Out-of-pocket Healthcare Costs of COPD Exacerbation Episodes: A Hidden Cost and Growing Strain on Family Budgets

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Authors' contributions

This work was carried out in collaboration among all authors. Authors MSI, and FIA designed the study, performed the initial statistical analyses and wrote the protocol. Author MZI wrote the first draft of the manuscript. Authors MSI and MZI managed refined analyses. Authors FIA and MSI revised the manuscript. All authors read and approved the final manuscript.

Article Information

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ABSTRACT

Introduction: Acute exacerbation of chronic obstructive pulmonary disease (AECOPD) appears to be the main reason for hospitalization among chronic obstructive pulmonary disease (COPD) patients. This study aimed to evaluate the substantial economic burden of COPD in terms of out-of-pocket costs (OOPCs) among COPD patients.
Methods: This study consisted of 67 consenting patients with AECOPD. A cross-sectional study was performed via convenience sampling. Data were gathered based on per episode of exacerbation and the calculation of OOPCs was done based on direct and indirect costs.
Results: This study showed that the mean length of hospital stay for four severity levels (according to GOLD guidelines) was 3.4, 7.2, 10.3 and 14.1 days, respectively. The mean OOPCs per episode of exacerbation according to the severity level were 139.1, 153.3, 171.4 and 365.8 USD, respectively.

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Conclusion: Impacts of OOPCs regarding AECOPD episodes on healthcare resources are worthy of attention. Cost estimation from patients' perspective especially OOPCs estimation is important in decision and policy-making to improve healthcare states of a population.

Keywords: Cost; exacerbation; AECOPD; OOPCs; pharmacoeconomics.

1. INTRODUCTION

In pharmacy practice, the pharmacoeconomic evaluation represents the estimation of costs of a drug or a disease in different aspects, like determining, calculating, and comparing risks with benefits of a program, service provided, or pharmacotherapies [1]. Pharmacoeconomic studies are vital for proper healthcare planning and the allocation of healthcare budgets because they help in identifying which best alternate produces the preeminent health outcomes for a specific drug or disease against the resources used [1,2]. The basic concept behind pharmacoeconomics' evaluations is how to appropriately manage and utilize the best financial resources wisely and precisely to fulfill the needs of patients or a disease outcome within the available resources [2]. COPD is an irreversible chronic lung disorder obstructing lung airflow that severely interferes with normal breathing. Nowadays, two earlier famous terms emphysema and chronic bronchitis are included and studied under COPD diagnosis and treatment [3].

COPD, a silent killer is currently a leading cause of deaths (more than 90%) in low and middle-income countries and is a continuous growing strain on their healthcare budgets [3-6]. Presently, COPD is the fourth leading cause of mortality worldwide but according to the World Health Organisation (WHO), it is expected to be the third leading cause of death by 2020 [6,7]. Expenses of COPD management are expressively higher where around 18% and 85% are of the direct medical costs for prolonged medication therapy and AECOPD [8]. According to Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines, the classification of COPD is mainly based on the severity of airflow limitation (ranged from FEV1≥ 80% to <30%) and categorized into four different stages called GOLD 1, GOLD 2, GOLD 3 and GOLD 4 [9]. According to the WHO, approximately 68 million COPD patients fall in the range of GOLD 1 to GOLD 3 with more than a million casualties each year [10].

In Pakistan, healthcare facilities are mainly delivered through a wider network of primary healthcare centers named basic healthcare units at town or union council level, sub-district (tehsil), and district levels [11,12]. Though these primary and secondary level healthcare setups are government-funded but sometimes due to few reasons patients have to spend money from their own pockets. There are two main types of costs usually investigated i.e. direct costs and indirect costs. Direct costs are further categorized into direct medical costs and direct non-medical costs and indirect costs are the costs which are borne by the patients in terms of loss of income due to absenteeism from work.

OOPCs are the costs that are borne by the patients and are not covered by the government or the insurance companies. These could be both medical or non-medical and direct or indirect. OOPCs mainly included the costs of outside lab investigation (if not provided within the hospital), travel for outside lab investigation, costs of transportation, food (for patients and their caregivers), traditional medicines (not available in the hospitals), and patients' and caregivers income lost (absenteeism from work) [13]. Recent studies reported that the cost of AECOPD was estimated to be 718 USD Turkey, 89.75 USD South India, 1571 USD in Greece and 2319 USD in Poland respectively [14-17]. To date, there is no information available about OOPCs among AECOPD patients in Pakistan. This study aimed to estimate and identify OOPCs per episode of AECOPD among COPD patients.

2. MATERIALS AND METHODS

A cross-sectional study was conducted among AECOPD patients admitted to a public hospital by using a convenient sampling method. A research tool was developed according to the study objectives and local settings to achieve the desired outcomes. It was validated by the face and content validation process and its reliability was confirmed by Cronbach's alpha which was 0.773. Eligible consenting patients were stratified based on disease severity in the presence of any combination of the following symptoms: increased dyspnea, and increased volume and

purulence of sputum as recommended by the GOLD guidelines [7]. All patients diagnosed with cystic fibrosis, asthma, eosinophilic lung disease, bronchiectasis, tuberculosis, evidence of pregnancy, and lactation either at presentation or during follow-up were excluded from the study. Statistical Package for Social Science (SPSS) version 22 was used to analyze the data. Data were also tested for normality distribution and expressed in the mean + and n% using descriptive statistics.

In pharmacoeconomics analysis, regarding patient perspective, OOPCs i.e. costs of outside lab investigation (if not provided within the hospital), travel for outside lab investigation, costs of transportation, food (for patients and their caregivers), traditional medicines (not provided in the hospitals), and patients' and caregivers income lost (absenteeism from work) were calculated as informed by the patients or their caregivers, if they were unable to do so. Expenditures were calculated in Pakistan Rupees (PKR) which were converted to United States Dollar (USD) according to the conversion rate at the time of the study (1 USD = 140 PKR).

3. RESULTS

Summary of demographic details and clinical characteristics of the patients are presented in Table 1. The majority of the AECOPD patients were male (92.6%), with a mean age of 62.8 ± 11.8 years, working (77.6%), and smokers (94%). Only 6% of the patients had never smoked in the past. The mean length of hospital stay for each severity level i.e. GOLD 1, GOLD 2, GOLD 3, and GOLD 4 were 3.4, 7.2, 10.3, and 14.1 days, respectively. Age, gender, comorbidities, and smoking habits played an enhancing role in the AECOPD episodes, as older people with more comorbidities (possibly) would have more chances of AECOPD as compared to the youngsters or patients without any comorbidity.

The summary of drug therapy for AECOPD patients is presented in Table 2. A high proportion of patients were receiving inhaled β-agonists (53.7%), a combination of β-agonists and anticholinergics (65.6%), oral corticosteroids (68.6%), parenteral corticosteroids (46.2%) and antibiotics (52.2%).

Table 1. Patients' characteristics (n = 67)

Patients' characteristics	Gold 1 N = 10	Gold 2 N = 29	Gold 3 N = 21	Gold 4 N = 7
Age (in years, mean, (SD))	51.4 (11.2)	58.1 (9.9)	64.3 (13.3)	77.5 (12.9)
Men (n, (%))	9 (90)	27 (93.1)	20 (95.2)	6 (85.7)
Working (n, (%))	10 (100)	22 (75.9)	18 (85.7)	2 (28.5)
Smokers (n, (%))	10 (100)	27 (93.1)	20 (95.2)	6 (85.7)
Hypertension (n,(%))	5 (50)	8 (27.6)	15 (71.4)	4 (57.1)
Diabetes mellitus (n, (%))	2 (20)	6 (20.7)	3 (14.3)	7 (100)
Dyslipidemia (n, (%))	1 (10)	2 (6.9)	1 (4.8)	2 (28.5)
Other co-morbidities (n, (%))	4 (40)	8 (27.6)	12 (57.1)	2 (28.5)
Length of hospital stay (in days, mean,(SD))	3.4 (8.8)	7.2 (1.6)	10.3 (3.5)	14.1 (6.4)

Table 2. Patients' drug therapy during AECOPD

Categories	N (%)
β-agonists (Parenteral)	4 (5.9)
β-agonists (Inhaler)	36 (53.7)
β-agonists (Oral)	2 (2.9)
Anticholinergics	10 (14.9)
Corticosteroids (Parenteral)	31 (46.2)
Corticosteroids (Inhaler)	11 (16.4)
Corticosteroids (Oral)	46 (68.6)
Combination of β-agonist and anticholinergics	44 (65.6)
Combination of β-agonist and corticosteroids	12 (17.9)
Methylxanthines	15 (22.3)
Antibiotics	35 (52.2)
Mucolytics	11 (16.4)
Antihistamines	8 (11.9)

Table 3. OOPCs among AECOPD patients according to severity level

COPD classification	Number of patients (%)	Direct medical and non-medical costs						Indirect costs		Total costs per episode
		Outside lab investigation	Travel for outside lab investigation	Transportation (to and fro)	Food cost for patient	Food cost for caregivers	Traditional medicine	Patient income lost (absenteeism from work)	Caregivers income lost (absenteeism from work)	Total OOPCs
GOLD 1	10 (14.9)	5.2	4.8	6.8	2.1	2.4	0	92.5	25.3	139.1
GOLD 2	29 (43.3)	3.9	6.3	6.3	2.2	2.7	4.1	106.6	21.2	153.3
GOLD 3	21 (31.3)	4.6	5.5	7.5	3.4	3.2	3.5	132.3	11.4	171.4
GOLD 4	7 (10.5)	3.2	4.5	4.5	2.7	3.9	2.1	322.2	22.7	365.8

All values are in mean and for per episode of AECOPD

Analysis of OOPCs for patient perspectives, according to each grade of exacerbation as described by GOLD guidelines are presented in Table 3. The mean OOPCs per episode of exacerbation according to the severity level i.e. GOLD 1, GOLD 2, GOLD 3, and GOLD 4 were 139.1, 153.3, 171.4 and 365.8 USD, respectively with an overall mean of 207.4 USD.

4. DISCUSSION AND CONCLUSION

The costs of AECOPD were highly skewed among all severity levels as shown in all disease severity categories. Since AECOPD is the main cause of hospitalization, its OOPC significantly contributed to the largest proportion of total direct medical costs in COPD care [18,19]. A key finding of the present study revealed that most of the patients were male, ex- or active smokers. This was in accordance with the findings of the Global Adult Tobacco Survey (GATS) that COPD is more prevalent among males than females [20]. This study findings also confirm the concept that COPD is a disease of prolonged smokers [21].

Recent studies reported that the overall cost of AECOPD was 718 USD and 89.75 USD in Turkey and South India respectively [14,16]. The overall cost of treating AECOPD is higher in Pakistan compared to South India. However, this is not the case when comparing Pakistan and Turkey. Additionally, Greece and Poland had the cost of AECOPD estimated at 1571 USD and 2319 USD respectively [5,17]. But in our study, we only determined OOPCs to treat per episode of AECOPD, not the overall costs as discussed in the majority of the studies. There is also an existence of high variability among the costs of AECOPD estimates among numerous international studies which are because of methodological differences, the overall organizational structure of the healthcare systems, degree of development, and factors related to the economic status of the countries. Another explanation may be that some studies are estimated based on epidemiological data and healthcare databases.

These differences in the findings of our study may be due to the overall socio-economic status of the public and the countries are different where the other studies were conducted. For example, the gross national income (per capita) of Pakistan is much less than the United States, Malaysia, and Thailand [22-24] where patients also receive some financial protection through health insurance schemes (private or government) which are currently at a very early stage in Pakistan.

One of the remarkable findings of the present study is the OOPCs were highly correlated with disease severity. These findings are in keeping with studies conducted in Sweden, Greece, and China indicating that the costs of treating patients with AECOPD increase with disease severity [15,25,26]. Based on a study conducted in the United States, an approach in an attempt to correlate the severity of COPD with cost also demonstrated that cost increases with disease severity [27]. The fact that disease severity increases the length of hospital stay, lab investigations, treatment costs, absenteeism from work (income decrease), caregivers' food costs, etc.

Although in Pakistan, the majority of the direct medical costs (in most of the cases) are borne by the government especially for govt employees and poor citizens still a strong healthcare infrastructure is needed by the Government. Despite the economic status of the country, patients receiving treatment of AECOPD in a public hospital are usually accessible and affordable unless otherwise stated (i.e. too poor patients).

Some limitations may merit considerations such as relatively less study sample (n = 67) in this study. However, the decision to perform a prospective follow-up study was based on the lack of preliminary data. Multi-center study and prolonged study periods are recommended for future studies to enlarge the study sample and improve the accuracy and precision of results. Besides, potential selection bias using convenience sampling warrants non-exact representation of the entire population of the country. Given that this study performed only in a public hospital, the findings are not representative of patients receiving treatment in private hospitals. Another limitation of the study was that presenteeism and absenteeism among studied patients were not estimated according to the criteria specified by WHO i.e. Health and Work Performance Questionnaire. This information was directly obtained from the patients or their caregivers. Despite some limitations, this study provides preliminary baseline information about OOPCs among AECOPD patients in Pakistan.

CONSENT

Written patient consent was taken before starting the study.

ETHICAL APPROVAL

The study was started after the approval of the concerned authorities.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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