

Accuracy of Noninvasive Multiwave Pulse Oximetry Compared With Carboxyhemoglobin From Blood Gas Analysis in Unselected Emergency Department Patients.

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Objective

Accurate and timely diagnosis of carbon monoxide (CO) poisoning is difficult because of nonspecific symptoms. Multi-wavelength pulse oximetry might facilitate the screening for occult poisoning by noninvasive measurement of carboxyhemoglobin (COHb), but its reliability is still unknown. We assess bias and precision of COHb oximetry compared with the criterion standard blood gas analysis.

Methods

This was a prospective diagnostic accuracy study according to STARD (Standards for the Reporting of Diagnostic accuracy studies) criteria, performed at a tertiary care hospital emergency department. We included all patients for whom both invasive and noninvasive measurement within 60 minutes was available, regardless of their complaints, during a 1-year period.

Results

One thousand five hundred seventy-eight subjects were studied, of whom 17 (1.1%) received a diagnosis of CO poisoning. In accordance with this limited patient cohort, we found a bias of 2.99% COHb (1.50% for smokers, 4.33% for nonsmokers) and a precision of 3.27% COHb (2.90% for smokers, 2.98% for nonsmokers), limits of agreement from -3.55% to 9.53% COHb (-4.30% to 7.30% for smokers, -1.63% to 10.29% for nonsmokers). Upper limit of normal cutoff of 6.6% COHb had the highest sensitivity in screening for CO poisoning. Smoking status and COHb level had the most influence on the deviation between measurements.

Conclusion

Multi-wavelength pulse oximetry was found to measure COHb with an acceptable bias and precision. These results suggest it can be used to screen large numbers of patients for occult CO poisoning.