Can noninvasive hemoglobin measurement reduce the need for preoperative venipuncture in pediatric outpatient surgery?

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BACKGROUND: Noninvasive measurements of hemoglobin in the pediatric perioperative setting could be helpful to avoid venipunctures in children. The present study aims to evaluate this by using a noninvasive device for hemoglobin determination. We compared noninvasively obtained hemoglobin with laboratory hemoglobin concentrations in children during their preoperative assessment.

METHODS: In an observational study, 122 nonanemic children (age 4.2 ± 1.6 years) who were scheduled to undergo different surgical procedures under general anesthesia were included. In their preoperative preparations, single invasive blood samples for laboratory hemoglobin concentrations were routinely taken following hospital policy and compared to simultaneous noninvasive determinations of hemoglobin. A preoperative invasive value ≤9 g/dL would have caused cancelation of surgery and implied further investigations.

RESULTS: A Bland-Altman plot showed that the average difference between noninvasively obtained hemoglobin and laboratory hemoglobin concentration was -0.44 g/dL (bias) with a standard deviation of the mean bias of 1.04 g/dL. A hemoglobin error grid showed that the noninvasive device could identify almost all invasive hemoglobin values >9 g/dL. In total, there were 4 false-positive values where noninvasively obtained hemoglobin observations were below while the paired invasive values were above 9 g/dL.

CONCLUSION: The data in this pediatric setting suggest that the device may eliminate the need for venipuncture in nonanemic children.