Assessment of COPD Severity in the UK CPRD

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DISCLOSURES

Estel Plana, Cristina Rebordosa, Jaume Aguado, Steven Thomas, Susana Perez-Gutthann, and Jordi Castellsague are full-time employees of RTI Health Solutions, which received funding from AstraZeneca to conduct this study. The contract between RTI Health Solutions and the sponsor includes independent publication rights. RTI-HS conducts work for government, public, and private organizations, including pharmaceutical companies. As an RTI-HS employee, Susana Perez-Gutthann has also participated in scientific advisory boards that are funded by pharmaceutical companies.

Esther Garcia Gil is an employee of AstraZeneca, Barcelona, Spain.

BACKGROUND

- Severity of chronic pulmonary obstructive disease (COPD) is an important predictor of COPD outcomes and mortality.

OBJECTIVES

- To evaluate the availability of data on spirometry and symptoms using electronic medical records from the Clinical Practice Research Datalink (CPRD) and Hospital Episodes Statistics (HES) in the United Kingdom (UK).
- To assess and compare the severity of COPD using the GOLD 2016 classification[1] and an adapted algorithm from Verhamme et al.[2]

METHODS

- Cohort study of new users of aclidinium and other COPD medications between 2012 and 2015, aged ≥ 40 years with COPD.
- Severity was classified using the GOLD 2016[1] COPD severity categories (Figure 1) at the time of starting a study drug (start date).
- Severity was also classified using an adaptation of the algorithm proposed by Verhamme et al. (Table 1).[2]

Figure 1. Model of Symptoms/Risk of Evaluation for Severity of COPD[1]

GOLD classification of airflow limitation / Exacerbation history

RISK	COPD Severity Categories		RISK
GOLD 3 or 4 % predicted FEV1 < 50%	C	D	≥ 2 or ≥ 1 leading to hospitalisation
GOLD 1 or 2 % predicted FEV1 ≥ 50%	A	B	≤ 1 and not leading to hospitalisation
	mMRC 0-1 or CAT < 10 or Breathlessness absent	mMRC ≥ 2 or CAT ≥ 10 or Breathlessness present	

CAT = COPD Assessment Test; FEV1 = forced expiratory volume in 1 second; mMRC = modified Medical Research Council.

In some patients, the three ways of assessing risk of exacerbations (% predicted FEV1, exacerbations, hospitalizations) will not lead to the same level of risk; in this case, the risk should be determined by the method indicating the highest risk.

Table 1. Classification of COPD Severity Using an Adaptation of the Algorithm Proposed by Verhamme et al.[2]

Severity of COPD	Definitions
Mild	First recorded diagnosis of COPD with up to two prescriptions within the last 12 months for a bronchodilator of the same drug class[a] with more than 6 months between them
Moderate	On regular bronchodilator treatment, defined as at least two prescriptions or refills of the same drug class with a maximum interval of 6 months within the 12 months prior to the start date
Severe	Occurrence of at least one of the following events within the 12 months prior to the start date: • At least one hospitalisation for COPD • Two or more exacerbations without hospitalisation, each defined by any of the following: – A recorded diagnosis of COPD exacerbation without hospitalisation – A course of antibiotics for respiratory tract infection – A course of systemic oral corticosteroids for the treatment of COPD exacerbation
Very severe	Use of oxygen therapy or scheduled for lung transplant

[a] Classes of COPD medications were defined following the GOLD (2016) classification: (1) bronchodilators: inhaled short-acting muscarinic antagonists (SAMAs) and inhaled long-acting muscarinic antagonists (LAMAs), inhaled short-acting beta2-agonists (SABAs), and inhaled long-acting beta2-agonists (LABAs) or fixed combinations of SABA/SAMA or LAMA/LABA; (2) inhaled glucocorticosteroids (ICSs)—ICS alone, fixed combinations of SABA/ICSs or fixed combinations of LABA/ICSs; (3) systemic oral glucocorticosteroids; (4) xanthines; and (5) PDE4 inhibitors.

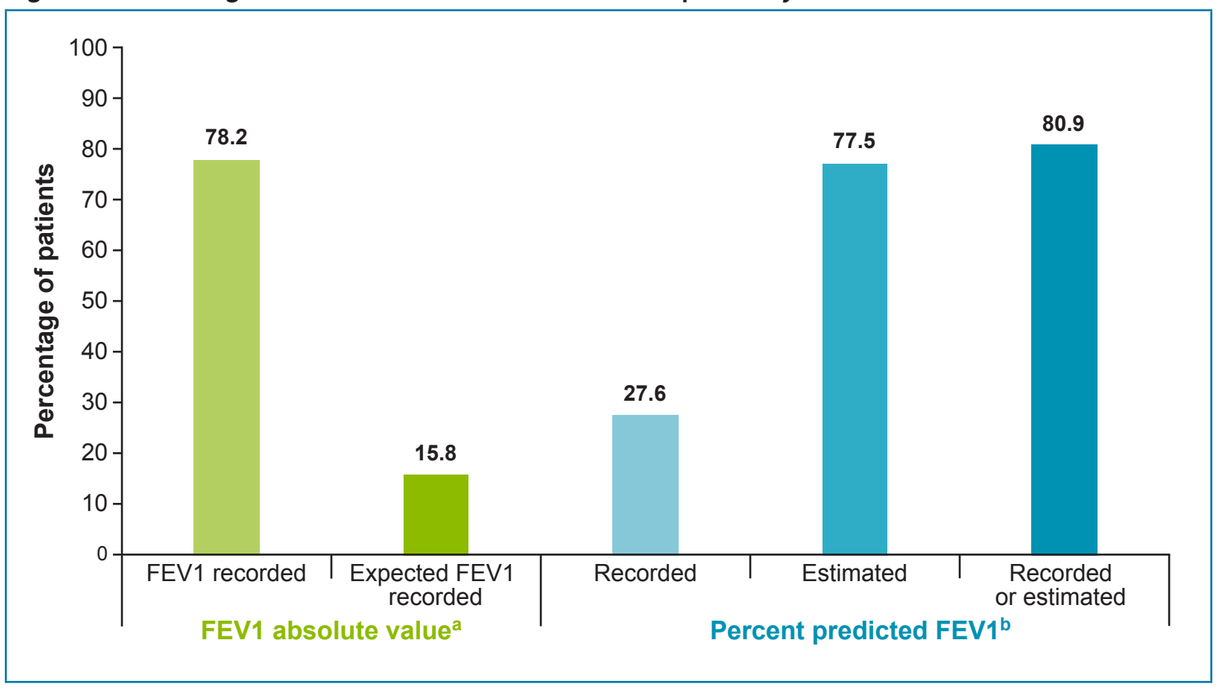
The number of exacerbations during the 12 months prior to the start date was determined by summing the number of exacerbation events occurring in different 21-day exacerbation episodes.

Indicators of severity were mutually exclusive, and patients who fulfilled criteria for more than one category were classified as being in the more severe category.

RESULTS

- The study included 63,900 new users of COPD medications aged ≥ 40 years with COPD.
- The percent predicted FEV1 (recorded or estimated) was available for 80.9% of patients (Figure 2). The kappa statistic, measuring the degree of agreement between the estimated and the recorded percent predicted FEV1, was 0.6216 (standard error, 0.0056) (Figure 3).
- Symptoms (i.e., mMRC, CAT, and breathlessness symptoms) could be assessed in 75.6% of patients (Figure 4) within the year prior to the start date.
- Ethnicity was available in 71.9% of patients using information available in the CPRD primary care database and in the HES. Height was available in 98.7% of patients. Age and sex were available for all patients.
- Information to classify patients into GOLD 2016 categories was available for 75.6% of patients. The Verhame et al. adapted algorithm yielded the same severity category as the GOLD 2016 definition in 36.2% of patients. The GOLD 2016 definition classified more patients in the high-risk categories (59.2% GOLD C/D) than the algorithm adapted from Verhamme et al.[2] (43.5% severe/very severe) (Figure 5).

Figure 2. Percentage of Patients With Available Data on Spirometry Values



[a] Expected FEV1 based on age, sex, height, and ethnicity, as provided by spirometry test. Ascertained through Read code 339P.00 "Expected FEV1."

[b] The percent predicted FEV1 was defined based on the most recent spirometry data on percent predicted FEV1, expected FEV1, and actual FEV1 within 5 years prior to the start date. When data on percent predicted FEV1 were not available, the percent predicted FEV1 was calculated as follows: percent predicted FEV1 = (FEV1 measurement/expected FEV1) × 100, using expected and measured FEV1 recorded closest to the start date within 5 years prior. When no data on expected FEV1 were recorded, the percent predicted FEV1 was calculated by applying the Global Lungs Initiative European Respiratory Society Task Force (TF 2009-03) formulas based on the measured FEV1, age, sex, height, and ethnicity.[3]

Figure 3. Agreement Between Estimated and Recorded Percent Predicted FEV1 Values

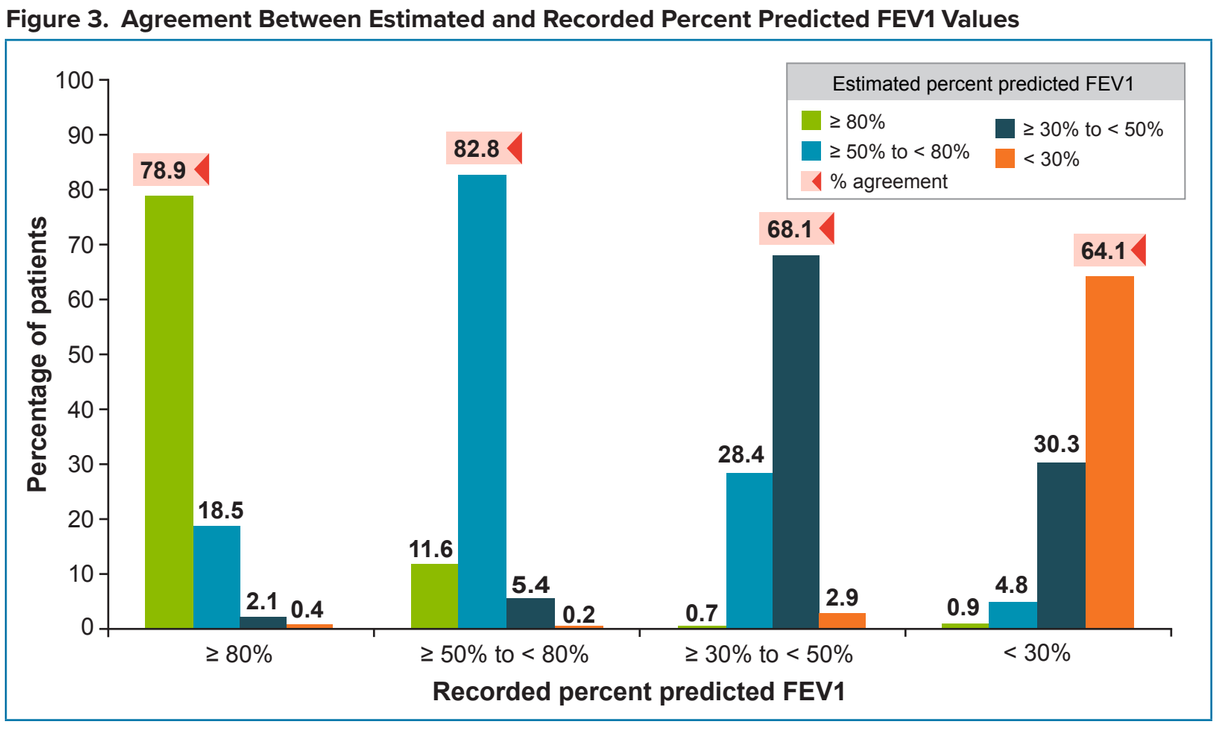


Figure 4. Percentage of Patients With Available Data on Symptoms in the 12 Months Before Start Date

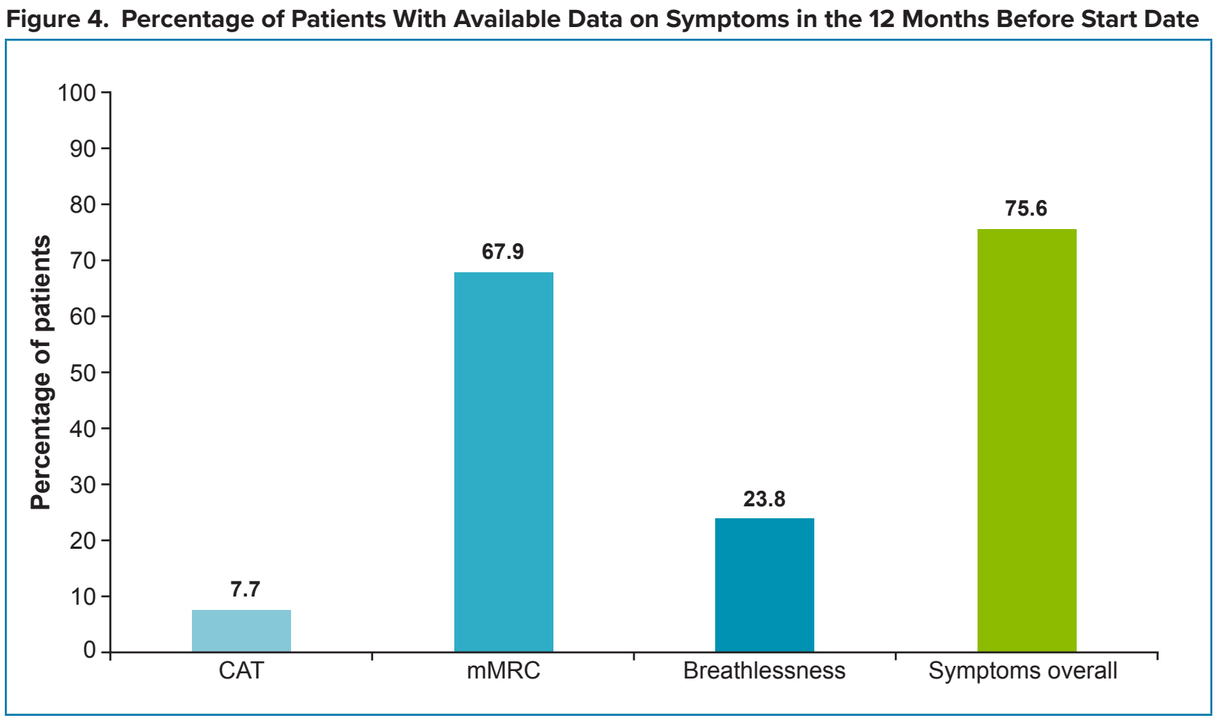
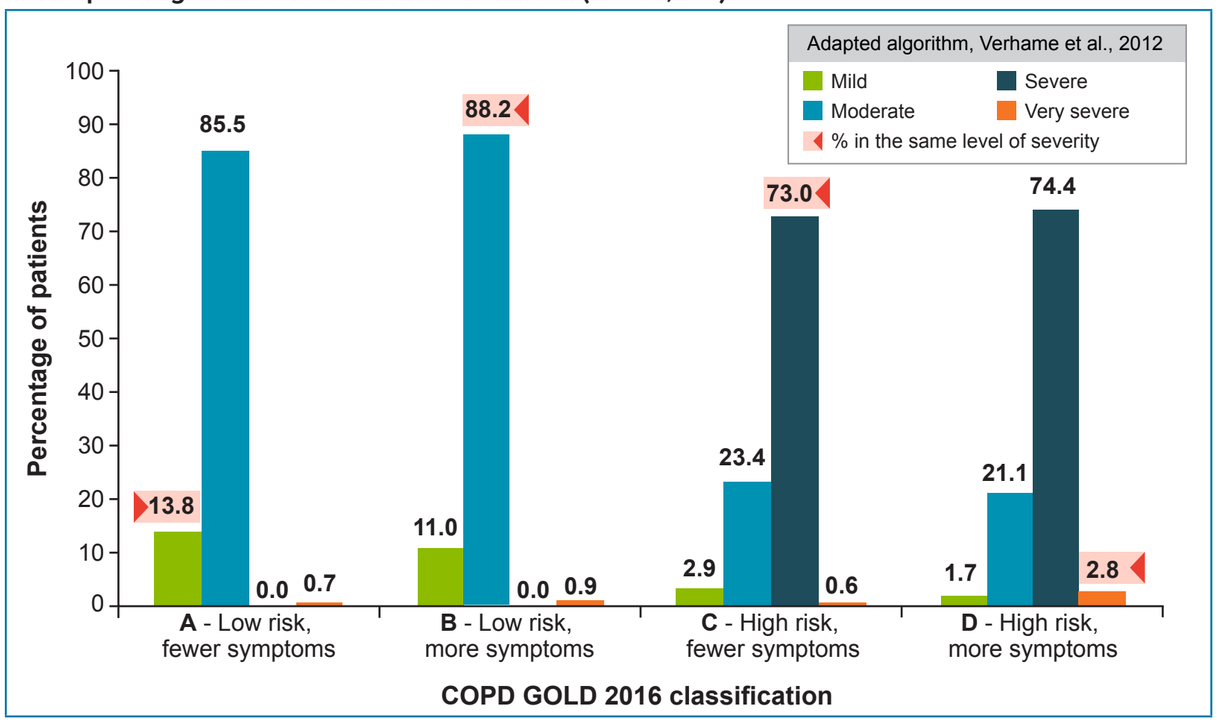


Figure 5. Percentage of Patients Classified Into Each Category of COPD Severity Using the Verhame et al. Adapted Algorithm and GOLD 2016 Definition (N = 48,285)



CONCLUSIONS

- In the CPRD, approximately three-quarters of patients with COPD had recorded data on spirometry and symptoms that can be used to assess COPD severity using the GOLD 2016 definition.
- The value of the estimated percent predicted FEV1 was slightly underestimated, especially in the lower percent predicted FEV1 categories.
- The adaptation of the algorithm proposed by Verhamme et al.[2] can be used in patients with missing information on spirometry or symptoms, although it may underestimate the prevalence of more severe COPD compared to the GOLD 2016 classification.[1]

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