

# Impact of OSA-COPD Overlap Syndrome on Hospital Admissions: a Retrospective Study

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## ABSTRACT

**Introduction:** Obstructive sleep apnea (OSA) and chronic obstructive pulmonary disease (COPD) frequently coexist (1 in 10 individuals with 1 condition will also have the other disorder), forming Overlap Syndrome (OVS), a condition associated with worse health outcomes and increased mortality compared to either disease alone. However, the impact of OVS on inpatient hospitalization remains unclear. This study evaluates the clinical characteristics of OVS and its association with inpatient admissions.

**Methods:** Data were obtained from the Healthcare Enterprise Repository for Ontological Narration (HERON) at the University of Kansas Health System for patients undergoing diagnostic sleep studies from 2012 to 2021. Patients with available apnea-hypopnea index (AHI) and forced expiratory volume/forced vital capacity (FEV1/FVC) data were included in the analysis.

**Results:** A total of 602 individuals met the study criteria (mean age: 57.9 years; 35.7% male). Diagnoses were classified as OSA only (41.4%, n=249), COPD only (13.4%, n=81), and OVS (13.2%, n=80). Logistic regression was used to assess associations between OVS and inpatient hospitalizations, adjusting for age, sex, body mass index (BMI), and comorbidities. Analyses demonstrated patients with OVS had a hospitalization rate of 16.8% (n=13), while those with COPD only had 16.2% (n=13). An increased prevalence of cardiac comorbidities existed in all groups with the highest being hypertension (58.6%, n=353). Unadjusted analysis suggested an increased hospitalization risk for OVS patients (OR: 1.74; 95% CI: 1.01-3.02), but this association was not statistically significant in adjusted models.

**Conclusions:** Patients with OVS experience an increase in medical comorbidities, possibly driving inpatient hospitalizations. These findings highlight the complex interplay between OVS and comorbid medical conditions, particularly cardiovascular disease. Interventions to improve cardiovascular disease outcomes in patients with OVS may improve hospitalization rates.

## INTRODUCTION

- Obstructive sleep apnea (OSA)** and **chronic obstructive pulmonary disease (COPD)** are two highly prevalent chronic respiratory conditions, each associated with significant morbidity and mortality
- Although pathophysiologically distinct, these conditions frequently coexist, forming **Overlap Syndrome (OVS)** — estimated to occur in approximately 10% of patients with either OSA or COPD (Marin et al., 2010; Flenley, 1985)

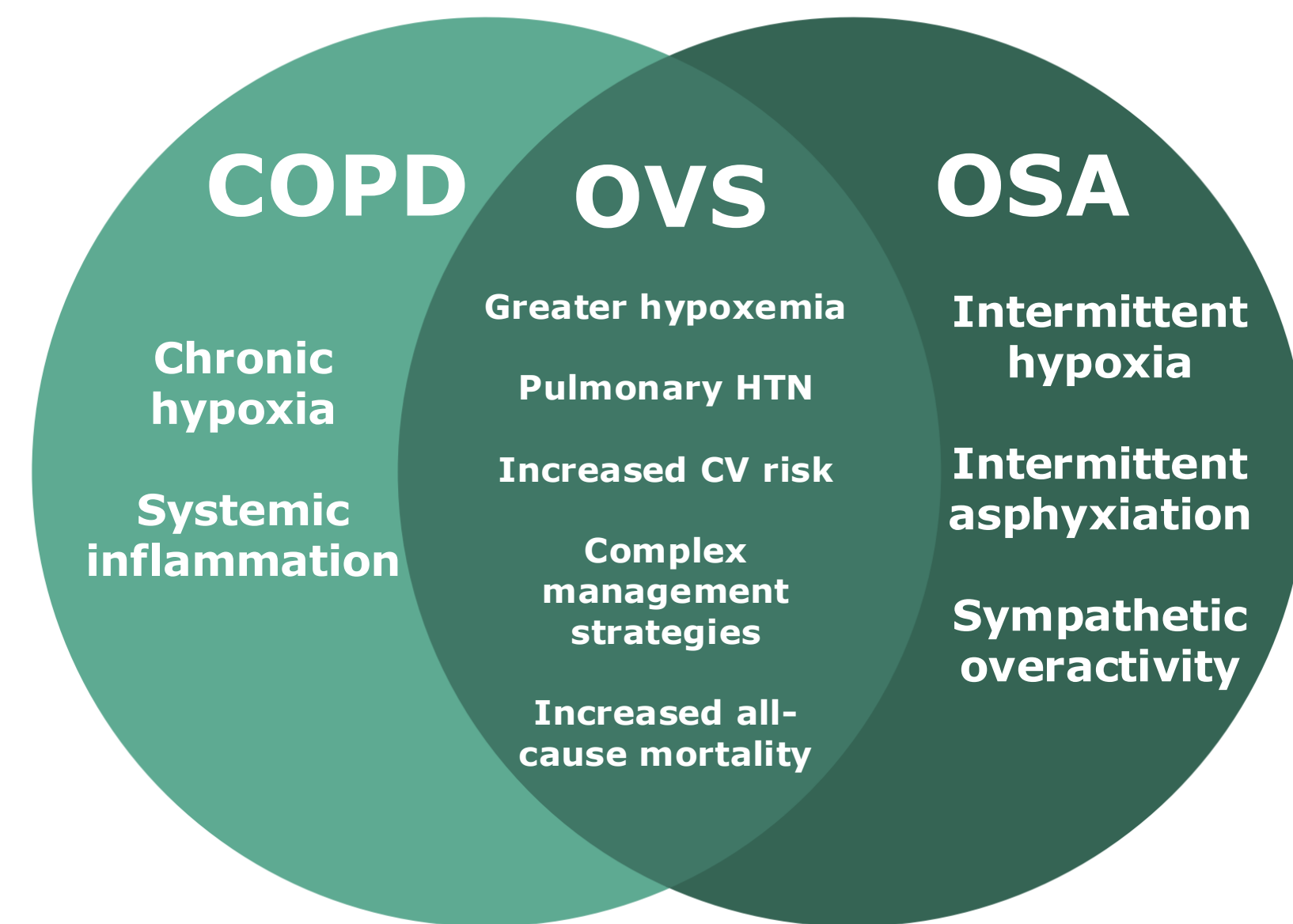


Figure 1: Pathophysiological and Clinical Characteristics of COPD, OSA, and Overlap Syndrome (OVS)

## METHODS

- Study population:** Retrospective cohort study using data from 2012 to 2021, obtained from the Healthcare Enterprise Repository for Ontological Narration (HERON) at The University of Kansas Health System
- Inclusion Criteria:** Adult patients undergoing diagnostic sleep testing with available apnea-hypopnea index (AHI) and pulmonary function testing (FEV1/FVC ratio)

	AHI <5	AHI ≥5
FEV1/FVC <70%	None (reference)	OSA only
FEV1/FVC ≥70%	COPD only	Overlap Syndrome

Table 1: Classification of patients

- Primary Outcome:** Occurrence of at least one inpatient hospitalization within one year of OVS diagnosis
- Statistical Analysis:** Logistic regression models were used to evaluate associations between diagnostic group and hospitalization, adjusting for demographic and clinical variables (age, sex, body mass index, comorbidities, tobacco use, oxygen use, and medication history)

## RESULTS AND DISCUSSION

**Total patients:** 602 adults (mean age 57.9 years; 35.7% male) with valid sleep study and pulmonary function data

	Percent of Patients (%)	Number of Patients
None	31.9	192
OSA Only	41.4	249
COPD Only	13.4	81
OVS	13.2	80

Table 2: Patient Distribution across groups

	Unadjusted OR (95%CI)	Adjusted OR (95%CI)
None	1 (reference)	1 (reference)
OSA only	1.13 (0.74-1.71); p=0.56	1.24 (0.79-2.03); p=0.31
COPD Only	1.63 (0.94-2.81); p=0.08	1.84 (0.82-4.12); p=0.14
OVS	1.74 (1.01-3.02); p=0.04	1.49 (0.67-3.33); p=0.32

Table 3: Unadjusted and Adjusted Odds Ratio (OR) for in-patient admission per diagnosis

### In-Patient Hospitalizations and Non-Hospitalized in OSA, COPD, and OVS Groups

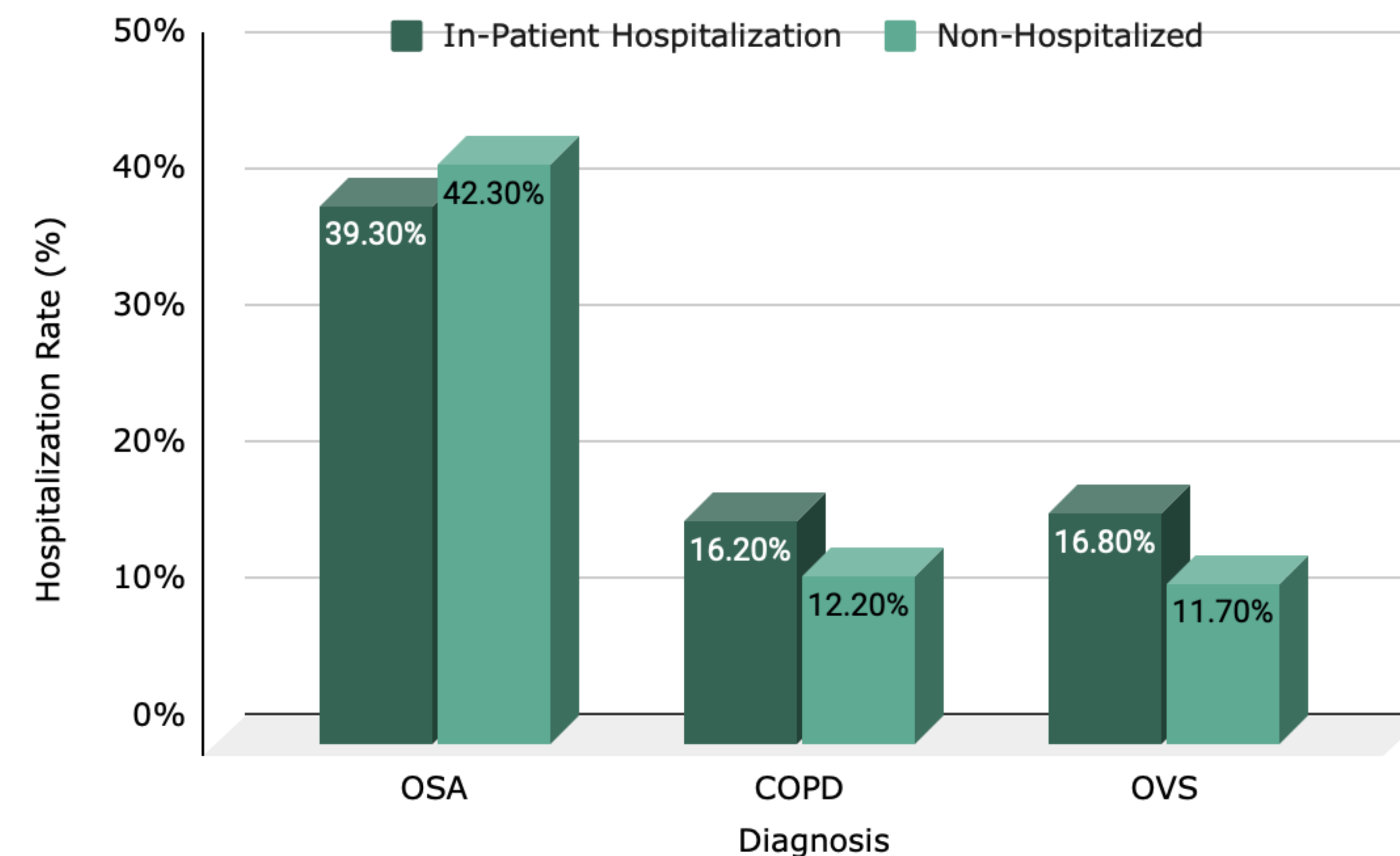


Figure 2: In-Patient Hospitalizations vs. Non-Hospitalized in OSA, COPD, and OVS Groups

Other significant predictors of hospitalization included:

- depression
  - (OR = 1.78 (1.18-2.69); p=0.01),
- hypertension
  - (OR = 2.04 (1.13-3.66); p=0.02),
- atrial fibrillation
  - (OR = 2.07 (1.27-3.37); p<0.01),
- coronary artery disease
  - (OR = 1.66 (1.07-2.58); p=0.02),
- supplemental oxygen use
  - (OR = 2.65 (1.30-5.41); p=0.01)

## CONCLUSION

- OVS was associated with increased hospitalization in unadjusted analyses, but this was not significant after accounting for age, BMI, and comorbidities
- OVS patients show increased hospitalization risk in unadjusted models, but this is driven primarily by underlying comorbidities, not the OVS diagnosis alone
- Strongest predictors of hospitalization were co-morbid conditions such as hypertension, depression, atrial fibrillation, and use of supplemental oxygen
- Findings offer important insight into the underlying drivers of healthcare utilization in complex respiratory patients
- By identifying the conditions most associated with hospitalization, this study contributes to more targeted, patient-centered care strategies