

## **Non-invasive hemoglobin estimation for preoperative anemia screening**

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**Background:** Preoperative anemia is common and associated with adverse postoperative outcomes. Assessment of hemoglobin concentrations may facilitate optimization prior to surgery. However, phlebotomy-based hemoglobin measurement may contribute to patient discomfort and iatrogenic blood loss, which makes non-invasive hemoglobin estimation attractive in this setting.

**Study design and methods:** This is a prospective study of adult patients presenting for preoperative evaluation before elective surgery at a tertiary care medical center. The Masimo Pronto Pulse CO-Oximeter was utilized to estimate blood hemoglobin concentrations (SpHb), which were then compared with hemoglobin concentrations obtained via complete blood count. Receiver operating curves were used to identify SpHb values maximizing specificity for anemia detection while meeting a minimum sensitivity of 80%.

**Results:** A total of 122 patients were recruited with a median (interquartile range) age of 66 (58, 72) years. SpHb measurements were obtained in 112 patients (92%). SpHb generally overestimated hemoglobin with a mean ( $\pm 1.96 \times$  standard deviation) difference of 0.8 (-2.2, 3.9) g/dL. Preoperative anemia, defined by hemoglobin <12.0 g/dL in accordance with institutional protocol, was present in 22 patients (20%). The optimal SpHb cut-point to identify anemia was 13.5 g/dL: sensitivity 86%, specificity 81%, negative predictive value 96%, and positive predictive value 53%. Utilizing this cut-point, 60% (73/122) of patients could have avoided phlebotomy-based hemoglobin assessment, while an anemia diagnosis would have been missed in <3% (3/122).

**Conclusion:** The use of SpHb devices for anemia screening in surgical patients is feasible with the potential to reliably rule-out anemia despite limited accuracy.