Impact of OSA Therapy on Healthcare Costs: Actuarial Analysis of OSA Prevalence, Therapy Adherence, Co-morbidity, and Costs in a Large Medicare Population Cohort

Chris R. Fernandez, MS, (1) Mark Kaiser, BS, (1) Jen McClurg, MBA, BS, (1) Maggie Richard, BS, FSA, MAAA, (2) Ian Duncan, PhD, FSA, MAAA (2), Sam Rusk, BS, (1) Nick Glattard, MS, (1) Fred Turkington, BS, (1) Yoav N. Nygate, MSc, (1) Nathaniel Watson, MD, MSc (3)

Introduction

Research studying the economics of Obstructive Sleep Apnea (OSA) therapy faces confounds including the prevalence of undiagnosed OSA, rate of diagnosed patients not starting continuous positive airway pressure (CPAP) therapy, spectrum of CPAP treatment adherence, and effects of concurrent co-morbidity.

We provide an actuarial analysis to study the economic impact of OSA therapy using CPAP, accounting for these confounds, using the 2016-2018 Medicare 5% Limited Data Set (LDS) Analytical File, a random sample of Medicare Claims containing approximately 2.9 million patients/year, resulting in N=2,001,538 eligible Fee-For-Service patients excluding managed care patients and incomplete data.

Methodology

We segmented a qualified study population of 52,087 members with OSA into three cohorts and three 12-month time-periods, including a total of 1,351,838 patient months.

The cohorts analyzed were A) patients with OSA diagnosis and ≥12 months treatment, B) patients with OSA and <12 months treatment, and C) patients with OSA diagnosis who never received treatment, requiring members to have at least 3 months of membership in each 12-month timeframe to qualify.

We analyzed the healthcare costs in each cohort in the year before treatment (BTY), the first year of treatment (DTY), and following treatment year (PTY).

Treatment adherence qualifications were based on therapy related claims (e.g. CPAP therapy initiation, CPAP supply claims) within any 6-month time window following OSA testing and diagnosis.

We applied actuarial risk adjustment within each cohort and time-period to provide a risk-adjusted cost comparison and applied trend rates to analyze costs in terms of 2016 dollars.

Results were analyzed cross- sectionally given zero-to-seven co-morbidities among obesity, hypertension, type-II diabetes, depression, COPD, CHF, and/or prior stroke, facility-vs-home testing, and with-or-without surgical procedures.

Results

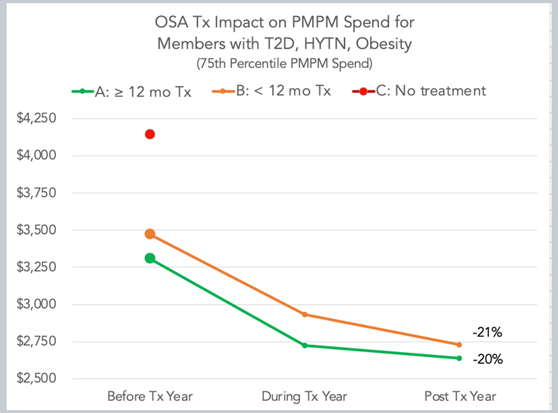
The average per-member-per-month (PMPM) total medical spend for beneficiaries with OSA was 209% higher than average PMPM of Medicare beneficiaries.

Sleep Apnea Member vs Average Medicare Member PMPM

(excludes cancer, ESRD, and members who died)

Total Medicare Population	Full Population	50th Percentile	75th Percentile	90th Percentile
Avg. PMPM	$935	$1,781	$3,248	$6,283
OSA Diagnosed Medicare Population				
Avg. PMPM	$1,952	$3,581	$5,976	$10,240
vs Average OSA Member		183%	306%	525%
OSA Diagnosed PMPM vs Medicare FFS Population PMPM	209%	201%	184%	163%

The average PMPM total medical spend was highest in the diagnosed-but- never-treated cohort-C ($1,375), second highest in <12-months treatment cohort-B ($1,005), and lowest in ≥12-months treatment cohort-A ($983). In both cohorts that started therapy, average costs decreased from before-treatment year (BTY) to post-treatment year (PTY), and from the first to second year on therapy. Compared to no-therapy cohort-C, costs were 29% lower in cohort-A and 27% lower in cohort-B. Among co-morbid members in the 75th spend percentile, we observed BTY to DTY PMPM reduction of 17.7% and 15.6% in Cohort-A and –B, respectively.

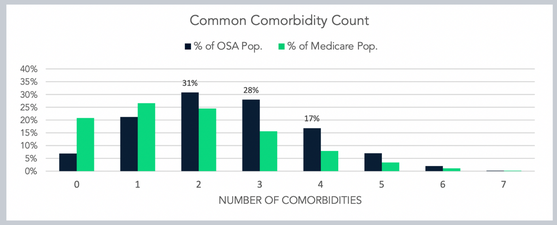


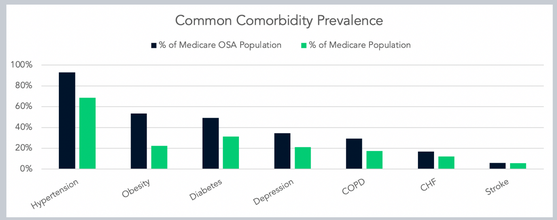
Results Continued

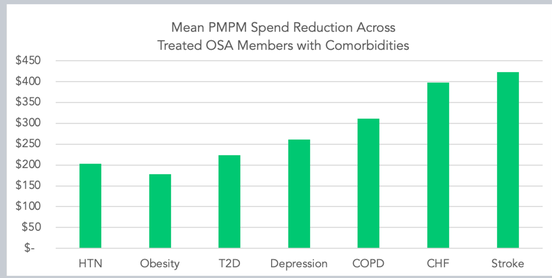
In the same cohorts, we observed 20% and 21% PMPM reductions between BTY and PTY, or after the 2nd treatment year. Patients undergoing surgical procedures had higher costs but lower spend reduction in initial and following year of therapy (22% and 5%).

We compared prevalence rates of major comorbidities for each cohort of members and each time period of interest. We also compared these rates to the baseline population (FFS Medicare without OSA).

In the OSA population, patients with 2-4 comorbidities account for 76% of the population whereas in the baseline population members with 2-4 comorbidities only account for 48%. In the figures below it is apparent how prevalent some of the most expensive conditions are and the degree of multiple morbidity within the Medicare OSA population.







Conclusion

We observed significant differences in cost between OSA patients that started treatment versus those that did not, and those differences further increased the year following therapy onset.

These findings imply that receiving treatment for OSA reduces a patients total medical spend. In terms of mean cost, the ≥12-month and <12-month cohort costs decreased in both follow-up treatment years.

Future Work

Our study, using Medicare claims data has the advantage of population scale, but lacks certain detail that we plan to include in future work:

- Nightly/hourly resolution CPAP usage and adherence data to improve the accuracy and depth of treatment analysis
- OSA severity with apnea-hypopnea index (AHI) we will analyze differences in treatment response and PMPM savings cross-sectionally by condition severity.
- This study did not account for alternative therapies, likely prevalent particularly in Cohort B, including oral appliances, neuromodulation, positional therapy, weight loss and lifestyle changes
- Objective surrogate markers like Hba1c and blood pressure, we will analyze co-morbid outcomes changes with respect to sleep apnea treatment
- Non-Medicare claims data, especially important in light of recent trends toward high deductible health plans.

References

1. Wickwire et al. “The Impact of Treatments for OSA on Monetized Health Economic Outcomes: A Systematic Review.” Chest vol. 155,5 (2019)

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Authors

1. EnsoData Research, EnsoData
2. Santa Barbara Actuaries
3. Department of Neurology, University of Washington School of Medicine,