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Understanding the Financial Strain of Asthma Management: A Review of Treatment Costs

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ABSTRACT

Background: Asthma is associated with various healthcare expenditures that include both direct and indirect costs. It is also associated with the loss of future earnings related to both morbidity and mortality. The objective of the study is to determine the financial strain associated with asthma. **Methods**: We performed a systematic search of MEDLINE, EMBASE, CINAHL, CDSR, OHE-HEED, and Web of Science Databases. **Results:** Hospitalization and medications were found to be the most important factor of direct costs. Work and school loss caused for the greatest percentage of indirect costs. The cost of asthma was correlated with comorbidities, age, and disease severity .**Conclusion:** This article provides a comprehensive review on the evidence of cost-effectiveness of asthma treatments derive d from the published literature and offers an overall summary of the financial strain of asthma and its relationship with the degree of disease control. Despite the availability of effective preventive therapy, costs associated with asthma are increasing. Strategies including education of patients and physicians, and regular follow-up are required to reduce the financial burden of asthma.

Keywords: Asthma, Asthma management, Cost effectiveness

INTRODUCTION

ASTHMA

Millions of individuals worldwide suffer from asthma, a common chronic inflammatory respiratory disease that can be difficult to diagnose and treat. The hallmark of this respiratory ailment is airway inflammation, which results in sporadic airflow restriction and bronchial hyperresponsiveness. Coughing, wheezing, and shortness of breath are common asthma symptoms, and they can sometimes be made worse by triggers such as viruses or allergies. A complicated interaction between genetic and environmental variables determines the prevalence and severity of asthma. Disparities in asthma care still exist despite breakthroughs in therapy, with different demographic groups having varying access to diagnosis, treatment, and patient education. Asthma development is linked to other atopic symptoms including eczema and hay fever, and it frequently manifests in childhood.The severity ranges from sporadic symptoms to airway closure that poses a serious risk to life. Using the patient's medical history, physical examination, pulmonary function testing, and relevant laboratory work, healthcare providers arrive at a firm diagnosis. The main diagnostic procedure is spirometry with a post-bronchodilator response (BDR). The mainstays of treatment include ongoing education, regular symptom evaluation, availability of fast-acting bronchodilators, and controller medication that is appropriate for the severity of the disease [1].

It is estimated that between 10 and 30 percent of asthma patients have exacerbations [2-4]. While there is a correlation between poor asthma control and exacerbation risk, the relationship is not perfect [5], thus it is crucial to evaluate each independently when deciding on a course of treatment. Treatment decisions in clinical practice are made in light of financial considerations, patient characteristics, and evidence of safety and efficacy [6].

From a clinical and financial perspective, it is desirable to better control asthma through effective intervention. Every country is facing pressure to reduce health care costs, and evaluations of novel therapies' safety and tolerability are being weighed against evidence of value for money more and more. Therefore, it's critical that medical professionals and health economists collaborate to comprehend asthma's expenses, evaluate the efficacy of available treatments, and determine how to attain the most possible cost-effectiveness [7].

Although asthma is associated with large healthcare consumption, the economic costs of asthma are considered to be among the highest of all chronic diseases. Numerous studies assessing the financial impact of asthma on both individuals and society have been published. Nevertheless, there hasn't yet been a thorough analysis of how asthma affects finances [5-8]. The purpose of this systematic review is to assess and consolidate the existing literature on the economic burden of asthma. It is crucial to analyze the financial implications of asthma from both social and economic standpoints in order to effectively allocate resources and improve patient care. This study aims to examine the following query: "What are the direct, indirect, and total expenses linked to asthma?".

METHODS

A systematic review was conducted to identify articles in English that included costs related to asthma. Only studies in English (because there was a lack of a translator) and published literature were included. The following electronic databases were searched using MEDLINE, EMBASE, CINAHL, the Cochrane Database of Systematic Reviews (CDSR), the Health Economic Evaluation Database (OHE-HEED), and Web of Science. Search terms were examined including: “asthma”, “direct service costs”, “illness costs”, “cost-benefit analysis” and “health costs”. Duplicate citations were identified and removed. Reviewers independently assessed the quality of each study according to the Cochrane Handbook.A third reviewer and I discussed the disagreements and reached a consensus[12].

Study Selection

The titles and abstracts of all publications identified through the primary literature search were independently assessed by two researchers. A total of four non-English abstracts were searched and excluded from the literature search. The full text of all potentially eligible articles identified after primary screening was reviewed to ensure that each article met the population and outcome of interest inclusion criteria.

The types of medical costs were divided into direct and indirect costs and were defined as follows: direct health care costs, which included alternative treatment/medications, physiotherapy/chiropractic, peak flow measurements, primary consultations, paid home care services, private and. outpatient hospital care, ambulance and other transport, and hospital care. Indirect costs concerned individual patients, their families, and lost opportunities for work or education. Total costs are the sum of both direct and indirect costs [12].

Data abstraction

The following information was extracted from all publications: authors, year of publication, primary country of origin, study design and duration, whether the study was placebo-controlled, patient characteristics (population, age and gender), number of patients included in each study. , treatment arm, types of analysis, cost measures and comparative drugs [13].

RESULTS

Key findings on clinical burden

Direct Versus Indirect Costs of Asthma

Asthma costs include both direct and indirect cost components. Direct costs include hospitalization, emergency room visits, physician visits, nursing services, emergency room use, medications and equipment, blood and diagnostic tests, research and education. Indirect costs or illness costs are lost school days, travel, waiting times and reduced work productivity for caregivers of children with asthma. Direct costs have been shown to exceed indirect costs, and the largest components of direct medical costs observed were drug costs and hospitalization. An increase in direct medical costs may lead to a reduction in total medical costs if it leads to a disproportionate reduction in indirect costs due to improved clinical outcomes. In our systematic review, nine studies found that the direct costs of asthma accounted for the majority (53-100%) of total costs [22,23,24-27,28,29,30].

Direct costs

Direct costs are determined by the severity of the disease, the adherence to medications, the general disease of the overweight and the health costs, for example in the United States, the health costs are higher. The relative importance of the components that make up direct costs varies widely across studies. In general, physician costs account for the smallest portion, and hospital costs are somewhat higher and roughly equal to drug costs, which account for most of the direct costs of mild to moderate asthma treatment[7].

Physician costs.

In three studies, treatment costs were divided into general practitioners and specialists [24,31,32], and in one study, hospital and outpatient treatment. Medical expenses are on average 22%, of which 75% are related to consultations with a family doctor and 25% with a specialist. Therefore, family medical care accounts for the majority of medical costs. Assuming that general medical care is part of the cost of asthma control, asthma treated by specialists is part of the cost of uncontrolled asthma. Therefore, improving asthma control by physicians, which requires better patient monitoring and assessment of control to be successful, can reduce emergency department use and therefore save money in the long term [33].

Hospitalizations

Reported asthma hospitalizations varied widely by age, geographic region, gender, and asthma medication use. In a large cohort study lasting over 20 years, Suissa et al. obtained information from the Saskatchewan Health databases on asthma patients aged 5–44 years in that province between 1975 and 1991 and found an overall incidence of asthma of 42/1000 asthma patients/year in patients followed for at least 1 year. A higher proportion (48/1000) was in patients who received at least 3 prescriptions for asthma medication in one year. Over various follow-up periods (up to 4 years), regular use of inhaled corticosteroids (ICS) reduced asthma hospitalizations by 31% and readmissions by 39%. those with more severe asthma and previous hospitalizations for this condition during the 1-year baseline period. The researchers noted that their findings underscore the importance of regular use of inhaled corticosteroids to avoid hospitalization. [14].

Large differences in reported hospitalization rates may be due to differences in ED visits and/or hospitalization rates [16]. Hospitalization appears to follow a bimodal age distribution, with the very young and older people being hospitalized more frequently [16]. Other factors that may increase hospitalization in certain regions or populations include higher morbidity, severity of illness, multiple comorbidities, and barriers to care related to socioeconomic status [15].

Emergency Department(ED) visits

The number of emergency room visits for asthma varied by age, type of therapy, social status and residential area (urban/non-urban). According to several studies, both children and adults with asthma had an average of less than one emergency room visit per patient per year [16,17,18]. The rate of ED visits was significantly higher in women than in men, and in general, the number of ED visits increased with age [16].

In spite of advancements in treatment and the availability of guidelines, Rosychuk et al.'sanalysisof patterns in asthma-related ED visits by over 45,000 children under the age of eighteen from April 1999 to March 2005 did not show a decline in ED presentation rates over time [19].

According to Sin et al., during a one-year follow-up period, elderly asthmatic patients who received ICS post-discharge from the hospital had a 29% lower chance of being readmitted to the hospital for asthma and a 39% lower risk of experiencing all-cause mortality. The use of inhaled corticosteroids (ICS) was linked to a 32% relative rate reduction for recurrent hospitalization or all-cause mortality (95% CI 23%-39%), after controlling for age, sex, comorbidity, and use of other antiasthma medications. When ICS was used 90 days after discharge, there was a 41% reduction in recurrent asthma-related hospitalizations or deaths among patients who had at least one prescription for ICS within a year prior to the index hospitalization, compared to not using ICS (95% CI 32%-49%). [20, 21].

Medication prescriptions

According to Lynd et al. [36], 27% of patients take oral corticosteroids, 17% don't take any, 47% take fewer than four ICS canisters annually, 29% take five to twelve canisters, and 8% take more than twelve canisters. According to the facts available, children were prescribed more medications annually per patient than adults [34, 35, 37].

Indirect Costs

Reduced productivity at work and school accounts for a significant share of the disease burden, according to economic assessments of asthma included in the reviewed studies. This adds to indirect health costs. It's critical to consider both lost productivity at work and time away from it, or absenteeism, in order to appropriately evaluate health-related work impairment. The days that patients missed from work due to their asthma, the days they were able to work despite their symptoms (known as restricted days), and the time spent traveling and waiting to receive outpatient asthma treatment were all used to calculate productivity losses. According to certain studies, the biggest single indirect cost is the productivity loss brought on by absences from work or school [39–42].

Since the cost of parents missing work due to their child's asthma is also an indirect cost, children with asthma have far higher indirect costs than children without asthma. High indirect resource consumption was noted in a Hungarian study involving both adult and pediatric participants. However, compared to adult patients, the percentage of indirect costs in total costs for pediatric patients was significantly higher (52% vs. 21%). Additionally, the cost of lost work increased statistically significantly for parents of patients with good control compared to parents of patients with poor control [38].

Intangible costs

A patient's quality of life can be severely compromised by asthma. The goal of therapy is to lessen symptoms so that the patient can live a relatively normal life, as the condition cannot be cured. In order to achieve patient satisfaction in the management of asthma, it is crucial to hear the patient's opinions and understand their perspective on the condition. Measuring quality of life involves evaluating these needs and, specifically, evaluating how the patient feels about how their asthma affects their life. The patient's age and the severity of the illness both affect intangible costs[47].

Many tools have been created to formally measure and assess quality of life from the patient's perspective as opposed to the clinician's. The Nottingham Health Profile [48], the McMaster Questionnaire [45], and the St. George's Respiratory Questionnaire [46] are a few that are used in the context of asthma. By using these, it has been shown that prophylactic treatment can improve the quality of life experienced by asthma patients [47].

Costs of controlled versus uncontrolled disease

Since asthma is regarded as a mild illness, ambulatory care is the best way to treat it. Nonetheless, ER visits, hospital stays, and fatalities account for approximately one-third of the direct costs associated with asthma. This clearly suggests that increasing disease control could result in a sizable cost savings.

Patients with asthma will experience different costs based on the severity of their condition and the level of control they are able to achieve. Health economists view "control" in a different way than clinicians do. From a clinical perspective, successful control is demonstrated by the patient's absence from the clinic; however, health economists define control as the patient's achieved quality of life. Because patients see their general practitioners more frequently and require more therapy, improved control frequently leads to higher drug and general practitioner costs. Still, other costs are decreased by the enhanced control [49, 50].

Prophylactic therapy and reduction of costs

According to international guidelines [52–54], prophylactic therapy ought to be started earlier in the course of treating asthma. Reductions in hospitalizations and time away from work will more than offset this, even though it will cause a shift in the disease's direct costs and result in a greater emphasis on medication and GP expenses. Three years of inhaled steroid treatment is covered by the price of a single hospital admission [55]. Numerous studies, both prospective and retrospective, have looked into the connection between the increased use of prophylactic therapy in asthma management strategies and outcome measures resulting from poorly controlled asthma [56, 57–62].

It has been demonstrated that in the formal clinical trial setting, savings in other areas of direct health care costs more than offset the higher cost of the preventive intervention [61–63]. For instance, ADELROTH and THOMPSON [33] showed that when high-dose inhaled corticosteroids were given to patients with severe asthma, hospital bed days decreased by 80%. More recently, in their economic evaluation of salbutamol and formeterol, BUXTON and SCULPHER [63] used the number of episode free days as an outcome. Because salbutamol has a lower acquisition cost than formeterol, this study determined that it was more cost-effective.

Cost-effectiveness and cost-utility

When making decisions in the context of the healthcare system, economic analyses are quite helpful. Before a clinician can use a novel therapeutic measure, clinical research must demonstrate that it is effective at least when compared to a placebo and frequently when compared to other available treatments or comparators. It is imperative to ascertain if the payer is willing to assume the additional costs associated with implementing the new treatment measure. Benefits that enable a sufficient evaluation and quantification of the introduction of the examined treatment measure must be a part of clinical improvement. Studies on cost-effectiveness contrast an intervention's monetary or currency costs with its clinically measured efficacy[51].]. In turn, cost-utility analyses present patient preference or evaluation with respect to a particular state of health. In addition to life years gained or lost in connection to a health state, the quality-adjusted life-year (QALY) is used to measure patient preferences regarding the quality of life that has been attained or avoided. Its primary benefit is that it enables us to compare various procedures logically while accounting for the number and quality of lives of individuals. On the other hand, when short periods are taken into account, QALY

has little meaning; the parameter may be complex and challenging to calculate; and the results may vary in different geographical settings with potentially different healthcare services. Despite the previously stated limitations, QALY is used as the denominator in a formula that is used to estimate the incremental cost effectiveness ratio (ICER) and the invested sum of money as the numerator[43]. When assessing if a particular measure is cost-effective, the National Institute for Health and Clinical Excellence's (NICE) recommendations are frequently followed, with consideration given to the factors that are reflected in QALYs. An independent body called NICE provides advice on the application of novel medical procedures and technological advancements to the British Healthcare System. The product's cost-effectiveness and clinical evidence are submitted by the manufacturer for assessment by an outside panel of experts. It is widely acknowledged that a treatment is cost-effective if it results in a cost per QALY of between £20,000 and £30,000 (or €27,000 and 40,000)[44].

CONCLUSION

In conclusion, asthma is linked to a considerable financial burden on society in addition to disability that is unique to each patient. Comparing research evaluating the direct and indirect costs of asthma highlights some crucial information.

Although there are effective preventive treatments for asthma, a large portion of the illness's expenses are related to things that could be avoided or minimized by enhanced prevention of diseases. Indirect costs occur when a condition is not completely treated and gets severe enough to interfere with day-to-day activities. Examples of these expenses include missing time from work or school and retiring early. These expenses make up half of the total cost of disease. Furthermore, quality of life evaluations have demonstrated the substantial socioeconomic impact that asthma has on the patient as well as the entire family.

Hospitalization makes up 20–25% of direct expenditures; nearly all of these are related to inpatient or emergency admissions and are hence the result of insufficient disease control. Physician bills make up the remaining 20–30%.

So as to ensure optimal use of the healthcare resources, physicians should consider the information provided by cost-effectiveness and cost-utility studies when determining the optimum course of therapy for patients with asthma.

There are ways to reduce asthmatic costs, especially for those who have moderate-to-severe symptoms. However, in order to make better use of available resources, interventions must be evaluated in terms of their costs, potential savings, and patient outcomes. For this reason, collaboration between health economics and physicians is crucial in determining the best way to maximize spending on asthma treatment.

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