

## **Precision of Noninvasive Hemoglobin-Level Measurement by Pulse CO-Oximetry in Patients Admitted to Intensive Care Units for Severe Gastrointestinal Bleeds.**

Coquin J., Dewitte A., Le Manach Y., Caujolle M., Joannes-Boyau O., Fleureau C., Janvier G., Ouattara A. *Crit Care Med.* 2012 Sep;40(9):2576-82.

### **Objectives**

Measurement of total hemoglobin, based on pulse co-oximetry, is a continuous and noninvasive method that has been principally evaluated in healthy volunteers subjected to hemodilution. We tested the hypothesis that its accuracy could adversely affect patients presenting with severe hemorrhage, which is traditionally associated with increased microvascular tone.

### **Design**

Observational study.

### **Setting**

Twelve-bed mixed medico-surgical intensive care unit.

### **Patients**

Thirty-three patients admitted to our critical care unit for gastrointestinal bleeds were included.

### **Intervention**

A spectrophotometric sensor was positioned on the patient's fingertip and connected to a pulse co-oximeter. During the first 24 hrs following admission, venous hemoglobin level was determined at the laboratory every 8 hrs and was compared with hemoglobin levels displayed on the pulse co-oximeter measurements screen and/or measured from capillary blood using a portable photometer.

### **Measurements and Main Results**

The primary end point was the percentage of inaccurate measurements, which were defined as >15% difference compared with reference values or their unavailability for any technical reason. Twenty-five (19%) measurements of pulse co-oximeter measurements were unavailable from the screen. Pulse co-oximeter measurements and capillary hemoglobin levels were significantly correlated to venous hemoglobin level. For venous hemoglobin level compared with pulse co-oximeter measurements ( $n = 105$ ), and for venous hemoglobin level compared with capillary hemoglobin levels ( $n = 111$ ), the biases were, respectively,  $1.0 \pm 1.9$  g dL and  $0.4 \pm 1.0$  g dL ( $p < .05$ ). The proportion of inaccurate measurements was significantly higher for pulse co-oximeter measurements (56% vs. 15%,  $p < .05$ ). Although the use of norepinephrine did not affect concordance parameters, unavailability of measurements was frequently observed (42% vs. 15%,  $p < .05$ ).

### **Conclusions**

Determination of pulse co-oximetry-based hemoglobin in patients presenting with severe gastrointestinal bleeds can be inaccurate, which renders its use to guide transfusion decisions potentially hazardous. The unavailability of measurements, especially during vasopressor infusion, represents another serious limitation for hemorrhagic patients.