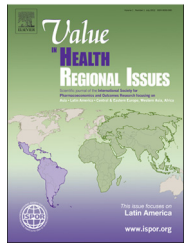
VALUE IN HEALTH REGIONAL ISSUES 5C (2014) 25–28

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/vhri



Asthma Control and Cost in Latin America

Laura S. Gold, PhD[1,], Federico Montealegre, PhD[2,3], Felicia C. Allen-Ramey, PhD[4], Jose Jardim, MD[5,6], Raul Sansores, MD[7], Sean D. Sullivan, PhD[1]*

[1]*Pharmaceutical Outcomes Research and Policy Program, School of Pharmacy, University of Washington, Seattle, Washington, USA;* [2]*Baxter Bioscience, Guaynabo, Puerto Rico;* [3]*Merck & Co., Inc, Carolina, Puerto Rico, USA;* [4]*Merck & Co., Inc, Whitehouse Station, NJ, USA;* [5]*Pulmonary Rehabilitation Center, Federal University of São Paulo (Unifesp), São Paulo, Brazil;* [6]*Associação de Assistência à Criança Deficiente (AACD), São Paulo, Brazil;* [7]*Instituto Nacional de Enfermedades Respiratorias Ismael Cosio Villegas, México, D.F., México*

ABSTRACT

Objective: Few patients with asthma have disease that is well-controlled, particularly in Latin American countries. The purpose of this study was to investigate whether partly controlled and uncontrolled asthma are associated with increased costs for asthma-related medications and health care utilization compared with well-controlled asthma in five Latin American countries. **Methods:** Using the Global Initiative for Asthma guidelines, we classified respondents from the Latin American Asthma Insights and Management survey into those with well-controlled, partly controlled, and uncontrolled asthma and compared the utilization of health care services and costs among these groups. **Results:** Most respondents to our survey (93%) had asthma that was classified as partly controlled or uncontrolled. Across all countries, patients whose asthma was partly controlled or uncontrolled had greater use of asthma-related medications and medical services than did patients whose asthma was well-controlled. After adjusting for age, sex, and country of residence, total costs for asthma-related medications and health care were greater in patients whose asthma was classified as partly controlled and uncontrolled. **Conclusions:** Our findings indicate that patients with asthma that are not well-controlled used more health care resources and had greater medical costs in Latin America.
Keywords: Global Initiative for Asthma (GINA) guidelines, health care utilization, hospitalization, long-term maintenance medications, oral steroids.

Introduction

Approximately 40 million patients with asthma reside in Latin American countries and although data are sparse, the prevalence of asthma in most of these countries is believed to be increasing [1,2]. In addition, mortality rates from asthma are higher in Latin American countries than in other regions [2,3]. Asthma is also a significant cause of missed school and work in Latin America [4]. Although medications that have been shown to be highly effective at managing asthma have been available since the 1990s [5], most of the patients do not have well-controlled asthma, particularly in Latin American countries [6]. Although few studies have examined the costs of asthma in Latin America, evidence indicates that poorly controlled asthma in Latin America leads to significant economic expenditures, most of which have been attributed to emergency and unscheduled health care sought by patients with severe persistent asthma [6].

Over the past decade, measurements of asthma control, rather than metrics of lung function such as forced expiratory volume in 1 second, have been introduced to characterize morbidity of patients with asthma because objective physiological measures have been shown to have little correlation with health-related quality of life [7,8]. Instead, the Global Initiative for Asthma (GINA) and the United States National Asthma Education Prevention Program have created guidelines focused on regulating asthma symptoms to maintain normal daily activity levels [9,10]. We recently conducted a US study that demonstrated that asthma that is defined as not well-controlled by GINA guidelines is associated with increased rates of adverse outcomes than is asthma that is classified as well-controlled [11] and found similar results using data from Latin America [12]. The purpose of this study was to investigate whether partly controlled and uncontrolled asthma in five Latin American countries (Argentina, Brazil, Mexico, Puerto Rico, and Venezuela, which comprise about 65% of the population of Latin America) were associated with increased costs due to asthma medications, as well as asthma-related utilization of health care services such as hospital admissions, emergency room visits, and visits with health care providers, than was asthma classified as well-controlled.

Conflicts of interest: The authors have indicated that they have no conflicts of interest with regard to the content of this article.

* *Address correspondence to:* Laura S. Gold, Pharmaceutical Outcomes Research and Policy Program, School of Pharmacy, University of Washington, Box 359455, Seattle, WA 98195.

E-mail: goldl@uw.edu.

2212-1099$36.00 – see front matter

http://dx.doi.org/10.1016/j.vhri.2014.06.007

Methods

Latin America Asthma Insights and Management Survey

The Latin America Asthma Insights and Management (LA AIM) survey [12,13] was designed to complement the US AIM survey and was conducted in 2011. Both the US and LA AIM surveys followed the methodology used in the Allergies in America survey, which was designed by physician experts from various regions who reviewed and approved survey questionnaires [14]. Subjects of the survey included in our analyses were 2168 patients with asthma aged 12 years or older identified from a sample of 51,208 households in Argentina, Brazil, Mexico, Puerto Rico, and Venezuela. These countries were selected because preliminary data indicated that the size of the asthma population in these countries was substantive enough to obtain sufficient sample sizes for analysis. Participants were selected randomly using national probability sampling by survey organizations based in each country [15]. Interviews were conducted in person and averaged 35 minutes in length. For subjects aged between 12 and 17 years, the survey was completed by a parent or guardian. The 53 survey questions were designed to assess asthma burden (short- and long-term symptoms, functional impact, and health care utilization such as provider visits and use of asthma medications) and patient beliefs on appropriate use of medications for asthma control. In addition, demographic variables, such as sex, age, education level, and diagnosis of nasal allergies, were queried [15].

Classification of Asthma Control

Patients were characterized on the basis of GINA guidelines [9] into three categories of level of asthma control: well-controlled, partly controlled, and uncontrolled (see Table 1 in Supplemental Materials found at http://dx.doi.org/10.1016/j.vhri.2014.06.007). The manifestations of asthma that were used for the categorizations included daytime symptoms, restriction of daily activities, nighttime symptoms, and need for reliever/rescue treatment. We used questions from the surveys that correlated with the GINA-defined asthma manifestations, with the exception of a lung function measurement of less than 80% predicted, because lung function measurements were not queried.

Statistical Analysis

Respondents to the survey provided data on the number of times they took oral steroids, inhalers for quick relief/rescue, and long-term maintenance medications for the management of asthma symptoms in the previous 12 months. They also reported the number of times they visited the emergency room, their health care providers, or were hospitalized for asthma symptoms in the past 12 months. Finally, respondents reported the number of days they missed school or work in the past year. This article evaluated total costs (e.g., payer, provider, and patient out-of-pocket costs) that could be attributed to each asthma-related medication and health service encounter. In Brazil, costs were determined from Simpro, a Brazilian company that collects and publishes the prices of medical costs that are released by the governmental Agencia Nacional de Vigilância Sanitária [16], and KairosBrasil, an aggregator of pharmaceutical dosing and cost data in Brazil [17]. In Argentina, costs were obtained from consultations with expert physicians and pharmacists. In Mexico, costs were obtained by contacting Hospital Infantil de Mexico Federico Gomez, Hospital Medica Sur, and Farmacia del Ahorro. Because Puerto Rico is an unincorporated territory of the United States and costs of drugs and health services are tied to Centers for Medicare & Medicaid Services reimbursement rates, we used 2011 Centers for Medicare & Medicaid Services reimbursement rates [18], adjusted for the Puerto Rico geographic pricing cost index, to calculate Puerto Rican costs. In Venezuela, costs were obtained from the Hospital de Clinicas Caracas and by visiting local pharmacies. Because costs varied substantially for patients treated in the public versus the private sector, unit costs were weighted by the proportion of patients with access to public/private health care in each country. To estimate the cost of days of missed work or school, we calculated the average income per day for each country by dividing the yearly average annual income by 240, the approximate number of working days per year. Only those respondents who were employed or younger than 18 years (assuming that a parent had to miss work to care for a child who missed school because of asthma) at the time of the survey were included in the analysis of the relationship between the level of asthma control and missing school or work. To allow comparison of costs between countries, all currencies were converted to US dollars using the exchange rates as of November 1, 2013. Mean annual costs for each medication/utilization were calculated by multiplying the average unit costs by the number of instances of utilizations in the previous 12 months reported by each AIM survey respondent. Finally, we totaled each participant's reported costs for all medications and instances of utilization over the previous 12 months to obtain the total mean annual direct costs of asthma care.

Frequencies and chi-square tests (or Fisher exact test when the n of any cell was <5) were calculated for demographic variables such as age, sex, and level of education. Next, differences by GINA-defined level of asthma control in rates of utilization of asthma-related medications, use of health care services, and missed days of school and work were examined. We calculated adjusted costs using negative binomial regression, controlling for age and sex. To test the appropriateness of using negative binomial regression, we examined the ratio of each model's deviance to the degrees of freedom. Because all ratios were approximately 1, we assumed that the models fit the data well [19]. Because variables, particularly costs, tended to vary widely by country of residence, all analyses were stratified on country. Analyses were conducted using SAS for Windows, version 9.3 (SAS Institute, Inc., Cary, NC).

This study was determined not to meet the federal regulatory definition of human subjects' research and hence was exempt from Human Subjects review by the University of Washington Institutional Review Board.

Results

Demographic characteristics of the respondents to the AIM survey, stratified on level of asthma control, are presented in (see Table 2 in Supplemental Materials found at http://dx.doi.org/10.1016/j.vhri.2014.06.007). The greatest proportion of patients with well-controlled asthma were in Brazil (9.3%) and Mexico (9.0%); only 3% of the patients in Venezuela had well-controlled asthma. In Brazil and Puerto Rico, respondents in the older age categories tended to have partly controlled and uncontrolled asthma compared with younger respondents. In all countries, males were more likely than females to have well-controlled asthma but the difference was statistically significant only in Argentina, Brazil, and Puerto Rico. In all countries, greater education was associated with greater proportions of well-controlled asthma but this relationship was statistically significant only for respondents from Brazil.

Next, we examined the mean number of times that respondents used asthma medications and health care services pertaining to their asthma, stratified on level of asthma control (see Fig. in Supplemental Materials found at http://dx.doi.org/10.1016/j.