

Emergency Department Revisit Rate of Chronic Obstructive Pulmonary Disease Patients On Oral Corticosteroids: An Observational Study

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ABSTRACT

Studies report inconclusive results regarding the efficacy of oral corticosteroids to reduce the risk of re-visiting the Emergency Department (ED). The aim of this was to compare between COPD patients who received oral corticosteroids and re-admitted to the ED earlier than 60 days. An observational study was conducted at the ED from 2016 to 2018. A cohort of adult COPD patients, who received oral corticosteroids was assessed for any ED re-visit due to a COPD exacerbation. A total of 325 COPD patients included the study, 71% had no subsequent ED visit, and 94 (28%) patients had a repeat ED visit due to a COPD exacerbation. Of this ED re-visit group, 61% was within 60 days. The ED re-visit within 60 days group was more likely to have cardiovascular disease than the group with an ED re-visit after 60 days (51% vs. 45%, p-value 0.64). The use of oral corticosteroids could potentially reduce the severity of COPD exacerbation and ED re-visits.

KEYWORDS: CHRONIC OBSTRUCTIVE PULMONARY DISEASE, EXACERBATION, ORAL CORTICOSTEROIDS.

INTRODUCTION

The Global Initiative for Chronic Obstructive Lung Disease (GOLD) (2022) reported that chronic obstructive pulmonary disease (COPD) could be the 3rd leading cause of mortality by 2021 (Almagro et al. 2002; Criner and Han 2018; Kim and Aaron 2018; Global Initiative for Chronic Obstructive Lung Disease 2022). Exacerbations of COPD are important events that negatively influence the patient's health status, the quality of life, and the hospital admission rate (Alamoudi 2006; Mannino and Buist 2007; Simmering et al. 2016). As a COPD exacerbation is complex and challenging to manage, it is crucial to identify the risk factors as this has significant implications. Many studies identified risk factors associated with a COPD exacerbation; however, little evidence is available regarding the risk factors for emergency department (ED) readmission (Parekh et al. 2014; Erezaee et al. 2018; Bogart et al. 2020; Shin 2021). Based on the literature, 10% of the COPD patients discharged from

hospital, were readmitted within 30-60 days, with more complications associated with mortality (Baker, Zou and Su 2013; Qahtani et al. 2017; Erezaee et al. 2018; Liao et al. 2018; Shin 2021).

There is a growing body of evidence regarding practical guidelines to reduce readmission and the factors that could contribute to reduce the risk of hospital readmission (Woods et al. 2014; Zafari 2021). Several studies examined the effect of prescribing oral steroids and subsequent hospital re-admission (Baker, Zou and Su 2013; Stefan et al. 2013; Woods et al. 2014; Simmering et al. 2016; Moran and Pavord 2020). The use of oral corticosteroids is recognized to relieve symptoms and exacerbations of the disease. In addition, randomized control trials provided evidence of short-term improvement in the symptoms of COPD exacerbation and pulmonary function (Lindenauer et al. 2010; Woods et al. 2014; Kim and Aaron 2018). However, evidence is still required regarding the effect of using oral steroids in reducing emergency re-visits. Thus, many studies have reported higher ED re-visit rates, ranging from 60% to 82% (Fidahussein et al. 2014; Erezaee et al. 2018; Zafari 2021). Some evidence did not focus on COPD patients who

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received oral corticosteroids. This study, therefore, aimed to identify a cohort of COPD patients who received oral corticosteroid and compare ED re-admission rate earlier than 60 days and ED re-admission rate after 60 days.

MATERIAL AND METHODS

A retrospective cohort study was conducted with all patients who presented with a COPD exacerbation at the ED of King Abdulaziz Medical City in Riyadh from 2016 to 2018. The inclusion criteria were middle-aged (>40 years old) patients with at least one month of active records in KAMC, and discharged from the hospital with an index diagnosis of COPD exacerbation or presented at the ED due to a COPD exacerbation. The International Classification of Diseases (ICD-10) were used to identify patients with COPD with acute exacerbation (ICD-10 code J44.1). The date of admission or ED visit was considered the index date. Of this group of patients, we identified a cohort who received a prescription for an oral corticosteroid, through the prescription data linked to the patient's electronic medical file. This cohort was assessed for any ED re-visit due to an exacerbation of COPD.

We excluded COPD patients who received oral corticosteroids for other diseases, such as rheumatoid arthritis, anaphylaxis, or angioedema. The main outcome of this study was an ED re-visit within 60 days of discharge

from the index date. The re-visit was identified as an admission in the ED due to shortness of breath or shallow, labored breathing, and coughing. Due to the possibility of multiple COPD-related ED re-visits during the study period, we focused only on the first ED re-visit after the index date. Each patient's clinical and demographic variables were retrieved from their electronic medical file. This included age (categorized into ≤65, 66-75, ≥75), gender, body mass index (BMI)(categorized into normal, overweight, and obese), comorbidities (diabetes mellitus, cardiovascular diseases, stroke, or hypertension), type of oral corticosteroid prescribed, and admission/discharge date. Descriptive statistics were used to analyze the data.

Continuous variables, if normally distributed, are presented as the mean and standard deviation or by median and interquartile range if not, and the categorical variables as the proportion. We calculated the frequency and proportions of the groups with an ED re-visit within or after 60 days, and compared the two groups in relation to the demographic and clinical variables using a chi-square test or Fischer exact test as appropriate. A p-value of less than 0.05 was considered significant. All analyses were performed using STATA 15. Patients with missing covariates were excluded from conducting a complete case analysis. This research was approved by the Institutional Research Board of King Abdullah International Medical Research Center and registered with protocol number SP19/173/R.

Table 1. Demographic characteristics of COPD patients treated with oral corticosteroids with an ER visit within and after 60 days

Characteristics	All patients N=94 (%)	Patients with an ED re-visit > 60 days N= 58(%)	Patients with an ED re-visit < 60 days N=36(%)	P-value*
Age category				0.45
≤65 year	14(15)	8(13)	6(17)	0.33
66-75 year	34(37)	19(33)	15(42)	
≥75 year	45(48)	31(53)	14(40)	
Gender				0.12
Male	36(38)	20(34)	16(44)	
Female	58(62)	38(66)	20(56)	
Body Mass Index(BMI)				0.12
Underweight	22(23)	18(31)	4(11)	
Normal	21(22)	10(17)	11(30)	
Overweight	22(23)	13(23)	9(25)	
Obese	29(31)	17(29)	12(33)	

* p-values were obtained using chi-square tests or Fisher's exact tests (for numbers less than five in each group). P<0.05 was considered as significant.

RESULTS AND DISCUSSION

A total of 325 COPD patients presented at the ED with a COPD exacerbation and received a prescription for an oral corticosteroid on the index date. The mean age was 72 ± 15 years, and 64% were female. Of this cohort, 28% (n=94)

re-visited the ED due to a COPD exacerbation during the study period. The median time between the first ED visit and the ED re-visit was 3 months (IQR 1–6 months). The mean age of this group was 75 ± 10 years, and 62% were female. Shortness of breath was the most frequent symptom (82%). Prednisolone was the most frequently prescribed oral

corticosteroid (93%), followed by hydrocortisone (3%). Of the 94 patients, 38% (n=36) had an ED re-visit within 60 days and 61% (n=58) after 60 days.

Table 1 demonstrates the demographic characteristics of the cohort with COPD with an ED re-visit. Compared with the after 60-day ED re-visit group, the group who re-visited within 60 days was younger (13% < 65 years vs. 17% < 65 years respectively, which was not significant). In terms of BMI, 29% of the after 60 days group were in the obese category compared to 33% in the within 60 days group. The difference was not significant.

Table 2 demonstrates the clinical characteristics of this cohort. The within 60 days group were more likely to have cardiovascular diseases (51% vs. 46%, p-value=0.64) compared to after 60 days group. The proportion of ED re-visits in the current study is consistent with similar studies, reporting rates of 16% to 24%. However, other studies reported a higher ED re-visit rate, ranging from 60% to 82% (Lindenauer et al. 2010; Fidahussein et al. 2014; Parekh et al. 2014; Shirakawa 2021).

Another study reported that 1 in 11 COPD patients is hospitalized within 30 days after discharge, highlighting the presence of important risk factors for early hospital readmission. The difference may be due to the studies investigating the ED re-visit rate for all COPD patients and within 30 days from the index date. The current study focused on COPD patients with an exacerbation

who received an oral corticosteroid, as the aim was to determine the effect of the oral steroid on the re-visit rate, hospital admission, and healthcare cost (Erezaee et al. 2018; Shirakawa 2021). For COPD patients, ED re-visits occur frequently and many studies focused on the identification and mitigation of the associated risk factors (Decramer and Janssens 2013). The severity and progression of the disease, with the presence of comorbidities, have a direct impact on the ED re-visit rate and length of hospital stay. In the current study, cardiovascular comorbidity was higher in the group re-visiting within 60 days compared to the counter group. This finding was consistent with previous studies (Shirakawa 2021).

The prescription of oral corticosteroid for the treatment of an acute exacerbation of COPD is recommended in many guidelines (Global Initiative for Chronic Obstructive Lung Disease 2022); however, its efficacy in reducing the ED re-visit rate is still debated (Parekh, et al. 2014; Woods et al. 2014; Erezaee et al. 2018; Colak 2021). Many studies recommended using the ED as a potential setting to implement re-admission reduction strategies for COPD patients. The studies support targeting subgroups of patients with severe and unstable COPD to reduce the overall ED re-visit rate and hospital re-admission. The finding of the current study is in agreement with this point as we restricted the sample to patients with COPD who presented at the ED with an exacerbation, and a relatively small proportion (28%) had an ED re-visit within the study period (Colak 2021).

Table 2. Clinical comorbidity of COPD patients treated with oral corticosteroids with an ED visit within or after 60 days

Characteristics	All patients N=94 (%)	Patients with an ED re-visit > 60 days N= 58(%)	Patients with an ED re-visit < 60 days N=36(%)	P-value*
Diabetes mellitus				0.41
No	35(38)	20(34)	15(43)	0.64
Yes	58(62)	38(65)	20(57)	
Cardiovascular disease				0.64
No	48(52)	31(53)	17(49)	
Yes	45(48)	27(46)	18(51)	
Hypertension				0.94
No	13(14)	8(14)	5(14)	
Yes	80(86)	50(86)	30(85)	
Stroke				0.40
No	88(95)	54(93)	34(97)	
Yes	5(5)	4(7)	1(3)	

* p-values were obtained using chi-square tests or Fisher's exact tests (for numbers less than five in each group). P<0.05 was considered as significant.

The main strength of this study is that we were able to identify the second visit of the COPD patients through the electronic medical files, using a valid diagnosis, which reduces misclassification bias. However, there are some limitations that may affect the generalizability of

the results. Though we collected information regarding the comorbidities of the cohort, many other factors, such as underlying disease activity, the burden of other comorbidities, the number of rehospitalizations in the stated period, and current medication were not collected, which

may influence the result of the study. Patients may also have had a previous visit to the ED before the start date of the study, which may affect the re-admission risk of the cohort. Further studies could be directed to identify the effect of such variables in exploring the association between the prescription of oral corticosteroids and ED re-admission (Colak 2021).

CONCLUSION

The findings of the present study aimed to estimate the 60 days ED re-visit rate of COPD patients with an exacerbation who received oral corticosteroids in their initial visit. The re-visit rate was 28% of the patients, and of this group, 38% re-visited the ED within 60 days, providing evidence of a low ED re-visit rate. Reviewing the management plan for COPD patients presenting at the ED, an improved treatment strategy is required to reduce the risk of readmission, reducing the healthcare cost as well as improving the patient's quality of life.

Conflicts of Interests: Author declare no conflict of interests to disclose.

Ethical Clearance Statement: This study was approved by the IRB office of King Abdullah International medical centre, study number SP19-173-R.

Data Availability Statement: The database generated and /or analysed during the current study are not publicly available due to privacy, but are available from the corresponding author on reasonable request.

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