, MD, Medical Director and Chief of Anesthesiology at The Heart Hospital Baylor Plano, Plano, TX

## Opportunity for Enhanced Bleeding Detection

### CONTINUOUS SpHb MONITORING MAY ALLOW YOU TO:

- > **Identify hemorrhaging** earlier, increasing patient safety by allowing for more timely intervention.
- > **Avoid patient morbidity** and its associated costs.

**SpHb could contribute to \$67,350 in net annual cost savings in an intensive care department.**

*Capgemini Report, 2009: Using Noninvasive Pulse CO-Oximetry to Help Improve Patient Safety, Reduce Costs and Increase Hospital Revenues.*

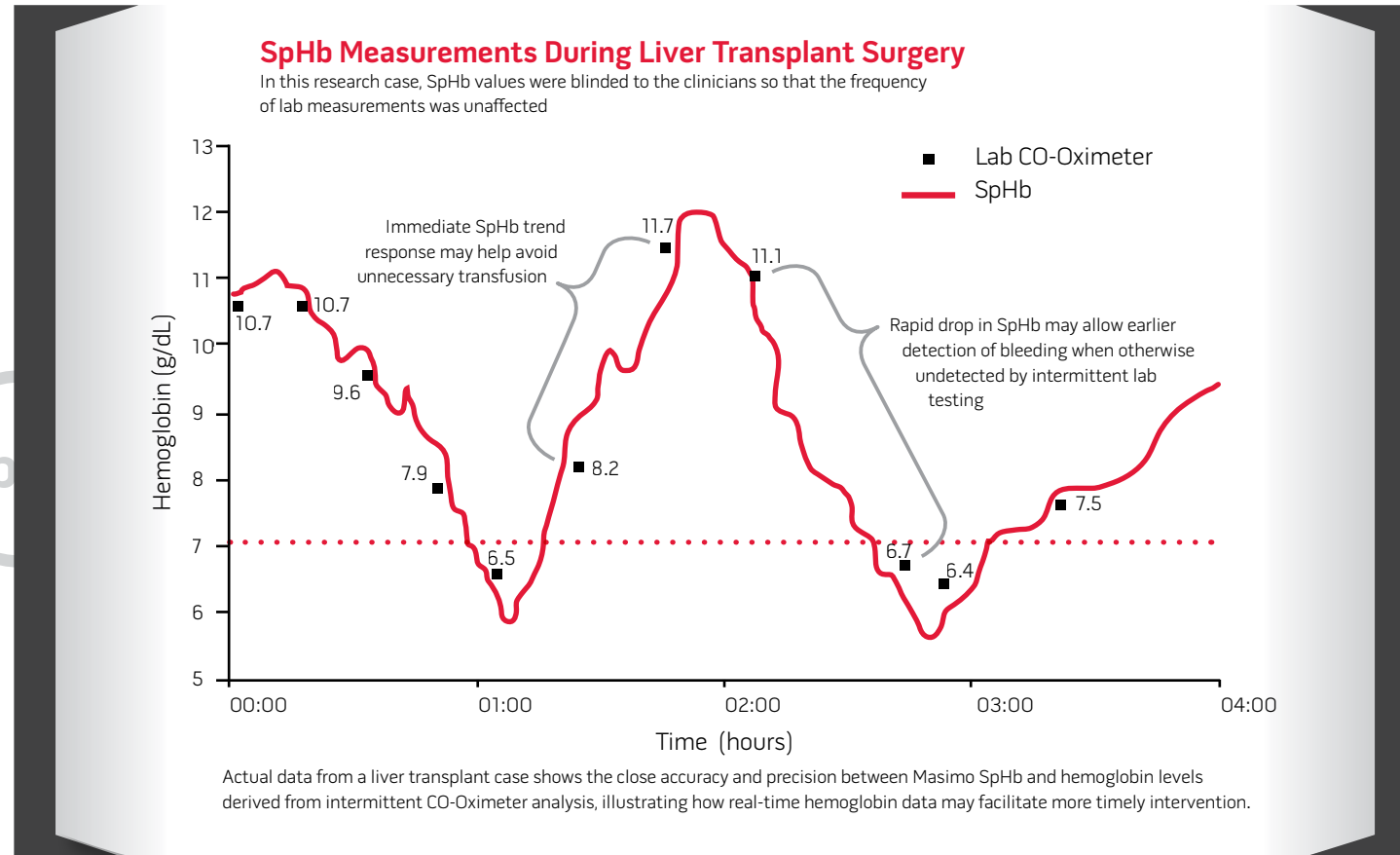


<sup>1</sup> Herbert PC. *Critical Care*. 1999; 3(2):57-63.  
<sup>2</sup> Herwaldt LA. *Infect Control Hosp Epidemiol*. 2003;24(1):44-50.

# The Value of Continuously-Trended Hemoglobin

KNOWING THE REAL-TIME STATUS OF YOUR PATIENTS' HEMOGLOBIN MAY IN SOME CASES ALLOW AVOIDANCE OF UNNECESSARY TRANSFUSIONS AND IN OTHER CASES ALLOW EARLIER INTERVENTION

- > Delayed and intermittent hemoglobin levels do not provide the same level of clinical decision-making data.



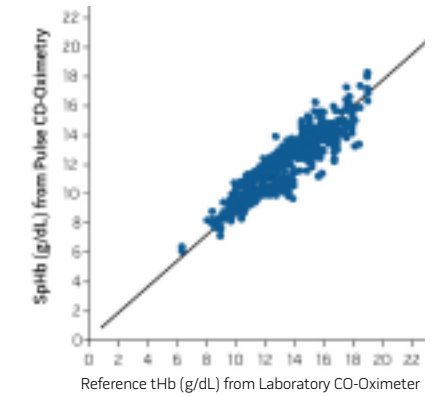
**“Masimo SpHb is an impressive new tool that could potentially help us to more safely guide patients in surgery through to recovery. With it, not only can we spot hemoglobin changes as they occur, but we can see where they are heading. This ability to identify an upward or downward hemoglobin trend on a second-by-second basis as it occurs could be of tremendous value.”**

Ronald Miller, MD, Chief of Anesthesia, Professor and Chairman of the Dept. of Anesthesia and Perioperative Care at the University of California, San Francisco, CA

# Proven Accuracy Compared to Laboratory Devices

NONINVASIVE AND CONTINUOUS HEMOGLOBIN WITH MASIMO RAINBOW SET PROVIDES ACCURATE MEASUREMENTS THAT CAN BE TRENDED OVER TIME

- > In 492 comparisons of SpHb readings with invasive hemoglobin (tHb) measurements taken at the same time and analyzed by a laboratory CO-Oximeter, SpHb had a correlation of 0.90, a standard deviation of 0.95 g/dL, and 96% of SpHb values were < 1.5 g/dL from the laboratory value in the critical anemic range below 12 g/dL.<sup>1</sup>
- > Comparisons to laboratory devices other than a CO-Oximeter may result in greater differences.



Using SpHb in combination with PVI may enable improved fluid and blood management during surgery and in the ICU

## PVI: Noninvasive Fluid Responsiveness Monitoring

PVI IS A BREAKTHROUGH MEASUREMENT THAT HELPS CLINICIANS NONINVASIVELY AND CONTINUOUSLY DETERMINE WHETHER TO ADMINISTER FLUID TO PATIENTS

- > Fluid administration is critical to optimizing patient status.<sup>3</sup>
- > Traditional methods to guide fluid administration often fail to predict fluid responsiveness.<sup>4</sup>
- > Newer methods may accurately predict responsiveness but are invasive or costly.<sup>5</sup>
- > PVI is proven to predict fluid responsiveness in mechanically ventilated patients under general anesthesia during surgery and in the ICU.<sup>6,7</sup>
- > PVI has been shown to help clinicians improve fluid management and decrease lactate levels compared to standard care.<sup>8</sup>

**“SpHb and PVI have been important improvements for both the department and our patients. The ability to track hemoglobin and fluid volume in real-time allows us to be more precise in our clinical routine.”**

Bertrand Debaene, MD, Anesthesiologist at the University Hospital Center of Poitiers, Poitiers, France

<sup>1</sup>Masimo FDA Submission Data. <sup>2</sup>Gehring H, et al. *Anesth Analg* 2007;105:S24-30. <sup>3</sup>Perel A. *Anaesth Analg* 2008;106(4):1031-33. <sup>4</sup>Michard F, et al. *Chest* 2002;121(6):2000-08. <sup>5</sup>Joshi G, et al. *Anaesth Analg* 2005;101:601-5. <sup>6</sup>Cannesson M, et al. *Br J Anaesth* 2008;101(2):200-6. <sup>7</sup>Feissel M, et al. *Critical Care* 2009;13(1):P205. <sup>8</sup>Forget P, et al. *Critical Care* 2009;13(1):P204.



# SpHb for the Continuum of Care

FROM SURGERY TO PACU TO THE ICU AND GENERAL FLOOR, SpHb MAY PROVIDE

Earlier and better clinical decisions > Improved patient safety > Decreased costs



## Part of the Upgradable Masimo Rainbow SET<sup>®</sup> Technology Platform

**BUILT ON THE SOLID FOUNDATION OF MASIMO SET**

The Gold-Standard in pulse oximetry with measure-through motion and low perfusion

**MASIMO RAINBOW SET LETS YOU CHOOSE THE CLINICAL MEASUREMENTS THAT ARE RIGHT FOR YOU NOW**

Be confident that your investment in patient safety won't become obsolete tomorrow

- > Hemoglobin (SpHb)
- > Carboxyhemoglobin (SpCO<sup>®</sup>)
- > PVI™
- > Pulse Rate
- > Oxygen Content (SpOC)
- > Methemoglobin (SpMet<sup>®</sup>)
- > SpO<sub>2</sub>
- > Perfusion Index



Masimo SpHb is available today in the Masimo Radical-7 (left) and Masimo Rad-87 bedside monitors.

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**MASIMO<sup>®</sup>**  
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