Resource Use and Exacerbations of Chronic Obstructive Pulmonary Disease (COPD) by GOLD Categories

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INTRODUCTION

• Exacerbations of chronic obstructive pulmonary disease (COPD) contribute to the overall disease severity, and can be an important cause of hospital admission.1
• Health care resource use associated with the management of COPD in primary and secondary care has risen substantially in a substantial economic burden borne by national health care systems.2
• In the United Kingdom (UK), COPD is the most common respiratory condition, with an estimated prevalence of 33 cases per 1,000 persons in 2013.3

OBJECTIVE

• To estimate COPD exacerbation rates and to assess primary and secondary care resource utilization in patients with COPD, classified according to the 2013 Global Initiative for Chronic Obstructive Lung Disease (GOLD) severity categories from A, low risk, less symptoms to D: high risk, more symptoms.

METHODS

Study Design

• A retrospective electronic medical records study using data from the Clinical Practice Research Datalink (CPRD) covering approximately 8.5% of the UK population linked to Hospital Episode Statistics (HES), which includes details of all admissions to the National Health Service (NHS) hospitals in England.

Patient Population and Study Period

• Patients registered in a CPRD practice linked to HES, with a diagnosis of COPD identified through Read codes and admissions in their medical record up to the cross-sectional date of 1 January 2011 were included.
• Patients were excluded if they were <40 years old at the time of diagnosis.
• Patients were included in the study prevalent cohort if they were active in 2011 (index date) and had a minimum of 12 months of active data recording history prior to cohort entry.
• Patients were classified into GOLD A 2013 severity groups at index date using records of symptoms and dyspnea assessment available in CPRD and exacerbations defined using information from both primary and secondary care records in the 12 months prior.

Outcomes

• The main outcomes in this study were assessed from index date until end of follow-up (the earliest of death, transfer out of study or December 2013).

Exclusions

• Episodes that occurred within a 21-day time period were identified in both primary and secondary care settings by the following:
  • In primary care:
    • A Read code in the clinical record indicating exacerbations or emergency admission to hospital due to COPD
    • An oral corticosteroid (OCS) and oral antibiotic (OAB) prescription occurring within 21 days
  • In secondary care, exacerbations were defined as a hospitalisation recorded in the HES data with the International Classification of Diseases, Revision 10 (ICD-10) code J44. "Chronic obstructive pulmonary disease with acute exacerbation, unspecified" within the reasons for admission.

Resource Use

• Resource use in primary care included general practitioner (GP) visits (at the surgery, home and telephone consultations)
• Hospitalisations were captured in HES. COPD-related admissions were defined as hospitalisations with at least one diagnosis related to COPD identified through ICD-10 codes (J40.X-J44.X, J47.X-J48.X). All other hospitalisations were classified as non-COPD-related admissions.
• The distribution of comorbidities was similar across severity groups; the most common comorbidity across all categories was hypertension (GOLD A: 34.4%, GOLD B: 33.3%, GOLD C: 34.4%, and GOLD D: 34.7%).

RESULTS

• A total of 44,201 patients with COPD fulfilled the criteria for inclusion in the study cohort.
• Demographics and Clinical Patient Characteristics
  • Baseline demographic and clinical characteristics for the overall COPD cohort and by GOLD category are shown in Table 1.
  • The distribution of comorbidities was similar across severity groups; the most common comorbidity across all categories was hypertension (GOLD A: 34.4%, GOLD B: 33.3%, GOLD C: 34.4%, and GOLD D: 34.7%).

Table 1. Baseline Characteristics of the Overall COPD Cohort and by GOLD Category

<table>
<thead>
<tr>
<th>GOLD Category</th>
<th>N</th>
<th>%</th>
<th>Age (years)</th>
<th>%</th>
<th>Time area diagnoses (months)</th>
<th>%</th>
<th>Females (%)</th>
<th>%</th>
<th>Smoking history (%)</th>
<th>%</th>
<th>Current smoker</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOLD A</td>
<td>4,461</td>
<td>10.0</td>
<td>67.4 (47.4)</td>
<td>38.3</td>
<td>49.2 (39.2)</td>
<td>28.9</td>
<td>5.88 (0.6)</td>
<td>24.3</td>
<td>3.33 (2.6)</td>
<td>7.4</td>
<td>4.69 (2.5)</td>
<td>3.3</td>
</tr>
<tr>
<td>GOLD B</td>
<td>6,619</td>
<td>15.0</td>
<td>64.8 (9.8)</td>
<td>26.7</td>
<td>54.0 (42.3)</td>
<td>28.9</td>
<td>6.86 (1.0)</td>
<td>24.3</td>
<td>3.61 (2.6)</td>
<td>7.4</td>
<td>4.42 (2.5)</td>
<td>3.1</td>
</tr>
<tr>
<td>GOLD C</td>
<td>6,331</td>
<td>14.3</td>
<td>67.4 (47.4)</td>
<td>38.3</td>
<td>49.2 (39.2)</td>
<td>28.9</td>
<td>5.88 (0.6)</td>
<td>24.3</td>
<td>3.33 (2.6)</td>
<td>7.4</td>
<td>4.69 (2.5)</td>
<td>3.3</td>
</tr>
<tr>
<td>GOLD D</td>
<td>26,890</td>
<td>60.7</td>
<td>53.0 (43.9)</td>
<td>20.0</td>
<td>54.0 (42.3)</td>
<td>28.9</td>
<td>6.86 (1.0)</td>
<td>24.3</td>
<td>3.61 (2.6)</td>
<td>7.4</td>
<td>4.42 (2.5)</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Abbr.: SD, standard deviation; GOLD A: low symptoms, low risk; GOLD B: high symptoms, low risk; GOLD C: low symptoms, high risk; GOLD D: high symptoms, high risk

• A total of 17% of patients were unclassified due to incomplete records for dyspnea assessment; mean age at all was 71.4 years, 53.4% were female, and no significant differences in comorbidities were observed compared to GOLD classified patients.

COPD Medication Use

• The use of reliever medication was highest among patients in GOLD A: 15.8% of patients on short-acting beta agonists (SABA).
• The majority of patients in the most severe GOLD D category were on a combination therapy (74.6%); the most frequent combination was long-acting beta agonists (LABA) + long-acting anticholinergics (LAMA) + inhaled corticosteroids (ICS) (29%).
• A total of 22.9% of patients in GOLD D were not on any maintenance medication in the six months prior to index (1 January 2011), compared to only 3.7% in the most severe GOLD D category.

Epidemiology of COPD Exacerbations

• The overall exacerbation rate for all patients for the total follow-up (2011-2013) was 1.4 exacerbations per PY (95% CI: 1.4–1.5).
• Exacerbation rates increased with GOLD severity and over time with a year over year increase of across all GOLD categories (Table 2, Figure 1).

Table 2. Rates of Exacerbations for the Total Follow-up (per PY) by GOLD Category

<table>
<thead>
<tr>
<th>GOLD Category</th>
<th>No. of Patients</th>
<th>Total No. of Exacerbations</th>
<th>Exacerbations per PY (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOLD A</td>
<td>4,461</td>
<td>690,107</td>
<td>1.6 (1.5–1.7)</td>
</tr>
<tr>
<td>GOLD B</td>
<td>6,619</td>
<td>930,298</td>
<td>1.4 (1.3–1.5)</td>
</tr>
<tr>
<td>GOLD C</td>
<td>6,331</td>
<td>810,998</td>
<td>1.3 (1.2–1.4)</td>
</tr>
<tr>
<td>GOLD D</td>
<td>26,890</td>
<td>1,898,838</td>
<td>1.4 (1.3–1.5)</td>
</tr>
</tbody>
</table>

Abbr.: CI, confidence interval; GOLD A: low symptoms, low risk; GOLD B: high symptoms, low risk; GOLD C: low symptoms, high risk; GOLD D: high symptoms, high risk

Figure 1. Annual Rates of Exacerbations at Follow-up (per PY) by GOLD Category

CONCLUSION

• A major strength of the present study was the use of a large database representative of the UK population and the inclusion of secondary care data from HES. This helped improve existing methodology for defining exacerbations in the absence of a standardised way of recording exacerbations, documenting prescriptions and diagnosis records in primary and records of hospital admission in the secondary care setting.
• The lack of complete modified Medical Research Council records for dyspnea assessment did not allow the classification of all patients with COPD into the GOLD 2013 severity categories. Nevertheless, only 17% of patients remained unclassified, and these were found to be comparable in terms of their demographic and clinical characteristics.
• Patients were not classified by GOLD criteria throughout the course of the study which may impact results, especially at later timepoints. However, based on estimates of disease progression it is unlikely that many patients will have transitioned between GOLD classes over the course of the study.6

REFERENCES

6. Sanders DB, Bittner RC, Rosenfeld M, Redding GJ, Goss CH. Pulmonary exacerbations are associated...