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Comparison of three noninvasive methods for hemoglobin screening of blood donors.

Ardin S(1), Störmer M, Radojska S, Oustianskaia L, Hahn M, Gathof BS.

BACKGROUND: To prevent phlebotomy of anemic individuals and to ensure hemoglobin (Hb) content of the blood units, Hb screening of blood donors before donation is essential. Hb values are mostly evaluated by measurement of capillary blood obtained from fingerstick. Rapid noninvasive methods have recently become available and may be preferred by donors and staff. The aim of this study was to evaluate for the first time all different noninvasive methods for Hb screening.

STUDY DESIGN AND METHODS: Blood donors were screened for Hb levels in three different trials using three different noninvasive methods (Haemospect [MBR Optical Systems GmbH & Co. KG], NBM 200 [LMB Technology GmbH], Pronto-7 [Masimo Europe Ltd]) in comparison to the established fingerstick method (CompoLab Hb [Fresenius Kabi GmbH]) and to levels obtained from venous samples on a cell counter (Sysmex [Sysmex Europe GmbH]) as reference. The usability of the noninvasive methods was assessed with an especially developed survey.

RESULTS: Technical failures occurred by using the Pronto-7 due to nail polish, skin color, or ambient light. The NBM 200 also showed a high sensitivity to ambient light and noticeably lower Hb levels for women than obtained from the Sysmex. The statistical analysis showed the following bias and standard deviation of differences of all methods in comparison to the venous results: Haemospect, -0.22 ± 1.24 ; NBM, 200 -0.12 ± 1.14 ; Pronto-7, -0.50 ± 0.99 ; and CompoLab Hb, -0.53 ± 0.81 .

CONCLUSION: Noninvasive Hb tests represent an attractive alternative by eliminating pain and reducing risks of blood contamination. The main problem for generating reliable results seems to be preanalytical variability in sampling. Despite the sensitivity to environmental stress, all methods are suitable for Hb measurement.