JOURNAL OF
CONTEMPORARY MEDICINE

DOI:10.16899/jcm.1027531
J Contemp Med 2022;12(4):520-525

Original Article / Orijinal Araştırma

Comparison of Patients with Chronic Obstructive Pulmonary Disease that Hospitalized in University Hospital and State Hospital

Üniversite Hastanesi ve Devlet Hastanesi'nde İzlenen Kronik Obtrüktif Akciğer Hastalığı Olan Hastaların Karşılaştırılması

Serkan Yavuz[1], Hasan Kahraman[2]

[1]Beyhekim Research and Training Hospital, Chest Disease, Konya, Turkey
[2]Kahramanmaras Sutcu Imam University, Faculty of Medicice, Chest Disease, Kahramanmaras, Turkey

Abstract

Aim: Chronic obstructive pulmonary disease (COPD) is an important mortality and morbidity reason and brings serious burdens to the economies of countries. We analyzed differences in examination, treatment and approach that may affect the economic burden of COPD in hospitalized patients with a diagnosis of COPD exacerbation in state and university hospitals

Material and Method:104 patients who were being treated in university hospital (UH) and 102 patients in State Hospital (SH) because of COPD were included. The difference in approach of physicians and cost analysis between two hospitals were compared.

Results: The average age was higher in SH (p=0.010). Comorbities were higher in UH (p<0.001). The number of patients who received nebulizer treatment (p=0.020) in UH and total number of nebulizer medication used was higher in SH (p<0.001). The number of patients for whom intravenous (IV) medication was used and the number of total IV medication used was higher in SH (p<0.001). The total number of IM medication used was higher in UH (p<0.001). The number oral antibiotics used was higher in UH (p<0.001). The penicillins, macrolids, penicillin-macrolids were used more in patients in UH. The cephalosporins and quinolons were used more in SH (p<0.001). Inhaler corticosteroid (ICS) (p<0.001), salbutamol+ipratropiumbromur combination in nebulizer form (p<0.001) and IV teophilin was used in more patients in SH (p=0.013). The use of salbutamol in nebulizer form was more in UH (p<0.001). Spirometry, arterial blood gas analysis (respectively p<0.001, p<0.001), chest radiography was applied more in UH (p=0.024). Total cost (p<0.001), total and daily medication costs was more in SH (p<0.001). Costs other than medication was more in UH (p=0.021).

Conslusion: We believe that adherence to the guidelines has a very important effect on cost in patients hospitalized with COPD exacerbation

Keywords: COPD, drug, economic burden, state hospital, university hospital

Öz

Amaç: Kronik obstrüktif akciğer hastalığı (KOAH) önemli bir mortalite ve morbidite nedenidir ve ülke ekonomilerine ciddi yükler getirmektedir. Devlet ve üniversite hastanelerinde, KOAH alevlenmesi tanısı ile yatırılan hastalarda KOAH'ın getirdiği ekonomik yükü etkileyebilecek olan muayene, tedavi ve yaklaşım farklılıklarını incelemeyi amaçladık.

Gereç ve Yöntem: Üniversite hastanesinde (ÜH) tedavi gören 104 hasta ile Devlet Hastanesinde (DH) KOAH nedeniyle tedavi gören 102 hasta çalışmaya dahil edildi.İki hastane arasındaki hekimlerin yaklaşım ve maliyet analizleri karşılaştırıldı.

Bulgular: SH'de yaş ortalaması daha yüksekti (p=0,010). UH'de komorbiditeler daha yüksekti (p<0,001). UH'de nebulizer tedavisi alan hasta sayısı (p=0,020) ve toplam sayı kullanılan nebulizatör ilaç miktarı DH'de daha yüksekti (p<0,001). İntravenöz (IV) ilaç kullanılan hasta sayısı ve kullanılan toplam IV ilaç sayısı DH'de daha yüksekti (p<0,001). Toplam İM sayısı UH'de daha fazlaydı (p<0,001). UH'de kullanılan oral antibiyotik sayısı daha fazlaydı (p<0,001). UH'li hastalarda penisilinler, makrolidler, penisilin-makrolitler daha fazla kullanıldı.Sefalosporinler ve kinolonlar SH'de daha fazla kullanıldı (p<0,001). DH'de inhaler kortikosteroid (ICS) (p<0,001), nebulizer formda salbutamol+ipratropiumbromur kombinasyonu (p<0,001) ve daha fazla hastada IV teofilin kullanıldı (p=0,013). UH'de nebulizer formda salbutamol kullanımı daha fazlaydı (p<0,001).Spirometri, arter kan gazı analizi (sırasıyla p<0,001, p<0,001), akciğer grafisi UH'de daha fazla yapıldı (p=0,024). Toplam maliyet (p<0,001), toplam ve günlük ilaç maliyetleri DH'de daha fazlaydı (p<0,001). UH'de ilaç dışı maliyetler daha fazlaydı (p=0,021).

Sonuç: KOAH alevlenmesi ile hastaneye yatırılan hastalarda maliyet üzerine kılavuzlara uyumun çok önemli bir etkisi olduğuna inanıyoruz.

Anahtar Kelimeler: KOAH, devlet hastanesi, ekonomik yük, ilaç, üniversite hastanesi

Corresponding *(İletişim)*: Serkan Yavuz, Beyhekim Training and Research Hospital, Chest Disease Unit, Selcuklu, Konya, Turkey
E-mail *(E-posta)*: scalp1114@hotmail.com
Received *(Geliş Tarihi)*: 24.11.2021 **Accepted *(Kabul Tarihi)*:** 22.02.2022

INTRODUCTION

COPD is a significant burden on the economies of many countries. Economic burden occurs due to both direct and indirect costs. While direct cost includes expenditures for diagnosis, treatment, prevention and rehabilitation, indirect cost includes expenses due to loss of workforce, disability, premature death.[1] According to the United States (USA) 2010 data, the total cost regarding COPD was 50 billion dollars, of which 30 billion US dollars were spent for direct.[2]

Hospitalization constitutes the most important part of the direct cost. The majority of hospitalizations are due to COPD exacerbations (50-75%). Advanced age and stage COPD, longer hospitalization and comorbidities are among the factors that increase the cost.[3] Our aim in this study is to analyze the cost of patients hospitalized with the diagnosis of COPD in two different hospitals and to compare the treatment approach to patients with COPD.

MATERIAL AND METHOD

This retrospective observational study was carried out by retrospectively reviewing the medical records of patients hospitalized with the diagnosis of COPD attack between January 2008 and December 2013 at the chest diseases clinic of Kahramanmaraş Sütçü İmam University Medical Faculty Hospital (UH) and Necip Fazıl Kısakürek State Hospital (SH) in Kahramanmaraş and followed up by a pulmonologist. Patients who were followed up in the intensive care unit or were taken to the intensive care unit later were excluded from the study. In addition, patients who underwent dialysis, interventional procedures (gastroscopy-colonoscopy, bronchoscopy, and pulmonary CT angiography) were not included in the study. A total of 206 patients were included in the study, of which 104 patients from in the UH and 102 patients from SH. The drug therapy given to patients, performed imaging tests, pulmonary function tests, total costs, drug and non-drug costs, daily costs, and daily drug costs were calculated from the registry system of the hospitals.

The drugs and the number of drugs used in the patients were examined according to the method of administration(IV, IM, nebulizer form, and subcutaneous). Among the bronchodilators in the nebulizer form, SABA (salbutamol), and SAMA+SABA (salbutamol + ipratropium bromide) combination was assessed. As steroids, only nebulizer form of ICS (fluticasone or budesonide) were included in the study. Penicillin,cephalosporin, quinolone, and macrolide group antibiotics were counted and recorded as oral antibiotics. While calculating the antibiotics given as IV, carbapenem group antibiotics were also recorded in addition to this group of antibiotics. As subcutaneous, only enoxaparin was taken into account. As IV drugs, antibiotics,proton pump inhibitors (PPI), antiemetics, systemic steroids, non-steroidal anti-inflammatory drugs (NSAIDs), acetylcysteine, and theophylline were evaluated. As IM, analgesics were evaluated.

Demographic data, comorbidities, arterial blood gas (ABG) count, pulmonary function test (PFT) count, and length of hospitalization of the patients were reviewed from the records. Direct chest radiography and thorax CT number were recorded by reviewing epicrises and invoices.

All data between the two hospitals were compared. The mean hospitalization time was calculated. In addition, patients with a hospital stay of 11 days or more were recorded.

The ethics committee approval from the local ethics committee of Kahramanmaraş Sütçü İmam University and the necessary approval from the officials of Necip Fazıl Kısakürek State Hospital were obtained (Approvel number:2013-15-08).

Statistical Analysis

Independent student's t-test was used for the evaluation of the means, and the Chi-square test for the evaluation of the percentages. The Mann Whitney-U test was used for parameters that not normally distributed. A value of $p < 0.05$ was considered statistically significant. Statistical analysis was performed using SPSS 19.0 statistical package program.

RESULTS

Of the 104 patients hospitalized in UH with a diagnosis of COPD, 79 (76%) were male. Of the 102 patients hospitalized in SH with a diagnosis of COPD, 79±11 (77.7%) were male. The mean age of the patients was 66.6±11.5 years in UH and 70.6±11.3 years in SH (p=0.010). In terms of comorbidities, those with atherosclerotic heart disease and heart failure were recorded as heart diseases. Cardiac comorbidity was present in 31 (29.8%) patients in UH and 10 (9%) patients in SH, it was higher in UH (p <0.001). While the number of patients with hypertension was 34 (32.6%) in UH, it was 13 (12.7%) in SH (p<0.001). The number of patients with diabetes mellitus (DM) was 4 (3%) in UH, 6 (5%) in SH and found to be similar (p=0.491) (**Table 1**).

Table 1. Comparison of groups' demographic data and comorbidities

	University hospital	State hospital	p value
Age (years)	66.6±11.5	70.6±11.3	0.010*
Gender (male/female) n(%)	79/25 (75.9/24.1)	79/23 (77.4/23.6)	0.80
Heart disease	31 (29.8%)	10 (9%)	<0.001*
Hypertension	34 (32.6%)	13 (12.7%)	<0.001*
Diabetes mellitus	4 (3%)	6 (5%)	0.49

The number of patients who received nebulizer treatment in UH was 99 (95%), and 102 (100%) in SH (p=0.02). Considering the total number of nebulizer drugs used 4,838 were used in SH and 3,460 in UH that significantly higher were used in SH (p<0.001). The number of patients who received IV drugs was 99 (95%) in UH and 102 (100%) in SH. The total number

of IV drugs used was 2,795 in UH and 5,936 in SH. Significantly more IV drug use was present in SH (p<0.001). The number of patients who received IM drug was 5 (4%) in UH and 3 (2%) in SH (p=0.486). The total number of IM drugs used was 22 in UH and 10 in SH (p=0.026). Enoxaparin was used in 80 (76%) patients in UH and 57 (55.8%) patients in SH. Enoxaparin was used more in UH (p<0.001) (**Table 2**).

Table 2. Comparison of the groups by the administration method of the drugs

	University hospital	State hospital	p value
Number of patients using nebulizer medication	99 (95%)	102 (100%)	0.020
Total number of nebulizer drugs	3460	4838	<0.001
Number of patients using IV drugs	99 (95%)	102 (100%)	0.02
Total number of IV drugs	2795	5936	<0.001
Number of patients using IM medication	5 (4%)	3 (2%)	0.48
Total number of IM drugs	22	10	0.02
Number of patients using subcutaneous drugs	80 (76%)	57 (55.8%)	<0.001
Total number of subcutaneous drugs	509	427	<0.001
ICS	72 (69.2%)	94 (92.1%)	<0.001
Salbutamol	57 (54.8%)	25 (24.5%)	<0.001
Salbutamol+ipratropium bromide	48 (46.1%)	85 (83.3%)	<0.001
Theophylline	67 (64.4%)	81 (79.4%)	0.013

IM:intramuscular, IV:intravenous

Considering the antibiotics used, the number of patients who used oral antibiotics in UH was 56 (53%), while this number was 13(12.7%) in SH (p<0.001). The number of patients receiving IV antibiotics was 58 (55.7%) in UH and 90 (88%) in SH (p<0.001). The total number of oral antibiotics used was 795 in UH and 127 in SH. The total number of IV antibiotics used was 1,216 in UH and 1,696 in SH. The number of oral antibiotics used was significantly higher in UH (p<0.001), and the total number of IV antibiotics was less in UH, however, this difference was not statistically significant (p=0.063). The number of patients who received penicillin group antibiotics was 53 (50.9%) in UH and 22 (21.5%) in SH, and more in UH (p<0.001). Cephalosporin antibiotics were used in 19 patients (18.2%) in UH and in 44 patients (43.1%) in SH and were used more in SH (p<0.001). While macrolide group antibiotics were used in 25 (24%) patients in UH, they were used in 6 (5%) patients in SH and the difference was significant (p<0.001). Penicillin and macrolide groups were used together in 14 (13.4%) patients in UH and 2 (1.9%) patients in SH(p=0.002). Cephalosporin and macrolide group antibiotics were used together in 8 (7.6%) patients in UH and 2 (1.9%) patients in SH (p=0.540). The number of patients who received quinolone group antibiotics was 5 (4.8%) in UH and 35 (34.3%) in SH, and it was used significantly more in SH (p<0.001). The number of patients who received carbapenem group antibiotics was 3 (2.8%) in UH and 2 (1.9%) in SH (p=0.669) (**Table 3**).

Table 3. Comparison of antibiotics used in university and state hospitals

	University hospital	State hospital	p value
Number of patients using oral antibiotics	56 (53%)	13 (12.7%)	<0.001
Total number of oral antibiotics	795	127	<0.001
Number of patients using IV antibiotics	58 (55.7%)	90 (88%)	<0.001
Total number of IV antibiotics	1216	1696	0.06
Penicillin	53 (50.9%)	22 (21.5%)	<0.001
Cephalosporin	19 (18.2%)	44 (43.1%)	<0.001
Macrolide	25 (24%)	6 (5%)	<0.001
Penicillin+Macrolide	14 (13.4%)	2 (1.9%)	0.002
Cephalosporin+ Macrolide	8 (7.6%)	2 (1.9%)	0.54
Quinolone	5 (4.8%)	35 (34.3%)	<0.001
Carbapenem	3 (2.8%)	2 (1.9%)	0.66

IV:intravenous

ICS was used in 72 (69.2%) patients in UH and 94 (92.1%) patients in SH. It was used more in SH (p<0.001). The number of patients receiving SABA in nebulizer form was 57 (54.8%) in UH, 25 (24.5%) in SH, and it was higher in UH(p<0.001). SABA+SAMA was used in 48 (46.1%) patients in UH and in 85 (83.3%) patients in SH(p<0.001). SABA was used significantly more in UH, and SABA+SAMA was used significantly more in SH. IV theophylline was used in 67 (64.4%) patients in UH and 81 (79.4%) patients in SH. Theophylline was used more in SH(p=0.013)(**Table 2**).

PFT was performed in 64 (61.5%) patients in UH and in 18 (17.6%) patients in SH, and more PFT was performed in UH (p<0.001). ABG analysis was performed in 79 (75.6%) patients in UH and in 17 (16.6%) patients in SH, and it was more in UH (p<0.001).

Chest radiography was performed in 89 (85.5%) patients in UH and 74 (72.5%) patients in SH, and the difference was significant (p=0.024). Lung tomography was performed in 32 (30.7%) patients in UH and 26 (25.4%) patients in SH and it was similar (p=0.411).

While the number of patients hospitalized for 11 days or more in UH was 12 (11.5%), the number of patients hospitalized for 11 days or more in SH was 16 (15.6%)(p=0.437). The mean hospitalization time was 6.6 days in UH and 7.2 days in SH (p=0.260).

In cost analysis, total cost, daily cost, drug cost, non-drug cost, and daily drug cost were examined. The mean total cost was 740 TL (352.3 USD) per person in UH and 938 TL (446.6 USD) in SH. The mean cost per person was found to be higher in SH (p<0.001).

The mean daily cost was found to be 115.5 TL (55 USD) per person in UH and 126.6 TL in SH, and there was no statistical difference (p=0.071). The non-pharmaceutical mean cost was 524 TL (60.2 USD) per person in UH and 453 TL (215.7 USD) in SH. Non-drug cost was significantly higher in UH (p=0.026). Total drug cost was 247 TL (117.6 USD) in UH and 484 TL (230.4 USD) in SH (p<0.001). The mean daily drug cost per person in UH was 38.7 TL (18.4 USD), while it was found to be 60.2 TL (26.6 USD) in SH (p<0.001). Total drug cost and daily drug cost were significantly higher in SH (**Table 4**).

Table 4. Comparison of the two groups in terms of cost analysis.

	University hospital (min-max)	State hospital (min-max)	p value
Total cost	58.66-3453.53 TL	174.71-6589.45 TL	<0.001
Daily cost	17.53-251.99 TL	43.6-366.08 TL	0.07
Non-drug cost	42.22-1914 TL	73.3-1695.14 TL	0.021
Drug cost	6.28-2197.03 TL	10.40-5609.69 TL	<0.001
Daily drug cost	3.06-549.26TL	5.20-311.65TL	<0.001

Min: minimum, max: maximum

When compared in terms of mortality rates, no patient was lost during hospitalization in UH. In SH, one patient has died during the follow-up.

DISCUSSION

Besides being an important cause of morbidity and mortality, the high cost of COPD puts a serious burden on the economies of the country. According to US data, the total cost used for COPD was 24 billion US dollars in 1993, and 50 billion US dollars in 2010. Of this, USD 30 billion is consisted of direct costs. According to US data, there was a more than 2-time increase in the total cost used for COPD in 17 years. Direct cost constitutes approximately 2/3 of the total cost according to 2010 data.[3]

The expenses regarding the hospitalization constitutes the most important part of the direct cost. In a study involving Canada, France, Italy, Spain, the Netherlands, USA, and UK, hospitalization costs constitute 52-84% of the direct cost.[4] Of direct costs, 54% are constituted by hospitalizations in the UK.[5] In a study conducted in Italy, the direct cost varies between 1500-3900 Euros per year, depending on the severity of COPD.[6] In the Netherlands, it has been stated that the direct cost due to COPD is three times the expenditures for asthma.[7] In a study conducted with 85 patients in Romania, the direct cost per patient in a year has been found to be 1456 Euros, and it has been stated that 82.5% of this cost was hospitalizations.[8] According to 2008 data in Canada, 1000 Canadian dollars were spent for each day of hospitalization in patients with COPD and the total annual cost of hospitalization has been stated as 1.5 billion Canadian dollars.[9]

In a study published in 2011 and conducted by Özkaya et al in a chest diseases hospital in Turkey, the cost of hospitalization per patient in a total of 7832 patients hospitalized in 5 years has been found to be 718 USD.[10] In another study of Varol et al. with 376 patients (SH) published in 2013, it has been stated that this cost was 1833 TL (872.8USD) on average.[11] In our study, this cost was found to be 740 TL (352.3USD) for UH and 938 TL (446.6USD) for SH. While the mean hospitalization time was 14.5 days in Özkaya et al's study[10] it was 6.6 days in UH and 7.2 days in SH in our study. The cost per patient was found to be lower in both centers in our study than in the mentioned study. This difference may be due to the fact that patients who were followed up in the intensive care unit and underwent interventional procedures were not included in our study and the hospitalization period was short. In the study of Deniz et al. covering state hospitals in 2014, the total cost was 808.5 dollars per patient and the drug cost was 223.1 dollars, while the total cost was similar to our study, the drug cost was much higher in SH in our study.[12]

In the 3-year cost analysis of patients with COPD hospitalized in a university hospital in Iran by Torabipour et al., it has been seen that the most important part of the expenses were hospitalization time and drugs.[13] In the study of Varol et al., the mean cost of drugs per patient was 526.5 TL (250.7USD), which was 28.7% of the total cost.[11] In the study conducted by Özkaya et al., it has been stated that the drug cost constituted 53.5% of the total cost.[10] In our study, the mean drug cost was 247 TL (117.7 USD) in UH and 33.6% of the total cost. In SH, the mean cost of drugs was found to be 484 TL (230.7 USD), which was 51.3% of the total cost. The drug cost was found to be significantly higher in SH. We think that the reason for this is the use of more nebulizing corticosteroids and more expensive antibiotics in SH.

In the study of Varol et al., considering the hospitalization time of the patients, patients who were hospitalized in the intensive care unit have been also included in the study and it has been stated that a total of 35.6% of the patients were hospitalized for 11 days or more.[11] In our study, patients hospitalized in intensive care were not included in the study, and patients who were hospitalized for 11 days or more were 11.5% of patients in UH and 15.6% in SH. The fact that we did not include patients in the intensive care unit may be a factor in the short hospitalization time.

COPD is more common in the elderly population and hospitalization rates of elderly COPD patients are increasing. According to US national data published in 2005, 65% of hospitalized COPD patients have been stated to be over 65 years old.[14] In another study involving 390 patients in Spain, the mean age of hospitalized COPD patients has been found to be 72.[15] In our study, the mean age of patients hospitalized in UH was found to be 66.6 years, and 70.6 years in SH and were consistent with other studies.

In the BREATHE study, which included Central Mediterranean and Northern Europe, hospitalization rates have been found to be significantly higher in patients with COPD with comorbidities.[16] Comorbidities detected in COPD, especially cardiac causes are factors that increase hospitalizations . In a study involving approximately 21,000 people at risk of atherosclerosis, cardiac comorbidity has been observed at 22% in patients with COPD and 9% in patients without COPD.[17] In a study examining patients with COPD, hypertension has been found in 40% to 60% of patients.[18] In two studies, DM has been found to be 1.5-1.8 times higher in COPD patients compared to the normal population.[17,19] In our study, cardiac comorbidity was found as 29.8% and hypertension was found as 32.6% in patients hospitalized in UH, cardiac comorbidity was found as 9% and hypertension was found as 12.7% in SH. These rates we found were similar to the rates in other

studies. DM was found as 3% in patients hospitalized in UH and 5% in patients hospitalized in SH. The DM rates we found in the two groups in our study were detected to be lower than the studies in the world. Cardiac comorbidity and HT were found at a higher rate in UH than SH, and the difference was statistically significant. We think that the reason for this may be due to the more complexity of the patients who apply or are referred to UH.

Antibiotic treatment has been shown to reduce short-term mortality to 77%, treatment failure to 53%, and sputum purulence to 44%.[14,20] Antibiotic option should be determined according to local antibiotic resistance. In a study conducted in China, 87.91% of patients hospitalized with a diagnosis of COPD have used antibiotics. However, they have not provided information about the oral-IV, and antibiotic groups. The empirical therapy recommended, according to the GOLD 2020 update, is amoxicillin clavulanic acid, second-generation cephalosporins, and new fluoroquinolones. Whether the antibiotic administration method is IV or oral may vary depending on the patient's well oral intake or the pharmacokinetics of the drug. However, oral administration of antibiotics should be preferred.[14] In our study, the number of patients receiving oral antibiotics in UH was 56 (53%), while this number was 13 (12.7%) in SH ($p<0.001$). The number of patients receiving IV antibiotics was 58 (55.7%) in UH and 90 (88%) in SH. Penicillin group was used most frequently and followed by macrolide group antibiotics in UH. In SH, on the other hand, the cephalosporin group was used most frequently, and the quinolone group antibiotics were used the second. This situation shows us that the guidelines are followed better in the treatment of COPD patients in UH.

In patients hospitalized with a diagnosis of COPD attack, SABA can be used alone or together with SAMA.[1] There are studies showing that ICS, when added to the treatment, reduces the risk of acute exacerbation.[21,22] However, no studies showing that it reduces hospitalization were encountered, and there are no results showing a negative effect.[23] ICS treatment is recommended for patients with COPD who have two or more attacks per year and whose FEV1 is below 50%.[14] Because COPD is a neutrophil-dominated inflammatory process. ICSs are not recommended to be used alone in COPD. In randomized-controlled, prospective studies involving a large number of patients for three years, it has been shown that ICS treatment alone does not change the natural history of COPD.[24,25] Theophylline is not preferred as the first choice in the treatment of COPD due to its potential side effects. Theophylline is recommended if patients with severe and very severe COPD are symptomatic despite the use of inhaler long-acting β2 agonists, ICS, and anticholinergics.[14]

In our study, the number of patients receiving theophylline in UH and SH was found to be 67 (64.4%), 81 (79.4%), respectively. According to these results, theophylline is still a widely used drug in this region. In this study, it was observed that nebulizer form ICS, SABA+SAMA, theophylline and number of nebulizer drugs used in SH were significantly higher than UH. Bronchodilator treatments in both groups, except the frequent use of theophylline, were found to be acceptable and in accordance with the guidelines.

CONCLUSION

In our study, it was found that pulmonary function test, arterial blood gas analyses, and chest radiography were performed significantly more in UH. More tests in UH may be due to the fact that patients in this hospital have more comorbidities. This situation may explain that non-drug costs in UH are higher than in SH.

There were some deficiencies in this study. As it is a retrospective study and the hospital records are incomplete, our data may be limited. The patients included in our study could not be classified according to GOLD staging.

Our aim in this study was to examine the cost of patients hospitalized with a diagnosis of COPD and the treatment approach to patients with COPD in two separate hospitals. As far as we know, there is no study comparing university hospitals and state hospitals on this subject.

There are many recommendations in the literature to reduce the costs regarding COPD. These recommendations are methods such as telemedicine, patient education, some pharmacological recommendations, and pulmonary rehabilitation. In addition, in order to reduce the cost of inpatients with COPD, rational use of antibiotics and corticosteroids during hospitalization in accordance with the guideline will contribute to reducing costs. We think that performing outpatient treatment with appropriate drugs, correct drug administration of patients, pulmonary rehabilitation, and vaccination will reduce hospitalizations, thus reducing direct and indirect costs..

ETHICAL DECLARATIONS

Ethics Committee Approval: The ethics committee approval from the local ethics committee of Kahramanmaraş Sütçü İmam University and the necessary approval from the officials of Necip Fazıl Kısakürek State Hospital were obtained (Approvel number:2013-15-08).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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