https://doi.org/10.5664/jcsm.8722

JCSM | Journal of Clinical Sleep Medicine

SCIENTIFIC INVESTIGATIONS

Which older adults receive sleep medicine specialty care? Predictors of being seen by a board-certified sleep medicine provider

Emerson M. Wickwire, PhD, FAASM [1,2]; Sophia L. Jobe[2]; Sairam Parthasarathy, MD[3]; Jacob Collen, MD[4,5]; Vincent F. Capaldi II, MD[5,6]; Abree Johnson, MS, MBA [7]; Aparna Vadlamani, MPH[8]; John M. Levri, DO; Steven M. Scharf, MD, PhD [2]; Jennifer S. Albrecht, PhD[8]

[1]Department of Psychiatry, University of Maryland School of Medicine, Baltimore, Maryland; [2]Sleep Disorders Center, Division of Pulmonary and Critical Care Medicine, Department of Medicine, University of Maryland School of Medicine, Baltimore, Maryland; [3]University of Arizona Health Sciences, Center for Sleep and Circadian Sciences and Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, University of Arizona, Tucson, Arizona; [4]Uniformed Services University of the Health Sciences, Bethesda, Maryland; [5]Sleep Disorders Center, Division of Pulmonary and Critical Care Medicine, Walter Reed National Military Medical Center, Bethesda, Maryland; [6]Division of Behavioral Biology, Walter Reed Army Institute of Research, Silver Spring, Maryland; [7]Pharmaceutical Research Computing, Department of Pharmaceutical Health Services Research, University of Maryland School of Pharmacy, Baltimore, Maryland; [8]Department of Epidemiology and Public Health, University of Maryland School of Medicine, Baltimore, Maryland

Study Objectives: The aim of this study was to characterize older adult Medicare beneficiaries seen by board-certified sleep medicine providers (BCSMPs) and identify predictors of being seen by a BCSMP.

Methods: Our data source was a random 5% sample of Medicare administrative claims data (2006–2013). BCSMPs were identified using a cross-matching procedure based on national provider identifiers available within the Medicare database and assigned based on the first sleep disorder diagnosis received. Sleep disorders (insomnia, sleep-related breathing disorders, hypersomnias, circadian rhythm sleep-wake disorders, parasomnias, and restless legs syndrome) were operationalized as *International Classification of Disease, Ninth Revision, Clinical Modification* diagnostic codes. The number of sleep disorders per beneficiary was computed and compared between BCSMPs and nonspecialists. Logistic regression was used to identify medical and demographic predictors of being seen by a BCSMP.

Results: A total of 57,209 beneficiaries received one or more sleep disorder diagnoses during the study period. Of these, 1,279 (2.2%) were initially diagnosed by a BCSMP. Relative to individuals seen by nonspecialists, beneficiaries treated by a BCSMP were more likely to have two or more sleep disorders (9.0% vs 24.1%, $P < .001$). The most common diagnosis assigned by BCSMPs was obstructive sleep apnea (70.4% of patients seen by BCSMPs were diagnosed with obstructive sleep apnea). The most common diagnosis assigned by nonspecialists was insomnia (48.2% of patients seen by nonspecialists were diagnosed with insomnia). In a fully adjusted regression model, male sex (odds ratio [OR] 1.53; 95% confidence interval [CI] 1.36, 1.72), asthma (OR 1.50; 95% CI 1.30, 1.73), and heart failure (OR 1.24; 95% CI 1.10, 1.41) were positively associated with being treated by a BCSMP. Conversely, depression (OR 0.85, 95% CI 0.73, 1.00), anxiety (OR 0.69, 95% CI .59, .82), Alzheimer and related dementias (OR 0.80, 95% CI .65, .99), and anemia (OR .88, 95% CI .78, .99) were associated with a reduced likelihood of being seen by a BCSMP.

Conclusions: Relative to older adults seen by nonspecialists, those seen by BCSMPs are more medically but less psychiatrically complex and are diagnosed with a greater number of sleep disorders. These results suggest the possibility that medically complex patients are referred for specialty care, whereas psychiatrically complex patients might be seen at the nonspecialist level. Further, these results demonstrate the value of board certification in sleep medicine in caring for complex sleep patients.

Keywords: sleep; sleep medicine; board certification; health services; Medicare; older adults

Citation: Wickwire EM, Jobe SL, Parthasarathy S, et al. Which older adults receive sleep medicine specialty care? Predictors of being seen by a board-certified sleep medicine provider. *J Clin Sleep Med*. 2020;16(11):1909–1915.

BRIEF SUMMARY

Current Knowledge/Study Rationale: Research suggests that board certification in sleep medicine specialty is associated with improved outcomes among patients with sleep disorders; however, to date, no study has sought to determine which patients are seen by board-certified sleep medicine providers (BCSMPs). The purpose of the current study was to identify predictors of being seen by a BCSMP among a national sample of older adults.

Study Impact: In this national analysis of older adult Medicare beneficiaries with sleep disorders, only 2.2% of individuals were seen by a BCSMP. These individuals were more likely to have two or more sleep disorders. Within an adjusted logistic regression model, male sex, asthma, and heart failure were positively associated with being seen by a BCSMP. Conversely, depression, anxiety, Alzheimer disease and related dementias, and anemia were associated with reduced likelihood of being seen by a BCSMP. These results demonstrate the importance of BCSMPs in caring for medically complex patients and patients with multiple concurrent sleep disorders. Future research should seek to evaluate associations between BCSMP status and quality of sleep medicine care delivery among these complicated patient populations.

INTRODUCTION

Specialty board certification is increasingly recognized as an important predictor of high-quality and cost-effective health care. Numerous studies have reported an overall positive association between board certification and clinical outcomes,[1–6] including reduced time to consultation,[7] increased disease awareness,[7] higher satisfaction rates,[8] and greater adherence to positive airway pressure therapy.[8,9] Not all studies, however, have supported the positive impact of board-certification in sleep medicine.

Table 1—Operational definitions of sleep disorders.

Sleep Disorder	ICD-9-CM Code
Insomnia	307.41, 307.42, 307.49, 327.00, 327.01, 327.09, 780.52, V69.4
Environmental sleep disorder	307.48
Sleep disturbances	780.50, 780.59
Obstructive sleep apnea	327.23, 780.57, 780.51, 780.53
Insomnia with obstructive sleep apnea	780.51
Central sleep apnea	327.21, 327.22, 327.27, 327.29, 768.04
Organic sleep apnea	327.20
Sleep hypoventilation	327.26
Restless legs syndrome	333.94
Parasomnia	327.40, 307.46, 307.47, 327.4×, 780.56
Circadian rhythm disorders	307.45, 327.3×, 780.55
Narcolepsy	347.0, 347.00, 347.01, 347.1, 347.10, 347.11
Hypersomnia	307.43, 307.44, 327.10, 327.11, 327.12, 327.13, 327.14, 327.15, 780.54
Sleep apnea with hypersomnia	780.53

ICD-9-CM = *International Classification of Disease, Version 9, Clinical Modification*.

For example, a controversial noninferiority clinical efficacy trial by Chai-Coetzer and colleagues found no significant differences in self-reported sleepiness, patient satisfaction, or positive airway pressure adherence between obstructive sleep apnea (OSA) patients cared for by board-certified sleep medicine providers (BCSMPs) and individuals treated by primary care physicians.[10] Similarly, a systematic review conducted by Kunisaki and colleagues found no difference in quality of care or sleep medicine outcomes between patients treated by BCSMPs and nonspecialists[11]; however, both these studies were subject to information bias owing to the nonspecialist providers having high levels of sleep training and many years of experience treating patients with sleep disorders.[12] In aggregate, these results suggest that more research is needed to understand the impact of specialty certification in sleep medicine.

A recent study from our group demonstrated that BCSMPs are involved in a substantial proportion of sleep-related care for Medicare beneficiaries.[13] Studies of the Medicare population have the potential to be particularly impactful because Medicare is the largest payer for health care services for older adults in the United States, and it is a leader in the development of federal and private health policy. To build on our prior findings and advance understanding of national practice patterns of BCSMPs who treat sleep disorders among older adult Medicare beneficiaries, the objectives of the present study were to 1) characterize patients seen by BCSMPs and 2) identify medical and demographic predictors of being seen by a BCSMP. We hypothesized that patients with cardiopulmonary disorders would be more likely to be seen by BCSMPs.

METHODS

Participants

Our data source was a 5% sample of administrative claims data from the Centers for Medicare and Medicaid Services Chronic Conditions Warehouse for the years 2006–2013. Inclusion criteria included age ≥ 65 years and one or more physician-assigned diagnoses of sleep disorders of interest during a 37-month period with continuous Medicare Parts A and B with no Medicare Part C (Medicare Advantage) coverage. The 37-month period was defined by the first sleep disorder diagnosis received during the study period and required 12 months of continuous coverage prediagnosis and 24 months of continuous coverage postdiagnosis, excluding the month of diagnosis. This study was approved by the Institutional Review Board at the University of Maryland, Baltimore.

Sleep disorders

Specific sleep disorders (eg, insomnia, sleep-related breathing disorders [eg, OSA and central sleep apnea], narcolepsy, circadian rhythm sleep-wake disorders, parasomnias, hypersomnia, and restless legs syndrome) were identified using *International Statistical Classification of Diseases and Related Health Problems, Ninth Revision, Clinical Modification* (ICD-9-CM) codes **(Table 1).** We recorded the first sleep-related diagnosis within the study period. If more than one diagnosis was received at the first date, we recorded all received diagnoses. Diagnoses were assigned to providers (BCSMPs or nonspecialists) based on National Provider Identifiers codes extracted from each claim as described in the following.

Identifying BCSMPs in the Chronic Conditions Warehouse

BCSMPs were identified using a novel cross-matching approach based on National Provider Identifiers available in the Medicare claims. The National Provider Identifiers is a Health Insurance Portability and Accountability Act Administrative Simplification Standard and a publicly available unique identifier for covered health care providers. BCSMPs who achieved certification through the American Board of Sleep Medicine as well as

the American Board of Medical Specialties were included. A detailed description of this method is presented elsewhere.[13]

Covariates

The Chronic Conditions Warehouse contains dates of the first diagnosis as well as annual flags for 27 chronic conditions that are based on validated and published algorithms.[14] The date of first diagnosis was used to determine whether a condition was present at the date of sleep disorder diagnosis.

Analytic plan

We tested comparisons of baseline demographic and clinical characteristics between individuals treated by BCSMPs and by nonspecialists using chi-square goodness-of-fit and Student's *t* tests. Next, we summed the number of diagnoses received by BCSMPs and nonspecialists and categorized all received diagnoses using frequencies and proportions. It should be noted that percentages do not add up to 100 owing to the multiple diagnoses received. The Center for Medicare and Medicaid Services cell-size suppression policy prevents the display of cells containing fewer than 11 observations; thus, certain categories were combined.

Logistic regression was used to identify independent predictors of being treated by a BCSMP. First, we added all variables that differed between BCSMPs and nonspecialists at a *P* value of < .1 to the model. Next, we removed variables that did not retain statistical significance at $P < .05$. Odds ratios (OR) and 95% confidence intervals (CI) are reported. Analyses were performed with SAS Studio version 3.71 (SAS Institute, Cary, North Carolina).

RESULTS

We identified 57,209 beneficiaries meeting inclusion criteria and diagnosed with a sleep disorder during the study period. Of these, 1,279 (2.2%) were treated by a BCSMP. Individuals treated by a BCSMP were younger (73.5 [standard deviation (SD) 6.3] years vs 75.7 [SD 7.3] years, $P < .001$) and more likely to be male (46.4% vs 33.1%, $P < .001$) **(Table 2).** Distribution of comorbidities by BCSMP status was mostly balanced with some exceptions reflective of the older age of those treated by nonspecialists. For example, the prevalence of Alzheimer disease and related dementias (13.3% vs 8.4%, $P < .001$) and anemia (52.1% vs 45.1%, $P < .001$) was higher among those treated by nonspecialists.

Beneficiaries treated by BCSMPs were more likely to receive two or more diagnoses compared with those treated by nonspecialists (24.1% vs 9.0%, $P < .001$) **(Table 3).** Among individuals treated by BCSMPs, the most common diagnoses were OSA (70.4% of beneficiaries), sleep apnea with hypersomnia (16.5% of beneficiaries), and insomnia (11.7% of beneficiaries) **(Table 4).** Among beneficiaries treated by nonspecialists, the most common diagnoses received were insomnia (48.2% of beneficiaries), OSA (31.4% of beneficiaries), and restless legs syndrome (8.7% of beneficiaries).

Our final logistic regression model included terms for age, sex, race, Alzheimer disease and related dementias, anemia, anxiety, asthma, depression, and heart failure. Male sex (OR 1.53; 95% CI 1.36, 1.72), asthma (OR 1.50; 95% CI 1.30, 1.73), and heart failure (OR 1.24; 95% CI 1.10, 1.41) were significant predictors of being treated by a BCSMP **(Table 5).**

DISCUSSION

This is the first large-scale study to identify predictors of being seen by a BCSMP. Among a national sample of older adult Medicare beneficiaries with sleep disorders, male sex, and comorbid pulmonary and cardiovascular disease were positively associated with receiving care from a BCSMP. By contrast, depression, anxiety, Alzheimer disease and related dementias, and anemia were associated with reduced likelihood of being seen by a BCSMP. These results demonstrate the importance of BCSMPs in caring for medically complex patients as well as patients with multiple concurrent sleep disorders, thus highlighting a vital public health role for BCSMPs. At the same time, results regarding psychiatric and neurodegenerative comorbidities being associated with reduced likelihood of being seen by a BCSMP suggest important opportunities for enhanced care coordination between sleep specialists and other health providers.

Sleep disorders are extremely prevalent among older adults,[15] and most of these sleep disorders remain undiagnosed and untreated.[16] One reason is a well-documented shortage of BCSMPs. To increase access to care, substantial efforts have been made to implement sleep disorders management programs in nonspecialty settings[17,18]; however, not all sleep patients are suitable for care at the primary level because of objective testing requirements, complexity of sleep pathology, poor adherence, and other complicating factors. In the present study, only 2.2% of beneficiaries with sleep disorders were seen by a BCSMP. Relative to beneficiaries with sleep disorders who were not seen by BCSMPs, those individuals were more likely to have serious pulmonary (eg, asthma) and cardiovascular (eg, heart failure) medical comorbidities and to be diagnosed with multiple sleep disorders. On the one hand, these results are not surprising; medically complex patients are likely to be time-consuming and to require more expert decision-making than uncomplicated OSA, for example. On the other hand, results regarding male sex are less intuitive. One potential explanation for why men were more likely than women to receive care from a BCSMP is that nonspecialists might not know that postmenopausal women are, like men, at increased risk for OSA; this lack of awareness could help explain the higher rates of BCSMP care for men that we observed in this study. In terms of our finding regarding the number of sleep disorder diagnoses, patients experiencing comorbid sleep disorders are difficult to treat,[19,20] which could explain why these individuals were more likely to be seen by BCSMPs. An alternative explanation is that BCSMPs possess advanced training and are skilled at recognizing sleep disorders, resulting in a greater number of diagnoses. We anticipate that more thorough assessment and multiple diagnoses would result in more comprehensive treatment plans, although this remains speculative. It is also possible that nonspecialists misclassify sleep disorders patients, for example, to over (or under)

Table 2—Baseline characteristics of Medicare beneficiaries aged ≥ 65 years who received sleep disorder diagnoses 2007–2011, by board-certified sleep medicine provider (BCSMP) status, n = 57,209.

	Total (n = 57,209)	Non-BCSMP (n = 55,930)	BCSMP (n = 1,279)	*P* Value[a]
Age (mean, standard deviation)	75.6 (7.3)	75.7 (7.3)	73.5 (6.3)	<.001
Sex (n, %)				
Male	19,097 (33.4)	18,503 (33.1)	594 (46.4)	<.001
Female	38,122 (66.6)	37,427 (66.9)	685 (53.6)	
Race (n, %)				
White	49,623 (86.7)	48,494 (86.7)	1,129 (88.3)	.006
Black	3,706 (6.5)	3,615 (6.5)	91 (7.1)	
Other	3,880 (6.8)	3,821 (6.8)	59 (4.6)	
Comorbidities (n, %)				
Alzheimer and related dementias	7,559 (13.2)	7,452 (13.3)	107 (8.4)	<.001
Alcohol dependence disorder	929 (1.6)	909 (1.6)	20 (1.6)	.09
Anemia	29,701 (51.9)	29,124 (52.1)	577 (45.1)	<.001
Anxiety	11,646 (20.4)	11,473 (20.5)	173 (13.4)	<.001
Asthma	8,236 (14.4)	7,998 (14.3)	238 (18.6)	<.001
Atrial fibrillation	9,178 (16.0)	8,953 (16.0)	225 (17.6)	.13
Benign prostate hyperplasia	8,589 (15.0)	8,359 (15.0)	230 (18.0)	.003
Chronic kidney disease	10,810 (18.9)	10,587 (18.9)	223 (17.4)	.18
Chronic obstructive pulmonary disease	17,312 (30.3)	16,918 (30.3)	394 (30.8)	.67
Depression	12,553 (21.9)	12,339 (22.1)	214 (16.7)	<.001
Diabetes	21,175 (37.0)	20,694 (37.0)	481 (37.6)	.66
Fibromyalgia	12,581 (22.0)	12,332 (22.1)	249 (19.5)	.03
Glaucoma	13,380 (23.4)	13,120 (23.5)	260 (20.3)	.009
Heart failure	18,040 (31.5)	17,620 (31.5)	420 (32.8)	.31
Hyperlipidemia	45,297 (79.2)	44,274 (79.2)	1,023 (80.0)	.46
Hypertension	48,586 (84.9)	47,504 (84.9)	1,082 (84.6)	.74
Hypothyroidism	14,475 (25.3)	14,180 (25.4)	295 (23.1)	.06
Ischemic heart disease	31,684 (55.4)	30,962 (55.4)	722 (56.5)	.44
Osteoporosis	22,424 (39.2)	22,056 (39.4)	368 (28.8)	<.001
Rheumatoid arthritis/osteoarthritis	34,559 (60.4)	33,893 (60.6)	666 (52.1)	<.001
Stroke	9,400 (16.4)	9,224 (16.5)	176 (13.8)	.009
Traumatic brain injury	3,872 (6.8)	3,807 (6.8)	65 (5.1)	.02
Deyo CCI[b] (n, %)				
0	7,832 (13.7)	7,627 (13.6)	205 (16.0)	.01
1	13,449 (23.5)	13,127 (23.5)	322 (25.2)	
2	11,377 (19.9)	11,126 (19.9)	251 (19.6)	
3	24,551 (42.9)	24,050 (43.0)	501 (39.2)	

[a]*P* value from Student's *t* test or chi-square goodness of fit;
[b]Charlson comorbidity index.

diagnose insomnia or OSA. Regardless, results of the current study suggest an important role for BCSMPs in providing care for medically complex patients. Future research should evaluate quality of care delivered by BCSMPs relative to nonspecialists in these complex patient populations.

By contrast, we found that psychiatric (eg, depression and anxiety) and neurodegenerative (eg, Alzheimer disease and related dementias) diseases, as well as anemia, were associated with reduced likelihood of being seen by a BCSMP. At the outset, it should be noted that despite statistical significance, the CI for all but anxiety (OR 0.69, 95% CI 0.59, 0.82) included 0.99 or 1.0, suggesting a reliable but generally negligible effect. Even so, one potential explanation for these findings is that the importance of sleep and sleep disorders, particularly OSA, is underappreciated by providers who care for these patients or that nonspecific systemic complaints, like fatigue, are

Table 3—Number of sleep disorder diagnoses received at first diagnosis by board-certified sleep medicine provider (BCSMP) status among Medicare beneficiaries aged ≥ 65 years, 2007–2011, n = 57,209.

Sum of Sleep Disorders	Total (n = 57,209)	Non-BCSMP (n = 55,930)	BCSMP (n = 1,279)	*P* Value[a]
1	51,849 (90.6)	50,878 (91.0)	971 (75.9)	<.001
2	4,772 (8.3)	4,496 (8.0)	276 (21.6)	
≥3	588 (1.0)	556 (1.0)	32 (2.5)	

[a]*P* value from chi-square goodness of fit.

Table 4—Sleep disorder diagnoses received at date of first diagnosis by board-certified sleep medicine provider (BCSMP) status among Medicare beneficiaries ≥ 65, 2007–2011, n = 57,209.

Sleep Disorder	Non-BCSMP n = 55,930 (%)	BCSMP n = 1,279 (%)	*P* Value*
Insomnia	26,967 (48.2)	150 (11.7)	<.001
Obstructive sleep apnea	17,554 (31.4)	901 (70.4)	
Restless legs syndrome	4,871 (8.7)	52 (4.1)	
Sleep disturbances	4,723 (8.4)	94 (7.3)	
Hypersomapnea	2,906 (5.2)	211 (16.5)	
Hypersomnia	1,871 (3.3)	140 (10.9)	
Parasomnia	897 (1.6)	23 (1.8)	
Insomapnea	751 (1.3)	13 (1.0)	
Organic sleep apnea	183 (0.3)	14 (1.1)	
Other sleep disorders[a]	864 (1.5)	25 (2.0)	

**P* value from chi-square goodness of fit. [a]Other sleep disorders include circadian rhythm disorder, narcolepsy, hypoventilation, central sleep apnea, and daytime sleepiness.

Table 5—Independent factors associated with receiving treatment from a board-certified sleep medicine provider among Medicare beneficiaries aged ≥ 65 years, 2007–2011, n = 57,209.

	Odds Ratio (95% Confidence Interval)	*P* Value
Age	0.96 (0.95, 0.97)	<.001
Sex		<.001
Female	Reference	
Male	1.53 (1.36, 1.72)	
Race		.008
White	Reference	
Black	1.03 (0.83, 1.29)	
Other	0.66 (0.51, 0.86)	
Depression	0.85 (0.73, 1.00)	.04
Anxiety	0.69 (0.59, 0.82)	<.001
Alzheimer and related dementias	0.80 (0.65, 0.99)	.04
Asthma	1.50 (1.30, 1.73)	<.001
Heart failure	1.24 (1.10, 1.41)	<.001
Anemia	0.88 (0.78, 0.99)	.03

attributed to another disorder, such as anemia or hypothyroidism. At the same time, the finding regarding anxiety warrants consideration. Given that anxiety is highly comorbid with insomnia and also is most often managed via pharmacotherapy at the nonsleep level, it is possible that patients with anxiety and sleep complaints receive symptomatic management (eg, via pharmacotherapy) without perceived need for consultation with a BCSMP. Although speculative, one potential implication

of this explanation could be prescription of sedative hypnotics with anxiolytic properties with unfavorable risk/benefit ratios (eg, benzodiazepines) for use among older adults. These and other quality-of-care outcomes warrant further research investigation.

Our study possesses several strengths. First, this is the first study to compare patients and sleep diagnoses assigned by BCSMPs and by nonspecialists. Second, our national data source was large, derived via random procedures,[14] and generalizable to most older adults in the US. Third, we used a novel, innovative method to identify BCSMPs in the Medicare claims.[13]

At the same time, limitations must be mentioned. Most important, our claims-based analysis does not enable analysis of sleep disorder severity, patient symptoms, or other clinical variables of interest, such as objective sleep parameters or sleep-wake patterns. Second, our study evaluated only diagnoses and did not consider sleep disorder treatments, such as medical devices or prescription medications; such aspects of care warrant future research attention. Third, although thorough, our approach to identifying BCSMPs has not been previously validated. Fourth, it is possible that other patient or systems-level variables are associated with being seen by a BCSMP. Finally, despite our large, national sample, it is unknown how well results from the CCW will generalize to older adults with health plans other than Medicare fee-for-service.

In summary, results from a large, national database of Medicare administrative claims data demonstrate that, relative to beneficiaries seen by nonspecialists, those seen by BCSMPs are more likely to experience comorbid pulmonary (asthma) and cardiovascular (heart failure) diseases and to have multiple concurrent sleep disorders. These results demonstrate the importance of BCSMPs in caring for medically complex patients. Future studies should evaluate the impact of BCSMP status on quality of sleep medicine care delivery among these complicated patient populations.

ABBREVIATIONS

BCSMP, board-certified sleep medicine provider
CI, confidence interval
OR, odds ratio
OSA, obstructive sleep apnea

REFERENCES

1. Sharp LK, Bashook PG, Lipsky MS, Horowitz SD, Miller SH. Specialty board certification and clinical outcomes: the missing link. *Acad Med.* 2002;77(6):534–542.
2. Chen J, Rathore SS, Wang Y, Radford MJ, Krumholz HM. Physician board certification and the care and outcomes of elderly patients with acute myocardial infarction. *J Gen Intern Med.* 2006;21(3):238–244.
3. Norcini JJ, Kimball HR, Lipner RS. Certification and specialization: do they matter in the outcome of acute myocardial infarction? *Acad Med.* 2000;75(12):1193–1198.
4. Norcini JJ, Lipner RS, Kimball HR. Certifying examination performance and patient outcomes following acute myocardial infarction. *Med Educ.* 2002;36(9):853–859.
5. Fleischut PM, Eskreis-Winkler JM, Gaber-Baylis LK, et al. Provider board certification status and practice patterns in total knee arthroplasty. *Acad Med J Assoc Am Med Coll.* 2016;91(1):79–86.
6. Silber JH, Kennedy SK, Even-Shoshan O, et al. Anesthesiologist board certification and patient outcomes. *Anesthesiology.* 2002;96(5):1044–1052.
7. Scharf SM, DeMore J, Landau T, Smale P. Comparison of primary-care practitioners and sleep specialists in the treatment of obstructive sleep apnea. *Sleep Breath.* 2004;8(3):111–124.
8. Parthasarathy S, Haynes PL, Budhiraja R, Habib MP, Quan SF. A national survey of the effect of sleep medicine specialists and American Academy of Sleep Medicine Accreditation on management of obstructive sleep apnea. *J Clin Sleep Med.* 2006;2(2):133–142.
9. Parthasarathy S, Subramanian S, Quan SF. A multicenter prospective comparative effectiveness study of the effect of physician certification and center accreditation on patient-centered outcomes in obstructive sleep apnea. *J Clin Sleep Med.* 2014;10(3):243–249.
10. Chai-Coetzer CL, Antic NA, Rowland LS, et al. Primary care vs specialist sleep center management of obstructive sleep apnea and daytime sleepiness and quality of life: a randomized trial. *JAMA.* 2013;309(10):997–1004.
11. Kunisaki KM, Greer N, Khalil W, et al. Provider types and outcomes in obstructive sleep apnea case finding and treatment: a systematic review. *Ann Intern Med.* 2018;168(3):195–202.
12. Parthasarathy S, Combs D, Patel SN, Poongkunran C, Quan SF. Provider types and outcomes in obstructive sleep apnea case finding and treatment. *Ann Intern Med.* 2018;169(3):201–202.
13. Wickwire EM, Albrecht JS, Dorsch JJ, et al. Practice patterns of board-certified sleep medicine providers: a national analysis among older adult Medicare beneficiaries. *J Clin Sleep Med.* 2020;16(5):689–694.
14. Centers for Medicare and Medicaid Services Chronic Condition Data Warehouse. https://www2.ccwdata.org/web/guest/home/. Accessed June 1, 2020.
15. Ancoli-Israel S. Sleep and its disorders in aging populations. *Sleep Med.* 2009;10(Suppl 1):S7–S11.
16. Silverberg DS, Oksenberg A, Iaina A. Sleep related breathing disorders are common contributing factors to the production of essential hypertension but are neglected, underdiagnosed, and undertreated. *Am J Hypertens.* 1997;10(12 Pt 1):1319–1325.
17. Kuna ST. Diagnosis and management of patients with obstructive sleep apnea in primary care. Ready or not? *Am J Respir Crit Care Med.* 2018;198(5):557–558.
18. Sánchez-Quiroga M, Corral J, Gómez-de-Terreros FJ, et al. Primary care physicians can comprehensively manage patients with sleep apnea: a non-inferiority randomized controlled trial. *Am J Respir Crit Care Med.* 2018;198(5):648–656.
19. Wickwire EM, Smith MT, Birnbaum S, Collop NA. Sleep maintenance insomnia complaints predict poor CPAP adherence: a clinical case series. *Sleep Med.* 2010;11(8):772–776.
20. Wickwire EM, Collop NA. Insomnia and sleep-related breathing disorders. *Chest.* 2010;137(6):1449–1463.

SUBMISSION & CORRESPONDENCE INFORMATION

Submitted for publication May 14, 2020
Submitted in final revised form July 29, 2020
Accepted for publication July 29, 2020
Address correspondence to: Emerson M. Wickwire, PhD, FAASM, University of Maryland School of Medicine, Sleep Disorders Center, 100 N. Greene St, 2nd Floor, Baltimore, MD 21201

DISCLOSURE STATEMENT

This article presents the results from an American Academy of Sleep Medicine Foundation Strategic Research Award, "Demonstrating the Value of Board-Certification in Sleep Medicine," awarded to the University of Maryland, Baltimore (Principal Investigator: E.M.W.). E.M.W., J.S.A., and S.M.S.'s institution has received research

funding from the American Academy of Sleep Medicine Foundation, the Department of Defense, Merck, and ResMed. E.M.W. has served as a scientific consultant to DayZz, Eisai, Merck, and Purdue and is an equity shareholder in WellTap. S.P., J.C., V.F.C., and S.M.S. are board-certified in Sleep Medicine by the American Board of Medical Specialties. S.P. has a patent, UA 14-018 U.S.S.N. 61/884,654; PTAS 502570970 (home breathing device). S.P. reports grant funding from NIH/NHLBI (HL140144, HL-126140, AG059202, HL151254, OD028307, HL138377), grants from Patient Centered Outcomes Research Institute (DI-2018C2-13161, IHS-1306-2505, EAIN no. 3394-UoA, and PPRND-1507-31666), and grants from the American Academy of Sleep Medicine Foundation (169-SR-17) at the time of submission. No other potential conflicts are declared. Material has been reviewed by the Walter Reed Army Institute of Research. There is no objection to its presentation and/or publication. The opinions or assertions contained herein are the private views of the authors and are not to be construed as official or as reflecting true views of the Department of the Army or the Department of Defense. All authors have seen and approved the manuscript. This study was not a clinical trial.