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Costs of chronic obstructive pulmonary disease in patients receiving specialist outpatient care in Poland

Koszty przewlekłej obturacyjnej choroby płuc u pacjentów leczonych w ramach specjalistycznej opieki ambulatoryjnej w Polsce

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Abstract

Introduction: Chronic obstructive pulmonary disease (COPD) is one of the leading causes of death in Poland and worldwide. Cost-of-illness studies (analysing total, direct and indirect costs) are studies aimed to determine the economic burden of a disease. Acute exacerbations and hospitalisation are the major cost drivers in COPD. The aim of the study was to estimate the direct costs of COPD treatment in the setting of specialist outpatient care from the societal perspective.

Material and methods: Chronic obstructive pulmonary disease costs were estimated from a compilation of data: medical records of patients managed at 8 specialist outpatient clinics and 5 teaching hospitals in Poland between 2007 and 2008. The direct costs, resulting from chronic treatment and treatment of acute exacerbations in the outpatient setting, were calculated using the bottom-up approach on the basis of data collected by pulmonary specialists at outpatient clinics. The mean cost of acute exacerbation managed in the inpatient setting was derived from a multicentre Polish study in which five clinical centres participated.

Results: The total cost per patient per year was 4027.82 zlotys (1007 euro) and included the cost of chronic treatment in the amount of 2423.57 zlotys (606 euro) plus the cost of treatment of an acute exacerbation in the outpatient setting in the amount of 421.16 zlotys (105 euro) plus the cost of treatment of an acute exacerbation in the inpatient setting in the amount of 1183.09 zlotys (296 euro).

Conclusion: Treatment of COPD in poses a considerable economic burden on the Polish society.

Key words: chronic obstructive pulmonary disease, direct costs, Poland

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Introduction

Epidemiological studies estimate the average prevalence of chronic obstructive pulmonary disease (COPD) in the general population at 10% [1–5]. According to a widespread belief, a certain undefined number of patients remain undiagnosed, which results from limited access to spirometry and very mild clinical symptoms, particularly in the early stages of the disease [3, 6]. The costs of

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respiratory diseases in the European Union are estimated at 6% of the health care budget, 56% of which being attributable to patients with COPD [5]. COPD is therefore not only a considerable public health problem but also a significant economic burden for each country's budget [1, 3, 4, 7, 8]. A comparison of this burden between individual countries is difficult due to the differences in health care systems, economic conditions and healthcare outlays. Cost-of-illness studies are aimed to determine the economic impact of a disease by measuring direct and indirect costs without taking into account issues related to treatment efficacy [9–11]. Measurements of costs show the financial burden to the state (state institutions) from the societal point of view and the cost of illness in the individual patient. They are also significant for the pharmaceutical industry, as they allow to assess the market and treatment standards in specific diseases. Sometimes studies of costs raise controversy, as they are used for making decisions in the process of defining priorities in access to health care resources [10, 11].

The aim of our study was to estimate direct costs of COPD in patients receiving specialist outpatient care in Poland from the societal perspective.

Material and methods

The study included 69 men and 39 women (mean age 69 ± 9.5 years) managed at 8 outpatient clinics providing specialist outpatient care (7 clinics from the Mazovian province and 1 clinic from the Silesian province). This was a prospective study conducted between 2007 and 2008. Costs were calculated on the basis of a compilation of data obtained from two sources:

1) the mean cost of chronic treatment of COPD and treatment of an acute exacerbation in the outpatient setting was derived from the patient records collected by pulmonary specialists in the participating clinics. The data included: demographic data, number of visits, diagnostic and laboratory tests, medication use, number of acute exacerbations managed in the outpatient and in the inpatient settings, use of home oxygen therapy, and influenza vaccinations. Additional parameters that were assessed included: transport of the patient to the clinic, line of employment, and the number and duration of sick leaves;
2) the mean cost of treatment of an acute exacerbation in the inpatient setting was derived from a previously published Polish multicentre study [12, 13].

Unit costs were derived from the catalogues of the National Health Fund. Medication costs, defined by gross retail prices, were derived from the lists published by the Minister of Health in force in 2008. The mean cost of home oxygen therapy per each analysed patient was calculated on the basis of reconciliations with the National Health Fund, assuming that 1 reconciliation point was equivalent to 1 day of oxygen therapy.

Statistical analysis

The study population was characterised using descriptive statistics: mean values and standard deviations were calculated for quantitative variables and absolute and relative frequencies were calculated for qualitative variables. Health care resource utilisation and the individual components of the costs of illness were presented as a mean cost per patient per year. The 95% confidence intervals (CI) were calculated using the bootstrapping approach [14]. Confidence intervals were not calculated for aggregate data.

Results

The age distribution in the study population was as follows: 2% of the patients were aged 40–50 years, 38% were aged 51–65 years, 52% were aged 66–80 years and 8% were aged 81 years or more. Current smokers and never-smokers accounted for 39% and 10% of the subjects, respectively. Patients with mild (stage I), moderate (stage II) and severe to very severe (stages III or IV) disease accounted for 9.2%, 47.2% and 43.5% of the study

Table 1. Comorbidities in COPD (% of patients)

Diabetes	8
Hypertension	42
Coronary artery disease	24
Pulmonary thromboembolic disease	7
Psychiatric disorders (depression, anxiety, aleksythymia	Not examined

Table 2. Type of employment and sick leaves due to COPD exacerbation (% of patients)

Full employment	6
Part time employment	4
Retired	60
Pension	31
Sick Leave	6

population, respectively. Table 1 lists the co-morbidities in COPD. The most common ones were cardiovascular diseases (coronary artery disease and hypertension), although diabetes mellitus was present in 8% and pulmonary embolism was present in about 7% of the patients. Psychiatric co-morbidities, such as depression, were not investigated in our study. According to Table 2, 91% of the patients managed at the specialist outpatient clinics were old-age or disability pensioners and only 6% took sick leave during acute exacerbation of their disease. Patients arrived at the clinic on public transport (56%) or in their own car (33%) (Table 3). More than 90% of the patients with COPD were managed with short-acting β_2-agonists (SABAs) or long-acting β_2-agonists (LABAs), 84.3% received anticholinergic agents and 61.1% received inhaled glucocorticosteroids (Table 4). During an acute exacerbation treated in the outpatient setting there was an increase in the number of patients receiving oral glucocorticosteroids, antibiotics, inhaled glucocorticosteroids and mucolytics. The mean cost of medication was 147.24 zlotys for chronic treatment (per 30-day period), 170.81 zlotys for an acute exacerbation treated in the outpatient setting and 426.00 zlotys for an acute exacerbation treated in the inpatient setting (Table 5). Patients in Poland attend an average of 2.94 outpatient visits, the mean number of exacerbation-free days is 333.1, an average of 57.1% of the patients undergo influenza vaccination and 11.4% of the doctors performing home visits prescribe home oxygen therapy (Table 6). There are 1.27 and 0.24 of acute exacerbations treated in the outpatient and in the inpatient setting, respectively, per one patient with COPD. Table 6 summarises the calculated total cost per patient per year broken down into component costs: cost of chronic treatment, cost of treatment of acute exacerbations in the outpatient setting and cost of treatment of acute exacerbations in the inpatient setting.

Table 3. Type of transport used to get to the outpatient clinic (% of patients)

Ambulance	1
Medical transport	0
Public transport	56
Private car	33
Taxi	1
Train/ Coach bus	3

Table 4. Drugs in the treatment of chronic COPD and during outpatient exacerbation (% of patients)

Drugs classes	Chronic treatment of COPD	Treatment of acute exacerbations of COPD
Oral Corticosteroids	2.8	43.5
LABA, SABA	91.7	72.2
Inhaled Corticosteroids	61.1	76.9
Anticholinergics	84.3	74.1
Xanthines	59.3	52.7
Mucolitics	32	47.2
Antibiotics	4.5	84.3

LABAs — long-acting β2-agonists; SABAs — short-acting β2-agonists

Discussion

In pharmacoeconomics, the costs of an illness are divided into direct medical costs, direct non-medical costs and indirect costs, which are associated with the loss of productivity [9–11, 15].

Direct medical costs comprise: hospitalisations, visits at medical emergency facilities, medical staff fees, medication, drug dosing devices (nebulisers, spacers), instruction and education. Direct non-medical costs are difficult to analyse, as they are outside the health care system and result, for instance, from the deterioration of the financial standing of the patient's spouse and children due to the loss of ability to earn a living by the patient. Indirect costs of an illness comprise: disability pensions, old-age pensions, sick leaves and premature mortality. Two approaches of estimating indirect costs are currently used: the human-capital approach and the friction cost approach. Accor-

Table 5. Medication costs in the chronic treatment of COPD and in the treatment of acute exacerbations of COPD (in zlotys; 95% CI)

	Chronic treatment (30 days)	Treatment of an acute exacerbation in the outpatient setting followed by 14-day treatment following the exacerbation	Treatment of an acute exacerbation in the inpatient setting
Medication cost	147.24	170.81	426.37
	(126.54–172.67)	(152.3–189.91)	(312.83–559.81)

Table 6. Mean cost of COPD per patient per year in Poland (in zlotys)

Acute exacerbations treated in the outpatient setting	
Number of acute exacerbations per year	1.27
Cost of medications and diagnostic tests	320.44
Cost of medical visits	100.71
Cost of one acute exacerbation	252.03
Total cost of acute exacerbations treated in the outpatient setting	421.16
Acute exacerbations treated in the inpatient setting	
Number of acute exacerbations per year	0.24
Cost of one acute exacerbation	4871.55 (4114.60–5712.80)
Total cost of acute exacerbations treated in the inpatient setting	1183.09
Chronic treatment	
Cost of medications and diagnostic tests	1650.15
Cost of medical visits	147.14
Cost of influenza vaccinations	45.71
Cost of home oxygen therapy	580.57
Total cost of chronic treatment of COPD	2423.57
Total cost of COPD per patient per year	**4027.82**

ding to the human-capital approach, the indirect cost comprises the number of days off work per patient resulting from the loss of gross domestic product. The friction cost approach, on the other hand, assumes gross domestic product loss until the outgoing employee is replaced. In this approach, indirect costs are lower than those calculated using the human-capital approach. While neither of the approaches has been shown superior so far, vast differences are seen in the results of research studies.

Our study was based on data from two other studies, one of outpatient care and the other of inpatient care. In both studies, data were collected prospectively but the idea to carry out the analysis appeared after the commencement of data collection, which is why the analysis is retrospective in nature.

It was shown that the mean total cost of treatment of a COPD patient in Poland in 2008 was 4027 zlotys. It was a selected group of patients receiving specialist care, most of whom were being treated in accordance with the COPD management standards [5, 16]. Anticholinergic agents were received by 84% of the patients, SABAs/LABAs by 91.7%, inhaled glucocorticosteroids by 61% and theophylline derivatives by 59%. Of note is the high cost of medications used in chronic treatment, which cost is shown from the societal perspective and nears an average of 150 zlotys a month. It should be emphasised that this is the cost of medications used for the treatment of COPD in patients who are commonly burdened with numerous co-morbidities.

The costs of treatment of COPD in Poland differ from those in other countries, as shown in a large Confronting COPD Survay study [17]. For instance, the annual direct costs were 614 euro in the Netherlands, 1255 euro in Italy, 3196 euro in Spain and 4119 dollars in the United States. A similarly high variability has been shown with respect to the indirect costs of the disease, which accounted for 4% of the total costs in Italy but as much as 60% in France. In Poland, the indirect costs of COPD are not high because 91% of the medical care is provided to old-age or disability pensioners, who do not contribute to gross domestic product. Only 6% of COPD patients in Poland take sick leave during periods of exacerbation.

Published data show that most of the indirect medical costs are costs of treatment of acute exacerbations in the inpatient setting [12, 17–20]. Multicentre studies conducted in Poland showed that the mean cost of treatment of acute exacerbations of COPD in the inpatient setting was 4871.55 zlotys, which suggests a considerable underestimation of this procedure by the National Health Fund. This analysis also reveals the faults of the health care system. In contrast to Western European countries, the Polish health care system lacks procedures for the treatment of acute exacerbations at home or at emergency facilities [18, 20]. Because of that the patient with an acute exacerbation of COPD is most commonly hospitalised irrespective of the severity of the exacerbation. In the context of the assessed costs of illness, the initiative to create a model of integrated care provided to patients with COPD in Poland seems very appealing [21]. In 2008 in the US, the average cost of an acute exacerbation was estimated at 3439 dollars, although the cost of a severe acute exacerbation, which was defined as the need for hospitalisation or death, was estimated at as much as 11,261 dollars [22]. Patients without acute exacerbations cost the payor half of what patients with acute exacerbations do.

Several aspects of diagnostic evaluation and treatment of patients with COPD rarely taken into consideration in everyday medical practice warrant attention. In Poland, despite the existence of relevant management standards (The Global Initiative for Chronic Obstructive Lung Disease), virtually no respiratory rehabilitation services are provided in the outpatient setting, which is why

this method of treatment could not be included in the analysis. In addition, the evaluation of costs in patients with COPD rarely takes into account mental and emotional problems and problems associated with the worsening of health-related quality of life (HRQoL) [23–27], while quality-of-life studies in patients with COPD are gaining an increasing significance as a supplementary element in the evaluation of the patient's clinical condition, the effects of education and treatment provided to the patient and the clinical evaluation of medications and the acceptance of the treatment by the patient [23–27].

A study by Grabowska-Krawiec showed that a considerable percentage of patients with COPD suffer from depression or alexithymia [25]. The elderly are particularly faced with significantly greater problems with the regulation of emotions compared to healthy individuals and are more often alexithymic, which may be associated with the difficulties in the doctor-patient relationship.

This relationship is very important, as adherence to treatment generates a 44% decrease in the number of acute exacerbations and a 60% decrease in mortality [28, 29]. According to the TORCH (Towards a Revolution in COPD) study, 80% of the patients adhered to inhaled therapy, while 20% did not, and in 8% of the patients adherence fell below 60% of the prescribed doses of inhalation therapy [29]. The study also showed that adherence to treatment does not depend on the severity of the disease, but is greater in men and in patients with a more intense perception of dyspnoea. A comprehensive assessment of chronic treatment requires therefore several years of follow-up in the setting of phase IV studies, when the clinical effectiveness, safety and adherence to treatment are being assessed in real-life conditions. Results of a Dutch analysis showed that 54% of the patients started their treatment of COPD with anticholinergic agents, 47% with LABAs and over 40% with fixed-dose combinations [30]. Three years later, however, 39–57% of the patients were no longer taking any medication.

Conclusion

Assessment of costs should be one of the arguments in the discussion on the improvement of care provided to patients suffering from COPD. Cost-of-illness studies in COPD should contribute to the increased awareness of the role of these costs, including, first of all, costs of acute exacerbations, among decision-makers in the health care system. A realistic assessment of costs requires taking into consideration such aspects as treatment compliance and treatment persistence.

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