

Asthma prevalence among employees of a university hospital as evaluated using a European Union respiratory health questionnaire*

ANTÔNIO SOARES AGUIAR FILHO¹, EDMUNDO PESSOA ALMEIDA LOPES NETO², EMANUEL SÁVIO CAVALCANTI SARINHO³, MARIA MAGALHÃES VASCONCELOS⁴, DARLA SIQUEIRA TENÓRIO LIMA⁴, PENÉLOPE MATOS WIRTSBIKI⁴

ABSTRACT

Objective: To determine the prevalence of bronchial asthma among university hospital employees between the ages of 20 and 44 based on the criteria established in the European Community Respiratory Health Survey. **Methods:** A descriptive, prospective, randomized, stratified prevalence study was conducted, in which questionnaires completed between April and October of 2002 by 351 employees of the Universidade Federal de Pernambuco (Federal University at Pernambuco) Hospital das Clínicas were evaluated. For sample characterization, the independent variables used were the signs and symptoms of asthma, and one dependent variable (physician-diagnosed asthma, characterized by data related to attacks occurring within the 12 months preceding the study) was included. **Results:** The prevalence of asthma was 10.7%. Nocturnal dyspnea, chest tightness and nocturnal cough were the most frequent symptoms, although statistically significant correlations with asthma were found exclusively among females ($p = 0.03$, $p = 0.04$ and $p = 0.001$, respectively). Nocturnal dyspnea, wheezing within the last 12 months, dyspnea with wheezing and the use of asthma medication were more frequent among individuals between 20 and 29 years of age. The last two variables presented statistical significance ($p < 0.001$). Undertreatment of asthma was identified in 35 (10.7%) of the cases. **Conclusions:** The results of this pioneering study show that asthma prevalence in a sample composed of employees of a university hospital located in a developing country was slightly higher than that found in the literature and suggest that working in a university hospital does not reduce the frequency of undertreatment.

Keywords: Asthma/diagnosis; Asthma/epidemiology; Hospitals, university; Questionnaires

* Study carried out in the Hospital das Clínicas of the Universidade Federal de Pernambuco (Federal University of Pernambuco) - UFP - Recife, Pernambuco (PE) Brazil.

1. Masters in Internal Medicine, Assistant Professor at the Universidade Federal de Pernambuco (UFP, Federal University of Pernambuco), Recife, Pernambuco, Brazil

2. Ph.D. and Professor of Gastroenterology at the Universidade Federal de Pernambuco (UFP, Federal University of Pernambuco), Hospital das Clínicas, Recife, Pernambuco, Brazil

3. Ph.D. and Professor of Pediatrics at the Universidade Federal de Pernambuco (UFP, Federal University of Pernambuco), Hospital das Clínicas, Recife, Pernambuco, Brazil

4. Medical student at the Universidade Federal de Pernambuco - UFP - Recife, Pernambuco, Brazil

Correspondence to: Antônio Soares Aguiar Filho. Rua Dona Benvenida, 258, Boa Vista, Recife - PE - Brazil. CEP 50070-220
Phone: 55 81 3423-0628. E-mail: aaguiar@hotmail.com.br

Submitted: 8 June 2004. Accepted, after review: 16 May 2005.

INTRODUCTION

The most intriguing aspect of the descriptive epidemiology of asthma and asthma-like symptoms is its geographical and temporal variability. Various epidemiological markers, such as morbidity rates, mortality rates, hospitalizations and amount of prescribed medications, suggest that the prevalence of asthma has significantly increased since 1970.⁽¹⁻²⁾

This phenomenon is particularly evident in urban areas of developing countries, although increased asthma morbidity has also been reported in developed countries.⁽³⁻⁴⁾

This problem triggered an international push to develop questionnaires that would make epidemiological studies more objective and consistent, especially regarding the concept of asthma. The questionnaire known as the European Community Respiratory Health Survey (ECRHS) was developed for use with individuals between the ages of 20 and 40.

Brazil is a country that lacks reliable epidemiological data, which makes the planning and execution of preventive and educational measures for health problems, targeted to an expressive part of the population, more difficult.⁽⁵⁾ The most comprehensive epidemiological data are those from the national Sistema Único de Saúde⁽⁶⁾ (SUS, Unified Health Care System). However, since they contain errors, they must be analyzed with care.⁽⁷⁾ In various regions in the country, asthma cases have not been reported, whereas, in other areas, some hospitals have used these data as an artifice in order to receive more money from the government.

Despite their unreliability, the statistical data are alarming. In 1996, asthma was the fourth leading cause of hospitalization in Brazil, accounting for approximately 350,000 hospitalizations nationwide, at a cost of approximately 76 million Brazilian reais, which was the third highest expenditure by the SUS for a specific disease, according to data reported at the III Consenso Brasileiro no Manejo da Asma (Third Brazilian Consensus on Asthma Management) of the Sociedade Brasileira de Pneumologia e Tisiologia (Brazilian Society of Pulmonology and Phthisiology). In addition, asthma was responsible for an average of 2000 deaths/year, 70% of which occurred during hospitalization.⁽⁸⁾

Costs directly related to the treatment of asthma consist of expenditures for medication, equipment,

medical appointments and hospitalizations. Indirect costs are related to intangibles such as patients and companions missing school or work, as well as productivity loss, early retirement and mortality.⁽⁹⁾

In 1995, it was demonstrated that the increase in morbidity and mortality seen in asthma is associated with, among other factors, inappropriate treatment strategies and low patient compliance with treatment. Since treatment is complex, it demands active participation by patients and their families. Due to the fact that asthma leads to physical, emotional and social limitations, therapeutic procedures require, in addition to adequate pharmacological treatment, that patients understand their disease, its inducing factors and how to avoid them. In addition, patients should be able to use medications correctly.⁽¹⁰⁾ Furthermore, patients must be able to recognize signs of asthma control and aggravation.⁽¹¹⁾

Based on these premises, any programs for the treatment, education or prevention regarding asthma should be preceded and followed by epidemiological studies based on standardized questionnaires, the objective being to monitor the process, analyze the effectiveness of the programs and make the necessary corrections.⁽¹²⁾

The ECRHS questionnaire has been used for the epidemiological studies of asthma in patients ranging from 20 to 44 years of age in order to investigate the general population and individuals in some professions, such as coal mining, construction work and farming, that are exposed to a higher risk of developing the disease.

It can be assumed that hospital employees, regardless of their position, develop activities for patients and (directly or indirectly) assist them. Acting under the supervision of academic professionals, hospital employees perform tasks of various levels of complexity, organize the work environment and ensure continuity during shift changes. These activities provide better service to the public at large, safeguarding the hospital image and giving patients greater peace of mind, which may lead to higher expectations for health recovery and better conditions to comply with quality standards.⁽¹³⁾ Therefore, when hospital employees get sick, the health of the patients is jeopardized since the balance in the chain of processes involved in treating the patients is altered.

All of these factors are even more important when employees work at public, tertiary-care university hospitals, such as the Universidade Federal de Pernambuco (Federal University of Pernambuco) Hospital das Clínicas, where the present study was conducted.

The objective of this study was to determine the prevalence of bronchial asthma among 351 employees of a teaching hospital. Based on the criteria established in the ECRHS, all participants were between the ages of 22 and 44.⁽¹⁴⁾

METHODS

A descriptive, randomized prevalence study was conducted, stratified by hospital sector. Data from 351 (53.9%) of the 651 employees were analyzed, respecting the inclusion and exclusion criteria.

We used the following inclusion criteria: being a hospital employee in good standing (active member of the staff), being between the ages of 20 and 44, and giving written informed consent (after being informed of the objectives of the study). One employee was excluded from the study for not providing information regarding all of the symptoms described in the ECRHS, which was a condition for data validity.⁽¹⁴⁾ All ethical precepts specified by Resolution number 196/96 of the Conselho Nacional de Saúde (National Council on Health) were respected.⁽¹⁵⁾

The Federal University of Pernambuco Hospital das Clínicas occupies an area of 64,614 m², employing 1578 workers, 306 professors and 174 resident physicians. The study body consists of 1637 medical students, 365 of whom are postgraduate students. This tertiary-care hospital has 213 clinics, 15 hemodialysis units in a nephrology unit, 416 beds in wards, 18 beds in the neonatal intensive care unit and 8 beds in the adult intensive care unit.

In accordance with the validity criteria adopted in the translation of the ECRHS to other languages,⁽¹⁴⁾ we adapted this first translation to Portuguese to the local culture through the application of the questionnaire to students, hospital employees and professors, and validation was carried out later.

Independent variables consisted of signs and symptoms, since these data were based only on information provided by the participants and were

not confirmed by the researcher. Such variables included: the presence of breath sounds (referring to sounds, such as wheezing, detected by the participant while breathing); dyspnea with breath sounds (reported as wheezing at respiratory movements, followed by the sensation of shortness of breath); breath sounds not associated with the flu (participant reported wheezing within the last 12 months, not concomitant with flu or cold episodes); chest tightness (participant reported this symptom within the last 12 months, regardless of the cause); nocturnal dyspnea (participant reported spontaneous awakening caused by shortness of breath); nocturnal cough (participant reported that cough caused spontaneous awakening within the 12 last months); use of medication (use of medication, in any form of pharmaceutical presentation, prescribed by a physician for the treatment of asthma, by the time information was reported).

In addition to the ECRHS questionnaire variables, we considered undertreatment of asthma as an independent variable. It was defined as reported, physician-diagnosed asthma attacks within the last 12 months, with or without the use of medication for asthma.

We considered as a dependent variable a history of asthma, characterized by the information regarding physician-diagnosed asthma attacks within the 12 months preceding the study.

Data were processed using the Epi Info 2002 program, version 1.0, from the Centers for Disease Control and Prevention - World Health Organization.⁽¹⁶⁾ Chi-square test was used as the statistical test for the analysis of association between variables. The significance level was set at 0.05.

RESULTS

The study comprised 351 employees, ranging in age from 21 to 44 (median, 37; 63.3% between 35 and 44). There were 99 males (28.2%; median age, 36), and 252 females (71.8%; median age, 37).

The distribution of the participants by level of education reflected the professional activity in the area of health care: 156 employees (44.4%) had completed high school, and 140 (9.9%) had a college degree. In the hospital, 128 (38.0%) of the employees performed activities that did not require contact with patients, whereas 209 (62.0%) performed either direct health care activities, at

TABLE 1

Distribution of ECRHS asthma symptoms, by gender, among the 351 employees of the Universidade Federal de Pernambuco (Federal University of Pernambuco) Hospital das Clínicas from April to November of 2002

Asthma signs and symptoms investigated using the ECRHS	Gender (%)		Total (%)	Statistical test
	Female	Male		
Wheezing within the last 12 months	36 (10.2)	8 (2.3)	44 (12.5)	P = 0,11
Wheezing not accompanying the flu	30 (8.5)	8 (2.3)	38 (10.8)	P = 0.30
Dyspnea and wheezing	29 (8.3)	9 (2.6)	38 (10.8)	P = 0.13
Nocturnal dyspnea	66 (18.8)	15 (4.3)	83 (23.6)	P = 0.03*
Chest tightness	38 (10.8)	7 (2.0)	45 (12.8)	P = 0.04*
Nocturnal cough	76 (21.6)	15 (4.3)	91 (25.9)	P = 0.001*
Use of medication for asthma	18 (5.1)	4 (1.1)	22 (6.3)	P = 0.28

Percentage based on 351 individuals since each presented more than one symptom

*statistically significant

ECRHS: European Community Respiratory Health Survey.

the bedside or in the clinics (185 employees; 54.8%), or indirect activities, such as cleaning and disinfection or laundering (24 employees; 7.2%).

Of the 351 employees evaluated, 326 provided information concerning asthma attacks within the last 12 months prior to the study. Of those 326, 35 (10.7%) reported asthma attacks within the last 12 months prior to the study. Of those 35, 29 (82.8%) were female and 6 (17.2%) were male. Although there was a predominance of asthma attacks among females, this difference was less than statistically significant ($p = 0.20$).

Analyzing the prevalence of asthma attacks by age bracket, it was statistically higher among individuals between the ages of 20 and 29 ($p = 0.02$).

Table 1 shows the distribution of ECRHS symptoms among the 351 employees by gender. Nocturnal dyspnea ($p = 0.03$), chest tightness ($p = 0.04$) and nocturnal cough ($p = 0.001$) were

statistically more frequent in females.

Analyzing the frequency of reported asthma-related symptoms by age bracket, we found no proportion differences in terms of wheezing within the last 12 months, wheezing accompanying the flu, chest tightness or nocturnal cough, all of which were proportional to the sample ratio of 1:4 between the young adult (20-29 years) and adult (30-44 years) age brackets. However, symptoms of dyspnea combined with wheezing and the use of medication were more frequent among individuals between the ages of 20 and 29, at an approximate ratio of 1:1 between the two age brackets (Table 2).

When the ECRHS signs and symptoms that were significantly associated with asthma attacks within the last 12 months were organized by frequency, the order was as follows: wheezing within the last 12 months, dyspnea with wheezing, wheezing not associated with the flu, nocturnal cough, nocturnal

TABLE 2

Distribution of asthma signs and symptoms investigated using the ECRHS regarding the age brackets of 351 employees of the Universidade Federal de Pernambuco (Federal University of Pernambuco) Hospital das Clínicas from April to November of 2002

Asthma signs and symptoms investigated using the ECRHS	Age brackets (%)		Total (%)	Statistical test
	20-29	30-44		
Wheezing within the 12 months	10 (2.8)	34 (9.7)	44 (12.5)	$p = 0,41$
Wheezing not accompanying the flu	9 (2.6)	29 (8.3)	38 (10.8)	$p = 0.36$
Dyspnea and wheezing	12 (3.4)	23 (6.6)	35 (10.0)	$p = 0.01^*$
Nocturnal dyspnea	20 (5.7)	61 (17.4)	81 (23.1)	$p = 0.09$
Chest tightness	9 (2.6)	36 (10.2)	45 (12.8)	$p = 0.74$
Nocturnal cough	17 (4.8)	73 (20.8)	90 (25.6)	$p = 0.85$
Use of medication for asthma	9 (2.6)	13 (3.7)	22 (6.3)	$p = 0.01^*$

Percentage based on 351 individuals since each presented more than one symptom

*statistically significant

ECRHS: European Community Respiratory Health Survey

TABLE 3

Distribution of ECRHS asthma signs and symptoms, as well as of asthma attacks, within the last twelve months, as reported by 35 employees of the Universidade Federal de Pernambuco (Federal University of Pernambuco) Hospital das Clínicas from April to November of 2002

Asthma signs and symptoms investigated through ECRHS	Reports of asthma attacks within the last 12 months	
	Nº of patients	%
Wheezing in the last 12 months	28	80.0
Dyspnea and wheezing	26	74.2
Wheezing not combined with the flu	25	71.4
Nocturnal cough	23	65.7
Nocturnal dyspnea	21	60.0
Use of medication for asthma	20	57.1
Chest tightness	18	51.4

Percentuais calculados com base em 351 pacientes, já que cada um apresentava mais de um sintoma.

ECRHS: *European Community Respiratory Health Survey*.

dyspnea, use of medication for asthma, and chest tightness (Table 3).

Among 326 employees that answered the question regarding "asthma attacks within the past 12 months", 21 (6.1%) reported to be using medication for asthma up to the time of this study independently of any medical prescriptions, 20 (95.2%) of whom reported that a physician had diagnosed the asthma attack. All of the 35 employees who reported asthma attacks within the year preceding the study were classified as cases of undertreatment, 20 (57.1%) because, although under treatment, they had received inappropriate medications or insufficient dosages, and 15 (42.9%), who stated that they were not under treatment, because of the absence of pharmacological therapy (Table 4).

DISCUSSION

The prevalence of asthma symptoms in the present study, which was carried out in the city of Recife (in the state of Pernambuco, Brazil), was higher than that reported in studies conducted in Canada,⁽⁴⁾ in the rural zone in Beijing (China),⁽¹⁷⁾ in Antwerp (Belgium)⁽¹⁸⁾ and in Spain.⁽¹⁹⁾ This may be attributable to the fact that those studies were population based and carried out in areas with climate and environmental characteristics quite distinct from those found in Recife or to differences in the socioeconomic characteristics between the groups of individuals evaluated in those studies and the employees of the Federal University of Pernambuco Hospital das Clínicas.

There are authors who consider the potential contribution of environmental and genetic factors as one of the most interesting hypotheses for these differences, and this warrants further study.⁽²⁰⁾ Other authors believe that it is unlikely that genetic factors are involved since epidemiological prevalence studies, repeated in various countries, have shown significant changes over short periods of time, incompatible with genetic causes, which have a long-term effect on populations.⁽¹⁹⁾

The ECRHS⁽¹⁴⁾ and the International Union Against Tuberculosis and Lung Disease were compared regarding their efficiency in detecting mild asthma.⁽²¹⁾ In order to do so, data from 196 patients between the ages of 16 and 59, with pulmonary or extrapulmonary complaints and never having been examined for bronchial asthma were studied. Patients were subdivided into two groups, answering the ECRHS or the International Union Against Tuberculosis and Lung Disease questionnaires during the first phase. Those who had reported at

TABLE 4

Distribution of the use of medication for asthma in 326 employees of the Universidade Federal de Pernambuco (Federal University of Pernambuco) Hospital das Clínicas with a history of asthma within the last twelve months from April to November 2002

Use of medication for asthma	Report of a physician-diagnosed asthma attack within the last 12 months				
	yes		no		n
total	n	%	n	%	
yes	20	57.1	1	0.4	21
no	15	42.9	290	99.6	305
TOTAL	35	100.0	291	100.0	326

25 employees omitted the information concerning asthma attacks in the last 12 months.

Percentages based on the total by category

least one symptom in any of the questionnaires were submitted to clinical, functional and allergological examinations. Based on the results, the authors concluded that the ECRHS should be the questionnaire of choice for epidemiological surveys on asthma. Therefore, since it is an internationally validated questionnaire, we adopted the ECRHS questionnaire as the instrument of data collection to be used in the present study.⁽²²⁾

In the ECRHS, asthma is defined as reference to an asthma attack within the last 12 months or the use of medication for its treatment. However, we acknowledge the fact that there might be a memory bias, and that, in the absence of a medical diagnosis, participants might classify a dyspnea episode as an asthma attack, as well as the fact that participants might be self-medicating, which is a frequently seen among health care workers. Consequently, we exclusively considered asthma when there was a documented asthma attack within the 12 months prior to the present study. We therefore restricted the concept of asthma in the ECRHS, similar to what other authors had done in a study investigating the increase in the prevalence of asthma in three Italian cities, comparing the period between 1998 and 2000 to that between 1991 and 1993.⁽²³⁾

This was a phase 1 study conducted in a restricted area of a university hospital. As an epidemiological survey, it was groundbreaking in the sense that we were able to obtain initial data that characterized the prevalence of asthma attacks within the last 12 months among employees of a university hospital.

We also analyzed undertreatment because we believed that this would be absent or present a low incidence since these employees deal with disease on a daily basis and have a higher level of education concerning health than do individuals in the general population. Therefore, we believed that they would seek treatment more frequently.

Another aspect of the methodology adopted in the present study is related to data collection using a self-report questionnaire, which is certainly not considered the best option in the investigation of asthma.

One study was developed, classified by its authors as innovative, pragmatic, randomized and controlled, in order to evaluate the sensitivity, acceptance and efficiency of primary care of asthmatic patients through telephone conversations.⁽²⁴⁾ The authors

concluded that such consultations provided assistance to 26% more patients than did those conducted in clinics or through self-report questionnaires, showing no clinical disadvantage, less satisfaction of patients and more freedom for them to express their symptoms, questions and occasional noncompliance with the treatment. The same authors stated that studies of the symptoms of asthma should be preferably conducted over the telephone. Although this methodology was also proven and validated by epidemiological population surveys using the ECRHS, it could not be applied in the present study due to the low socioeconomic status of the hospital employees who performed administrative or sanitation duties (not all of them had a telephone at home), which would represent a significant loss in the maximal sample size (approximately 39%).

Although the analysis of occupational asthma was not the objective of the present study, we could not ignore the fact that Samet⁽²⁰⁾ had warned about the influence of the environment in restricted areas on the prevalence of asthma, which might explain some of the results in the present study, since the hospital environment may act as a risk factor for asthma symptoms.

In the present study, asthma attacks were more frequent in females, which could be explained by results reported by other authors who found that females presented greater bronchial hyperresponsiveness than did males, almost exclusively due to the smaller caliber of their airways.⁽²⁵⁾ This was confirmed in another study involving 18,659 individuals (52.1% female; 47.9% male), residing in 16 countries, who completed the ECRHS. The authors reported that the incidence of asthma in the 0-44 age bracket presented an inverse relationship regarding age and is predominance in females.⁽²⁶⁾

Higher prevalence of nocturnal dyspnea, chest tightness and nocturnal cough was also statistically significant among females, but there were no similar reports in the literature we reviewed. These data may be related to holding positions that require working in less safe and less healthful environments, such as kitchen work, laundry work and cleaning/disinfecting the environment, all of which are more commonly held by females. Individuals working in such environments are submitted to sudden changes in temperature (when withdrawing food from refrigerators or freezers) and to vapor (when preparing meals or ironing clothes).

The predominance of asthma attacks reported by younger individuals agreed with the natural history of the disease but disagreed with a study on the prevalence of asthma by age.⁽²⁷⁾ A possible explanation for the results in the present study is that the characteristics inherent to hospital work, which subjects individuals to very high levels of stress and pollution and demands much adaptability in order to cope with the suffering of patients while maintaining their own psychological balance. Making such adjustments affects individuals between 20 and 29 years of age more intensely, probably due to the fact that they have had less time to learn how to adapt to situations of conflict and to the suffering of others.

We can hypothesize that, in this population, personal, behavioral and professional factors might affect both genders. This hypothesis is in agreement with the findings of another study of the neurosis-inducing component of asthma.⁽²⁸⁾ In that study, comprising 426 adults participating in phase 2 of the ECRHS, it was reported that the presence of wheezing within the last 12 months severely affected the quality of life of the participants, even more than asthma attacks or isolated bronchial hyperresponsiveness, although these two signs resulted in extreme worsening of the mental state of patients.

The finding that 12.5% of the individuals with wheezing within the last 12 months in the sample of the present study was important because it indicated the negative effect on the quality of life of hospital employees and, indirectly, of the patients treated by them.⁽²⁹⁾

The identification of 35 employees in a university hospital who were likely undertreated for asthma makes us reflect upon the prevention and reduction of asthma morbidity that can be obtained through educational interventions.

In studies in Canada⁽³⁰⁾ and in Brazil,⁽⁹⁾ after a 12-month educational program for asthma, there was significant improvement in the understanding of the disease and disposition to alter the medication, as well as in the quality-of-life score and peak expiratory flow. However, no educational programs or improvement in the treatment of asthma will be valid if patients do not adhere closely to the proposed orientations regarding the understanding of the disease and subsequent improvement in the acceptance of the therapy.

Epidemiological investigations of asthma should not be limited to large urban populations since its study in relatively restricted areas may provide information that may be conducive to the understanding of various causes of its prevalence. The results of the present study indicate the need for further, more detailed surveys that may contribute to the welfare of asthmatic patients and improving the quality of hospital services.

REFERENCES

1. Burney PG, Chinn S, Rona R. Has the prevalence of asthma increased in children? Evidence from the national study of health and growth 1973-1986. *BMJ*. 1990;300(6735):1306-110.
2. Weiss KB, Wagener DK. Changing patterns of asthma mortality. Identifying target populations at high risk. *JAMA*. 1990;264(13):1683-7.
3. Reid DD, Abramson M, Raven J, Walters HE. Management and treatment perceptions among young adults with asthma in Melbourne: the Australian experience from the European Community Respiratory Health Survey. *Respirology*. 2000;5(3):281-7.
4. Manfreda J, Becklake MR, Sears MR, Chan-Yeung M, Dimich-Ward H, Siersted HC, et al. Prevalence of asthma symptoms among adults aged 20-44 years in Canada. *CMAJ*. 2001;164(7):995-1001.
5. Godoy DV, Dal Zotto C, Bellicanta J, Weschenfelder RF, Nacif SB. Doenças respiratórias como causa de internações hospitalares de pacientes do Sistema Único de Saúde num serviço terciário de clínica médica na região nordeste do Rio Grande do Sul. *J Pneumol*. 2001;27(4):193-8.
6. Brasil. Ministério do Trabalho e Emprego. CBO-Classificação Brasileira de Ocupação. [texto na Internet]. Versão 1.0 reduzida. 2002. [citada 2003 Maio 10]. Brasília: Ministério do Trabalho e Emprego. Disponível em: <http://www.mteco.gov.br/index.htm>
7. Menezes AMB. Epidemiologia. In: Correa SLC. *Condutas em pneumologia*. Rio de Janeiro: Revinter; 2001. p.42-9.
8. Sociedade Brasileira de Alergia e Imunologia. Sociedade Brasileira de Pediatria e Sociedade Brasileira de Pneumologia e Tisiologia. III Consenso Brasileiro no Manejo da Asma. Capítulo I. Definição, epidemiologia, patologia e patogenia. *J Pneumol*. 2002;28(Supl 1):S4-S5.
9. Oliveira MA, Muniz MT, Santos LA, Faresin SM, Fernandes ALG. Custo-efetividade de programa de educação para adultos asmáticos atendidos em hospital-escola de instituição pública. *J Pneumol*. 2002;28(2):71-6.
10. Sears MR. Changing patterns in asthma morbidity. *J Investig Allergol Clin Immunol*. 1995;5(2):66-72.
11. Evans D. To help patients control asthma the clinician must be a good listener and teacher. *Thorax*. 1993;48(7):684-7.
12. Vieira JE, Cukier A, Stelmach R, Kasahara DI, Gannam S, Warth M. Comparison of knowledge on asthma: doctors completing internal medicine residence and doctors completing medical school. *São Paulo Med J*. 2001;119(3):101-4.
13. Brasil. Ministério da Saúde. Conselho Nacional de Saúde. Resolução 196/96 do Conselho Nacional de Saúde. Diretrizes e normas regulamentadoras de pesquisas

- envolvendo seres humanos [texto na Internet]. [citado 2002 Jan 2]. Disponível em: <http://www.unifesp.br/reitoria/orgaos/comites/etica/resolucao6.htm>
14. European Community Respiratory Health Survey (ECRHS). Variations in the prevalence of respiratory symptoms, self-reported asthma attacks, and use of asthma medication in the European Community Respiratory Health Survey (ECRHS). *Eur Respir J*. 1996;9(4):687-95.
 15. Brasil. Ministério da Saúde - DATASUS. Morbidade hospitalar por local de residência - Pernambuco - asma - 20 a 44 anos, jan/1996-jan/2003 [texto na Internet]. [citado 2003 Mar 19]. Disponível em <http://tabnet.datasus.gov.br/cgi/tabcgi.exe?sih/cnv/mespe.def>.
 16. Centers for Disease Control and Prevention - CDC. Vital and health statistics: current estimates from the National Health Interview Survey, 1996. Atlanta US: Department of Health and Human Services; 1999.
 17. Chan-Yeung M, Zhang LX, Tu DH, Li B, He GX, Kauppinen R, et al. The prevalence of asthma and asthma-like symptoms among adults in rural Beijing, China. *Eur Respir J*. 2002;19(5):853-8.
 18. Wieringa MH, Weyler JJ, Nelen VJ, Van Hoof KJ, Van Bastelaer F, Van Sprudel MP, et al. Prevalence of respiratory symptoms: marked differences within a small geographical area. *Int J Epidemiol*. 1998;27(4):630-5.
 19. Upton MN, McConnachie A, McSharry C, Hart CL, Smith GD, Gillis CR, et al. Intergenerational 20 year trends in the prevalence of asthma and hay fever in adults: the Midspan family study surveys of parents and offspring. *BMJ*. 2000;321(7253):88-92.
 20. Samet JM. A historical and epidemiological perspective on respiratory symptoms questionnaires. *Am J Epidemiol*. 1978;108(6):435-46.
 21. Sergeeva GR, Emel'ianov AV, Ivanova NI. Effectiveness of detection of bronchial asthma with two international questionnaires. *Ter Arkh*. 2002;74(3):12-4. Russian.
 22. Samet JM. Asthma Epidemiology: old and new issues. In: Neffen HE, Baena-Cagnani CE, Fabbri L, Holgate S, O'byrne P. Asthma - A link between environment, immunology, and the airways. Proceedings of the XVIth World Congress of Asthma. Argentina : Hogrefe & Huber; 1999. p.27-32.
 23. Verlato G, Corsico A, Villani S, Cerveri I, Migliore E, Accordini S, et al. Is the prevalence of adult asthma and allergic rhinitis still increasing? Results of an Italian study. *J Allergy Clin Immunol*. 2003;111(6):1232-8.
 24. Pinnock H, Bawden R, Proctor S, Wolfe S, Scullion J Price D, et al. Accessibility, acceptability, and effectiveness in primary care of routine telephone review of asthma: pragmatic, randomised controlled trial. *BMJ*. 2003;326(7387):477-9.
 25. Schaubel DH, Johansen H, Mao Y, Dutta M, Manfreda J. Risk of preschool asthma: incidence, hospitalization, recurrence, and readmission probability. *J Asthma*. 1996;33(2):97-103.
 26. De Marco R, Zanolin ME, Accordini S, Signorelli D, Marinoni A, Bugiani M, et al. A new questionnaire for the repeat of the first stage of the European Community Respiratory Health Survey: a pilot study. *Eur Respir J*. 1999;14(5):1044-8.
 27. Campello C, Ferrari M, Poli A, Olivieri M, Tardivo S, Verlato G, et al. Prevalence of asthma and asthma-like symptoms in an adult population sample from Verona. ECRHS Verona. European Community Respiratory Health Survey. *Monaldi Arch Chest Dis*. 1998;53(5):505-9.
 28. Matheson M, Raven J, Woods RK, Thien F, Walters EH, Abramson M. Wheeze not current asthma affects quality of life in young adults with asthma. *Thorax*. 2002;57(2):165-7.
 29. Huovinen E, Kaprio J, Koskenvuo M. Asthma in relation to personality traits, life satisfaction, and stress: a prospective study among 11,000 adults. *Allergy*. 2001;56(10):971-7.
 30. Coté J, Bowie D, Robichaud P, Parent J, Battisti L, Boulet L. Evaluation of two different educational interventions for adult patients consulting with an acute asthma exacerbation. *Am J Respir Crit Care*. 2001;163(6):1415-9.