

Non-Invasive Measurement of Hemoglobin: Assessment of Two Different Point-of-Care Technologies.

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Background

Measurement of blood hemoglobin (Hb) concentration is a routine procedure. Using a non-invasive point-of-care device reduces pain and discomfort for the patient and allows time saving in patient care. The aims of the present study were to assess the concordance of Hb levels obtained non-invasively with the Pronto-7 monitor (version 2.1.9, Masimo Corporation, Irvine, USA) or with the NBM-200MP monitor (Orsense, Nes Ziona, Israel) and the values obtained from the usual colorimetric method using blood samples and to determine the source of discordance.

Methods and Findings

We conducted two consecutive prospective open trials enrolling patients presenting in the emergency department of a university hospital. The first was designed to assess Pronto-7™ and the second NBM-200MP™. In each study, the main outcome measure was the agreement between both methods. Independent factors associated with the bias were determined using multiple linear regression. Three hundred patients were prospectively enrolled in each study. For Pronto-7™, the absolute mean difference was 0.56 g.L⁻¹ (95% confidence interval [CI] 0.41 to 0.69) with an upper agreement limit at 2.94 g.L⁻¹ (95% CI [2.70;3.19]), a lower agreement limit at -1.84 g.L⁻¹ (95% CI [-2.08;-1.58]) and an intra-class correlation coefficient at 0.80 (95% CI [0.74;0.84]). The corresponding values for the NBM-200MP™ were 0.21 [0.02;0.39], 3.42 [3.10;3.74], -3.01 [-3.32;-2.69] and 0.69 [0.62;0.75]. Multivariate analysis showed that age and laboratory values of hemoglobin were independently associated with the bias when using Pronto-7™, while perfusion index and laboratory value of hemoglobin were independently associated with the bias when using NBM-200MP™.

Conclusion

Despite a relatively limited bias in both cases, the large limits of agreement found in both cases render the clinical usefulness of such devices debatable. For both devices, the bias is independently and inversely associated with the true value of hemoglobin.