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COMMENTARY

Ready for Primetime? Home Sleep Apnea Tests for Children

Commentary on Masoud et al. Validation of the MediByte portable monitor for the diagnosis of sleep apnea in pediatric patients. *J Clin Sleep Med.* 2019;15(5):733–742.

Rakesh Bhattacharjee, MD

University of California San Diego, La Jolla, California

Given an increased awareness of the complications related to pediatric obstructive sleep apnea (OSA),[1,2] measures to improve the diagnosis of pediatric OSA are of paramount importance. Studies have defined prevalence rates of pediatric OSA ranging from 2% to 5% of all children.[3,4] The challenges to adequately identify pediatric OSA are largely related to an insufficiency of resources to diagnose pediatric OSA, specifically the lack of access to pediatric polysomnography (PSG) laboratories, pediatric trained sleep physicians, and pediatric trained sleep technologists. Not surprising, in most cases where surgery is offered to treat pediatric OSA, most surgery is performed without PSG to confirm a diagnosis.[5]

In the study by Masoud and colleagues[6] published in this issue of the *Journal of Clinical Sleep Medicine*, the investigators sought to evaluate the utility of a level 3 portable monitor (PM) device to diagnose pediatric OSA in children age 7 to 17 years. The key findings of their study reveal that compared to PSG, identification of the apnea-hypopnea index (AHI) by a level 3 PM was strongly correlated to AHI determined using standard in-laboratory level 1 PSG (r = .932, P < .001). Further, this correlation was strongest in older children (age 12 to 17 years). Level 3 PM also demonstrated high sensitivity and specificity to diagnose severe OSA (AHI > 10 events/h), but was inferior to mild and moderate cases of OSA. Finally, the authors evaluated the frequency of "bad data" recorded by PM and compared autoscoring to manual scoring. They reported improvements in diagnostic utility with manual scoring following exclusion of "bad data."

Before level 3 PM can be enthusiastically accepted in the arena of pediatric sleep medicine, several comments must be made. The authors reported 15 of the 85 (~18%) included PM studies had failed. Although this is not far discrepant from previous studies by Lesser et al.[7] and Massicotte et al.,[8] this should be considered a rather high failure rate for studies that were attended by night technologist and for older children. The authors cite that most study failures were related to poor oximetry signal and that most inaccuracy was related to oxygen desaturation artifact.

The authors did not report a high frequency of failed studies related to poor airflow signals. As they stated, if airflow was poor quality or interrupted during the recording, the night technologist was present to adjust and correct the problem, implying the feasibility of their study design was enhanced by having recordings attended by a sleep technologist. In one of the few studies examining *unattended* PM in children in their home environment, Marcus et al.[9] reported that the nasal pressure signal was satisfactory for ≥ 75% of PM recording time in only 67% of children. This supports the notion that nasal canula-based flow signals are often suboptimal when pediatric studies are not continuously monitored by a sleep technologist.

In contrast to the study by Masoud and colleagues,[6] the study by Marcus et al.[9] was an evaluation of a level 2 PM device in which there was the inclusion of electroencephalogram, bilateral electrooculogram, and submental and tibial electromyogram leads. In contrast to level 3 PM, this study was able to discern events that culminated in cortical arousal rather than just oxyhemoglobin desaturation. Further, Marcus et al. reported greater signal stability of these leads in children compared to nasal flows in an unattended home setting. The addition of these signals should further improve the accuracy of AHI by including events that lead to cortical arousals exclusively, but also by confirming whether the child is asleep during an obstructive event. In addition, level 2 PM has the ability to identify rapid eye movement (REM) sleep, which compared to non-REM (NREM) sleep, is more typically associated with obstructive sleep-disordered breathing in children.[10] Identifying sleep stages improves characterization of pediatric OSA through determination of REM and NREM AHI indices.

Despite the inability to stage sleep or identify cortical arousal, Masoud and colleagues[6] report excellent sensitivity and specificity in diagnosing pediatric OSA using a level 3 PM device. Certainly, an attempt to improve oximetry signals in their device would have resulted in fewer failed studies and even greater detection of respiratory events. A recent study by Hornero et al.[11] in a very large cohort of children across 13 pediatric sleep centers placed emphasis on accurate oximetry signals. The authors suggest that these signals alone can be used to adequately diagnose pediatric OSA.

Taken together, findings by Masoud and colleagues[6] add a certain level of excitement that home sleep apnea tests may help improve the diagnosis of pediatric OSA with the potential to reduce, if not eliminate, the issue of access of sleep testing in children. However, implementation of PM may still need further refinement to improve signal stability and additional

studies[12] would be needed that carefully evaluate their accuracy in the setting that these were originally developed for, in the child's home, where the study would be unattended.

CITATION

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Address correspondence to: Rakesh Bhattacharjee, Associate Professor of Clinical Pediatrics, Section of Respiratory Medicine, Department of Pediatrics, 9500 Gilman Drive #0984, La Jolla CA 92093. Tel: (858) 966-5846; Fax: (858) 966-7732; Email: r1bhattacharjee@ucsd.edu

DISCLOSURE STATEMENT

Dr. Bhattacharjee reports no conflicts of interest.