

COMMENTARY

Top of the morning: best time to teach adults who are cognitively impaired about home sleep apnea testing

Commentary on Colelli DR, Black SE, Masellis M, Lam B, Lim ASP, Boulos MI. Feasibility of unattended home sleep apnea testing in a cognitively impaired clinic population. *J Clin Sleep Med*. 2021;17(3):435–444. doi:10.5664/jcsm.8918

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In this issue of the *Journal of Clinical Sleep Medicine*, Colelli et al¹ evaluated the feasibility of home sleep apnea testing (HSAT) in 119 patients with varying types and severities of dementia. They showed that they could obtain ≥ 4 hours of interpretable HSAT data for 86% of patients who agreed to try HSAT (56% of the original invitees). Their work yielded far better results than a 2016 HSAT feasibility study in older adults that found only 23% of 35 women with minimal cognitive impairment (MCI) who agreed to testing.² Of the 8 who first agreed, 4 returned the testing device without using it (“changed their mind”); ≥ 4 hours of analyzable HSAT data were obtained in the end from only 2 (6%) participants.

Colelli et al¹ further analyzed their data to identify which patients with dementia would be able to provide ≥ 4 hours of interpretable HSAT data. They found that the likelihood of obtaining “enough” interpretable data from HSAT was better if the patient (1) did not need help to assemble the device and (2) had a score ≥ 22 on the Mini-Mental Status Exam and/or ≥ 19 on the Montreal Cognitive Assessment. The authors further found that by using multiple logistic regression modeling, a single variable predicted successful HSAT in older adults who were cognitively impaired: being taught how to assemble and use the device in the morning (as opposed to the afternoon). Amazingly, the likelihood of ≥ 4 hours of readable HSAT data was 40-fold higher if the patient was introduced to the device in the morning.

This finding prompted us to review the medical literature on the time-of-day fluctuations in neurocognitive performance.³ Temporal fluctuations in attention and neurocognitive function are thought to be driven by homeostatic and circadian pressure further impacted by morning/evening chronotype.⁴ Aging is often associated with an advance in sleep-wake timing and optimal neurocognitive performance in the morning.⁵

Older adults are more likely to engage in tasks that require greater cognitive or physical challenge in the morning (such as reading newspapers or shopping).⁶ Studies show that explicit memory tasks (which require high levels of cognitive processing) are better performed when attention and arousal are high (which is morning for older adults and evening for young adults).⁷

Executive function and working memory load are particularly sensitive to time-of-day modulations, especially among older adults, more so in older adults who are cognitively impaired.^{3,8} The cognitive performance of evening-type young adults improves over the day but deteriorates in morning-type adults, particularly those who are older.⁸ Given these circumstances, scheduling introduction and training in the use of HSAT that are cognizant of the patient’s best time of day and circadian preference seems smart.

A few more words need to be said regarding why screening older adults for sleep-disordered breathing is important. Fifty million people worldwide are now living with dementia, and the number is projected to increase to 132 million.⁹ In 2019, 5.8 million adults in the United States had Alzheimer disease (AD); 13.8 million will develop AD by 2050, barring medical breakthroughs to prevent, slow, or cure the disease.⁹

OSA increases the likelihood of middle-aged or older adults who are cognitively normal subsequently developing MCI, AD, or vascular dementia.^{10–12} A 2016 meta-analysis found that polysomnography-confirmed OSA was 5 times more likely to be found in patients with AD than in healthy control patients.¹³ A prospective study of 298 women without dementia (mean age, 82 years) followed for 5 years found that those with AHI ≥ 15 events/h were 1.85 times more likely to develop MCI or dementia.¹⁴ A prospective longitudinal study of $> 2,400$ participants in the AD Neuroimaging Initiative Cohort found that those with self-reported OSA developed MCI or AD a decade earlier than those without OSA and that CPAP use delayed the onset of MCI (age 82 years vs age 72 years).¹⁵

A 2020 study assessed the risk for AD in patients with OSA with or without treatment, comparing 3,978 patients with OSA and 15,912 without OSA.¹⁶ Patients were first diagnosed with OSA between 1997 and 2012, and they were followed until death or until the end of 2013. OSA was independently and significantly associated with a higher incidence of AD (adjusted hazard ratio, 2.12). AD was first detected 5.4 ± 3 years after the diagnosis of OSA. Patients with OSA treated with CPAP had a far lower risk of developing AD compared with those who did not receive treatment (incidence rate ratio, 0.23).

Several small studies have shown that diagnosing and treating OSA in patients with AD or MCI can slow cognitive decline or even improve cognitive function.^{17–20} In 1 study, 54 adults with MCI and AHI ≥ 10 events/h were followed for 1 year; 29 were treated with CPAP, and 25 were not treated.¹⁷ Significant improvements in psychomotor/cognitive processing speed were noted in the group who used CPAP. Small to moderate effect sizes were also observed for memory, attention, daytime sleepiness, and daytime functioning. Another study showed that 8 patients with MCI and mild OSA who used CPAP an average of ≥ 4 hours per day for 1 year had an 8- to 9-fold greater odds of showing cognitive improvement on 2 different dementia scales, whereas cognitive performance in the 6 patients who were nonadherent declined or was unchanged.¹⁸ CPAP use in 14 patients with mild/moderate AD and severe OSA followed for 3 years showed a reduced median annual decline in Mini-Mental Status Exam scores compared with patients who needed but did not use CPAP.²⁰

The rise of AD and dementia has been called the “silver tsunami” and has been recently recognized by the World Health Organization as a global public health priority.²¹ OSA is a potentially modifiable independent risk factor for MCI, AD, and vascular dementia.^{10–12,22,23} HSAT is worth employing especially among older adults who will not or cannot tolerate in-laboratory polysomnography to provide the greatest good for the most patients we can. Finally, instructing older patients who are cognitively slowed about the HSAT at the “top of the morning” may result in “first time’s a charm.”

CITATION

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