

REFERENCE VALUES FOR NOCTURNAL HOME PULSE OXIMETRY IN CHILDREN

Urschitz MS ^{1,2}, Wolff J ³, von Einem V ⁴, Urschitz-Duprat PM ³, Schlaud M ⁵, Poets CF ¹



¹ Department of Neonatology, University of Tuebingen, Tuebingen, Germany

² Division of Neonatology, Department of Pediatrics, Vienna General Hospital, University of Vienna, Vienna, Austria

³ Department of Pediatric Pulmonology and Neonatology, Hannover Medical School, Hannover, Germany

⁴ Department of Biomedical Engineering, Hannover Medical School, Hannover, Germany

⁵ Department of Epidemiology, Social Medicine and Health System Research, Hannover Medical School, Hannover, Germany

INTRODUCTION

- Pulse oximetry is increasingly used for the evaluation of sleep disordered breathing (SDB) in adults.¹ It is easy to use and provides accurate information on both baseline oxygen levels and intermittent falls in oxygenation.
- Accurate interpretation of these measurements in children requires knowledge of reference values. In children, these are not yet available for the new generation of motion-resistant pulse oximeters.

METHODS

- As part of a population-based, cross-sectional study on the prevalence of SDB in primary school children, all children attending the third grade of 27 randomly selected regular primary schools located in Hannover, Germany were asked to participate.
- Nocturnal home pulse oximetry (NHPO) recordings were performed using an instrument (VitaGuard[®] 300; getemed AG; Teltow, Germany) with a new generation, motion-resistant oximeter module (Masimo SET[®], software version 3.0.2.1, 2-4 s averaging mode; Masimo Corp; Irvine, CA).
- A study nurse explained handling of the pulse oximeter to the children in their classroom. Children were instructed to start the recording at bedtime and terminate it in the morning.
- Recordings were analyzed for the minimum and median SpO₂ value found (SATmin and SAT50) and the value below which SpO₂ was 5% and 10% of time (SAT5 and SAT10).
- Furthermore, the number of falls in SpO₂ by ≥ 4% and to ≤ 90% and 92% was calculated (D4, D90 and D92 events).
- Total and artifact-free recording time, SAT5, SAT10, SAT50, and D4 events were calculated using data analysis software (Matlab[®]; MathSoft Inc; Cambridge, MA).
- SATmin, D90 and D92 events were visually confirmed to exclude spuriously low values not identified by the software tool.
- Indices of all desaturation events were calculated per hour of artifact-free recording (DI4, DI90, and DI92).

RESULTS

- Of 1760 children attending the third grade, 1144 (65%) were enrolled. Ninety-five children had moved or were ill at the time of study, thus, 1091 recordings were obtained.
- Of these, 95 had to be excluded because of insufficient artifact-free recording time (<5 h).
- Mean (SD) age, height and weight of the remaining 996 children (508 boys) was 9.6 years (0.6), 139.3 cm (7.1) and 33.9 kg (7.8).
- Median (range; 5th centile) values for SATmin, SAT5, SAT10 and SAT50 were 92.6% (71-97; 88), 96.9% (53-99; 95), 97.2% (76-99; 96) and 98.1% (93-100; 97).
- Median (range; 95th centile) values for DI4, DI90 and DI92 were 1.4 (0.0-12.9; 3.9), 0.0 (0.0-1.4; 0.2) and 0.1 (0.0-2.6; 0.6).
- Boys had significantly lower SATmin (mean [SD]: 92.09 [4.8] vs. 92.84 [2.3]; p=0.020) and higher DI4 (mean [SD]: 1.74 [1.8] vs. 1.32 [1.7]; p<0.000) and DI90 (mean [SD]: 0.05 [0.1] vs. 0.02 [0.1]; p=0.031) values than girls.

CONCLUSION

- Baseline SpO₂ values <97% were uncommon in these children, as were intermittent desaturations to 90% or less.
- These data may serve as a basis for the interpretation of NHPO recordings in children referred for SDB.

REFERENCES

- Netzer N, Eliasson AH, Netzer C, Kristo DA. Overnight pulse oximetry for sleep-disordered breathing in adults: A review. Chest 2001;120:625-633

BASELINE SATURATION AND DESATURATION EVENTS

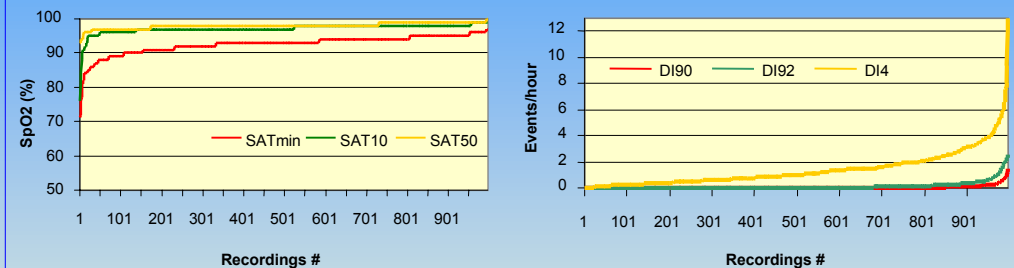


Figure 1

Figure 2

DESCRIPTIVE STATISTICS

	Mean ± SD	Median	IQR	Range	5th Centile
SATmin	92.6 ± 2.8	93	92-94	71-97	88
SAT10	97.2 ± 1.5	97	97-98	76-99	96
SAT50	98.1 ± 0.8	98	98-99	93-100	97

Table 1

	Mean ± SD	Median	IQR	Range	95th Centile
DI90	0.0 ± 0.1	0	0.0-0.0	0.0-1.4	0.2
DI92	0.1 ± 0.3	0	0.0-0.1	0.0-2.6	0.6
DI4	1.4 ± 1.3	1	0.5-1.9	0.0-12.9	3.9

Table 2

IQR, interquartile range (25th-75th centile)