Background
Chronic obstructive pulmonary disease (COPD) is a leading cause of morbidity and mortality and results in substantial personal and economic burden. The estimated direct costs of COPD are $30 billion and the indirect costs are $50 billion, with exacerbations accounting for the greatest proportion of total COPD costs. COPD-related exacerbations (exacerbations) resulting in hospitalization have been shown to be the most costly aspect of COPD care. Furthermore, a minority of patients with COPD experienced the majority of exacerbations.

Despite the clinical and economic importance of exacerbations, data are available concerning the impact of exacerbation frequency on healthcare resource utilization (HCRU) and costs for patients with COPD.

Objective
To describe COPD-related healthcare resource utilization and costs by exacerbation frequency in patients with COPD.

Methods
Study Design: Retrospective cohort study

2. Cohort definition: Patients with a history of COPD
3. Data Source: Humana administrative claims database, which contains integrated medical, pharmacy, behavioral, and lab data
4. Patient selection:
   - Medication Advantage plan with Prescription Drug coverage (MDAP) patients, aged 40 to 69 years, with no medical claims for an ostomy
   - Includes patients enrolled in commercial, Medicare advantage, and prescription drug plans
5. Exacerbation definition:
   - Level I exacerbation: A primary diagnosis of COPD (J44.xx) and any other diagnosis code related to exacerbation (99.04, 99.05, or 99.06)
   - Level II exacerbation: A primary diagnosis of COPD (J44.xx) and any other diagnosis code related to exacerbation (99.04, 99.05, or 99.06) plus at least one exacerbation-related diagnosis code (518.84, 478.10, 362.82, 496.xx, or 209.3x, or 209.7x) anytime during the study period
   - Level III exacerbation: A primary diagnosis of COPD (J44.xx) and any other diagnosis code related to exacerbation (99.04, 99.05, or 99.06) plus at least one exacerbation-related diagnosis code (518.84, 478.10, 362.82, 496.xx, or 209.3x, or 209.7x) anytime during the study period
   - Level IV exacerbation: A primary diagnosis of COPD (J44.xx) and any other diagnosis code related to exacerbation (99.04, 99.05, or 99.06) plus at least one exacerbation-related diagnosis code (518.84, 478.10, 362.82, 496.xx, or 209.3x, or 209.7x) anytime during the study period

6. Data analysis:
   - Comprehensive Health Insights Inc., Louisville, KY; Dual Eligibility Limited Data are Available for Patients Who Started Therapy during the Post index Period
   - Treatment for cost; general linear models with gamma distribution and link function

Outcomes
- COPD-related Healthcare Costs: Total medical and pharmacy costs
- Effects: Intercepts and linear trend for COPD-related exacerbations

Statistical Methods:
- COPD-related HCRU: percentage of patients with ≥1 visit or (re)hospitalization and mean (standard deviation) [SD] number of exacerbations and related HCRU
- Univariate statistical comparisons among cohorts: analysis of variance for continuous and chi-square tests for categorical variables

Conclusions
COPD-related healthcare costs increase significantly with increasing exacerbation frequency, underscoring the importance of interventions aimed at reducing exacerbations, such as appropriate treatment and education.

Limitations
- This study is subject to limitations including coding errors, incomplete claims, and unobserved factors that may also influence the outcomes.
- COPD patient identification was based on diagnosis codes submitted on medical claims; the validity of which may be impacted by provider, region, or specific coding practices, and may not confirm by airway testing.
- While Humana is a large national health plan with members of broad geographic diversity, the results may not be generalizable to the general COPD population.