The Economic Impact of Pharmacotherapeutic Follow-Up in Copd Patients at a Health Care Institution in Medellin-Colombia

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Abstract

Context: several studies show that missing doses and an incorrect inhalation technique, are the most common pharmacological risks in patients with Chronic Obstructive Pulmonary Disease diagnosis. These are associated with an increase in Health-related costs, mainly due to an increase in the number of emergency visits, hospitalizations and switches of medication as a consequence of therapeutic failures.

Objective: to determinate the median cost per month of each patient stratified by type of pharmacological risks, after pharmacotherapeutic follow-up assessment.

Method: Follow-up cohort, in Chronic Obstructive Pulmonary Disease patients. The observation period was from January 2012 to June 2014 [n:108]. The pharmacological risks assessed were incorrect inhalation technique and missing doses. The main outcome was the median cost per month in each patient before and after having received Health-related education by a Pharmacist, stratified by having or not pharmacological risks [1 USD=1.906,9COP information to august 2014]. Wilcoxon test for paired sample and U de Mann-Whitney test for independent sample were used for this purpose.

Results: The median cost per month was 165, 3[104,0-277,8], a patient without pharmacological risks was 119,2 [88,9-201,4] USD and a patient with pharmacological risks was 186,7 [123,7-307,9] [p= 0,033]. On the other hand, a patient with missing doses was 195,1 [131,6-297,6], in comparison with a patient with incorrect inhalation technique, that was 143,0 [96,3-169,0]. The cost before the Pharmacotherapeutic Follow-up implementation was 169,8 [110,8-253,8] and after that it was 150,7 [106,7-278,1], with an important decrease of 11,25% [p= 0,517].

Conclusion: Having pharmacological risks was related with a higher median cost per patient. The median cost per patient was lower after giving Health-related education to patients by Pharmacotherapeutic Follow-up.

Key words:

Health care costs; Pharmaceutical care; Medication adherence

Introduction

The so called Chronic Obstructive Pulmonary Disease [COPD] is a preventable and treatable condition, principally characterized by airflow limitation in the lungs [1]. Currently this disease is an important issue because it is the fourth mortality cause around the world and in 2004, 64 millions of persons had this disease, according to the WHO [2]. Regarding the colombian context, it is estimated that 9 out of 100 people have COPD, and it is the most common cause in the elderly [up to 60 years]. According to the National Administrative Department of Statistics, in 2010, 4500 deaths were attributed to COPD [3]. These patients show a diminution in their Health-related Quality of Life and an increase of health resources [4–9].

Despite this is a chronic and progressive disease, it is possible to obtain an accurate control with a proper diagnosis and treatment, ensuring an excellent patient compliance in taking its medications [10,11]. This experience has permitted us to determinate the main factors related to therapy failure in COPD patients, such as missing doses and incorrect use of inhaled medications [12–19].

Nowadays several tools permit us to determinate the impact of good compliance and correct use of medicines. One of them is the so called "pharmacotherapeutic follow-up". This is a clinical practice led by a Pharmacist who detects, prevents and solves Drug Related Problems [20,21]. Several studies have shown the Pharmacist's benefits in solving these problems [22-26] and this has direct consequences on patients satisfaction and the understanding of its disease, which is related with the number of hospitalizations and a better control of the disease [27–29].

The main objective of this study was to determinate the median cost per month of each patient stratified by type of pharmacological risks, after pharmacotherapeutic follow-up assessment.

Methodology

Study type

Follow-up cohort

Patient type

COPD patients, evaluated by a pharmacotherapeutic follow-up program

Observation period

Between January 2012 to June 2014 [one year before and after the intervention]

Dependent variable

Median monthly cost of patient [it contains the cost of utilization for each patient, for instance: medications, hospitalization, specialist consults, surgical interventions, among others].

Independent variable

Sociodemographics and pharmacological risks [incorrect inhalation technique and missing doses]

Population

Patients of +helPharma, a health institution located in Medellin, diagnosed with COPD and evaluated by pharmacotherapeutic follow-up program between January 2012 and June 2014.

Sample size

Sample size was calculated by paired comparison, and expected in a standard deviation of 78.7 USD pre-test and 52.4 USD post-test [through the pilot test], an expected average difference of 26.2 USD, confidence level of 95% and power of 80%, for which it was necessary to have a number of not less than 103 pairs.

Since the base population had 1,100 patients, they were selected randomly [simple random selection]. An additional 5% of this population was included in order not to lose power due to lack of information. Epidat 3.1 statistical package was used to this purpose.

Data collection techniques

The necesary datas for the study were extracted from +helPharma health institution database, which was loaded with pharmacotherapeutic follow-up datas and the patient medical records.

A standard digital medical record was used with questions for data collection, which let us not just to validate this information, but also provide us a higher veracity and data quality and to do interface with Excel program, decreasing typos.

Data analysis

Univariate analysis: For the descriptive analysis of qualitative variables, relative and absolute frequencies [simple and accumulated] were used, and quantitative variable summary measures such as central tendency [mean], scatter [range, interquartile range, standar deviation], position [median, quartile and percentile]. Both type of variables were illustrated by tables and graphics.

Normality test for quantitative variables were performed.

1 USD = 1.906,9 COP [information of August 2014].

Bivariate analysis: The t-Student test was used to compare dichotomous qualitatives variables and quantitative variables if having normal distribution [and U Mann-Whitney test if not]. We used wilcoxon test for dependent samples. Statistical package SPSS for Windows version 18 and Rstudio Versión 0.98.1103– ©2009-2014, Inc. were used. [License was covered by the University CES].

Ethical considerations: According to article 11 of the resolution 1993 of Colombian Ministry of Health, for which the scientific, technique and administrative standards for health research were established. This research was considered to be safe, since these studies use techniques and retrospective documentary research methods. Besides no intervention or intentional modification of social, psychological, biological of individuals participating in the study was not carried out [30].

Identification datas were deleted, ensuring confidence and privacy to information. The Epidemiology and Statistics research group at CES University and +helPharma approved the job.Bass Publishing. San Francisco, CA.

Results

The analysis was performed with 108 patients diagnosed with COPD. Table 1 describes the socio-demographic characteristics of the patients. The 35% of patients did not have any pharmacological risks (38) and 65% of them did (70), of these, 21.4% had some missing doses and 18.6% had incorrect inhalation techniques.

Variable	n [%]
Age	74 [± 10]
Gender	
Female	53 [49]
Male	55 [51]
Educational level	
Illiterate	1 [1]
Primary	58 [54]
Secondary	41 [38]
Technical	2 [1]
Technologist	1 [1]
University	5 [5]
Stage of disease	
COPD Gold 1	5[5]
COPD Gold 2	11[10]
COPD Gold 3	25[23]
COPD Gold 4	67[62]
Marital status	
Married	70 [65]
Separate	4 [4]
Single	13 [12]
Free union	6 [6]

Widower	15 [14]
Occupation	
Housewife	36 [33]
Unemployed	12 [11]
Employee	16 [15]
Independent	12 [11]
Pensioner	32 [30]
Affiliation	
Beneficiary	44 [41]
Contributor	64 [59]
Absolute frequencies (n) and relative frequencies (%) were reported.	

**Table 1:** Distribution of patients by socio-demographic variables.

It was identified that the median monthly cost of patients was 165.3 (interquartile range from 104.0 to 277.8) USD (Figure 1).

**Figure 1:** Median cost per month of treating patients diagnosed with COPD.
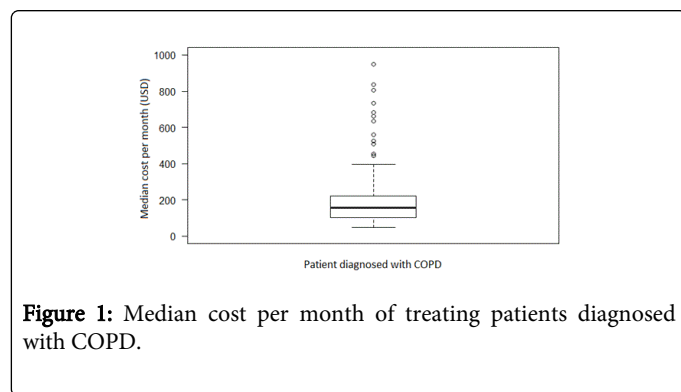
After that we discriminated between patients who had and those who did not have any pharmacological risk, finding that those who did not, had a lower median cost per month, 119.2 (interquartile range 88.9 to 201.4) VS 186, 7 (interquartile range from 123.7 to 307.9) USD, with a p-value = 0.033 (Figure 2).

Figure 2: Median cost per month of treating patients discriminated by pharmacological risks.
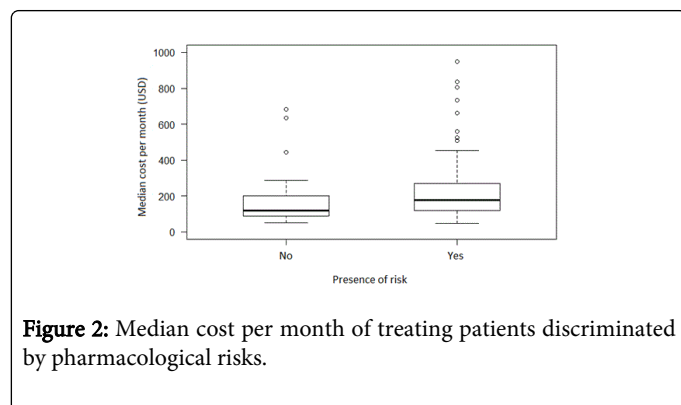
When stratified by type of pharmacological risk, patients who had missing doses or incorrect inhalation technique showed a median cost per month of 195.1 (interquartile range from 131.6 to 297.6) USD and 143.0 (interquartile range 96, 3-169.0) USD respectively (Figure 3).

Figure 3: Median cost per month of treating patients classified by type of pharmacological risk.
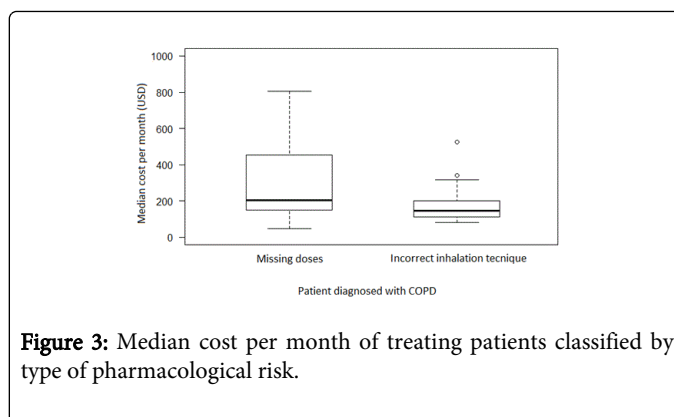
The pre and post analysis showed a delta change of -11.25% after a one-year intervention, which went from an initial value per patient of 169.8 USD (interquartile range from 110.8 to 253.8) to 150.7 USD (interquartile range 106.7 to 278.1), after the evaluation by the SFT program, with a p-value = 0,517 (Figure 4).

Figure 4: Median cost per month of patient treatments before and after pharmaceutical intervention.
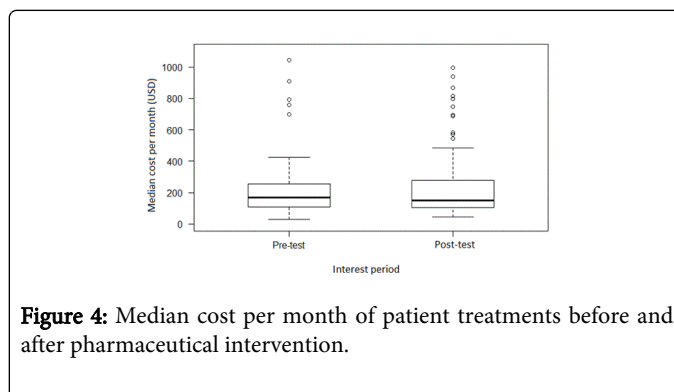
Discussion

The outcomes in this study, suggest that having some type of risks are associated with an increased patient monthly cost, where missing doses and incorrect inhalation techniques, represent the highest proportion of pharmacological risks identified. Patients that skip some of their doses, have a higher monthly average cost than patients with an incorrect inhalation technique. These findings are confirmed by several authors [12–19,31,32] which show that patients with an inappropriately use of its medications, have a bigger health resources spending due to upper presence of therapy failure.

It is also important to show the cost impact generated in case these risks are solved. In this study 11-25% of saving per patient was observed after a one-year long intervention.

It is noteworthy that currently the disease-related cost can be underestimated due to the lack of any prevention or educational program that allows the identification of these risks. Therefore, it is critical to involve all the professionals that could contribute to the solution of medication-related problems.

Currently there are several tools that allow us to generate an important health-related cost saving. These are focused on improving the adherence and the correct use of medicines. One of these tools is pharmacotherapeutic follow-up, which is led by a Pharmacist. Several

health institutions at Colombia are using these strategies to improve their patient's health [33].

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