Real-World Incremental Economic Burden of Fatigue among Patients with Obstructive Sleep Apnea in the Medicare Fee-for-Service Population

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INTRODUCTION

- OSA is a serious, chronic, sleep-related breathing disease caused by sleep-related neuromuscular dysfunction and predisposing anatomic abnormalities, leading to episodes of disrupted breathing, sleep fragmentation, and decreased oxygenation[1-5]
- OSA is associated with a range of adverse health sequalae including cardiovascular diseases, metabolic syndromes, neurocognitive impairment, and depression[6-8]
- Fatigue and excessive daytime sleepiness are two of the most commonly reported symptoms of OSA, affecting 71% and 80% of people with OSA, respectively[9]
- Fatigue has been associated with more depression and anxiety as well as poorer self-reported mental health and respiratory-specific health related quality of life in patients with OSA[9-11]
- A growing body of evidence suggests the importance of distinguishing fatigue from sleepiness in OSA[12-16]

OBJECTIVE

To estimate the incremental healthcare cost burden of fatigue among patients newly diagnosed with OSA in the Medicare FFS population

METHODS

- Retrospective observational claims analysis comparing newly diagnosed OSA patients with fatigue to matched OSA patients without fatigue
- Medical and pharmacy claims from the 2017-2022 Medicare FFS database were used to identify incident cases of fatigue among newly diagnosed OSA patients, ≥65 years, who met the following criteria:
  - ≥1 inpatient or ≥2 outpatient claims (with ≥7 days apart), with ICD-10-CM OSA diagnosis code (G47.33, G47.30, G47.39)
  - ≥1 procedure code for PSG or HSAT in 12 months prior to OSA diagnosis index date
  - Continuous insurance coverage ≥12 months before OSA diagnosis index (baseline period) and ≥12 months after fatigue index date (follow-up period)
- Patients with cancer, HIV, fibromyalgia, multiple sclerosis, and mood disorders that may be associated with fatigue or daytime sleepiness were excluded
- Cases had ≥1 claim for fatigue (R53.1, R53.81, R53.82, R53.83) after the OSA diagnosis index date
- Controls had no diagnosis of fatigue and were 1:1 propensity score matched to fatigue cases on age, gender, race, region, BMI, CVD history, depression, hospitalization, GLP-1 or GLP-1/GIP use, sleep or wakefulness promoting drugs
- Outcomes during follow-up period:
  Total all-cause healthcare costs (PPPY) = medical + pharmacy

KEY TAKEAWAY:

- Fatigue was significantly associated with over a two-fold increase in per patient per year, all-cause total healthcare costs in newly diagnosed OSA patients compared to matched OSA controls without fatigue

RESULTS

Figure 1. Study Design

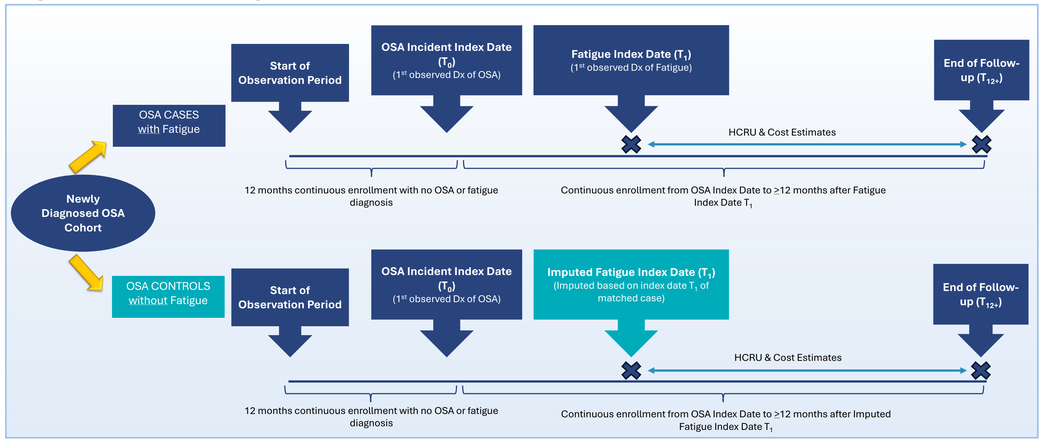
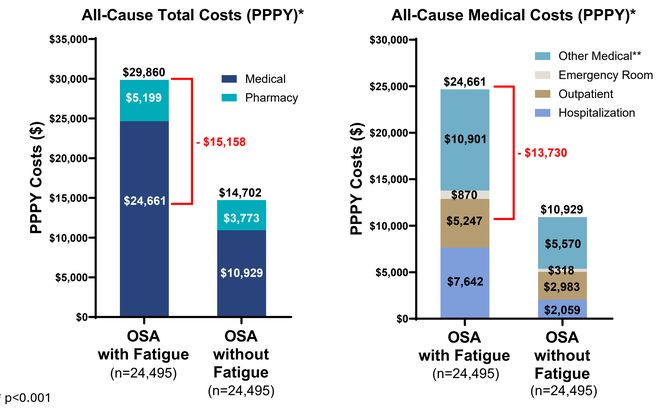


Table 1. OSA Population Demographics and Characteristics

	Unmatched		Matched	
	OSA with Fatigue (n = 25,513)	OSA without Fatigue (n = 46,197)	OSA with Fatigue (n = 24,495)	OSA without Fatigue (n = 24,495)
Age, mean (SD)	73.5 (5.6)	72.4 (5.0)	73.3 (5.5)	73.0 (5.2)
Male, n (%)	12,242 (48.0)	24,419 (52.9)	11,966 (48.9)	12,179 (49.7)
White, n (%)	22,642 (88.7)	40,088 (86.8)	21,695 (88.6)	21,770 (88.9)
Region, n (%)				
Northeast	4,427 (17.4)	8,373 (18.1)	4,303 (17.6)	4,277 (17.5)
Midwest	5,825 (22.8)	11,816 (25.6)	5,689 (23.2)	5,584 (22.8)
South	9,994 (39.2)	16,295 (35.3)	9,431 (38.5)	9,493 (38.8)
West	5,228 (20.5)	9,570 (20.7)	5,035 (20.6)	5,104 (20.8)
Other/Unknown	39 (0.2)	143 (0.3)	37 (0.2)	37 (0.2)
BMI (kg/m^2), n (%)				
<25	821 (3.2)	1,361 (2.9)	783 (3.2)	701 (2.9)
25-29	2,257 (8.8)	3,929 (8.5)	2,148 (8.8)	2,078 (8.5)
30-39	4,753 (18.6)	8,898 (19.3)	4,596 (18.8)	4,546 (18.6)
40+	1,594 (6.2)	2,869 (6.2)	1,533 (6.3)	1,482 (6.1)
Unknown	16,088 (63.1)	29,140 (63.1)	15,435 (63.0)	15,688 (64.0)
CVD history, n (%)	12,705 (49.8)	19,111 (41.4)	11,859 (48.8)	11,324 (46.2)
Depression history, n (%)	5,033 (19.7)	6,769 (14.7)	4,556 (18.6)	4,206 (17.2)
Use of sleep promoting or wakefulness promoting agent, n (%)	5,182 (8.6)	3,143 (6.8)	1,991 (8.1)	1,946 (7.9)
Use of GLP-1 or GLP-1/GIP, n (%)	658 (2.6)	1,082 (2.3)	627 (2.6)	559 (2.3)
Baseline hospitalization, n (%)	4,315 (16.9)	6,123 (13.3)	3,962 (16.2)	3,768 (15.4)

Figure 2. All-Cause Total and Medical Costs in Newly Diagnosed OSA Patients with Fatigue vs without Fatigue



* p<0.001

** Other medical costs include costs from skilled nursing facilities, hospice care, home health agencies, and durable medical equipment providers

CONCLUSIONS

- Fatigue is significantly associated with an increase in all-cause total healthcare costs in newly diagnosed OSA patients as compared with matched patients without fatigue
- Addressing fatigue may be useful as part of OSA screening, diagnosis, and treatment due to the incremental humanistic and economic burden

LIMITATIONS

- Imputing the index date for the OSA without Fatigue cohort and requiring 12 months of continuous enrollment post-index may introduce selection bias, favoring the inclusion of healthier patients
- Propensity score matching ensures covariate balance at OSA diagnosis but not necessarily at the fatigue index date
- Generalizability may be limited due to differences in diagnostic and clinical practices outside the Medicare population

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ABBREVIATIONS

BMI, body mass index; CVD, cardiovascular disease; FFS, fee-for-service;; GLP-1, glucagon-like peptide-1; GIP, glucose-dependent insulinotropic polypeptide; HIV, human immunodeficiency virus; HSAT, home sleep apnea test; OSA, obstructive sleep apnea; PPPY, per-patient-per-year; PSG, polysomnography; SD, standard deviation; US, United States

DISCLOSURES

K.S. Yu, J. Yee, R. Farkas, J. Cronin are employees of Apnimed, Inc. N.F. Watson is the Chief Medical Officer of EnsoData and participated in advisory boards for React Health, and Jazz pharmaceuticals. B. Cade has nothing to disclose. B. Zeldow, J. Zhao,, and A. Tan are employees of Genesis Research. T. Yee was employed by Genesis Research at time of study. S. Redline has received consulting fees from Eli Lilly Inc., and is an unpaid consultant to Apnimed and unpaid board member for the Alliance of Sleep Apnea Partners and National Sleep Foundation

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