

The Risk of Fall in Patients with Chronic Obstructive Pulmonary Disease (COPD)

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Abstract

A matched cohort study was conducted to determine the incidence of falls in patients following a diagnosis of chronic obstructive pulmonary disease (COPD) using a UK primary care database. 44,400 COPD patients and 175,545 non-COPD subjects were identified. The incidence rate of fall per 1000 person years in COPD patients was higher (44.9;95%CI 44.1-45.8) compared to non-COPD subjects (24.1;95%CI 23.8-24.5), $P < 0.0001$. COPD patients were 55% more likely to have an incident record of fall than non-COPD subjects (adjusted hazard ratio, 1.55; 95% CI, 1.50 to 1.59). The greater falls risk in patients with COPD needs consideration and modifiable factors addressed.

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Introduction

The morbidity and mortality associated with chronic obstructive pulmonary disease (COPD) pose a public health challenge with a high economic burden.[1] The prevalence of falls has been reported to be greater among COPD patients.[2] Two previous small studies, both <100 subjects, reported almost half of the patients had fallen in the preceding year.[3, 4]

Risk of falls usually encompasses the complex interaction of several risk factors;[5] some of which are common, if not more problematic in COPD patients, including impaired balance control and skeletal muscle dysfunction.[3, 6] There is little consideration of falls risk in COPD in guidelines. [5, 7] The purpose of this study was to determine the incidence of coded recording of a fall in patients following a diagnosis of COPD in a matched cohort study within The Health Improvement Network (THIN) primary care database in the United Kingdom.

Methods

The study population comprised individuals aged ≥ 35 years who had a new diagnosis of COPD between 1st of January 2000 and 4th of May 2014. The index date was the date of the first recorded COPD diagnosis. Up to four non-COPD individuals were matched with each patient with COPD based on sex, age within one year of the index date, and general practice and were assigned the same index date as their matched cases.

Potential confounders included age (<65, 65-79, ≥ 80 years old), gender, and socioeconomic status (quintile of the Townsend Index of Deprivation). Clinical covariates included: most recent body mass index (BMI) categorized as (BMI ≤ 20 , BMI > 20 kg/m² or missing), most recent cigarette smoking status (never, ex-smoker, smoker, unknown), history of any of the following fall risk factors before the index date including but not limited to sight impairment, depression, cerebrovascular accident, heart failure, peripheral vascular disease (PVD), coronary heart disease (CHD), arrhythmia, dizziness, and dementia.[5] Recorded

medications, that were considered as fall risk factor were also identified; these included but not limited to sedatives, diuretics, and antidepressants.[5] More detail is described in Online supplement (OLS). Medication episodes were constructed for each participant, and the exposure time was divided into periods of non-exposed periods and exposed periods. Exposed periods were started from the medication dispensing date until the first gap of more than 90 days between prescriptions. Medications started within 90 days prior to the index date were considered within the exposed period. Records of medications initiated more than 90 days prior to the index date were not considered in the analysis.

The demographic and clinical characteristics of the COPD patients and non-COPD subjects were examined using chi-square tests. The first recorded fall event following the index date was considered. Multivariable Cox proportional hazard model were used to evaluate the association between COPD and fall, as well as a complete case analysis. Person-time commenced at the index date and ended when a fall was experienced or when patients died or left a contributing general practice, whichever occurred first. Each of the confounders that changed the association between fall and COPD by 5% were included in multivariate Cox regression model, which allowed for the match cohort. Data management and statistical analysis were performed using Stata version 13 (Statacorp, College Station, TX, USA).

Results

44,400 patients diagnosed with COPD and 175,545 non-COPD subjects were included. Similar median follow up time for COPD and non-COPD, (median 4.2 years; IQR 1.8-7.4 and 4.1 years; IQR 1.7 to 7.5, respectively). The clinical features of the study population are presented in Table 1 (Further detail in OLS). The population had a mean (SD) age of 66.8 (11.4) years, and 53% were men. 37% of COPD patients were current smokers as were 15% of the non-COPD subjects. 10,646 (24%) COPD patients had a doctor recorded fall after the index date, compared to 22,117 (12%) of the non-COPD subjects. The incidence rate of fall

in COPD patients was 44.9 per 1000 person-years, (95% CI 44.1 to 45.8) and in non-COPD subjects was 24.1 per 1000 person-years (95% CI 23.8 to 24.5). The time to first recorded fall was significantly different between the COPD patients and non-COPD subjects ($p < 0.0001$). [Figure 1] COPD patients were 47% more likely to have a record of incidence of fall than non-COPD subjects (adjusted hazard ratio (aHR), 1.47; 95% CI, 1.43 to 1.51), after adjusting for smoking status, use of antidepressants and diuretics. In the complete case analysis the results were similar ($n = 39,681$ COPD Vs $144,058$ Non-COPD, aHR 1.55; 95% CI, 1.50 to 1.59) after adjusting for the same confounders.

Discussion

The coded incidence rate of falls was significantly greater among COPD patients compared to non-COPD subjects from the THIN primary care database, even after consideration of adjustment for age, gender and other confounding factors. This was the first study that investigated the incidence of falls in COPD patients and which considered other fall risk factors.

A number of factors likely to contribute to falls in the elderly are of even more relevance in patients with COPD. These include impaired balance and skeletal muscle dysfunction, [8 9] but might also include cognition, tremulousness and vision, and skeletal muscle dysfunction.[5, 7] Given the high incidence of fall in COPD and the consequences of falls on mobility, quality of life, and injury-related mortality,[10] assessment of falls risk is important to identify modifiable factors.

A strength of this study is this primary care data is large, representative sample cohort of COPD patients within the UK. However, the actual incidence of falls might be underestimated because of the possibility that patients who experienced minor fall may not have reported to the GP, and some incidence might be not recorded or recorded as free text. Another limitation, this study is based on READ coded COPD diagnosis. READ coded

spirometry confirmation at time of diagnosis is not consistently available. Finally, this analysis focused on the first recorded fall and does not consider repeat falls for the same patient.

To conclude, the study demonstrated an increased risk of recorded falls in patients with incident diagnosis of COPD. Further falls risk assessment might be indicated in COPD patients with opportunity to address modifiable factors.

LEGEND

[Figure 1] Kaplan-Meier analysis of incidence of time to first fall in patients with COPD and non-COPD.

Table 1. Baseline characteristics of COPD patients and non-COPD subjects.

Characteristics	COPD n=44,400	Non-COPD n=175,545
Age at diagnosis mean(SD) years	67.1 (11.4)	66.8 (11.4)
Gender n(%)		
Male	23,509 (52.9)	92,981 (52.9)
Female	20,891 (47.1)	82,564 (47.1)
Townsend Quintile n(%)		
1 least deprived	6,890 (15.5)	39,167 (22.3)
2	7,585 (17.1)	37,957 (21.6)
3	8,937 (20.1)	34,992 (19.9)
4	10,297 (23.1)	32,518 (18.5)
5 most deprived	9,222 (20.7)	24,787 (14.1)
Not recorded	1,472 (3.3)	6,124 (3.5)
Most recent smoking status n(%)		
Never	4,773 (10.7)	84,184 (47.9)
Ex	21,983 (49.5)	55,599 (31.7)
Current	16,497 (37.1)	27,349 (15.6)
Not recorded	1,147 (2.5)	8,424 (4.7)
Most recent BMI n(%)		
≤ 20 kg/m ²	5,578 (12.5)	9,541 (5.4)
>20 kg/m ²	36,722 (82.7)	149,065 (84.8)
Not recorded	2,100 (4.7)	16,939 (9.6)
Abbreviations: BMI: body mass index;		

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