Factors Associated With Chronic Obstructive Pulmonary Disease–Related Inpatient Readmissions

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BACKGROUND
• Chronic obstructive pulmonary disease (COPD) is a progressive condition characterized by fixed airflow limitation.
• Chronic lower respiratory diseases (including COPD) are recognized as a major public health concern and are the third-leading cause of death in the United States.1
• Patients with COPD have a history of hospital admission and readmission.2

• In 2014, there were approximately 830,000 patient readmissions related to COPD among patients aged 40–64 years in the US.3
• Inpatient readmission rates within 30 and 90 days of an initial COPD-related hospitalization have been estimated at between 11% and 15%.1
• Elderly patients experience a higher rate, with an estimated 25% of fee-for-service Medicare beneficiaries experiencing a 30-day all-cause inpatient readmission in a recent study.4

OBJECTIVE
To assess factors associated with COPD-related inpatient readmission among a commercially insured population.

METHODS
Study Design
• Retrospective cohort study using a nationally representative administrative claims database of a commercially insured population from 2011 to 2015.
• RTI International’s institutional review board determined that this study met all criteria for exemption.

Data Source: PharMetrics Plus Database
• Commercially available sales of electronic administrative claims data covering more than 170 million file lines across the US.

• Information includes demographics, health plan enrollment, diagnoses, dates and place of service, diagnosis/procedure codes, and outpatient physician services, and prescription drug use.
• Data were longitudinally linked for each patient via a deidentified and unique member identifier number.

Patient Selection Criteria
• Patients with at least one COPD-related hospitalization in 2011 and at least one claim with a continuous health plan enrollment from January 1, 2011 to December 31, 2015.
• Patients aged 40 years or older on the date of their first observed COPD diagnosis.
• Patients with at least one inpatient readmission with a primary diagnosis of COPD in 2011 (COPD hospitalization), with the discharge date of the first inpatient admission defined as the index date.
• Patients with continuous health plan enrollment for at least 30 days (30-day cohort) or 90 days (90-day cohort) after the index date.

Study Measures
• Patient characteristics and comorbidities
• Age, sex, race, geographic location, health plan type, and payer type reported on the index date.
• Charlson Comorbidity Index (CCI) score measured the 12 months before and after the index date, based on available health plan administrative data (Table 1).
• Other relevant comorbidities (i.e., asthma, chronic renal failure (CRF), ischemic heart disease (IHD), lung cancer, and pneumonia) measured the 12 months before and after the index date, based on available health plan enrollment.
• Clinical characteristics
• COPD complexity (i.e., high, moderate, or low complexity) based on an algorithm developed by Maip and colleagues2 assessed in the 12 months pre-index date.
• Length of stay of the index inpatient admission.
• Readmission outcomes
• 30-day and 90-day COPD-related readmissions/inpatient admissions with a primary diagnosis of COPD occurring within 30 or 90 days after the index date, respectively.

Data Analysis
• Descriptive statistics were provided for all study measures.
• Means and standard deviations were reported for continuous variables.
• Percentages were reported for categorical variables.
• Logistic regression models were constructed to assess factors associated with COPD-related inpatient readmissions in the 30 and 90 days after index date (separate models for each cohort).
• The dependent variable was a binary indicator for whether the patient had a 30-Day or 90-Day inpatient readmission.
• The independent variables included patient demographics, comorbidities, and clinical characteristics.
• All analyses were conducted using SAS version 9.3 (SAS Institute, Cary, NC, USA).

RESULTS
For the 30-day cohort, 49,896 (13.1%) patients had a COPD-related hospitalization within 30 days of discharge. For the 90-day cohort, 38,241 (12.9%) patients had a COPD-related hospital admission within 90 days.

Across both study groups, stratified by those with and those without an inpatient readmission, the median length of observation time prior to the index date was 365 days.

Patient demographics and clinical characteristics are displayed in Table 2.

Factors associated with a 30-day COPD-related readmission (Table 2): • Increasing LOS (vs. 2–7 days), female age (65+ years, vs. 40–54 years), higher CCI score, comorbidities including asthma, CRE, CRF, and pneumonia, and moderate or severe COPD complexity (vs. low complexity) were associated with significantly higher odds of readmission.
• Residing in the South (vs. Northeast), having a commercial payer (vs. other), and residing in the West (vs. Northeast) were associated with significantly lower odds of readmission.

Factors associated with a 30-day COPD-related readmission (Table 2): • Higher Charlson score (vs. 1), the presence of at least one COPD-related readmission in the 12 months prior to the index date (3–10), residing in the West (vs. Northeast) were associated with significantly higher odds of readmission.
• All-cause mortality (vs. alive), residing in the Northeast (vs. South), residing in the Midwest (vs. Northeast), residing in the West (vs. Northeast), and residing in the East (vs. Northeast) were associated with significantly lower odds of readmission.

LIMITATIONS
• This study is subject to limitations common to retrospective analyses using claims data, including coding errors, diagnoses clustering, and undiagnosed diseases that may also influence outcomes.
• No clinical data or electronic medical records were available to confirm diagnoses or clinical events.
• Because PharMetrics is a database covering a commercially insured population, findings from this study may not be generalizable to patients with COPD in fee-for-service Medicare or Medicaid programs, or other payer types.

CONCLUSIONS
• Long LOS for the initial hospitalization, being elderly, having more complex COPD, and a greater comorbidity burden may contribute to an increased risk of 30-day and 90-day COPD-related readmissions.
• These results provide insights for health-care service organizations to target those likely to be readmitted after a COPD-related hospital admission, enabling appropriate interventions and preventing future costly rehospitalizations.

REFERENCES

FINANCIAL DISCLOSURE
The authors have no financial interests related to the information contained within this manuscript.

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Table 1. Demographics and Clinical Characteristics, by Cohort
Table 2. Factors Associated With 90-Day Inpatient Readmission Among Copd-Patient Subgroups

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