

Healthcare Resource Utilization and Costs Among Patients with Chronic Obstructive Pulmonary Disease in the United States

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BACKGROUND AND RATIONALE

- Globally, chronic obstructive pulmonary disease (COPD) is the third leading cause of death,¹ and is associated with substantial economic burden to healthcare systems.²
- In the United States (US), costs attributed to COPD were estimated at \$32.1 billion in 2010 and \$49.0 billion in 2020.³
 - Disease severity and COPD exacerbations have been shown to be key drivers of healthcare resource utilization (HCRU) and costs.⁴
- To address a lack of current HCRU and cost estimates among patients with COPD, this study examined real-world HCRU, costs and predictors of HCRU among a large, diverse sample of patients with COPD in the US.

METHODS

- Patients were identified from US administrative claims data (Inovalon Insights, LLC) from 01/01/16-31/12/17.
- Eligibility criteria: aged ≥ 40 years; 1 COPD-related hospitalization or emergency department (ED) claim or 2 other COPD-related claims (index date); pharmacy data available; and 2 years of data post-index date (baseline year, follow-up year).
- COPD complexity, a proxy for disease severity, is a claims-based classification of three groups (high, moderate, and low) based on the presence or absence of comorbid respiratory conditions per Mapel et al. (2011).⁵
- Annual all-cause and COPD-related HCRU (hospitalizations, ED visits, office visits) and estimated payer-paid costs (prescriptions, hospitalizations, ED visits, office visits) were assessed for baseline and follow-up years.
 - COPD-related HCRU was based on COPD exacerbation events as defined in Mapel et al. (2021).⁶
- Baseline predictors of having COPD-related hospitalizations and ED visits were assessed using multivariable logistic regression models.

RESULTS

Sample Characteristics

- 1,123,924 patients were included; mean (SD) age was 63.1 (11.1) years and 56.2% were female (**Table 1**).
- COPD complexity in the sample: low (41.9%), moderate (49.7%), and high (8.4%).
- Approximately 97% of patients had ≥1 comorbidity, with an average of 4.7 comorbid conditions.

Healthcare Resource Use and Costs

- The proportion of patients who had all-cause and COPD-related resource use are shown in **Figure 1**.
- Overall, unadjusted mean (SD) annual per patient all-cause and COPD-related hospitalizations were 0.30 (0.92) and 0.04 (0.31), respectively, and all-cause and COPD-related ED visits were 1.08 (2.81) and 0.30 (1.14), respectively.
- Among all patients, unadjusted mean annual per patient COPD-related costs were highest for prescriptions and comparable for hospitalizations and ED visits (**Figure 2**).
- HCRU and costs for all service types increased with increasing disease complexity.

Predictors of COPD-Related Hospitalizations and ED Visits

- Significant predictors of having COPD-related hospitalizations included baseline COPD-related hospitalizations, older age, moderate/high COPD complexity, and certain comorbidities (**Figure 3**).
- Significant predictors of having COPD-related ED visits included baseline COPD-related ED visits or hospitalizations, payer type, moderate/high COPD complexity, any rescue medication claim, and certain comorbidities (e.g., heart failure, asthma, anxiety).

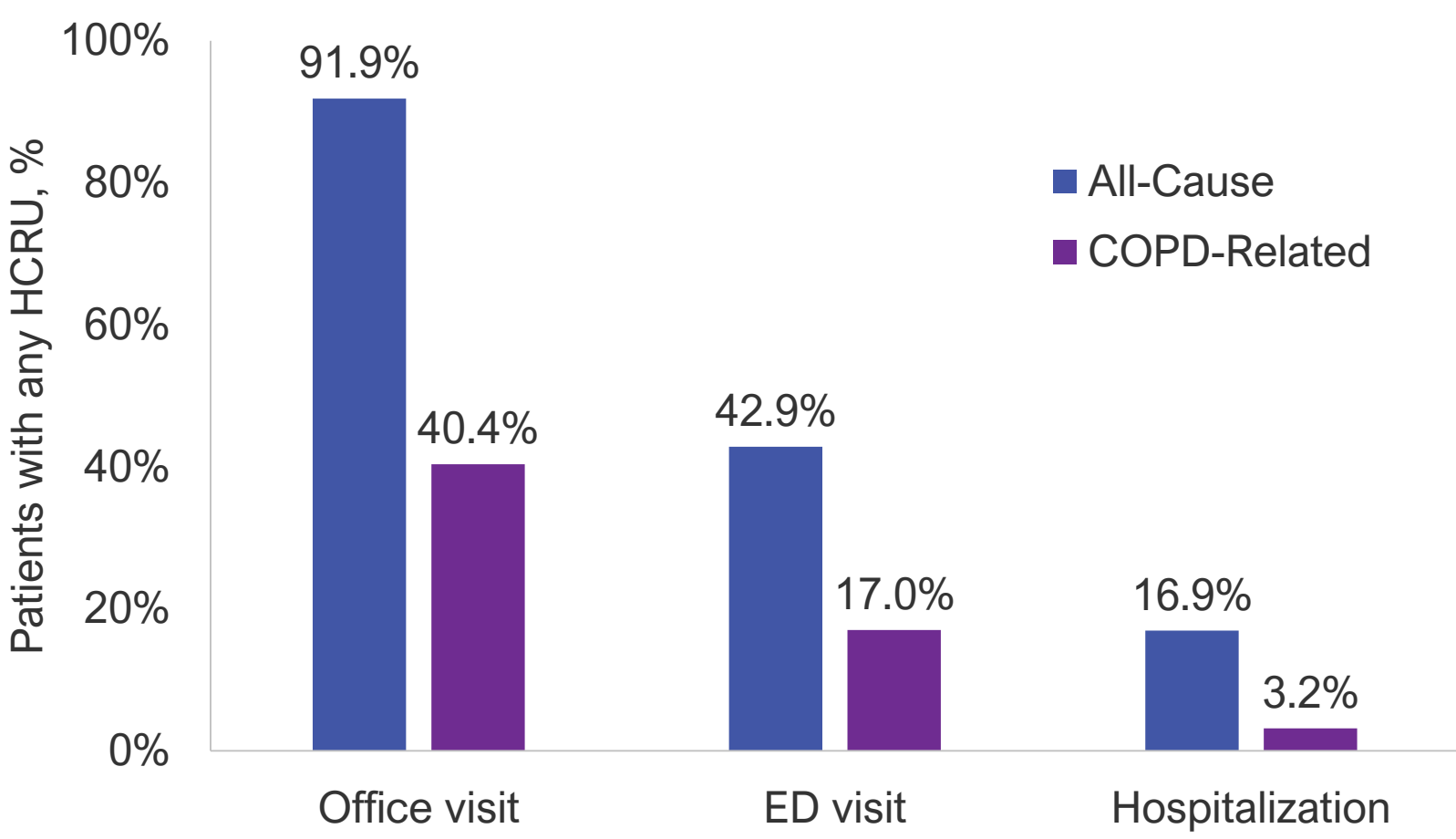
RESULTS

Table 1. Patient Baseline Demographic and Clinical Characteristics, Overall and by COPD Complexity

Characteristic	Overall (N=1,123,924)	Low Complexity (n=471,234)	Moderate Complexity (n=558,285)	High Complexity (n=94,405)
Age, mean (SD)	63.1 (11.1)	62.7 (11.0)	63.1 (11.2)	64.7 (11.1)
Female, n (%)	631,398 (56.2)	258,560 (54.9)	320,402 (57.4)	52,436 (55.5)
Health insurance plan type, n (%)				
Commercial	305,256 (27.2)	132,911 (28.2)	147,183 (26.4)	25,162 (26.7)
Medicaid	398,528 (35.5)	163,229 (34.6)	205,995 (36.9)	29,304 (31.0)
Medicare Advantage	325,407 (29.0)	135,040 (28.7)	158,643 (28.4)	31,724 (33.6)
Dual Coverage (Medicaid/Medicare Adv.)	94,733 (8.4)	40,054 (8.5)	46,464 (8.3)	8,215 (8.7)
Comorbid conditions, mean n, (SD)	4.7 (2.7)	4.0 (2.3)	5.0 (2.8)	6.3 (3.0)
Common comorbid conditions, n (%)				
Hypertension	859,476 (76.5)	350,392 (74.4)	430,148 (77.0)	78,936 (83.6)
Hyperlipidemia	720,493 (64.1)	301,743 (64.0)	354,132 (63.4)	64,618 (68.4)
GERD	425,245 (37.8)	160,749 (34.1)	223,046 (40.0)	41,450 (43.9)
Type 2 diabetes	405,566 (36.1)	161,391 (34.2)	205,427 (36.8)	38,748 (41.0)
Depression	360,203 (32.0)	138,640 (29.4)	188,758 (33.8)	32,805 (34.7)
CAD	350,476 (31.2)	118,614 (25.2)	189,789 (34.0)	42,073 (44.6)
Anxiety	346,119 (30.8)	128,793 (27.3)	185,234 (33.2)	32,092 (34.0)
Maintenance medication claim, n (%)	477,303 (42.5)	164,453 (34.9)	268,464 (48.1)	44,386 (47.0)
Rescue medication claim, n (%)	597,619 (53.2)	205,957 (43.7)	338,455 (60.6)	53,207 (56.4)

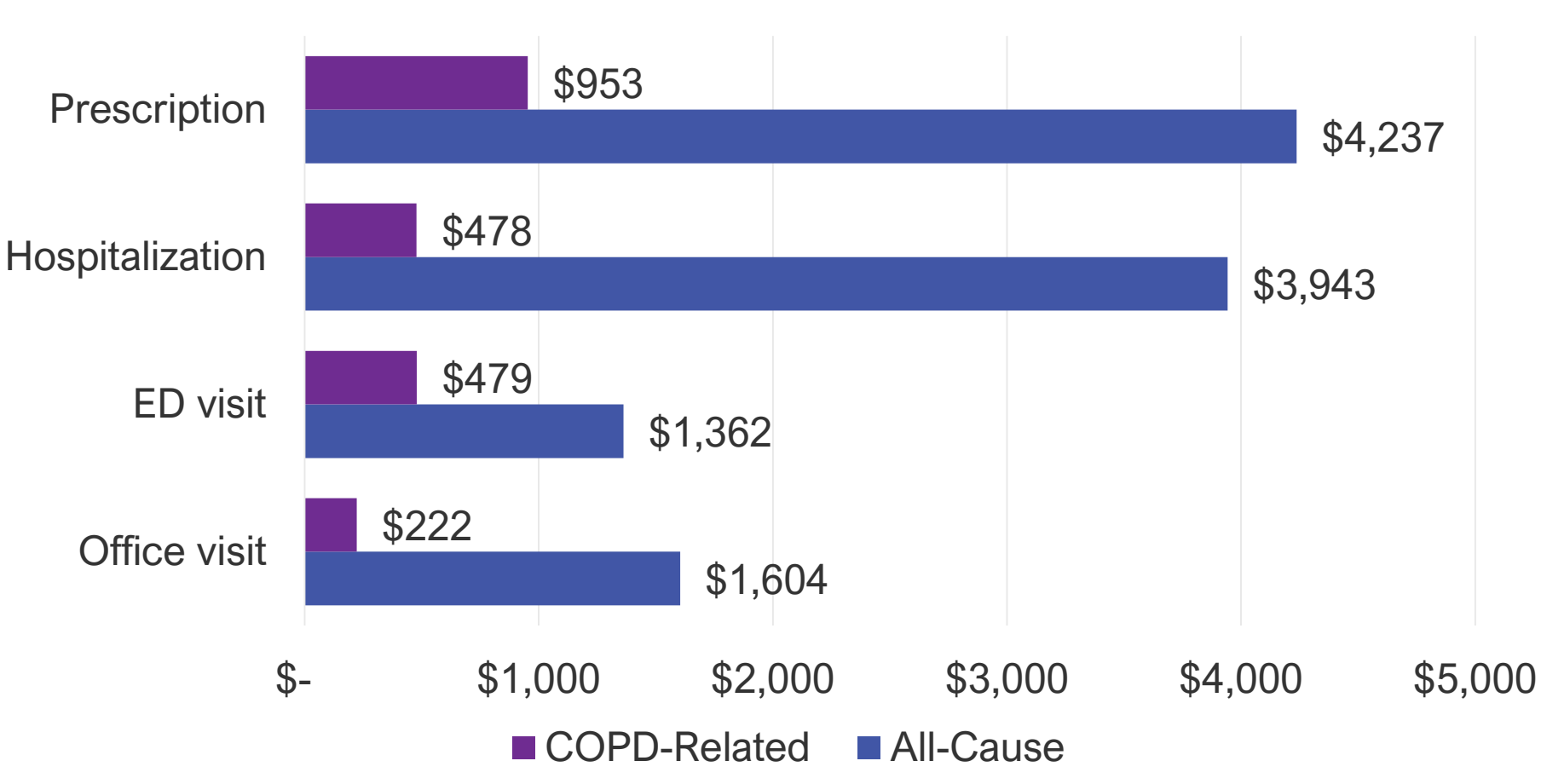
Adv., Advantage; CAD, coronary artery disease; COPD, chronic obstructive pulmonary disease; GERD, gastroesophageal reflux disease.

Figure 1. Annual All-Cause and COPD-Related HCRU at Follow Up



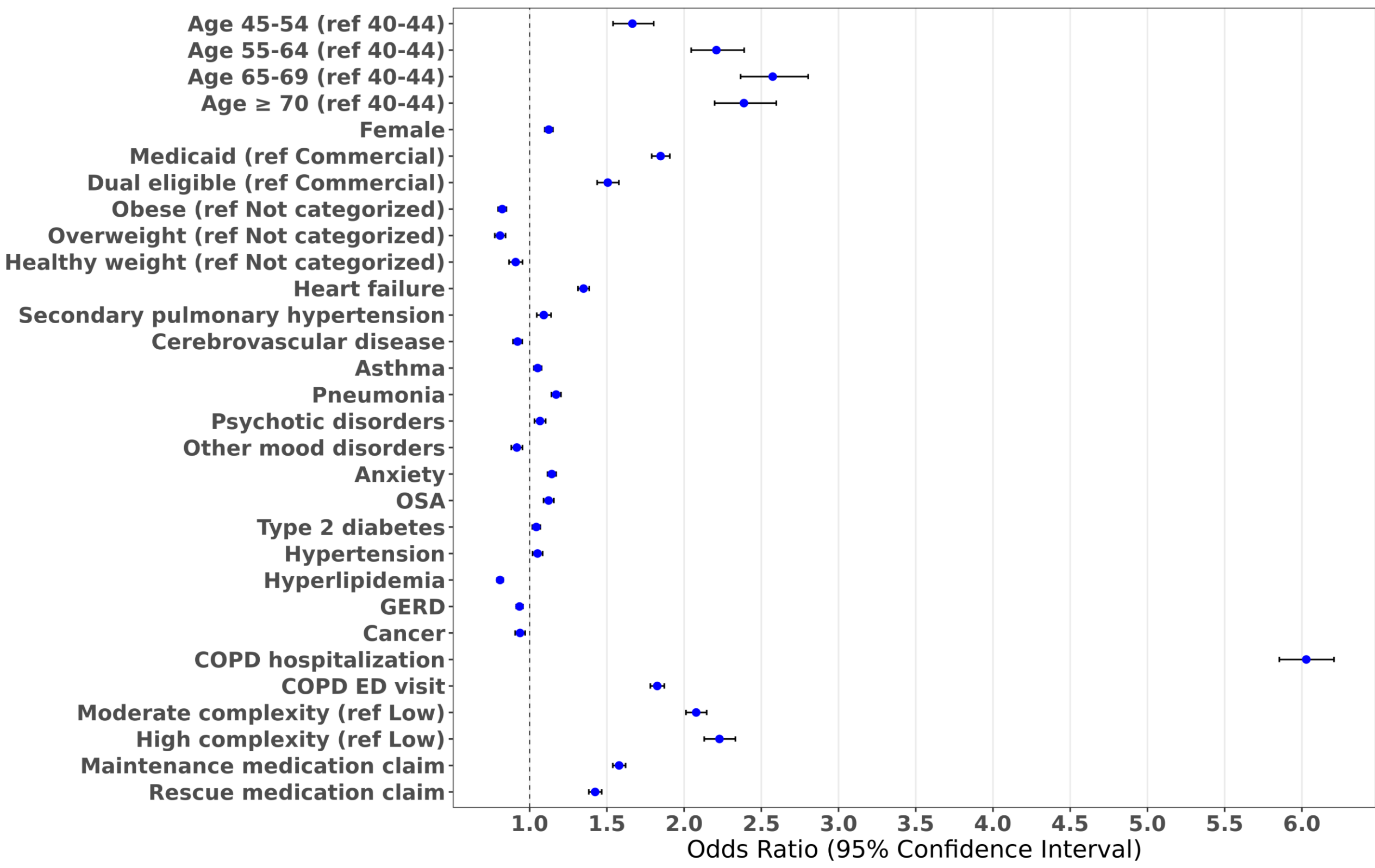
COPD, chronic obstructive pulmonary disease; ED, emergency department; HCRU, healthcare resource utilization.

Figure 2. Annual Per Patient Estimated All-Cause and COPD-Related Healthcare Costs (US Dollars) at Follow Up



COPD, chronic obstructive pulmonary disease; ED, emergency department.

Figure 3. Baseline Predictors of Having COPD-Related Inpatient Hospitalizations at Follow Up



COPD, chronic obstructive pulmonary disease; ED, emergency department; GERD, gastroesophageal reflux disease; OSA, obstructive sleep apnea.

CONCLUSIONS

- This analysis adds to the evidence demonstrating that older age, disease complexity, and comorbid conditions contribute substantially to the economic burden of COPD.
- Additionally, patients in our study were 5 times more likely to have a COPD-related hospitalization if they had a baseline COPD-related hospitalization.
- Greater monitoring of higher-risk COPD patients (e.g., older age, severe disease, certain comorbidities) may be useful in preventing initial exacerbation-related hospitalizations that lead to increased HCRU/costs and poorer outcomes.

REFERENCES AND DISCLOSURES

1. World Health Organization. [https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-\(copd\)](https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-(copd)). 2. Global Initiative for Chronic Obstructive Lung Disease. <https://goldcopd.org/2022-gold-reports>. 3. Centers for Disease Control and Prevention. <https://www.cdc.gov/copd/infographics/copd-costs.html>. 4. Iheanacho I, et al. Int J Chron Obstruct Pulmon Dis. 2020;15:439-460. 5. Mapel DW, et al. BMC Health Serv Res. 2011;11:43. 6. Mapel DW, et al. Int J Chron Obstruct Pulmon Dis. 2021;16:1687-1698.

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