

Determination of the Coefficient of Variation of Continuous Noninvasive Hemoglobin Measurement.

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Background

Noninvasive continuous determination of haemoglobin may be very important. Variation of measurement can be due to device variability, including self-calibration (coefficient of variation -CV-) or real patient changes. Our aim is to determine the CV since it has not been reported yet for this device.

Methods

After local ethics committee approval, written informed consent was obtained from patients scheduled to any kind of surgery. After standard monitoring, a Rainbow R2-25 (Masimo, USA) probe was placed in the middle finger of the contralateral IV line hand according to the manufacturer's recommendations. After a standard anesthesia induction, the probe was connected to a monitor (Masimo Radical-7, USA), and noninvasive haemoglobin determination (SpHb) started. No IV liquids (except to maintain blood pressure, if necessary) were administered. Anesthesia was maintained with 1-2% sevoflurane in oxygen. No surgical procedure was performed during 40 minutes. If perfusion index was lower than 1, data were rejected. Doing it this way, SpHb variations are likely to be due to monitor variability rather than patient changes. After surgery, data were downloaded to a computer (Masimo TrendCom, Masimo, USA), obtaining one recording every 2 seconds. CV was analyzed offline for 8 periods of five minutes, then in periods of ten minutes (4 periods) and finally in two periods of 20 minutes. CV from each patient and each period of time was compared with the others, in order to find out the maximum period of variability and the actual CV, which is the lowest one of all the measurements. A CV below 2,8% (within-subject biologic variation) would be desirable. Comparison was performed with Student's t test or ANOVA with Bonferroni correction as appropriate. $P < 0,05$ was considered significant.

Results

35 patients were enrolled. One of them was withdrawn due to haemodynamic problems and one due to low perfusion index. 1200 determinations were obtained for each patient.

Conclusions

In our study, CV has been established in 1,6% (DE=1,4%). When using SpHb, first 20 minutes should be discarded.

Minutes	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
CV (%)	1,4 (1,4)	0,7 (0,6)	1,5 (0,5)	1,7 (0,6)	0,8 (1,0)	0,9 (1,0)	0,7 (0,6)	1,1 (2,9)
Minutes	0-10	10-20	20-30	30-40				
CV (%)	2 (5,3)	1,8 (1,3)	1,2 (1,2)	1,2 (1,3)				
Minutes	0-20	20-40						
CV (%)	2,8 (3,7)	1,6 (1,4)						