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COMMENTARY

Improving Accuracy of Home Sleep Apnea Testing

Commentary on Zhao et al. Effect of manual editing of total recording time: implications for home sleep apnea testing. *J Clin Sleep Med*. 2017;13(1):121–126.

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Portable monitoring for obstructive sleep apnea (OSA) has become increasingly common using a variety of devices,[1] and the American Academy of Sleep Medicine (AASM) published clinical guidelines in 2007[2] and scoring criteria in 2015.[3] In patients with a high pretest probability of OSA, home testing has been shown to have high sensitivity and specificity for detecting OSA.[4] Although home sleep test (HST) and apnea-hypopnea index (AHI) are established clinical terms, the AASM-preferred terms are home sleep apnea test (HSAT) and respiratory event index (REI), because home testing generally does not measure either sleep staging or sleep duration. Limitations of an HSAT have been described and include the absence of electroencephalography (EEG) monitoring for arousals, so that hypopneas can only be scored using desaturation criteria.[1,2] In clinical practice, inaccurate estimation of total sleep time (TST) is an obvious confounding error in any HSAT, potentially leading to misclassification of presence and severity of OSA. Manual editing of HSAT data has been shown to improve accuracy.[5,6]

In the current issue of the *Journal of Clinical Sleep Medicine*, Zhou and colleagues have investigated the value of editing TST on HSAT data by comparing two methods for determining REI versus the gold standard of AHI measured using TST from polysomnography (PSG) performed in the Multi-Ethnic Study of Atherosclerosis (MESA).[7] Method 1, editing out periods of probable wakefulness and artifact from TST analysis, resulted in overestimation of TST and underestimation of AHI compared to PSG-derived data. Method 2, using total recording time without editing as TST, resulted in even greater overestimation of TST and underestimation of AHI compared to PSG-derived data. Sensitivity was higher for Method 1. Specificity for both AHI $\geq$ 5 and AHI $\geq$ 15 was 100% for both methods. Method 1 (edited TST) showed misclassification of moderate OSA (10% had mild OSA) and Method 2 (unedited TST) showed greater misclassification for both mild and moderate OSA. Clear strengths of this study are comparison to PSG-derived TST and AHI, using hypopnea criteria of $\geq$ 3% desaturation (not having EEG arousals is typical of how HSAT is performed), blinded scoring, and inclusion of only mild to moderate OSA where misclassification is a greater clinical concern. Weaknesses of this study include using the MESA cohort with mean age 68 y, which may not be generalizable to other populations; not including hypopneas based on EEG arousals in the AHI calculation, which could lead to greater AHI underestimation and OSA misclassification; not focusing on subjects who have high pretest probability of moderate to severe OSA where HSAT is recommended; and finally, not using an HSAT device but rather in-home PSG with sleep staging masked from scorers, so that sensors were all placed by experienced research personnel. In clinical practice, where patients perform placement of sensors, data loss would likely be greater, increasing the value of editing raw data or repeating HSAT if necessary. Data loss in HSAT ranges from 3% to 18%.[8] Clinical research has shown that subjects can effectively place sensors, but rates of data loss are not always described.[9]

Given the variability between devices and also limitations of HSAT, it is important for sleep centers to follow AASM recommendations that "portable monitoring devices must allow for the display of raw data for manual scoring or editing of automated scoring by a trained and qualified sleep technician/technologist."[2] This new study provides valuable support for prior studies regarding the importance of editing probable wakefulness so that TST and therefore REI (estimated AHI) are more accurate, and misclassification of OSA is minimized or avoided. Expert clinical sleep correlation with symptoms remains important for effective management and outcomes. Improving accuracy of HSAT is a valuable goal for patients, providers and insurers; therefore, routine editing of HSAT and TST data should improve clinical outcomes in the real world of clinical sleep medicine.

CITATION

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DISCLOSURE STATEMENT

The authors have indicated no financial conflicts of interest.