Burden of Chronic Obstructive Pulmonary Disease (COPD) Healthcare Costs in Patients with Moderate-To-Severe Disease

COPD

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Background

- Chronic obstructive pulmonary disease (COPD) is a major cause of morbidity and mortality, with a substantial economic burden.[1] In 2020, COPD-attributable costs were estimated to be $49 billion in the United States.[2] In Europe, the estimated direct cost of COPD ranged from approximately $2,164 to $11,800 per patient per year.[3]
- COPD-related medical costs increase with increasing disease severity.[4] There is a lack of real-world evidence evaluating healthcare costs among patients with moderate-to-severe COPD.

Objective

- **To assess all-cause and COPD-related healthcare costs in patients with uncontrolled moderate-to-severe COPD in a real-world setting.**

Conclusions

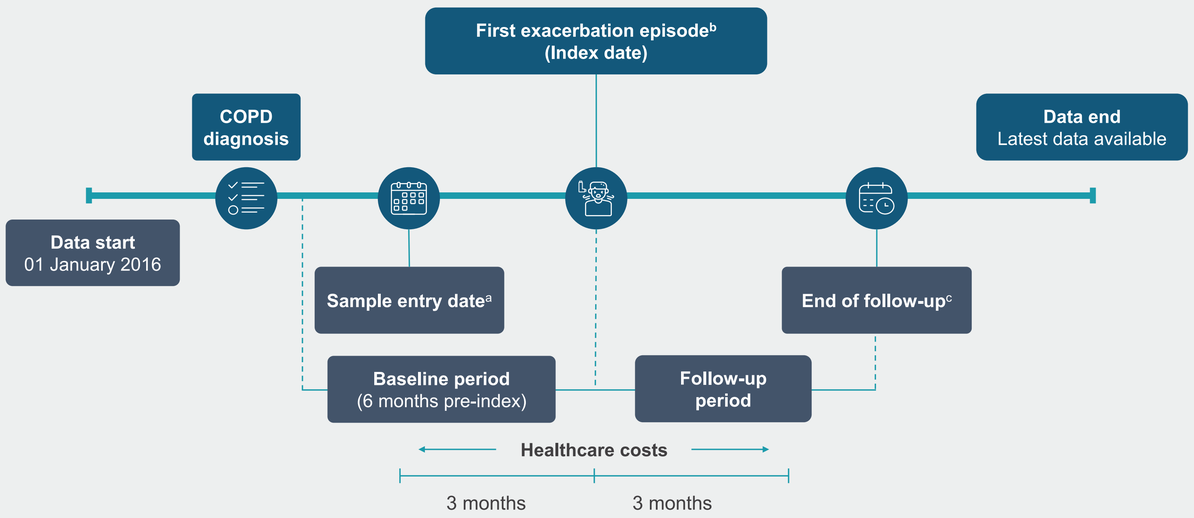
- **In this real-world study, patients in both the moderate and severe exacerbation cohorts experienced a high economic burden (all-cause and COPD-related costs), with those in the severe exacerbation cohort demonstrating a higher burden than those in the moderate exacerbation cohort. This underscores the need for more resource allocation for patients with severe exacerbations.**
- **Early interventions for COPD patients with moderate exacerbations could potentially reduce the progression to severe exacerbations, thereby lowering healthcare costs.**
- **Limitations of this study include the potential misclassification of uncontrolled COPD as these are inferred from claims database. Additionally, the severity of the cohort is defined based on the severity of exacerbation episodes, which may introduce bias.**

METHODS & RESULTS

Data source and study design

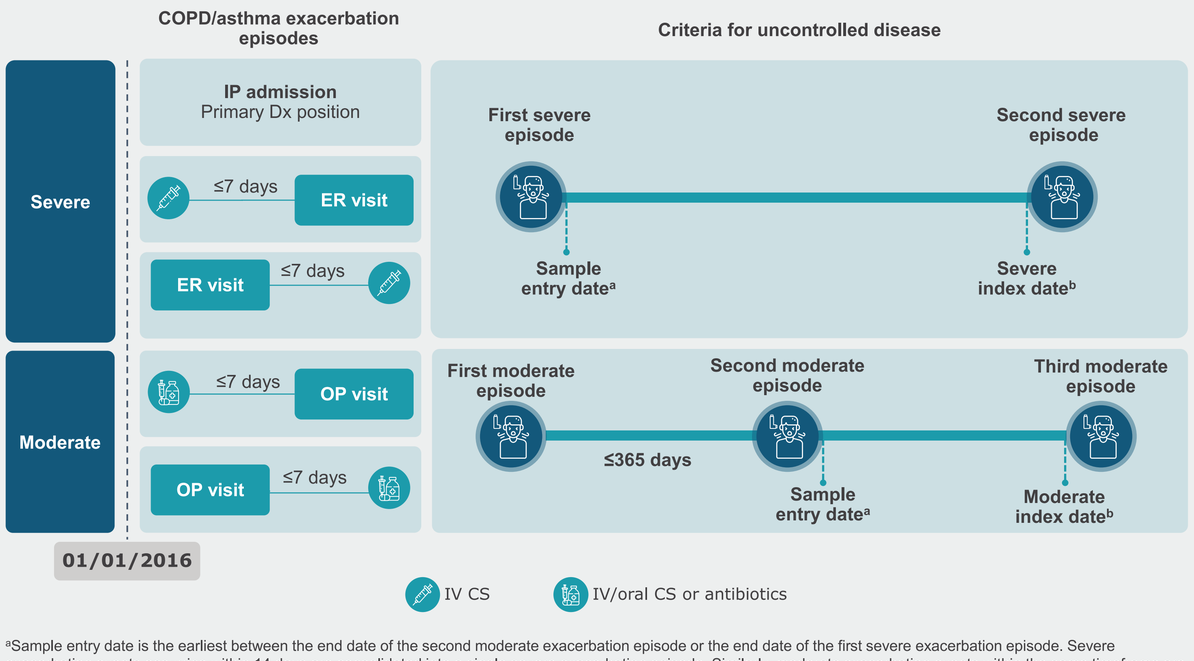
- We identified patients from the Optum Clinformatics claims data between 01 January 2016 and 30 November 2023.
- The study cohort consisted of patients with uncontrolled COPD (aged ≥40 years), defined as those having ≥2 moderate exacerbation episodes within a 12-month period or ≥1 severe exacerbation episode, who enrolled continuously for at least 6 months before and after the index date (**Figure 1**).
- Uncontrolled COPD patients were also required to be continuously enrolled from the first indication of the disease (i.e., the start date of the first exacerbation episode during the study period) until the sample entry date (SED). The SED is the earliest date when a patient met the criteria for uncontrolled disease (**Figure 2**).
- Patients with ≥1 severe exacerbation episode following the SED were considered part of the severe exacerbation cohort. Similarly, patients who experienced ≥1 moderate exacerbation episode after the SED were included in the moderate exacerbation cohort (**Figure 2**).
- The index date was defined as the date of the first severe exacerbation episode (for severe exacerbation cohorts) or the first moderate exacerbation episode (for moderate exacerbation cohorts) starting after the SED.

Figure 1. Study design



[a]The earliest date when a patient met the criteria for uncontrolled disease. Patients were considered to have uncontrolled disease if they had either (i) ≥2 moderate exacerbation episodes that were <12 months apart or (ii) ≥1 severe exacerbation episode.
[b]First severe exacerbation episode (severe exacerbation cohorts) or first moderate exacerbation episode (moderate exacerbation cohorts) starting after the SED.
[c]Earliest between end of continuous enrolment for the patient, end of data availability, or date of death.
COPD, chronic obstructive pulmonary disease; SED, sample entry date.

Figure 2. Definition of exacerbation episodes and criteria for uncontrolled disease



[a]Sample entry date is the earliest between the end date of the second moderate exacerbation episode or the end date of the first severe exacerbation episode. Severe exacerbation events occurring within 14 days are consolidated into a single severe exacerbation episode. Similarly, moderate exacerbation events within the same timeframe are combined into one moderate exacerbation episode. Moderate events that overlap with severe events are collapsed as part of severe episodes.
[b]Index date refers to the date of first exacerbation episode starting after the sample entry date.
A severe exacerbation was defined as an ER visit for COPD/asthma, and a diagnosis claim of IV CS within 7 days of the visit. A moderate exacerbation was defined as an OP visit for COPD/asthma, and a diagnosis claim of IV/oral CS or antibiotics within 7 days of the visit.
COPD, chronic obstructive pulmonary disease; CS, corticosteroids; Dx, diagnosis claim; ER, emergency room; IP, inpatient; IV, intravenous; OP, outpatient.

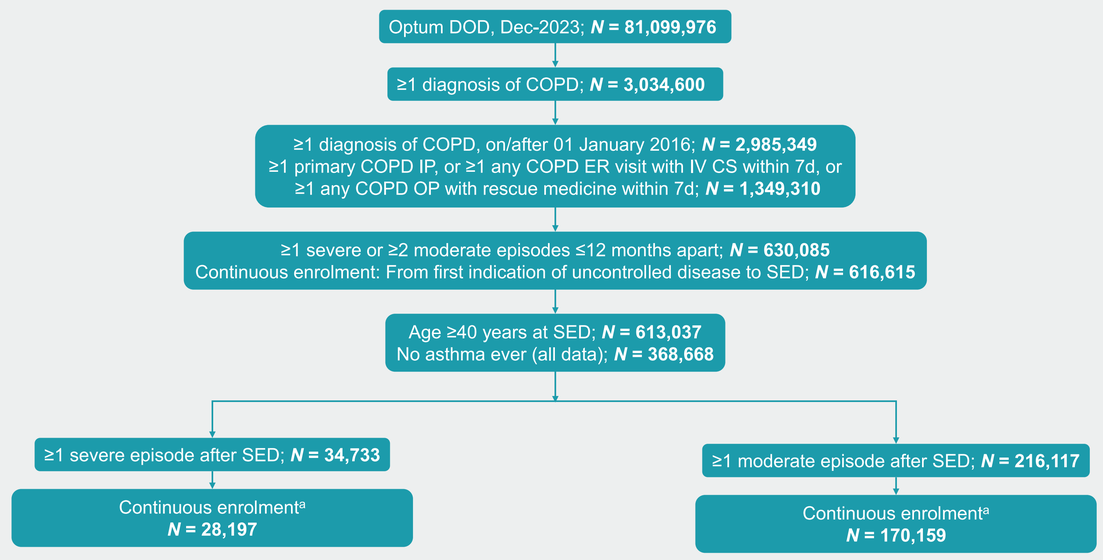
Outcomes

- We assessed the all-cause and COPD-related healthcare costs, including medical services and pharmacy costs, during the index exacerbation and at 3 months after the index exacerbation. All costs were standardised and reported in 2023 US dollars using the Gross Domestic Product Price Index.
- The results were summarised descriptively.

Patient demographics

- A total of 28,197 patients were included in the severe exacerbation cohort and 170,159 in the moderate exacerbation cohort. The patient selection process and the reasons for exclusion are depicted in **Figure 3**.
- The average age of patients was approximately 72.6 years, and about 54.3% were females. Most of the patients were white (>76.0%), followed by black (11.8%). A large majority were enrolled in Medicare (>91.0%).

Figure 3. Patient selection

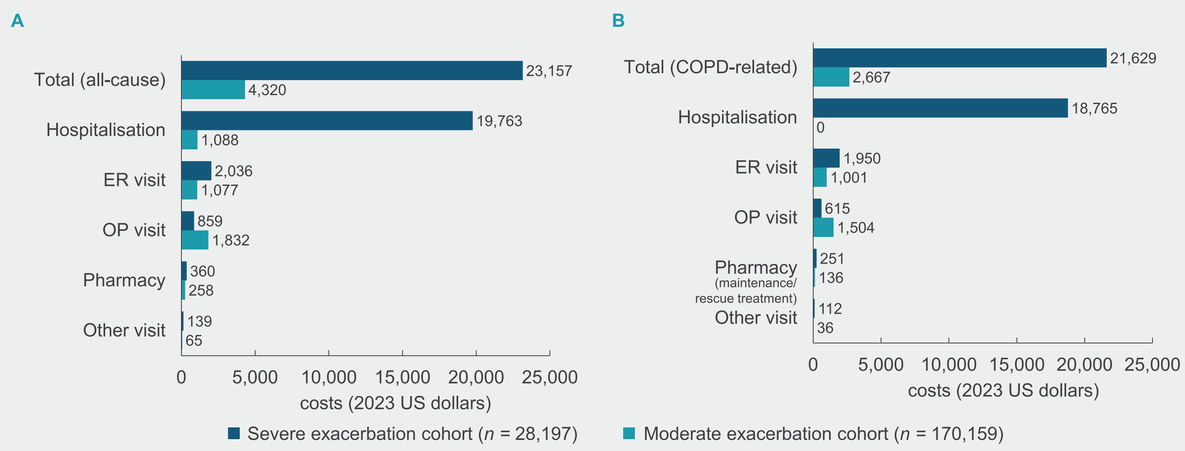


[a]From ≥6 months baseline to ≥6 months follow-up/death, if earlier.
COPD, chronic obstructive pulmonary disease; CS, corticosteroids; DOD, date of death; ER, emergency room; IP, inpatient; IV, intravenous; OP, outpatient; SED, sample entry date; 7d, 7 days.

Healthcare costs at the index exacerbation

- In the severe exacerbation cohort, the total mean (standard deviation [SD]) all-cause and COPD-related costs during the index exacerbation were $23,157 (27,996) and $21,629 (26,729), respectively. The mean (SD) COPD-related hospitalisation, emergency room (ER) visit, and outpatient (OP) visit costs were $18,765 (25,866), $1,950 (3,830) and $615 (3,454), respectively (**Figure 4**).
- Among patients within moderate exacerbation, the mean (SD) all-cause and COPD-related costs were $4,320 (11,574) and $2,667 (8,375), respectively. The mean COPD-related ER and OP visit costs were $1,001 (3,378) and $1,504 (7,466), respectively (**Figure 4**).

Figure 4. Healthcare costs at the index exacerbation: (A) all-cause and (B) COPD-related

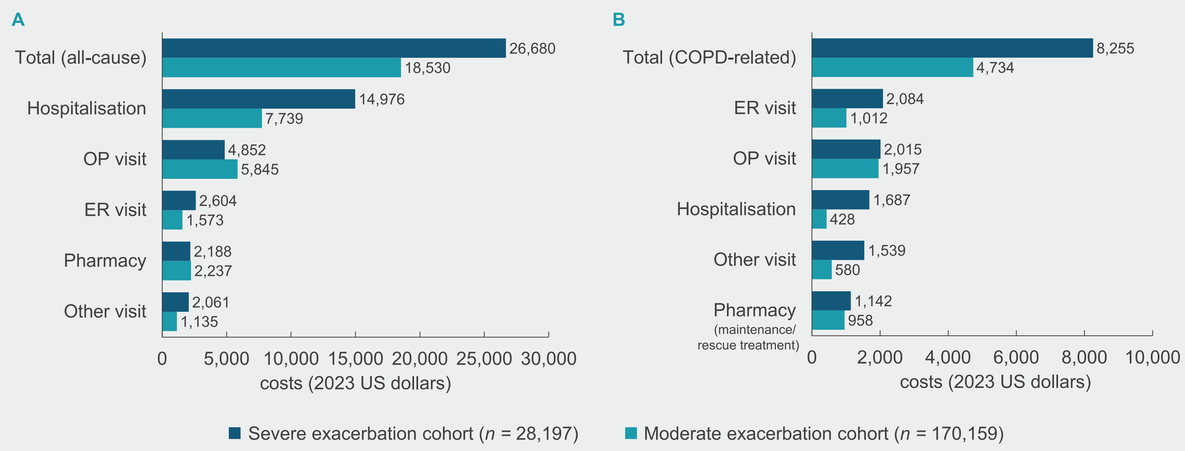


COPD, chronic obstructive pulmonary disease; ER, emergency room; OP, outpatient; US, United States.

Healthcare costs at 3 months after the index exacerbation

- At 3 months after the index exacerbation, the mean (SD) all-cause and COPD-related costs for the severe COPD cohort were $26,680 (46,421) and $8,255 (14,271), respectively. The mean (SD) COPD-related hospitalisation, ER visit and OP visit costs were $1,687 (8,679), $2,084 (5,905) and $2,015 (7,139), respectively (**Figure 5**).
- The mean (SD) all-cause and COPD-related costs for the moderate COPD cohort were $18,530 (37,807) and $4,734 (12,293), respectively. The mean COPD-related hospitalisation, ER, and OP visit costs were $428 (5,417), $1,012 (4,295), and $1,957 (9,073), respectively (**Figure 5**).

Figure 5. Healthcare costs at 3 months after the index exacerbation: (A) all-cause and (B) COPD-related



COPD, chronic obstructive pulmonary disease; ER, emergency room; OP, outpatient; US, United States.

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ACKNOWLEDGEMENTS

Medical writing support was provided by Ali Nasir Siddiqui and G. Subramanian Kaushik from Sanofi.

FUNDING

The study was sponsored by Sanofi and Regeneron Pharmaceuticals, Inc.

CONFLICTS OF INTEREST

RL, **EMH**, **NP-I**, **KH**, **DM**, and **TQ** are employees of Sanofi and may hold stocks and/or stock options in the company. **W-HC** was an employee of Sanofi at the time of study conduct.

Poster presented at The International Society for Pharmacoeconomics and Outcomes Research Europe 2024 (ISPOR EU), 17–20 November, Barcelona, Spain.