

An evaluation of hemoglobin measurement tools and their accuracy and reliability when screening for child anemia in Rwanda: A randomized study.

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Blood hemoglobin (Hb) is a common indicator for diagnosing anemia and is often determined through laboratory analysis of venous samples. One alternative to laboratory-based methods is the handheld HemoCue[®] Hb 201+ device, which requires a finger prick and wicking of blood into a pretreated cuvette for analysis. An alternative HemoCue[®] gravity method is being investigated for improved accuracy. Further, recent developments in noninvasive technologies could provide an accurate, rapid, safe, point-of-care option for hemoglobin estimation while addressing some limitations of current tools, but device performance must be assessed in low-resource settings. This study evaluated the performance of two HemoCue[®] Hb 201+ blood sampling methods and a noninvasive device (Pronto[®] with DCI-mini[™] sensors) in a Rwandan pediatric clinic. Reference hemoglobin values were determined in 132 children 6 to 59 months of age by using a standard hematology analyzer (Sysmex KN21TM). Half were tested using the HemoCue[®] wicking method; half were tested using the HemoCue[®] gravity method; and 112 had successful hemoglobin readings with Pronto[®] DCI-mini[™]. Statistical analysis was used to assess the level of bias generated by each method and the key drivers of bias. The HemoCue[®] gravity method was the least biased. The HemoCue[®] wicking and Pronto[®] methods biases were inversely related to the Sysmex KN21TM results. Both HemoCue[®] sampling methods correctly classified patients' anemic status in 80% or more of instances, whereas the Pronto[®] device had a correct classification rate of only 69%. The HemoCue[®] gravity method was more accurate than the traditional HemoCue[®] wicking method in this study, but its accuracy and operational feasibility should be confirmed by future studies. The Pronto[®] DCI-mini[™] devices showed considerable promise but require further improvements in sensitivity and specificity before wider adoption.