The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance. The title text is centered in the upper half of the slide.

OXIMETRY AND POLYSOMNOGRAPHY - INTERPRETATION

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Test Question - How many hours of sleep did you have last night?

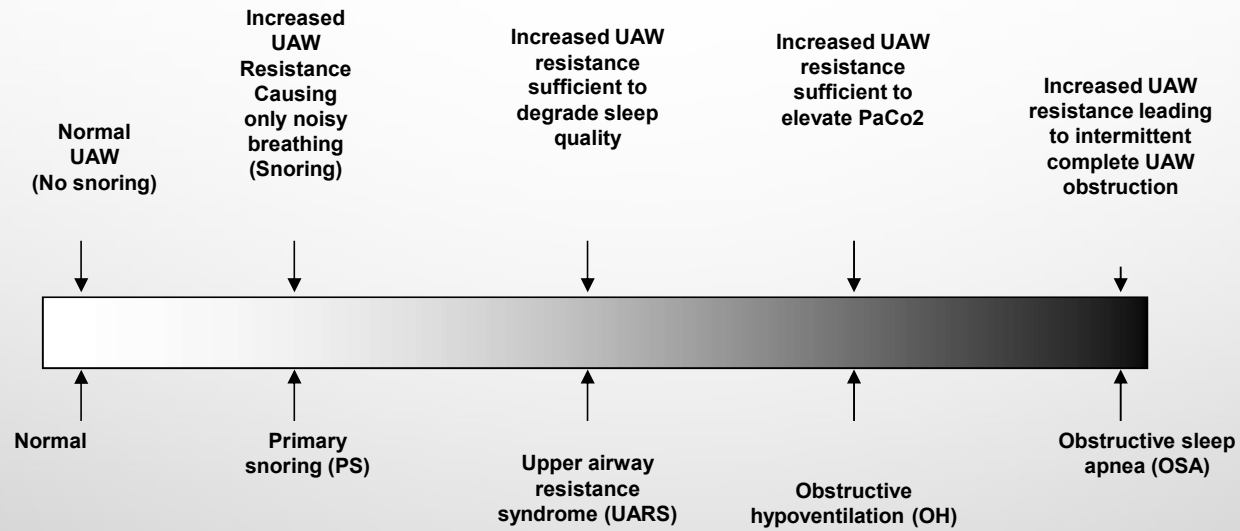
< 3
hours

3 - 6
hours

6 - 8
hours

> 8
hours

SLEEP DISORDERED BREATHING



INTERPRETATION OF PULSE OXYMETRY

IN A KEY VALIDATION STUDY, GRIES ET AL NOTED A NORMAL OVERNIGHT MEAN (THE SO CALLED SAT 50) SAO₂ OF 96.5% (+/- 1.5%).

ETHNICITY, GENDER AND WEIGHT DID NOT SIGNIFICANTLY INFLUENCE NORMAL VALUES.

GRIES RE, BROOKS LJ. NORMAL OXYHEMOGLOBIN SATURATION

DURING SLEEP. CHEST 1996; 110:1489–1492

Pulse Oximetry in Diagnosing SDB

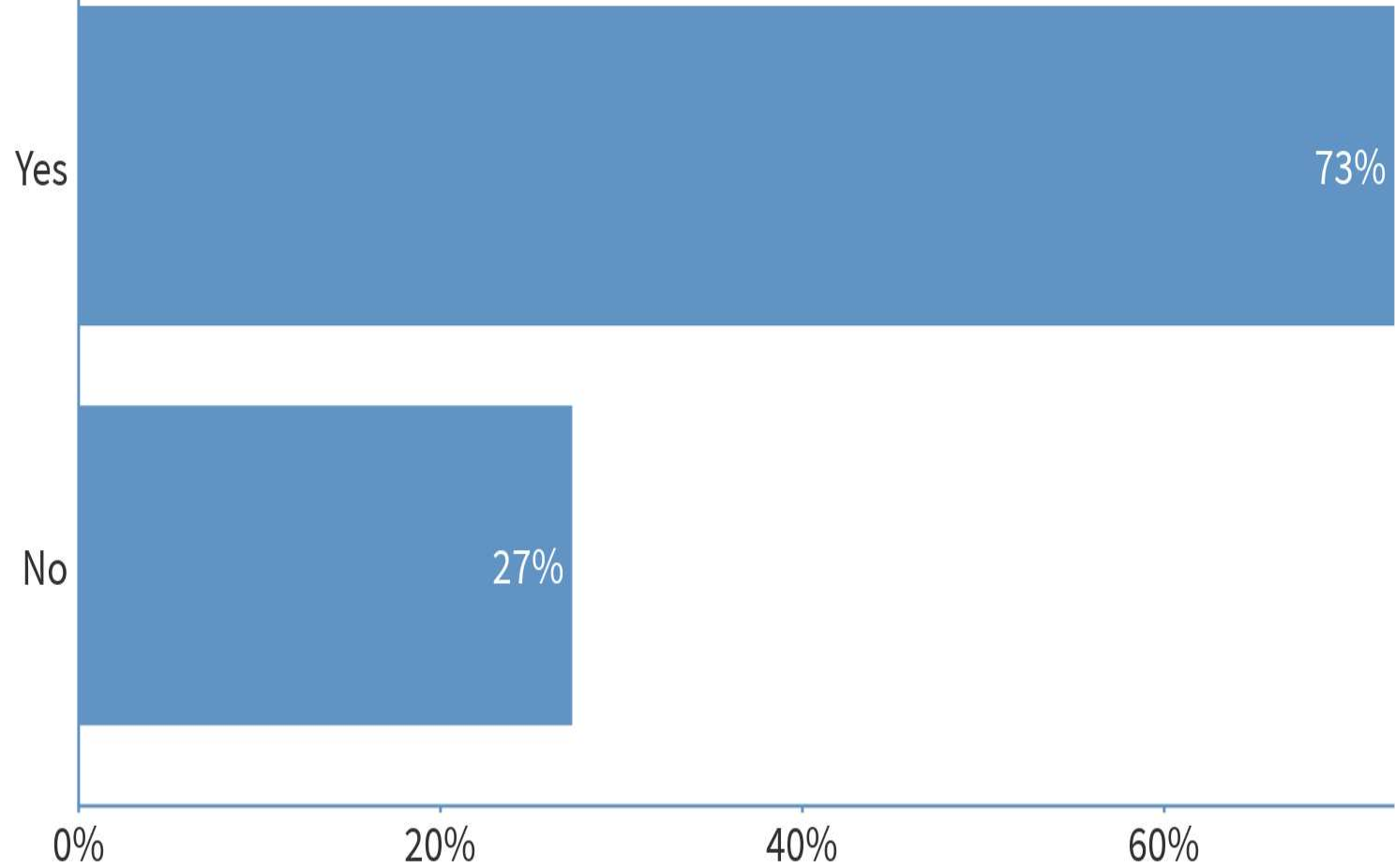
- Easy to perform, automatic analysis possible
- Inexpensive, good acceptance with parents
- Diagnostic if positive result
- Low sensitivity: neg. result does not exclude SDB

OVERNIGHT OXIMETRY- CONVENTIONAL

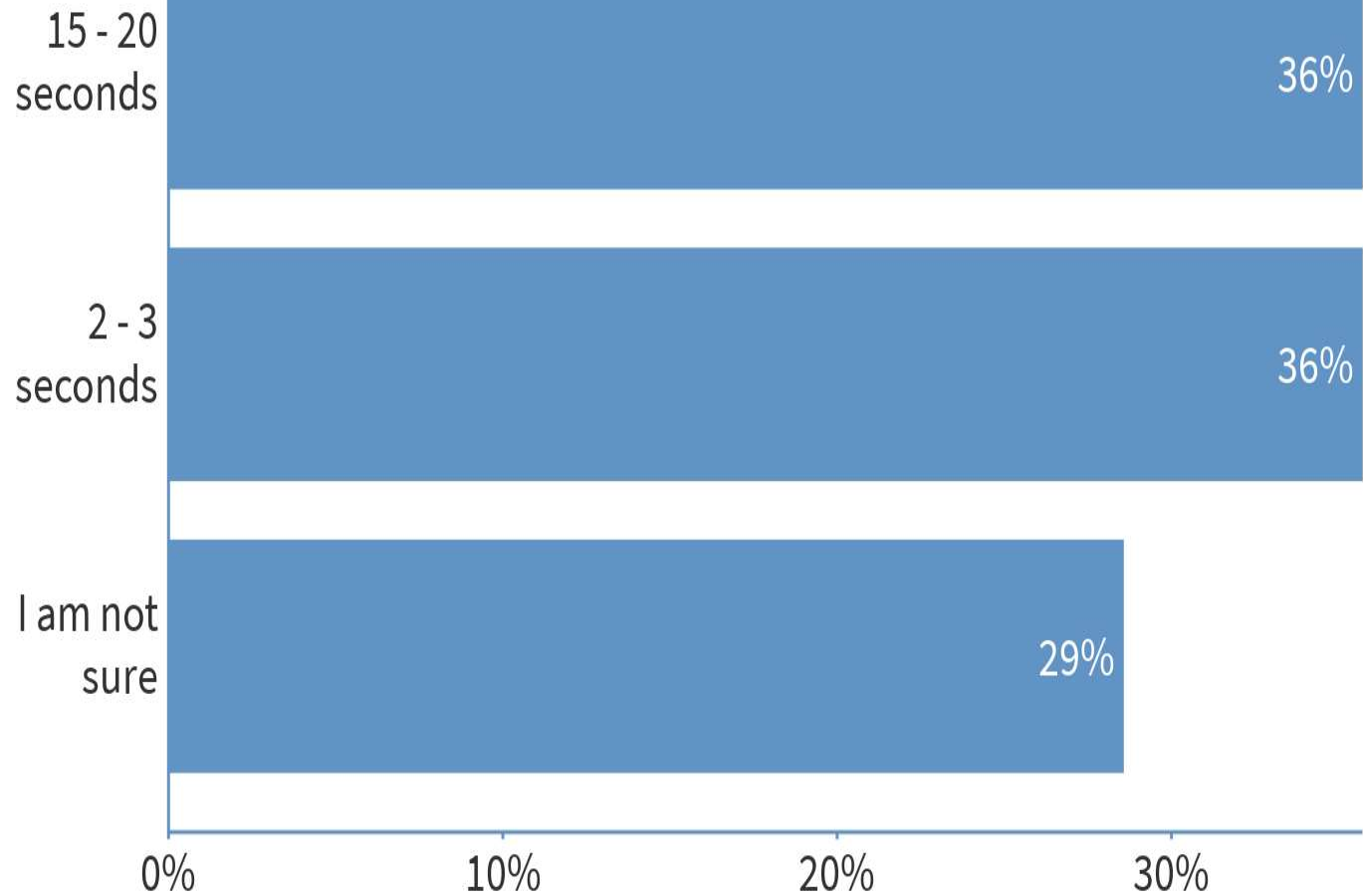
- SIMPLE, NONINVASIVE, AND REASONABLY ACCURATE ESTIMATION OF ARTERIAL OXYGEN SATURATION
- CANNOT DETECT NON ARTERIAL BLOOD
- DOES NOT GIVE BEAT TO BEAT VALUES



Do you use Overnight Pulse oximetry for looking at intermittent hypoxia?



What is the averaging times of your pulse oximeter?



SO WHAT DO WE USE

- MASSIMO SERIES
 - RADICAL 7
 - RADICAL 8



- NELLCOR SERIES
 - NELLCOR N 200



National University Hospital
Singapore, Singapore

Test date: [REDACTED]
[REDACTED]

Start: [REDACTED] 21:49:27
End: [REDACTED] 07:49:57

[REDACTED]
[REDACTED]

Oximetry: Comprehensive Report

Comments: Overnight study breathing room air.

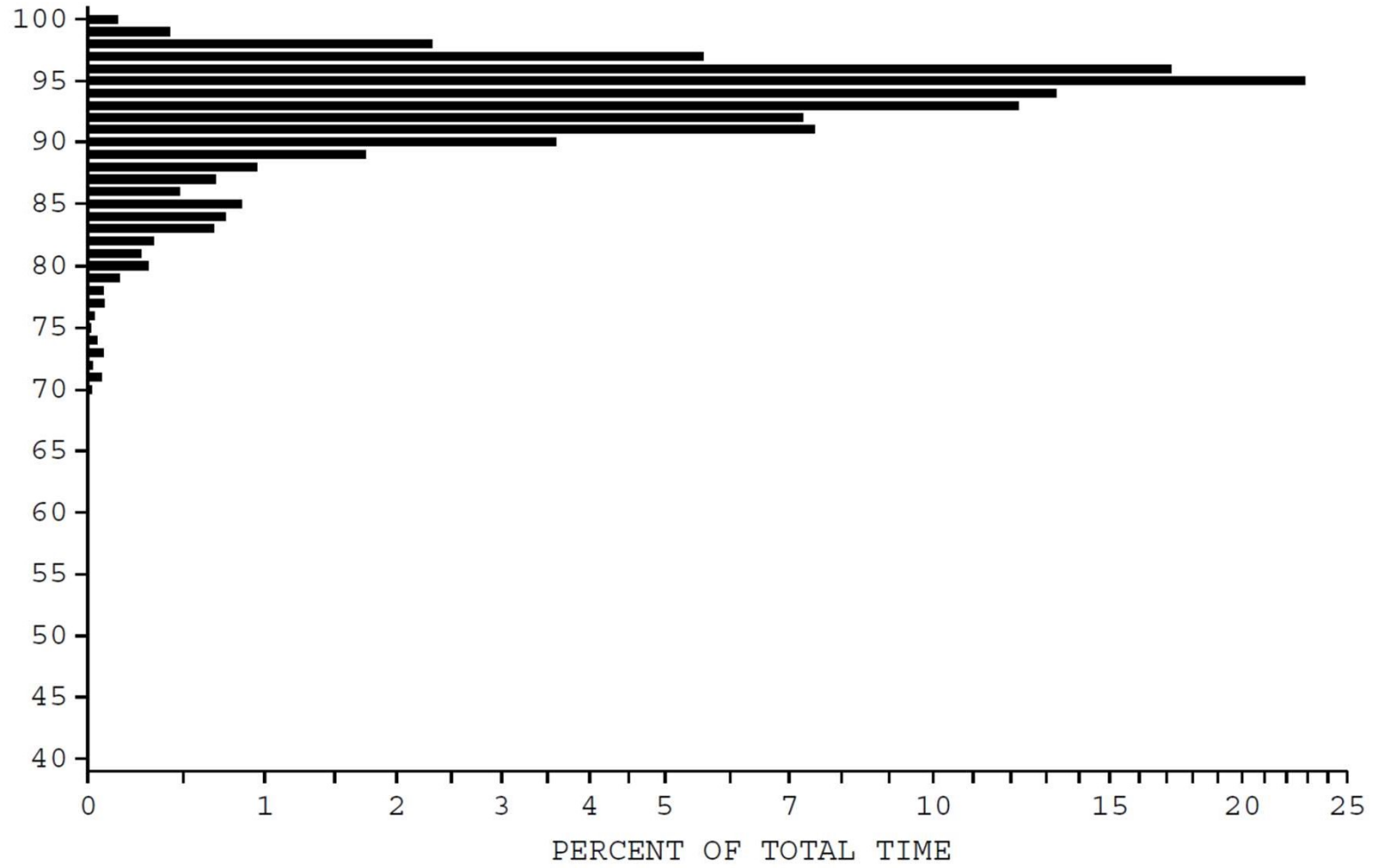
Recording time: 10:00:30	Highest pulse: 188	Highest SpO2: 100%
Excluded sampling: 01:06:54	Lowest pulse: 40	Lowest SpO2: 70%
Total valid sampling: 08:53:36	Mean pulse: 124	Mean SpO2: 93.5%

Time with SpO2<90:	0:40:46,	7.6%
Time with SpO2<80:	0:03:08,	0.6%
Time with SpO2<70:	0:00:00,	0.0%
Time with SpO2<60:	0:00:00,	0.0%
Time with SpO2<88:	0:26:24,	4.9%

The longest continuous time with saturation ≤ 88 was 00:10:26, which started at 05-21-14 21:49:27.

A desaturation event was defined as a decrease of saturation by 4 or more.
One event was excluded due to artifact.
There were 8 desaturation events over 3 minutes duration.

SATURATION



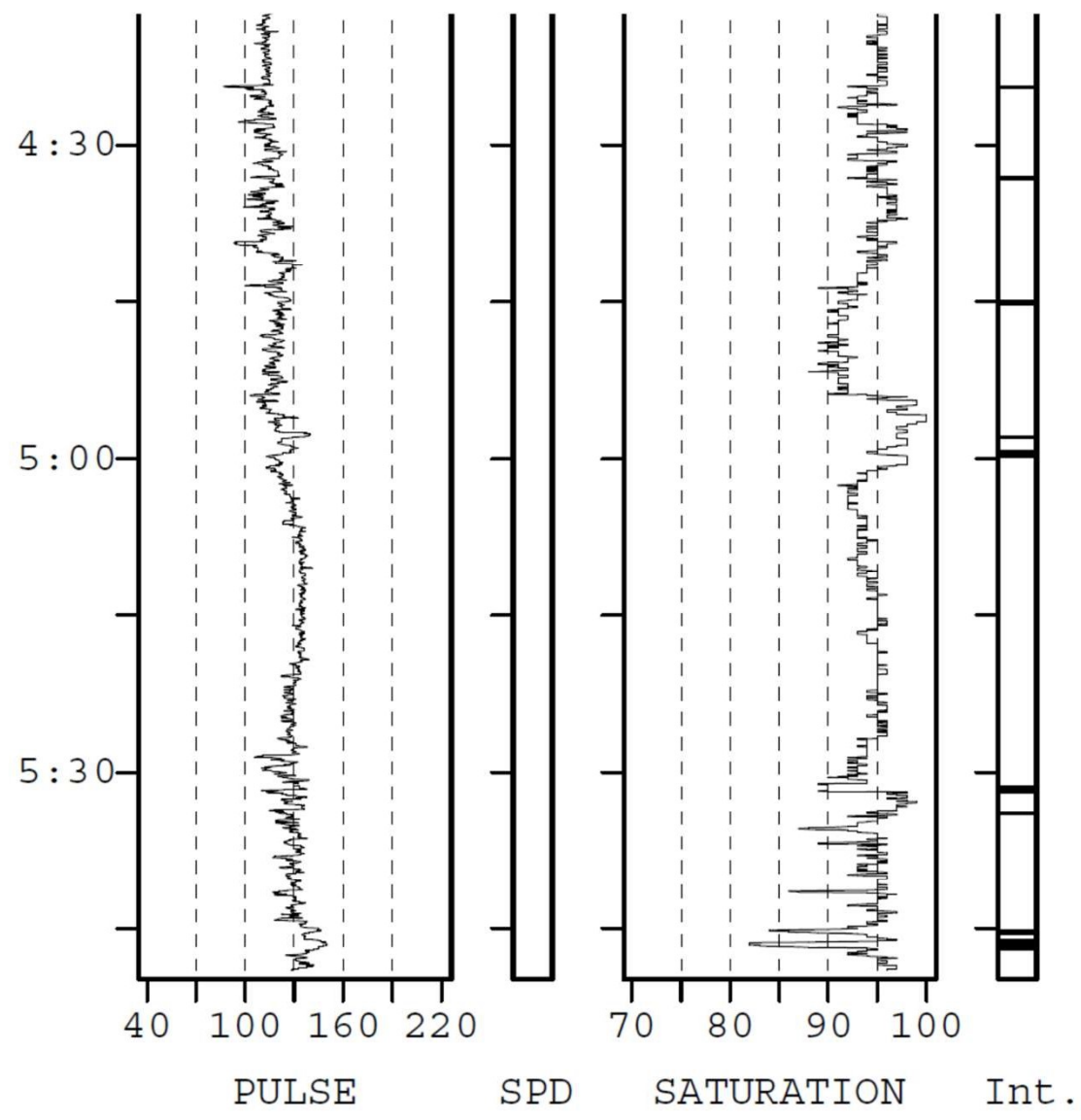


Table 1: Oximetry study classification according to McGill criteria.

Description	Definition
A 'desaturation'	$\geq 4\%$ fall in saturation
A 'cluster'	≥ 5 desaturations within a 30 minute period
A 'positive' study	≥ 3 clusters with ≥ 3 desaturations to $<90\%$
An 'Inconclusive' study	Not a positive study (i.e. <3 clusters or <3 desaturations below 90%)

TABLE 1. The McGill Oximetry Scoring System Devised in Phase 1 and Validated in Phases 2 and 3

Oximetry Score	Comment	Criteria				Recommendation
		No. of Drops in SaO ₂ <90%	No. of Drops in SaO ₂ <85%	No. of Drops in SaO ₂ <80%	Other	
1	Normal study/ inconclusive for OSA	<3	0	0	Baseline: stable (<3 clusters of desaturation) and >95%	Additional evaluation of breathing during sleep required to rule out OSA
2	OSA, mild	≥3	≤3	0	Three or more clusters of desaturation events ¹⁴	Recommend T&A on the waiting list
3	OSA, moderate	≥3	>3	≤3	Three or more clusters of desaturation events ¹⁴	Recommend surgery within 2 wk
4	OSA, severe	≥3	>3	>3	Three or more clusters of desaturation events ¹⁴	Recommend urgent surgery (within days)

What are the limitations of Pulse oxymetry

LIMITATIONS OF OXIMETRY

- PULSE OXIMETRY RELIES ON PULSATILE BLOOD FLOW. HENCE, MOVEMENTS, VASOCONSTRICTION AND HYPOTENSION CAUSE ARTIFACTS
- MOVEMENT ARTIFACTS
- CHANGES IN HEMOGLOBIN STRUCTURE
- INABILITY TO DETECT CENTRAL APNEA OR UPPER AIRWAY RESISTANCE SYNDROME

SUMMARY

- PULSE OXIMETRY IS AN ALTERNATIVE INVESTIGATION TO PSG, IN PROVING THE PRESENCE OF OSAS IN CHILDREN.
- A NEGATIVE STUDY DOES NOT RULE OUT OSAS
- IT CAN BE USED TO CATEGORIZE THE SEVERITY OF OSAS AND HENCE THE TREATMENT ALGORITHM
- IT IS IMPORTANT TO UNDERSTAND THE LIMITATIONS OF THE PROCEDURE.



POLYSOMNOGRAPHY INTERPRETATION

PAEDIATRIC POLYSOMNOGRAPHY IS UNIQUE
IMPORTANCE OF MANUAL SCORING

VERY DEPENDENT ON A GOOD TECHNICIAN

RUBBISH IN/RUBBISH OUT

KNOW THE PATIENT BEFORE REPORTING



How does patient's age affect POLYSOMNOGRAPHY interpretation?

Start the presentation to see live content. Still no live content? Install the app or get help at PollEv.com/app

INTERPRETATION OF PSG

- SLEEP EFFICIENCY - $\text{TOTAL SLEEP TIME} / \text{TIME IN BED} \times 100$
- ADEQUATE SLEEP STAGES –
 - STAGE 1 - 4 – 7%
 - STAGE 2 – 36% - 49%
 - STAGE 3 – 14% - 32%
 - STAGE 4 – 17% – 21%
- AROUSALS – MEAN AROUSAL INDEX OF 8.8 – 9.5.

INTERPRETATION OF PSG

- OAH I INDEX
 - <1 – NORMAL
 - 1 – 4.9 – MILD OSA
 - 5 – 9.9 – MODERATE OSA
 - 10 AND ABOVE – SEVERE OSA
- CENTRAL APNEA INDEX – INVESTIGATE IF >5



INTERPRETATION OF PSG

- VIDEO RECORDING
- 

SLEEP ARCHITECTURE

Lights off clock time:	10:16:12 PM
Lights on clock time:	8:07:48 AM
Total Recording Time (TRT):	596.4 minutes
Time In Bed (TIB):	591.6 minutes
Sleep Period Time (SPT):	576.9 minutes
Total Sleep Time (TST):	561.4 minutes
Sleep Efficiency:	94.9 %
Sleep Onset:	14.7 minutes
WASO:	15.5 minutes
REM Latency (from Sleep Onset):	315.0 minutes
REM Latency (from Lights Off):	329.7 minutes

Sleep Staging	Duration	% TST	Latency (from LOFF)
N 1:	4.0 minutes	0.7 %	N 1: 14.7 minutes
N 2:	381.9 minutes	68.0 %	N 2: 15.7 minutes
N 3:	131.5 minutes	23.4 %	N 3: 22.7 minutes
R:	44.0 minutes	7.8 %	R: 329.7 minutes

RESPIRATORY DATA

	CA	OA	MA	Apnea	Hypop*	A+ H	RERA	Total
Number:	0	0	0	0	1	1	0	1
Mean Dur : (sec)	0.0	0.0	0.0	0.0	27.5	27.5	0.0	27.5
Max Dur (sec):	0.0	0.0	0.0	0.0	27.5	27.5	0.0	27.5
Total Dur (min)	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.5
% of TST:	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1
Index (#/h TST)	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1
REM Count:	0	0	0	0	0	0	0	0
NREM Count:	0	0	0	0	1	1	0	1
REM Index:	0/h	0/h	0/h	0/h	0/h	0/h	0/h	0/h
NREM Index:	0.0/h	0.0/h	0.0/h	0.0/h	0.1/h	0.1/h	0.0/h	0.1/h

OAH	0.11/hr
------------	---------

*Above Index Values Based on Total Sleep Time ■ Hypopneas were scored per AASM definition VIII4.B (3% desaturation).

AROUSALS

	REM	NREM	Arousals	Awakenings	Ar + Aw	Ar + Aw Index
Respiratory:	0	0	0	0	0	0.0
Leg Movement:	0	0	0	0	0	0.0
Snore:	0	0	0	0	0	0.0
Spontaneous:	0	39	41	18	59	6.3
Total:	0	39	41	18	59	6.3
Arousal Index:	0.0	4.5	4.4	1.9	6.3	--

LIMB MOVEMENTS

	Count	Index (#/h)
Total Leg Movement:	0	0.0
PLMS:	0	0
PLMS Arousals:	0	-

OXYGEN SATURATION

	WAKE		NREM		REM		TIB		TST	
# of Abs Desats	0		0		0		0		0.00	
Mean SpO2%:	98		97		95		97		96.00	
Min. SpO2%:	-		-		-		87		87	
<89% (min):	0.0		0.2		5.0		5.2		5.20	
	WAKE		NREM		REM		TIB		TST	
	Time		Time		Time		Time		Time	
	Min.	%	Min.	%	Min.	%	Min.	%	Min.	%
90 – 100%:	28.70	95.03	0.77	97.43	35.40	80.45	568.2	96.04	539.50	96.10
80 – 89%:	0.00	0.00	0.20	0.04	8.60	19.55	8.80	1.49	8.80	1.57
70 – 79%:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60 – 69%:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50 – 59%:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
< 50%:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00
Artifact / Bad Data:	1.5	4.97	13.1	2.53	0.0	0.00	14.6	2.47	13.10	2.33

OXYGEN SATURATION DISTRIBUTION

EtCO2 distribution (all durations are in % of TST)

	W	REM	NREM	Total
>=75	0.00	0.00	0.00	0.00
>=65	0.00	0.00	0.00	0.00
>=55	0.00	0.00	0.00	0.00
>=50	0.00	0.00	0.00	0.00
>=47	0.00	0.00	0.00	0.00
>=40	1.23	0.24	8.96	10.43
>=30	5.05	7.44	87.31	99.80
>0	0.00	0.00	0.00	0.00
Rejected	0.05	0.00	0.15	0.20
Average	6.25	6.25	6.42	0.00

PAEDIATRIC POLYSOMNOGRAPHY REPORT

Study Information

Name:	[REDACTED]		Date of Birth:	[REDACTED]	Date of Study:	[REDACTED]			
ID#:	[REDACTED]	BMI:	17.3	Wt:	44.2	Height:	160.0	Sex:	M
Technician:	[REDACTED]		Referring Physician:			[REDACTED]			

[REDACTED] is a [REDACTED] year old boy with [REDACTED] admitted for evaluation of sleep disordered breathing.

Methods:

Polysomnography was performed overnight in a darkened room in the NUH Paediatric Sleep Laboratory (Bed 1) with the patient sleeping in a comfortable bed. Standard polysomnography consisted of: EEG (F4-M1, C4-M1, O2-M1), EMG (chin and legs), EOG (right/left), ECG (modified lead II) and heart rate monitoring, SpO2 (Novametrics) and oximeter pulse waveform, end-tidal CO2 monitoring (Novametrics), oronasal airflow (thermistor), nasal pressure transducer, thoracic and abdominal motion (respiratory inductance plethysmography), body position sensor, external microphone and digital video. The study was performed on a computerised system (Respironics Alice 6) using the Philips G3 software. The technical and digital specifications of the study were per the American Academy of Sleep Medicine (AASM) Manual 2012. Scoring of events was also per the AASM Manual.

The patient was studied while breathing spontaneously on room air and without mechanical ventilatory assistance. The patient was on the following medications: NASONEX AUGMENTIN

Results summary

Total recording time (min) 455.1, Total sleep time (min): 387.0, Sleep latency (min) 2.6, REM latency (min): 194.0 . Total arousals: 17 Arousal Index: 2.6. Sleep efficiency 85%
Sleep stages as percentage of total sleep time:

Sleep Staging	% TST
Stage N 1:	1.3 %
Stage N 2:	76.9 %
Stage N 3:	13.6 %
REM:	8.3 %

Sleep efficiency was normal. Sleep stage distribution was normal. REM latency was increased. The number of arousals from sleep was increased. The arousals were mainly spontaneous and secondary to respiratory events.

There was moderate snoring. Paradoxical inward rib cage motion during inspiration did occur (and was transient).

There were 23 obstructive apneas and 83 obstructive hypopneas. The obstructive events occurred during REM and non REM sleep. The obstructive events were associated with oxygen desaturation to a nadir of 87% and were not associated with hypoventilation.

There were 6 central apneas.

There were 9 mixed apneas.

The obstructive apnea hypopnea index (OAHl, which includes mixed apnea, obstructive apnea plus obstructive hypopnea) was 14.82/hour of total sleep time. There was no sleep-related hypoventilation.

(There were no significant EEG abnormalities.)

There were no significant cardiac arrhythmias.

The periodic limb movement index was normal.

No observed behavioral abnormality was noted during the study.

The accompanying caregiver thought that the night's sleep was typical.

Conclusions:

Severe obstructive sleep apnea associated with desaturation and sleep fragmentation.



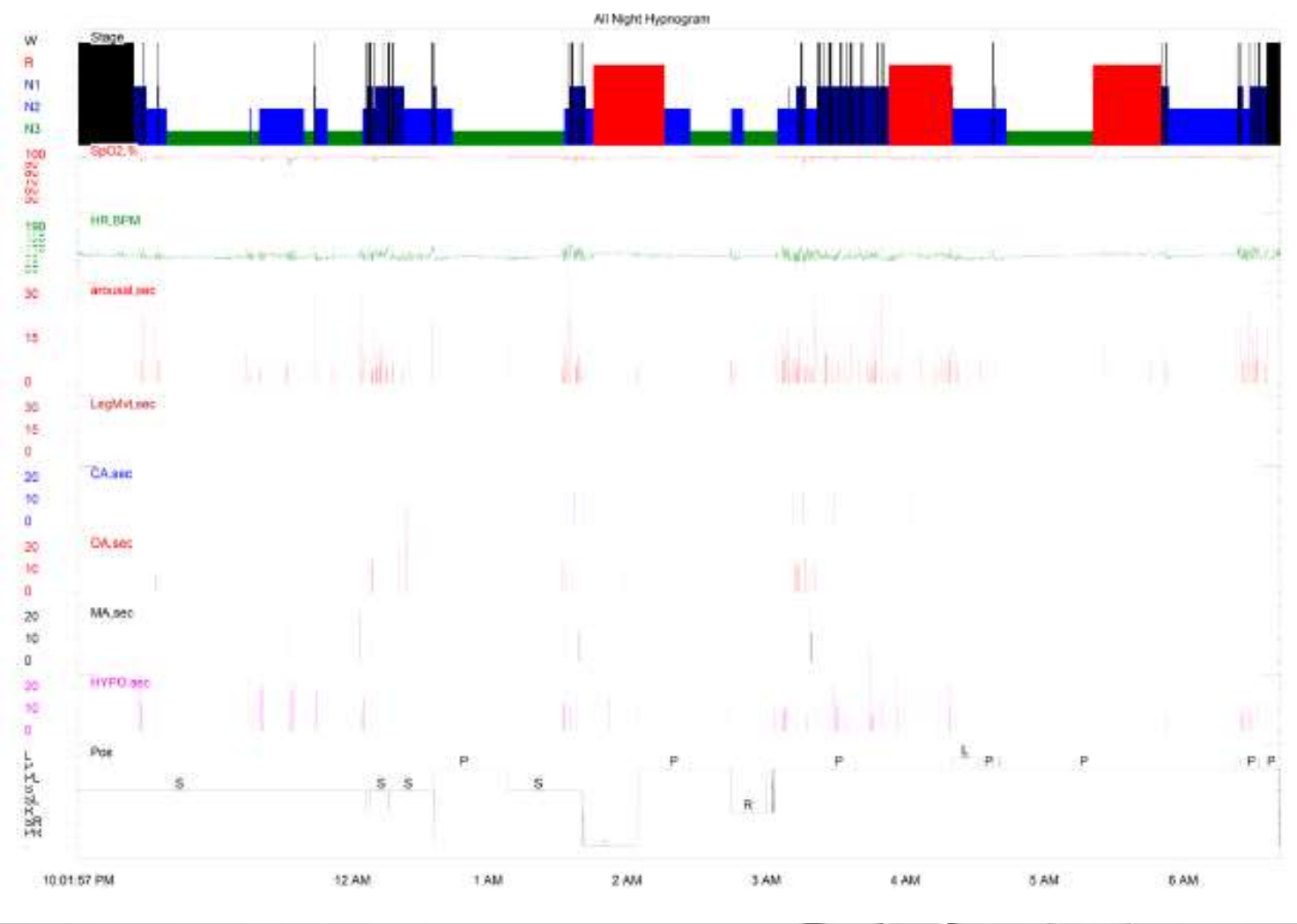
Fellow



Senior Consultant

Patient Name: [REDACTED]
Study Date: [REDACTED]

3



THANK YOU



Any Questions please - Either oral or written!!

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