

Hospitalizations for asthma: impact of a program for the control of asthma and allergic rhinitis in Feira de Santana, Brazil*

Hospitalizações por asma: impacto de um programa de controle de asma e rinite alérgica em Feira de Santana (BA)

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Abstract

Objective: To evaluate the impact of the *Programa de Controle da Asma e Rinite Alérgica em Feira de Santana* (ProAR-FS, Program for the Control of Asthma and Allergic Rhinitis in Feira de Santana) on the frequency of hospitalizations for asthma in patients monitored at a referral center for one year. **Methods:** This was a historical control study involving 253 consecutive patients with asthma, ages ranging from 4 to 76 years. We compared the frequency of hospital admissions and visits to the emergency room (ER) in the 12 months prior to and after their admission to the ProAR-FS. During the program, patients received free treatment, including inhaled medications and education on asthma. Demographic and socioeconomic aspects were also assessed. **Results:** There was a significant reduction in the number of hospitalizations (465 vs. 21) and of visits to the ER (2,473 vs. 184) after their admission to ProAR-FS ($p < 0.001$ for both). Of the 253 patients who had been hospitalized and had had ER visits within the year prior to the admission to ProAR-FS, only 16 were hospitalized and 92 visited the ER during the follow-up year, representing a reduction of 94% and 64%, respectively. **Conclusions:** Implementing a referral center for the treatment of asthma and rhinitis in the Unified Health Care System, with the free distribution of inhaled corticosteroids and the support of an education program, is a highly effective strategy for the control of asthma.

Keywords: Hospitalization; Asthma; Rhinitis; Health services; Public health.

Resumo

Objetivo: Avaliar o impacto do Programa de Controle da Asma e Rinite Alérgica em Feira de Santana (ProAR-FS) na frequência de hospitalizações por asma em pacientes acompanhados por um ano em um centro de referência. **Métodos:** Estudo de controle histórico de 253 pacientes com asma, entre 4 e 76 anos idade, e admitidos consecutivamente. Comparou-se a frequência de internações e de atendimentos em emergência nos doze meses anteriores e posteriores à sua inclusão no ProAR-FS. Durante o programa, os pacientes receberam atendimento gratuito, incluindo medicação inalatória e educação em asma. Os aspectos demográficos e socioeconômicos também foram avaliados. **Resultados:** Houve redução significativa no número de internações (463 vs. 21) e de atendimentos em emergência (2.473 vs. 184) após a matrícula no ProAR-FS ($p < 0,001$ para ambos). Dos 253 pacientes internados e atendidos na emergência no ano anterior à participação no ProAR-FS, apenas 16 foram novamente internados e 92 foram atendidos na emergência durante o ano de acompanhamento, correspondendo a uma redução de 94% e 64%, respectivamente. **Conclusões:** A implementação de um ambulatório de referência para o tratamento de asma e rinite no Sistema Público de Saúde, com o fornecimento de corticoide inalatório e o suporte de um programa de educação, é uma estratégia muito efetiva para o controle da asma.

Descritores: Hospitalização; Asma; Rinite; Serviços de saúde; Saúde pública.

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Introduction

Frequent hospitalizations for asthma reflect elevated morbidity and indicate a relevant public health problem.^(1,2) The lack of appropriate control of the disease has led to an increased number of emergency room visits, hospitalizations and deaths. Appropriate asthma treatment, with the use of inhaled corticosteroids, allows the control of the disease and avoids exacerbations, hospitalizations and deaths.^(3,4) Studies show that there is still a lack of strategies and planning in public policies related to asthma outpatient care within the Brazilian Unified Health Care System,^(5,6) which has disastrous consequences for the health care system and for the patients.

Despite of the unfavorable scenario, health programs have reduced the number of hospitalizations for asthma attack, by offering appropriate diagnostic and therapeutic approach, complemented by educational activity and rehabilitation measures.^(7,12) Education programs on asthma associated to medication represent one of the pillars of the success of the effectiveness of the asthma program and have been proven to reduce exacerbations and hospitalizations for asthma, as well as reducing the expenses with the disease.⁽¹³⁾ The *Programa de Controle da Asma e Rinite Alérgica em Feira de Santana* (ProAR-FS, Program for the Control of Asthma and Allergic Rhinitis in the city of Feira de Santana, Brazil) was evaluated using data from the Information Technology Department of the Unified Health Care System after the first year of the program in the city, and a reduction of 42% in hospitalizations for asthma was observed.⁽¹²⁾

The present study aimed at evaluating the impact of the implementation of the ProAR-FS on hospitalizations for asthma in patients monitored for a year in the referral center of the program.

Methods

Implemented in 2004, ProAR-FS has offered inhaled medication free of charge and an asthma education program to the asthma patient, as well as training to health professionals, with the objective of providing control of mild and moderate asthma in the primary health care clinics and in the Family Health Program. Severe asthma patients are referred to a referral center,

where they received specialized monitoring and treatment.

This was an observational, longitudinal, retrospective and prospective study with historical controls. The same patients were used in order to evaluate the effectiveness of the medical care provided to the asthma patient by comparing data related to the number of emergency room visits for asthma attacks and to the number of hospitalizations in the 12 months preceding the monitoring in the ProAR-FS with the number of hospitalizations and emergency room visits in the 12 months following enrollment in the ProAR-FS. We evaluated all 253 consecutive patients who were residents of Feira de Santana and were admitted to the referral center.

Patients diagnosed with asthma who had been hospitalized for an asthma attack at least once in the 12 months preceding admission to the program were included. Smokers and patients with a pulmonary disease other than asthma were excluded. The patients were monitored for a period of 12 months.

Data referring to the period preceding admission to the referral center in Feira de Santana were obtained retrospectively according to the standardized treatment protocol implemented upon the foundation of the outpatient clinic. During the 12 months of prospective monitoring, specific questionnaires of the study were applied, with questions related to the following aspects: demographic data (gender, age at admission to the program, place of birth and residence); socioeconomic status (family income and level of education); anthropometric data (weight, height); asthma history (age at first attack, severity and frequency of hospitalizations/emergency room visits in the 12 months preceding admission to the outpatient clinic); medical care (use of prophylactic medication, number of follow-up visits during monitoring and respiratory therapy); and overall health status (including comorbidities, such as allergic rhinitis, arterial hypertension and diabetes).

The diagnosis and classification of asthma severity were carried out by a pulmonologist at the first ProAR-FS patient visit and were performed according to the Global Initiative for Asthma criteria.⁽¹⁴⁾ The diagnosis of allergic rhinitis was made based in the criteria established in the World Health Organization "Allergic Rhinitis and its Impact on Asthma" workshop.⁽¹⁵⁾ Severe

asthma was characterized by the following criteria: continuous daytime symptoms and nearly daily nighttime symptoms; limitation of activities; frequent exacerbations; and FEV₁ or PEF \leq 60% of predicted.⁽¹⁶⁾

During the 12-month monitoring period, a standard outpatient form was used in order to obtain data related to emergency room visits and hospitalizations for asthma. Patients with severe rhinitis were referred to an otolaryngologist. All of the patients monitored (or their parents) were included in an asthma education program, which provides information on the disease, its triggering factors, the appropriate use of medications, the identification of attacks and the use of an action plan for asthma exacerbations. Patients with moderate or severe asthma were referred to a physical therapist, who aided them in the performance of lung deflation maneuvers and in the appropriate use of the respiratory muscles, as well as giving them a refresher course in the correct use of the inhaled medication. Medication for asthma and allergic rhinitis were dispensed at the treatment facility and consisted of inhaled corticosteroids (beclomethasone or budesonide), bronchodilators (albuterol or formoterol), topical nasal corticosteroids (beclomethasone or budesonide),

antihistamines and oral corticosteroids, in the doses recommended by the attending physician. The medication was distributed via the pharmacy, after the completion of a form containing identification, type of medication, date, quantity dispensed, and the subsequent units dispensed upon the return of the empty flask.

The project was approved by the Research Ethics Committee of the Bahia Foundation for Science Development.

Statistical analysis

For the calculation of the sample, we used PEPI (Sagebrush Press, Salt Lake City, UT, USA). The study indicators of the benefit of the intervention were measured by the comparison of the frequencies and the absolute numbers of hospitalizations and emergency room visits within the 12 months prior to and following the monitoring at the ProAR-FS referral center. In order to compare the frequencies and the absolute numbers of hospitalizations and emergency room visits before and after the ProAR-FS, we used McNemar's test and Wilcoxon test, respectively. Statistical analyses were carried out using the Statistical Package for the Social Sciences, version 14.0 (SPSS Inc., Chicago, IL, USA).

Table 1 - Demographic and clinical characteristics of a sample of children, adolescents and adults monitored via the Program for the Control of Asthma and Allergic Rhinitis in Feira de Santana, Brazil.

Variable	Children and adolescents	Adults	Total
	(n = 151)	(n = 102)	(n = 253)
Age, years ^a	7 (5)	43 (18)	11 (32)
Female	55 (36.4)	82 (80.4)	137 (53.8)
City of origin: Feira de Santana	147 (97.4)	53 (52)	200 (79.1)
Resident of the urban area	142 (94.0)	80 (78.4)	222 (87.7)
\leq 9 years of schooling	97 (64.7)	79 (78.2)	176 (70.1)
Family income \leq the national minimal wage	97 (66.4)	85 (89.4)	182 (75.5)
Age at first attack, years ^a	1.0 (2.5)	6.5 (16)	1 (4)
Type/severity of asthma			
Intermittent	2 (1.4)	0 (0)	2 (0.8)
Moderate persistent	33 (21.8)	3 (2.9)	36 (14.2)
Mild persistent	73 (48.3)	31 (30.4)	104 (41.2)
Severe persistent	43 (28.5)	68 (66.7)	111 (43.8)
Rhinitis symptoms	130 (86.7)	87 (85.3)	218 (86.1)
Admission to the intensive care unit	No admissions	18 (17.6)	18 (7.1)
Previous treatment with inhaled corticosteroids	7 (4.7)	12 (11)	19 (7.5)
Previous knowledge of asthma	66 (43.7)	Not measured	66 (26.1)
Parental history of asthma	120 (80.5)	62 (60.8)	182 (71.9)

Data presented as n (%), except where otherwise indicated. ^aData presented as median (interquartile range).

Table 2 – Impact of the Program for the Control of Asthma and Allergic Rhinitis in Feira de Santana, Brazil, in terms of the frequency of hospitalizations and emergency room visits due to asthma, 2005.

Grouping/variable	Frequency in the 12 months preceding ProAR-FS enrollment, n (patients/year)	Frequency in the 12 months following ProAR-FS enrollment, n (patients/year)	p*
Sample as a whole			
Hospitalizations	465 (1.83)	21 (0.08)	< 0.001
Emergency room visits	2,473 (9.77)	184 (0.72)	< 0.001
Children and adolescents			
Hospitalizations	306 (2.02)	12 (0.07)	< 0.001
Emergency room visits	973 (6.47)	88 (0.58)	< 0.001
Adults			
Hospitalizations	165 (1.61)	9 (0.008)	< 0.001
Emergency room visits	1,509 (15.08)	96 (0.94)	< 0.001

ProAR-FS: *Programa de Controle da Asma e Rinite Alérgica em Feira de Santana* (Program for the Control of Asthma and Allergic Rhinitis in Feira de Santana, Brazil). *Wilcoxon test.

Results

Demographic and clinical characteristics of the population are shown in Table 1. The sample comprised 253 patients (107 children, 44 adolescents and 102 adults). The male/female ratio among the children and adolescents was 2.6:1 (63.6% vs. 36.4%), whereas, among the adults, females predominated at a ratio of 4:1 (80.4% vs. 19.6%). The majority (78.2%) of the adult asthma patients had at least 9 years of schooling, as did most (64.7%) of the mothers of the children and adolescents evaluated. Family incomes were typically low, being less than or equal to the national minimum wage in 75.5% of the cases. Severe asthma was significantly more common in adults (66.7%), and only 7.5% of the patients had used inhaled

corticosteroid prior to enrolling in the program. There were 219 patients (86.3%) who presented with concomitant allergic rhinitis/asthma, and 139 (63.5%) of those patients used medication for the treatment of rhinitis (a topical nasal corticosteroid or an antihistamine).

All 253 patients had been hospitalized and had visited the emergency room for an asthma attack before enrollment in the ProAR-FS. The decrease in the number of hospitalizations was 95.5% (465 vs. 21), and the decrease in the number of emergency room visits was 92.6% (2,473 vs. 184). There was a significant decrease in the number of hospitalizations and emergency room visits, regardless of patient age ($p < 0.001$; Table 2). We also observed a significant decrease in the number of hospitalizations and emergency

Table 3 – Impact of the Program for the Control of Asthma and Allergic Rhinitis in Feira de Santana, Brazil, in terms of the frequency of hospitalizations and emergency room visits due to asthma, by asthma severity, 2005.

Setting/asthma severity	Frequency in the 12 months preceding ProAR-FS enrollment, n (patients/year)	Frequency in the 12 months following ProAR-FS enrollment, n (patients/year)	p*
Hospitalizations			
Mild	57 (1.50)	0 (0.00)	
Moderate	193 (1.85)	8 (0.07)	< 0.001
Severe	215 (1.93)	13 (0.11)	< 0.001
Emergency room visits			
Mild	170 (4.47)	9 (0.23)	< 0.001
Moderate	788 (7.57)	59 (0.56)	< 0.001
Severe	1,515 (13.64)	116 (1.04)	< 0.001

ProAR-FS: *Programa de Controle da Asma e Rinite Alérgica em Feira de Santana* (Program for the Control of Asthma and Allergic Rhinitis in Feira de Santana, Brazil). *Wilcoxon test.

room visits, regardless of the degree of asthma severity, hospitalizations for asthma dropping from 215 to 13 and emergency room visits dropping from 1,515 to 116 ($p < 0.001$; Table 3). In a patient-by-patient analysis of the study period, we found that, of the 253 patients who had been hospitalized or treated in the emergency room in the 12 months preceding enrollment in the ProAR-FS, only 16 were hospitalized and 96 visited the emergency room, which represents a decrease of 93.7% and 62.1%, respectively ($p < 0.001$).

Discussion

The decrease in hospitalizations for asthma is the principal goal of asthma control programs. Previous experiences in some countries, including Brazil, indicate that the access to treatment offered by programs of this nature reduces the number of hospitalizations.⁽⁹⁻¹²⁾ In one study, it was demonstrated that appropriate asthma patient treatment policies can reduce the rates of asthma-related mortality.⁽¹⁷⁾ In the present study, we observed a considerable decrease in the number of hospitalizations and emergency room visits in the 12 months following enrollment in the ProAR-FS, in all age brackets, reflecting the great impact that appropriate management has the control of the asthma symptoms.

The limited access to appropriate medication and the irregular monitoring of asthma patients within the Unified Health Care System have been implicated in the overuse of the emergency room and the great number of hospitalizations for asthma. In the present study, the percentage of patients using inhaled corticosteroids for asthma control before enrollment in the ProAR-FS (7.5%) was lower than that observed in other national studies.^(5,18) After the medication for asthma and rhinitis came to be distributed free of charge, the proportion of patients using inhaled corticosteroid increased to 94.7%, contributing to a 94.0% decrease in hospitalizations, a value similar to that found in a case-control study involving children with asthma using inhaled corticosteroid and enrolled in an asthma education program.⁽¹⁹⁾ One of the differences between the ProAR-FS and other asthma control programs is the concomitant treatment of rhinitis (providing patients with topical nasal corticosteroids), as well as the fact that the ProAR-FS serves all age brackets

and treats all patients with asthma or rhinitis, regardless of the degree of severity.

In this study, the combination of asthma and allergic rhinitis was seen in over 80% of the patients in the two age brackets, which is in accordance with studies indicating that nasal symptoms occur in 30-80% of all patients with asthma and in up to 99% of those who are atopic.⁽²⁰⁾ Studies have shown that rhinitis and asthma are interrelated, and that the appropriate treatment of allergic rhinitis improves asthma control, decreasing symptoms and reducing the risk of emergency room visits and hospitalizations.⁽²¹⁻²⁵⁾ Indeed, 35 children in the ProAR-FS with mild asthma (23.6% of the sample of children and adolescents) and persistent rhinitis, using exclusively nasal corticosteroid, were not hospitalized, and there was a decrease of 84.2% in the frequency of emergency room visits during monitoring in the ProAR-FS. Scientific evidence suggests that treatment of rhinitis with topical nasal corticosteroids prevents bronchial hyper-responsiveness associated with the exposure to allergens and can avoid the exacerbations of symptoms in patients with mild asthma.⁽²³⁾

Another important observation of our study was the predominance of hospitalizations among male children and among female adults. Although there was predominance of hospitalizations among female adults, there was no statistically significant difference between the two genders in terms of the number of hospitalizations during the ProAR-FS monitoring period. Another important point is the great positive impact this program has had on a region in which the majority of resident have no more than 9 years of schooling and family incomes rarely surpass the national minimal wage, establishing its efficiency and its feasibility among those who most need support from health policies.

The present study had a retrospective component, being subject to memory and measurement biases in relation to the events that occurred before enrollment in the ProAR-FS, as well as to biases common to interventional observational studies, due to the lack of control of other potentially confounding variables, such as in randomized clinical trials. However, we attempted to verify the verbal information on the basis of the hospital discharge register.

We conclude that the activities at the outpatient clinic of the ProAR-FS referral center, with

the care of the health team, distribution of nasal and inhaled corticosteroids, in combination with an asthma education program for patients and their relatives, was associated with a pronounced decrease in the use of health resources due to asthma in an cohort of outpatients with a history of hospitalization.

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