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Title: The importance of Polysomnogram (PSG) Duration on Measured Sleep Parameters

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Introduction:

Sleep apnea is a condition where, for a variety of reasons, a person ceases to breathe during sleep. Sleep apnea can be categorized into the following types.

- Central sleep apnea: defined as the absence of both airflow and breathing efforts. In essence, it is the failure of the brain to signal the diaphragm and other muscles of ventilation to contract.
- Obstructive sleep apnea: defined as having no airflow or a significant decrease in airflow although there are continuing respiratory efforts.
- Mixed sleep apnea: as the name implies this is simply a combination of both central and obstructive sleep apneas. It generally begins as a central apnea followed by an obstructive component.

According to the National Sleep Foundation, a person who suffers from sleep apnea may experience as many as 20-30 apneic episodes per hour in any given night. An apneic episode is defined as 10 or more consecutive seconds of apnea.

From here we can understand the importance in doing a correct diagnosis, that's why we need a correct PSG time recording.

Children require at least 9 hours of sleep per night, but PSGs are often shorter. Shorter PSG length may change measured sleep variables, producing faulty data.

Polysomnography (PSG) is a diagnostic test during which a number of physiologic variables are measured and recorded during sleep. Physiologic sensor leads are placed on the patient in order to record:

- Brain electrical activity

- Eye and jaw muscle movement
- Leg muscle movement
- Airflow
- Respiratory effort (chest and abdominal excursion)
- EKG
- Oxygen saturation

Information is gathered from all leads and fed into a computer and outputted as a series of waveform tracings which enable the technician to visualize the various waveforms, assign a score for the test, and assist in the diagnostic process. Physiologic Variables measured and recorded.

Methods: A retrospective evaluation was conducted on all PSGs at least 9.5 hours in length in children age 1 to 17 years performed 01/10/05 to 6/30/05 and scored by a single individual. Lights On time was shifted to 6, 7, 8 and 9 hrs after Lights Out, and Apnea-Hypopnea Index (AHI), arousal index, minutes and % sleep time in each sleep stage were recalculated for each study length.

Results: Individual AHI varied as study length increased. There were no differences in % of sleep stages or arousal index. REM minutes increased as study length increased ($p < 0.05$). Age was not correlated with AHI. If we grouped children based on their AHI, group1: Mild, group2 Moderate, Group3: Severe; all variables didn't show any increase or decrease such as for the individual ones. Eight studies would have been grouped into a different severity classification if the study were 6 hrs long. Such differences may cause errors in clinical decisions.

But, how can Sleep Disorders affect children?

The effects of sleep apnea are wide ranging and can be simply bothersome or can be more severe and even life threatening. The most common reported effects of sleep apnea include:

- Daytime somnolence sometimes cited as "excessive daytime sleepiness"
- Irritability and/or depression
- Difficulty paying attention during the day

- Learning and memory difficulties

Other more serious effects of sleep apnea include possible hypertension and increased risk for heart attack or stroke. Although these relationships are not yet fully understood, there does appear to be a correlation between sleep apnea and hypertension, perhaps due to the hypoxemia accompanying the apneic episodes. Sleep apnea has also been linked to SIDS cases in infants as well.

Conclusion: We can say that an appropriate PSG time recording has to be done to make sure diagnosis. The study we have done is just the beginning. Larger groups and better assessment of individual variability are needed to determine PSG length in children, in order to prevent serious clinical effects.