

Original Article

Reduction in the number of asthma-related hospital admissions after the implementation of a multidisciplinary asthma control program in the city of Londrina, Brazil*

Redução do número de internações hospitalares por asma após a implantação de programa multiprofissional de controle da asma na cidade de Londrina

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Abstract

Objective: To evaluate the relationship between the reduction in the number of asthma-related hospital admissions and the changes occurring after the intervention performed in the health care system of the city of Londrina, Brazil. **Methods:** In 2003, an intervention was performed in the local health care system (Family Health Clinics). The steps adopted were as follows: development of a protocol based on the III Brazilian Consensus on Asthma Management; access to free inhaled corticosteroids for patients; training of health professionals; and implementation of educational measures, especially for the community. The authorizations for hospital admission of patients diagnosed with asthma alone between 2002 and 2005 in the city of Londrina were analyzed. **Results:** The mean age was 14.3 ± 0.5 years, without gender predominance. The number of hospital admissions fell more markedly in 2005 than in the previous years studied. This decline was more pronounced at the Family Health Clinics where professional training occurred earlier. The post-intervention (2004–2005) rate of asthma-related hospital admissions (120/100,000 inhabitants) was significantly lower than the pre-intervention (2002–2003) rate (178/100,000 inhabitants; $p < 0.01$). **Conclusions:** The admission curve showed a tendency toward a reduction after 2003, and, aside from the intervention performed, no other factors that would explain the results obtained were identified. The rate at which the number of hospital admissions decreased was in direct proportion to the length of time elapsed since the intervention (greater decreases over time). We conclude that the intervention performed in the local health care system was responsible for the data presented.

Keywords: Asthma; Hospitalization; Public health.

Resumo

Objetivo: Avaliar a relação entre a redução do número de internações hospitalares por asma e as transformações ocorridas após a intervenção realizada no sistema de saúde de Londrina. **Métodos:** Em 2003, houve intervenção no sistema de saúde local (Unidades de Saúde da Família). Foram adotados os seguintes passos: elaboração de protocolo baseado no III Consenso Brasileiro no Manejo da Asma, fornecimento gratuito de corticosteróides inalatórios aos pacientes, capacitação de profissionais de saúde e realização de ações educativas, especialmente para a comunidade. Foram analisadas as autorizações de internação hospitalar de pacientes de Londrina com diagnóstico único de asma entre 2002 e 2005. **Resultados:** A média de idade foi de $14,3 \pm 0,5$ anos, sem predomínio de sexo. Houve redução mais acentuada do número de internações hospitalares em 2005, em comparação aos anos anteriores estudados. Verifica-se declínio mais acentuado em Unidades de Saúde da Família onde a capacitação dos profissionais ocorreu há mais tempo. O índice de internação hospitalar por asma após a intervenção (2004 e 2005)—120/100.000 habitantes—foi significativamente menor que o encontrado antes da intervenção (2002 e 2003) —178/100.000 habitantes ($p < 0,01$). **Conclusões:** A curva de internação mostrou tendência à queda após o ano de 2003, não sendo identificado outro fator, além da intervenção realizada, que justificasse os resultados obtidos. Quanto maior o tempo decorrido desde a intervenção, maior a redução do número de internações. Concluímos que a intervenção realizada no sistema de saúde local foi a responsável pelos dados apresentados.

Descritores: Asma; Hospitalização; Saúde pública.

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Introduction

Asthma treatment with inhaled corticosteroids is well established in medical practice. Despite the indisputable advances in disease control and disease-related cost reduction,⁽¹⁾ there has been no reduction in the number of hospital admissions within the public health care system; in contrast, there has been an increase in the number of patients with asthma attacks treated in emergency rooms.⁽²⁾ To this scenario, we can add the lack of access to inhaled corticosteroids for this population,⁽³⁾ the inefficiency of the health care system and of the professionals in providing accessible information about asthma,⁽⁴⁾ the lack of efficient educational measures to increase patient awareness of asthma,⁽³⁾ and inappropriate asthma management by health professionals.⁽¹⁾

In an attempt to improve this situation, there are some programs, in Brazil and in the world, that emphasize access to inhaled corticosteroids for the population, increasing patient knowledge and awareness of asthma, and the active search for cases of asthma in the community.⁽⁵⁾ These interventions can result in a reduction in the number of asthma-related hospital admissions in specific groups or in severe cases of asthma.⁽⁶⁾ However, there are no studies suggesting an overall reduction in hospital morbidity among the patients treated within the public health care system.

In the city of Londrina, the public initiatives aimed at asthma have a multidisciplinary character and are directed at the *Unidades de Saúde da Família* (USF, Family Health Clinics). In addition, there is no age limit for the general treatment of patients with asthma. It is believed that this type of approach can reduce the number of asthma-related hospital admissions and improve the quality of life of less privileged patients.

The objective of this study was to determine whether interventions aimed at organizing health care systems, together with programs of asthma education for health professionals and patients, can reduce the number of hospital admissions.

Methods

We analyzed secondary data (data previously collected in a systematic fashion) for the city of Londrina, Brazil (urban area). The data were obtained through a review of all authorizations

for hospital admission (AHAs) of patients diagnosed with asthma alone—tenth revision of the International Classification of Diseases (J45 and J46)—that were issued in the city between 2002 and 2005, totaling 1,520 AHAs. Demographic variables (age and gender) and geographic variables (region of the city and USF of origin) were analyzed, as was the length of time elapsed since the training of the professionals working at the USFs. Of the 1,520 AHAs studied, 76 were excluded: 59 because the address provided was incorrect or there were other incorrect data; 15 because the patients resided in rural areas; and 2 because the field “age” had been filled in incorrectly. All addresses were geoprocesed by region, street, and USF serving the area. A total of 1,444 AHAs were selected.

The *Programa Respira Londrina* (PRL, “Breathe, Londrina” Program) was created to change asthma patient care practices and readjust the local health care system. In order to achieve this objective, an intervention was performed in the local health care system between 2003 and 2004.

A certain team of health professionals, affiliated with the municipality and founders of the PRL,⁽⁷⁾ developed a specific protocol, based on the III Brazilian Consensus on Asthma Management,⁽⁸⁾ with the objective of treating asthma patients. The document included the national guidelines for the treatment of asthma, which have been well established and validated by the consensus cited. In addition, it presented the training method for the multidisciplinary teams, together with suggestions for preparing flow charts of treatment at the USFs and at the Asthma Referral Center. In the latter, there was a pulmonologist responsible for guiding the teams and treating the most severe cases, as well as for performing spirometry. Furthermore, standardized forms were developed: for use in the first evaluation (enrollment in the program); to outline the schedule (individual chart of the patient enrolled in the PRL—this chart, which is filled out by the employee responsible for the USF pharmacy, remains under the control and supervision of the USF where the patient receives treatment, and is useful for the control and dispensing of medications); to report the environmental visit findings; and to record the medications dispensed.

Medications were purchased to be distributed, free of charge, to the patients enrolled in the program

(beclomethasone, 200 and 400 µg, inhaled; and albuterol, 100 µg by metered-dose inhaler). These medications were provided by the USF pharmacies upon prescription by the family physician working at the USF, according to severity and to the municipal clinical protocol. In severe cases, the medications were provided by the Regional Health Department, which is responsible for the dispensing of special medications, upon prescription and request by the specialized physician (pulmonologist) who worked at the Asthma Referral Center.

All health professionals involved in the new proposal were trained using a specific training program involving expository classes, meetings, and practical courses at their workplaces. The teams were trained respecting the abilities and knowledge inherent to each respective professional category (nurse, community health agent, physician, and nursing assistant). The first part of the training consisted of expository continuing education classes on the main topics in asthma (pathophysiology, classification, treatment, and attacks), as well as of the dissemination of important information regarding the workings of the PRL. The second part of the training occurred on-site (at each USF), where all teams received practical guidance on the use of inhalers and discussed not only clinical cases whose main focus was asthma but also how the program functions at the USF. Thus, 108 family health program teams, each comprising one physician, one nurse, two nursing assistants, and four community health agents, were trained.

Before dispensing the medication, the family health program team provided all patients enrolled in the program with information about asthma. Patients with severe asthma and patients who had difficulty in understanding the information provided by the health professionals received home visits (from the nursing team) in which the themes of environmental control and use of inhalers, as well as how to recognize and manage asthma attacks, were addressed.

The implementation of the PRL at the USFs was territory-based. Each USF serves an area with its own geographic, population, social, and political characteristics in which there are three to four family health program teams. The USFs were accredited progressively and gradually from December of 2003 to December of 2004. Initially, the 5 largest clinics

in each region were accredited, forming group 1. Subsequently, 10 other clinics (2 in each region of the city) were accredited, comprising group 2, and, finally, the remaining 30 clinics were accredited, forming group 3. Therefore, by 2004, all urban USFs had been accredited, and their respective asthma programs were working. These health clinics currently account for a population coverage of 83%.

The AHAs were analyzed individually, first year-to-year and, subsequently in groups divided by USF and length of time elapsed since the training. In order to evaluate the impact of the PRL, the AHAs were divided by period: pre-intervention (2002 and 2003); and post-intervention (2004 and 2005). These periods were compared, in terms of the demographic, geographic, and intervention variables mentioned above, to determine whether there was a reduction proportional to the vegetative growth of the population. Demographic data were obtained from the Brazilian Institute of Geography and Statistics. Data were compiled in a Microsoft Office Excel 2003 spreadsheet and transferred to the Epi Info program, version 3.3, which was used to carry out the statistical, descriptive, and analytical studies. Data are presented as proportions, and the chi-square test was used. The level of significance was set at $\alpha = 0.05$. This research project was approved by the Ethics in Human Research Committee of the State University at Londrina.

Results

In the sample evaluated during the four-year study period, the mean age was 14.3 ± 0.5 years,

Table 1 - Distribution of the patients hospitalized for asthma attacks by gender and age.

Parameter	Gender			
	Female		Male	
	n	%	n	%
Age (years)				
<3	214	40.3	317	59.7
3 to 12	225	41.1	323	58.9
13 to 18	16	88.9	2	11.1
19 to 65	213	77.2	63	22.8
>65	46	64.8	25	35.2

and 74.5% of the patients were 12 years of age or younger. There was no gender-related predominance when the sample as a whole was analyzed.

Table 1 shows the distribution of the patients by age and gender. Among the patients over 13 years of age, there was a predominance of females.

Figure 1 shows the number of hospital admissions in each region, in the four years studied, corrected for the respective number of inhabitants in each one of them. We can see that there was a reduction in the number of asthma-related hospital admissions in all regions of the city in 2005.

The analysis of the reduction in the number of hospital admissions in relation to the length of time elapsed since the training of the professionals working at the USFs in each group reveals that the decline was more pronounced at the USF where the training occurred earlier. Figure 2 shows the number of hospital admissions, in the four years, by length of time elapsed since the training of the professionals working at the USFs in each group.

Taking the annual vegetative growth of the city into consideration, the analysis of the pre-intervention (2002 and 2003) and the post-intervention (2004 and 2005) periods revealed a significant reduction in the rate of asthma-related hospital admissions, respectively, from 178/100,000 inhabitants to 120/100,000 inhabitants ($p < 0.01$).

Discussion

The data used in this study were secondary and individualized. They were obtained from the public sector through the review of the AHAs of patients diagnosed with asthma alone according to the tenth revision of the International Classification of Diseases (J45 and J46), and patients diagnosed with accompanying diseases were therefore not considered. There is considerable criticism of the use of such data in scientific studies, especially due to misdiagnosis and the impossibility of verifying such information, which could lead to a measurement bias. The researchers attempted to minimize this bias by training the medical professionals (intervention), which might have contributed to the improvement in diagnosis and in the way the AHAs were filled out. Despite the limitations, the usefulness of community-based data, and the use of community interventions⁽¹⁰⁾ for effectiveness studies are unanimously recognized in the special-

ized literature. The Brazilian National Ministry of Health has invested heavily in the training and certification of the professionals who supply the Unified Health Care System Hospital Information System with information from the AHAs, especially at the state and municipal level, and the information obtained thusly is currently considered to be of good quality.⁽¹¹⁾ In addition, the data provided on the AHAs constitute the only source of information regarding diseases and hospital admissions for the vast majority of the Brazilian states.⁽¹²⁾

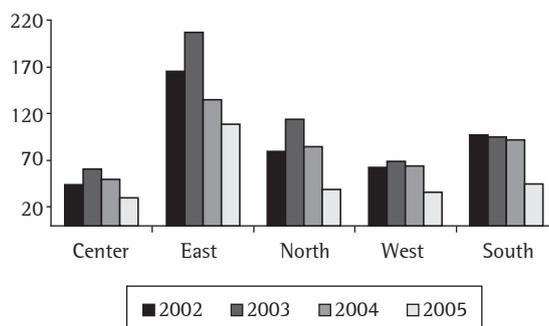


Figure 1 - Distribution of the number of authorizations for hospital admission by region corrected for the respective number of inhabitants in each ($\chi^2 = 13.9$; $p = 0.362$).

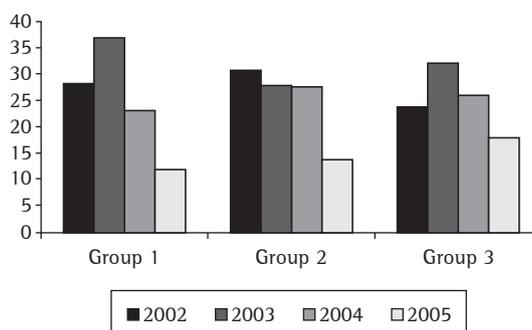


Figure 2 - Distribution of the number of authorizations for hospital admission by length of time elapsed since the training of the professionals working at the primary health care clinics in each group ($\chi^2 = 17.63$; $p = 0.007$).

In order to better analyze the influence of the intervention (the PRL) on the reduction of the number of hospital admissions, we divided the AHAs by period: pre-intervention (2002 and 2003); and post-intervention (2004 and 2005). The rates were calculated per 100,000 inhabitants and corrected for the respective population estimate in each year studied. After the implementation of the PRL, these rates were found to be significantly reduced.

In the years studied, there were no differences among the three large groups of USFs analyzed in terms of age or gender, showing that the groups were homogeneous. Although asthma diagnosis in children ≤ 2 years of age is controversial, we included the AHAs of patients over 6 months of age, since the greater part of asthma diagnoses are made in individuals of this age or older.^(8,13)

According to the medical literature, there is a predominance of younger individuals among the patients hospitalized for asthma. Studies have demonstrated that asthma is the most common chronic disease among children and young adults.⁽¹⁴⁻¹⁶⁾ The predominance of women in the upper age brackets can be explained by their increased longevity as compared with that of men, and this occurs due to biological differences (such as the protection against coronary disease conferred by female hormones), the reduction in the maternal mortality rate, the lower exposure to work-related risk factors, and the lower incidence of smoking, as well as the fact that women are more attentive to symptoms and take better care of their health.⁽¹⁷⁾ Some studies show that emergency treatment of individuals over 12 years of age is more common in women.^(9,18) However, the mechanism of interrelationship among gender, age, and asthma remains unknown.⁽¹⁹⁾

We observed that the number of hospital admissions in 2003 was greater than that found in the preceding year and in the two succeeding years (Table 2). This could result from the increase in the number of patients diagnosed with asthma after the training of the professionals working in primary health care. This paradigm change, generated by the model of training used in primary health care, effected a change in the behavior of the health professionals, who began to rethink their treatment approaches and manner.⁽²⁰⁾ After 2003, the curve of asthma-related hospital admissions showed a tendency toward a reduction, as previously mentioned and

as demonstrated in Table 2. This tendency occurred homogeneously and uniformly throughout the city. The analysis of the three large groups, specifically in terms of the number of hospital admissions in the five regions of the city, revealed that they were homogeneous, and that in none of them was a specific region solely responsible for the results obtained. This datum reflects the training method, in which all professionals, taking the region where they work into account, were trained at the same time—considering that there were three large treatment periods and groups through which all urban areas of the city were served. Studies indicate that health care system organization and asthma education for health professionals and patients are responsible for a marked reduction in the number of asthma-related hospital admissions.⁽²¹⁾

Aside from the intervention performed, we identified no other factors or agents (be they external or administrative) that would explain the marked reduction in the number of hospital admissions in 2004 and 2005. It is known that, in general, the number of beds available for admissions in the city remained practically unchanged throughout the study period. Various authors have demonstrated that interventions similar to that performed in the city of Londrina result in a reduction in the number of hospital admissions.⁽²²⁻²⁴⁾

In addition, the training of health professionals and their inclusion in primary health care in order to treat patients, in conjunction with the distribution of inhaled corticosteroids to patients enrolled in and monitored via the PRL, in their own community, contribute to the success of asthma control programs.^(25,26) As professionals acquire adequate

Table 2 – Distribution of the patients hospitalized for asthma attacks by year of admission.

Year of admission	n	%
2002	385	26.5
2003	466	32.3
2004	371	25.7
2005	222	15.4
Total	1,444	100.0

knowledge of asthma and apply it to their daily practice, it is expected that they do it with the least operational structure possible. Changes in practice occur gradually, and the primary objective of health professionals is to see these changes finally reflected in their patients.⁽²⁷⁾ The significant reduction in the number of hospital admissions related to the USFs where the program was implemented earlier is therefore not surprising.

In conclusion, the data reveal that, after the intervention performed in the city of Londrina, there was a significant reduction in the number of asthma-related hospital admissions. Aside from the restructuring and accreditation of the public health care systems, with the inclusion of primary health care professionals and distribution of appropriate medications to treat asthma, we found no other explanation for this reduction. The time elapsed since the training of the professionals working at the USFs seems to have a positive influence on the reduction in the number of asthma-related hospital admissions.

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