



How Do Out-of-Pocket Expenditures Affect Healthcare: A Qualitative Insight of Acute Exacerbation among Asthma Patients

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Authors' contributions

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

Article Information

DOI: 10.9734/JPRI/2020/v32i430427

Editor(s):

(1) Rahul S. Khupse, University of Findlay, USA.
(2) Rafik Karaman, Al-Quds University, Palestine.

Reviewers:

(1) Reshmina Chandni Clara Dsouza, Father Muller Medical College, Kankanady, India.
(2) Syed Umer Jan, University of Balochistan, Pakistan.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/56044>

Received 01 February 2020

Accepted 07 April 2020

Published 12 April 2020

Original Research Article

ABSTRACT

Introduction: This study was designed to determine the out of pocket costs (OOPCs) of acute exacerbation of asthma (AEA) in asthma patients attending a public hospital.

Methodology: A cross-sectional study was done by interviewing the patients using the convenience sampling technique. Data were obtained based on per episode of AEA. OOPCs were calculated based on direct and indirect costs. A total of 128 patients participated in the study. The data were analyzed with SPSS ver 23.

Results: The study group comprised of 88 males (68.8%), 57 (44.5%) singles and 67 (52.3%) less than 40 years of age. There were considerable differences found between the severity levels and lengths of hospital stay towards the OOPCs.

Conclusion: The severity of the AEA and length of stay in the hospital increase the per episode OOPCs of AEA among asthma patients.

Keywords: Acute exacerbation; asthma; AEA; OOPCs; pharmacoeconomics.

1. INTRODUCTION

According to national asthma guidelines of Pakistan which are mainly based on the Global Initiative for Asthma (GINA) recommendations, asthma is a chronic, inflammatory disease with symptoms of breathlessness, wheezing and recurrent attacks [1]. It is varying in the severity and frequency from person to person [2]. AEA is also known as an asthma attack where patients having episodes of progressively worsening of the symptoms. Mild AEA might be manageable at home whereas severe exacerbations will require unscheduled emergency department visits or hospital admission [3].

According to the World Health Organisation (WHO), 235 million people suffer from asthma, globally where over 80% of asthma-related deaths only occur in lower-middle-income countries. Proper on-time (early) treatment and effective management of asthma could save lives. It is estimated an increment of 33% or 400 million people will be affected by 2025 [4]. In Pakistan, according to a report on the global burden of asthma, the prevalence is 4.3% and in rural areas, it is quite high [5]. Asthma's risk factors include inhaling asthma "triggers", for example, allergens, physiological conditions, tobacco smoke, and certain medications [6].

Compared to other chronic diseases, asthma has a relatively low fatality rate therefore asthma has become an economic burden that influences the quality of life of the patients [5-7]. It is essential to understand the cost of asthma per episode of exacerbation to effectively use the current asthma medication resources, and to identify where the burden occurs and learn to achieve optimal cost-effectiveness [4-7]. The economic evaluation of a disease can lay the basis for precise healthcare decisions that can influence financial resources more effectively toward the management of that disease [7]. The pharmacoeconomic analysis of asthma has been evaluated by numerous studies in various countries and according to them the major risk factors responsible for AEA were sedentary lifestyle, high pollution, obesity and lack of exercise [7-9]. The established treatment of asthma primarily comprises two classes of drug, bronchodilators and anti-inflammatory/immunosuppressive drugs. By far the most effective bronchodilators in asthma are β 2-adrenoceptor agonists [10]. These include

short-acting beta2 agonists, inhaled corticosteroids, long-acting beta2 agonists, leukotriene receptor antagonists (eg, montelukast) or theophylline [11, 12].

Pakistan, with a population of around 230 million, is currently facing a high pharmacoeconomic burden of asthma. This high pharmacoeconomic burden of asthma further poses a major challenge to the country's economic development which further affects the overall quality-of-life of the general populace [13]. In Pakistan, the majority of primary and secondary healthcare facilities are provided by the government but most of the time, especially in rural areas due to the less availability of some advanced healthcare facilities, patients have to spend money from their own pockets. In pharmacoeconomics analysis, usually, two main types of costs are concerned which are direct costs and indirect costs. Direct costs are of further two types i.e. direct medical costs and direct non-medical costs. On the other hand, indirect costs are the costs that are borne by the patients in terms of loss of their income because of absenteeism from work due to the severity of the disease and the food costs.

Numerous newly recommended drugs to treat asthma drugs are long-acting β agonists (LABAs) and interleukin 4 modulators like IL-4, IL-5, IL-13, and IL-17 are investigated under trials. As well as, few other classes for asthma treatment are toll-like receptor 2 agonists (TRAs), dissociated corticosteroids, tyrosine kinase inhibitors (TKIs) and CXC chemokine receptor 4 antagonists (CCRAs) are in the earlier stages of drug development process [14].

In developing countries, OOPCs are the costs that are not covered by the insurance companies or the government and they are normally borne by the patients and their caregivers. OOPCs primarily comprised of the outside lab investigation costs (if the facility is not available in the hospital), costs of travel (for the outside lab investigation), transportation costs, traditional medicines costs, absenteeism from the work costs i.e. the income lost due to the disease (patients' and caregivers) and their food costs (patients and caregivers) [15]. Different studies done in different parts of the world estimated the total costs of asthma and AEA [16-22]. Some of them measured only direct medical costs, while some of them determined direct medical and

non-medical costs. On the other hand, very few determined OOPCs of asthma or AEA [23,24]. To date, there is no information available about OOPCs among AEA patients in Pakistan. This study aimed to estimate and identify OOPCs per episode of AEA among asthma patients.

2. METHODOLOGY

This study was conducted among AEA patients attending a public hospital using a convenient sampling method. The research tool was developed after an extensive literature review and according to the study objectives. The research tool was further validated by the face and content validity and the reliability of the research tool was examined by Cronbach's alpha. Patients hospitalized with AEA were included in the study. Patients who were unable to give consent for any reason, (having a communication barrier or with neurological or psychological problems) were excluded from the study. Besides that, patients with other similar underlying diseases such as cystic fibrosis, TB and COPD were also excluded from this study. Data were analyzed using SPSS version 23.0, with statistical significance set at a *p*-value less than 0.05.

3. RESULTS

The patient characteristics were summarized in Table 1. One hundred and twenty-eight patients participated in the study with written consent.

Eighty-eight of the participants were male and 40 were females. Seventy-one were married while 57 were single. Sixty-seven of the patients were less than 40 years of age and 60 of them were more than 40 years. A total of 97 participants were not smokers and 94 patients were without any comorbidity.

Table 2 represents the patients' presenting illnesses. Among AEA patients, 91.4% were coughing and 75.7% were wheezing. Around 68.8% of the patients felt shortness of breath. Neck tightness, difficulty in speaking and agitation were observed among 45.3%, 32.8% and 48.4% of the patients, respectively.

Table 3 represents commonly administered medications among AEA patients. Around 87.5% of the patients were receiving short-acting beta-agonists in any form i.e. parenteral, inhalations or oral. About 82.1% of AEA patients were receiving corticosteroids in any form i.e. parenteral, inhalations or oral. Anticholinergics were used among 60.1% of the patients, and leukotriene receptor antagonists were 38.2%.

Table 4 shows OOPCs per episode of AEA from the patients' perspective, based on the severity of exacerbation or flare-up of asthma among asthma patients. The mean OOPCs per episode of exacerbation according to the severity level i.e. mild, moderate, severe and life-threatening were 36.2, 73.9, 121.5 and 144.5 USD respectively.

Table 1. Patients' characteristic (n=128)

Patients' characteristics	Exacerbation severity among AEA patients			
	Mild	Moderate	Severe	Life-threatening
Gender				
Female	20	10	9	1
Male	55	15	13	5
Marital status				
Single	48	7	2	0
Married	27	18	20	6
Age (Years)				
Less than 40	54	9	4	0
More than 40	21	16	18	6
Working/Business				
Yes	66	20	11	2
No	9	5	11	4
Smoking				
Yes	14	7	7	3
No	61	18	15	3
Comorbidities				
Yes	7	10	12	5
No	68	15	10	1
Days of hospital stay (mean±SD)	1.5 (8.6)	2.8 (7.7)	3.5 (11.2)	5.3 (9.8)

4. DISCUSSION

AEA results in hospitalization and an increase in economic burden towards patients and society. Previous studies reported that direct medication cost is the most cost-determining factor for patients with AEA [19,25]. The results of this study are almost in accordance with another study done by Çelik et al. [25] in Turkey which found out that after the medication costs the majority of the total cost (usually borne by the patients in lower-middle-income countries) are OOPCs. They also found that hospitalization cost contributed 13.3% to the total expenditure. Besides that, another study done by Szucset *al.* in Switzerland found out that direct medical cost accounts for 61% of the total cost, and the remaining were OOPCs, but the majority of them were also borne by their government [19].

In this study, the estimated OOPCs for AEA were based on the severity levels and varied but were still lower (per episode) when compared to Switzerland 1889 USD [19] and Sweden 493 USD [8]. This might be due to the differences in the organizational structure of the healthcare system, facilities provided to the public and the difference in reference prices of the medicines.

Numerous earlier studies have also shown that many factors such as age, intensive care unit (ICU) admissions, the severity of the disease and

length of stay in the hospital or ward mainly account for the increase of direct medical and non-medical costs. In this study, we can also say that age, comorbidities, severity and lengths of stay increased the OOPCs of AEA. Age is one of the factors that increase the cost of hospitalization among asthma patients. A study done in Spain reported that hospitalization and medical costs for elderly patients were doubled when compared to younger asthma patients. [26] Another study in Canada showed that hospitalization and the emergency department admission mainly account for the huge treatment costs. They found out that in non-hospitalized patients the cost was 234.48 USD but among hospitalized patients, the cost raised to 3102 USD because of in-patients nursing care that accounted for around 42.6% [27]. According to another United States study, the length of stay in the hospital directly influences the cost of treatment as for the patients with 2 days' stay, the cost was around 8205 USD whereas for 4.7 days cost was 18436 USD [28].

In our study, it was found out that the severity of the illness directly influenced the OOPCs per episode of AEA. This is because higher severity levels often prolong the overall management of AEA and also increase the length of stay of hospitalization. A comparison between the costs of asthma in the Asia-Pacific region had been carried out in a study that showed that in

Table 2. Patients'presenting illnesses

Presenting illnesses	n (%)
Coughing	117 (91.4)
Wheezing	97 (75.7)
Shortness of breath	88 (68.8)
Neck tightness	58 (45.3)
Speaking difficulty	42 (32.8)
Chest tightness	47 (36.7)
Tachycardia	53 (41.4)
Agitation	62 (48.4)

Table 3. Medication therapy used for AEA patients

Types of medications (Mostly combined)	n (%)
Short-acting beta-agonists (any form)	112 (87.5)
Corticosteroids (any form)	105 (82.1)
Anticholinergics	77 (60.1)
Leukotriene receptor antagonists	49 (38.2)
Intubation	42 (32.8)
Oxygen	34 (26.5)
Ventilation	31 (24.2)
Antibiotics	17 (13.2)
Antihistamines	27 (21.1)

Table 4. OOPCs among AEA patients based on their severity levels

AEA severity levels	Number of patients (%)	Direct medical and non-medical costs					Indirect costs		Total costs per episode Total OOPCs	
		Outside lab investigation	Travel for outside lab investigation	Transportation (to and fro)	Food cost for the patient	Food cost for caregivers	Traditional medicine	Patient income lost (absenteeism from work)		Caregivers income lost (absenteeism from work)
Mild	75 (58.6)	3.1	2.1	3.5	1.1	1.4	0	17.7	7.3	36.2
Moderate	25 (19.5)	3.9	3.2	4.9	1.8	1.9	0	46.9	11.3	73.9
Severe	22 (17.2)	3.6	4.7	5.2	2.5	2.7	2.1	85.2	15.5	121.5
Life-threatening	06 (4.7)	3.8	4.4	5.5	2.3	3.2	1.3	104.6	19.4	144.5

All values are in mean and per flare-up of AEA

Singapore, Hong Kong, Malaysia, and China, the acute or flare-up care costs of asthma were quite high than the maintenance costs. They had also concluded that overall poorer general health status, elderly patients, and severity of AEA were among the main predictors of the higher costs [29]. These days, in Pakistan also the majority of the direct medical costs (in most of the bigger public hospitals) are borne by the government especially for govt employees and poor citizens. But yet, there is a great scarcity of strong healthcare infrastructure to cater to the healthcare needs of the citizens.

5. CONCLUSION

The study data provides insight on OOPCs per episode of AEA among asthma patients. This data could be taken as the foundation in various future healthcare actions targeted in the allocation of healthcare resources. This study has also identified that many factors such as length of hospital stay, the severity levels and pharmacotherapy compliance directly influence the OOPCs among asthma patients.

6. LIMITATIONS

Despite the small sample size used, the study has provided some preliminary findings towards perceptions about the OOPCs and drug utilization patterns (drugs prescribed). Larger sample size in future studies would allow a better exploration of the actual burden of disease among patients. Besides that, subjects are selected via convenient sampling which might lead to bias in population selection. Nevertheless, convenient sampling was often the only feasible way, particularly due to restricted time and resources. There is also another concern regarding the possibility of bias as the selected population was not the representative of the entire country. For future research, the study could be repeated in hospitals of other cities or private hospitals to compare the differences.

CONSENT

Written consent was taken from each patient who participated in the study.

ETHICAL APPROVAL

Ethical approval was taken from the concerned authorities.

ACKNOWLEDGEMENT

The authors would like to thank the Deanship of Scientific Research at Prince Sattam bin Abdulaziz University, Alkharj, Saudi Arabia for the support in the publication of this manuscript. The authors would also like to express their sincere gratitude to all of the participants involved in this study in any capacity.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
 The peer review history for this paper can be accessed here:
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