Accuracy of Noninvasive and Invasive Point-of-Care Hemoglobin Measurement in the Emergency Department

Abstract:

Hemoglobin measurement is one of the most common tests performed in the Emergency Department (ED). Rapid, point-of-care measurement of hemoglobin with a finger sensor may provide benefits to ED patients if the accuracy is comparable to invasive testing. The objective of this study was to compare noninvasive hemoglobin measurement with the Pronto-7 (SpHb) and capillary point-of-care measurement with HemoCue to reference values from a laboratory hematology analyzer (Hb).

We studied the performance characteristics of point-of-care hemoglobin measurement in ED patients requiring a complete blood count for standard care. Eligible patients were hemodynamically stable and able to provide informed consent for enrollment prior to phlebotomy. Blood collection for venous and capillary tests was performed within 15 min of noninvasive testing. Results from the two point of care devices were compared to clinical laboratory results, the current gold standard.

Of the 305 patients enrolled, 34 were excluded from analysis due to missing values. Subjects ranged from 18 to 100 yrs and 56% were female. Hb values ranged from 4.5 to 22.26 g/dL. Bias±SD compared to Hb were -0.38±1.42 g/dL for SpHb and -0.89±1.71 for capillary measurement. Limits of agreement were -3.16 to 2.40 g/dL for SpHb and -4.24 to 2.45 g/dL for capillary measurement. There were no significant differences in the bias or the limits of agreement between methods.

Noninvasive hemoglobin measurement with the Pronto-7 had slightly better performance characteristics than capillary HemoCue measurements in ED patients. However, the Pronto-7 failed to work more than 3 times as often, and errors caused by device failure were frequently reported. Our results suggest that both the Pronto-7 and Hemocue may have utility for triage, screening, or continuous hemoglobin monitoring in the ED and detection of anemia.