

Impact that an educational intervention carried out by community health agents has on environmental conditions in the households of children with asthma*

Repercussão de uma intervenção educativa com agentes comunitários de saúde nas condições ambientais de domicílios de crianças asmáticas

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Abstract

Objective: To determine the impact that an educational intervention employing problem-solving strategies for the environmental control of aeroallergens has on environmental conditions in the households of children with asthma. The intervention was carried out by community health agents. **Methods:** This was a prospective intervention study. The community health agents visited 95 households in which there were children (2-10 years of age) who had recurrent episodes of wheezing and dyspnea. All of the households investigated were in the city of Iguatu, Brazil. The educational interventions involved focus groups and community health agents. The focus groups were asked to brainstorm the educational measures to be implemented, in order to devise problem-solving strategies. After the intervention, 84 households were revisited and reevaluated. **Results:** After the intervention, there was a significant decrease in the use of brooms for cleaning the floor ($p = 0.02$), in the use of coal-burning stoves ($p = 0.001$), and in the number of stuffed toys ($p = 0.05$). There was also a significant post-intervention improvement in the environmental control of aeroallergens in the bedrooms of the children ($p = 0.003$). **Conclusions:** The educational intervention applied in this study proved to be an important tool for the target population, improving environmental conditions in the households of children with asthma.

Keywords: Asthma; Primary health care; Family health program; Health education.

Resumo

Objetivo: Verificar o impacto de uma intervenção educativa problematizadora sobre o controle ambiental para aeroalérgenos, conduzida por agentes comunitários de saúde, nos domicílios de crianças com asma. **Métodos:** Estudo prospectivo de intervenção. Foram visitados 95 domicílios com crianças (faixa etária de 2-10 anos) com episódios recorrentes de dispneia e sibilância no município de Iguatu (CE). A intervenção educativa envolveu grupos focais com agentes comunitários de saúde com a problematização sobre medidas educativas a serem implementadas. Após a intervenção, 84 domicílios foram revisitados e reavaliados. **Resultados:** Após a intervenção, houve uma redução significativa na limpeza do piso com vassoura ($p = 0,02$), no uso de fogão a carvão ($p = 0,001$) e no número de bichos de pelúcia no domicílio ($p = 0,05$). Houve uma melhoria significativa no controle ambiental para aeroalérgenos nos quartos das crianças após a intervenção ($p = 0,003$). **Conclusões:** A intervenção educativa mostrou ser uma importante ferramenta junto à população estudada, minimizando os aspectos negativos das condições ambientais dos domicílios das crianças asmáticas.

Descritores: Asma; Atenção primária à saúde; Programa saúde da família; Educação em saúde.

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Introduction

Asthma is a chronic inflammatory disease that is associated with high morbidity, especially in children, resulting in high costs to the health care system, as well as having a negative impact on the quality of life of patients and their families. The clinical profile of asthma includes recurrent symptoms of dyspnea, chronic cough, and wheezing; the periodicity of symptoms is typically three or more episodes of wheezing per year, with seasonal variability of symptoms.⁽¹⁻⁴⁾ In Brazil, the estimated overall prevalence of asthma is approximately 20% and asthma is the third leading cause of hospitalization in children.^(2,5,6)

Hospital admissions for asthma result in high costs to the health care system and are attributable to poor asthma control, which is in turn attributable to the lack or failure of several aspects: continuity in outpatient follow-up⁽⁷⁾; the use of prophylactic medication between attacks; family education and support⁽⁸⁾ that would promote recognition of attacks; measures to reduce the number of asthma triggers; and the implementation of preventive environmental measures in the home that are appropriate to the socioeconomic status and cultural characteristics of the families. From this perspective, patient/family education is one of the cornerstones in the management of asthma in children, permeating all stages of the treatment.

In the primary health care setting, which provides a better understanding of the living conditions, health status, and disease status of the population, community health agents (CHAs) have been considered persons of interest because of certain particularities⁽⁹⁻¹¹⁾: they reside in the area where they work; they carry out their activities directly with the users, primarily through home visits; and they have in-depth knowledge of the health problems, way of life, and culture of the community. However, CHAs need to be provided with technical/scientific information in clear and objective language. Such information can serve as a tool for their work in the community.

The objective of the present study was to determine the impact that a CHA-implemented educational intervention employing problem-solving strategies for the environmental control of aeroallergens has on environmental conditions in the households of children with

asthma treated via the Family Health Program (FHP) strategy in a Brazilian city.

Methods

This was a prospective, exploratory study, with a before-and-after design,⁽¹²⁾ based on the evaluation of environmental conditions, in terms of aeroallergen levels, in the households of children with asthma before and after an educational intervention carried out by CHAs affiliated with three FHP clinics. The study was conducted within three neighborhoods with similar living conditions in the city of Iguatu, located in the south central region of the state of Ceará, Brazil.

Asthma was defined as a clinical profile consisting of more than three episodes of dyspnea and wheezing in the last year, with clinical improvement after the use of a short-acting bronchodilator.^(3,4)

After the initial identification of the children whose households might be visited, CHAs were recruited from the three FHP clinics and instructed to locate the households. If the residents of those households were interested in participating in the study, the CHAs invited them to attend an upcoming educational intervention. The following inclusion criteria were applied: presence of at least one 2- to 10-year-old child who had recurrent episodes of dyspnea and wheezing; and agreement of parents or legal guardians to participate in all phases of the study. The decision to exclude children under 2 years of age was made because of the difficulty in diagnosing asthma in such children. On the basis of the information provided by the CHAs, we located 95 households that met the inclusion criteria. Of those 95 households, 11 were excluded from the study because the families changed residence before the end of the study. Therefore, the families in 84 households completed the phase of reassessment of environmental conditions.

The initial visits occurred between December of 2008 and February of 2009. The instruments used for data collection were as follows: a form with fields for recording biological variables (gender, age, and family history of allergies) and socioeconomic/demographic variables (income, level of education of the caregiver, number of people in the household, and number of rooms), as well as for identifying

asthma triggers (smoking and upper airway infections) and listing environmental control measures (cleaning of floors and furniture); and an instrument for environmental assessment proposed by the Allergy Guidance Center of the University of São Paulo *Hospital das Clínicas* and consisting of a checklist for home observation of the living room and the bedroom—appropriate environmental control being defined as a score ≤ 15 and inappropriate environmental control being defined as a score > 15 . The checklist includes questions regarding the conditions in the bedroom and living room, focusing on rugs/ carpets, curtains, beds, blankets, humidity in the environment, pets, potted plants, smoking in the household, and irritants in the environment.

There were a total of 34 CHAs affiliated with the FHP clinics that served the area of the selected households. All of the CHAs agreed to participate in the educational intervention involving the use of problem-solving methods, and the intervention was carried out between March and May of 2009. The participants were divided into three focus groups,⁽¹³⁻¹⁵⁾ according to the FHP clinic that served their area, and five meetings were held with each focus group.

The themes covered in the educational intervention were as follows: the concept of asthma; use of inhaled medication; asthma triggers; and preventive care that should be implemented in the households visited in the first phase of the study. It was established that the CHAs would carry out a minimum of four visits to the households visited in the initial phase of the study. During these visits, asthma-related information would be provided and emphasis would be placed on the environmental control in the household.

At 60 days after the completion of the educational intervention, between July and August of 2009, the households were revisited by one of the researchers in order to check the environmental conditions. To that end, the same instruments used in the first phase (the form with questions regarding asthma triggers and environmental control measures; and the environmental assessment instrument) were applied.

The data collected were double entered into an Epi Info version 6.04 database. The results regarding the biological, socioeconomic, and demographic profiles were analyzed

descriptively, whereas the data regarding the environmental evaluation were approached analytically, by means of the chi-square test with Yates' correction or Fisher's exact test. The level of statistical significance was set at $p \leq 0.05$.

The present study, which was approved by the Ethics Research Committee of the Federal University of Pernambuco (Protocol no. CAAE 0275.0.172.000-08), was conducted in accordance with the Declaration of Helsinki and with Brazilian National Health Council Resolution 196/96. All participants gave written informed consent.

Results

The mean age of the children with asthma was 5.06 ± 2.64 years. The mean number of residents in the household and the mean number of rooms per household in the target population were 4.86 ± 1.83 and 4.75 ± 1.55 , respectively.

Table 1 – Biological, socioeconomic, and demographic profiles of the children/families in the households visited. Iguatu, Brazil, 2009.

Variable	n	(%)
Gender		
Male	50	59.5
Female	34	40.5
Relationship of the caregiver to the child		
Mother	63	75.0
Sibling	1	1.2
Grandmother	20	23.8
Level of education of the caregiver, years of schooling		
0	7	8.3
1-3	13	15.5
4-6	25	29.8
7-11	38	45.2
> 11	1	1.2
Family income, number of times the national minimum wage		
< 1	28	33.3
1-2	42	50.0
2-3	11	13.1
> 3	3	3.6
Family history of allergy		
Yes	49	58.3
No	35	41.7
Maternal workplace		
Outside the home	30	35.7
Inside the home	53	63.1
Not applicable	1	1.2

Table 1 shows the data regarding the biological, socioeconomic, and demographic profiles of the children/families in the households visited. Of the 84 primary caregivers, 38 (45.2%) had had 7-11 years of schooling ($n = 38$; 45.2%). We observed that 53 (63.1%) of the 84 mothers worked at home, and that the family income was 1-2 times the national minimum wage in 42 (50.0%) of the households.

Table 2 describes the asthma triggers identified in the households of the children with asthma. After the intervention, there was a significant decrease in the use of brooms for cleaning the floor ($p = 0.02$) and in the use of coal-burning stoves ($p = 0.001$).

Table 3 shows the environmental conditions in the bedrooms/places where the children with asthma slept (in some cases, in the living room or in the kitchen) before and after the educational intervention. There was a statistically significant decrease in the number of stuffed toys after the intervention ($p = 0.05$).

Table 4 describes the environmental control in the households visited. The participants reported having received environmental control counseling that was highly relevant to their situation ($p = 0.002$). However, 16 caregivers (19.0%) reported never having received environmental control counseling, even after the intervention. After the intervention, there was a significant improvement in the environmental control in the bedrooms/places where the

children slept ($p = 0.003$), although there was no significant difference in the environmental control in the living room ($p = 0.68$).

Discussion

The use of educational tools to provide asthma education to CHAs and, subsequently, the performance of those workers in the households of children with asthma, in order to improve the environmental conditions in these households, resulted in changes in some of the items under study. However, it should be noted that the measurements were taken a short time after the intervention.

It is noteworthy that the study involved a low-income population, as well as that there was limited information regarding environmental control measures for asthma in the initial phase of the study. In addition, due to their low socioeconomic status, many of the families were unable to implement measures requiring the allocation of financial resources.

Asthma educational interventions that can reduce emergency room visits and hospitalizations, as well as school and work absenteeism, and in which the approaches and methods have various configurations, have been extensively studied worldwide. In a randomized study of 567 adults with persistent asthma in the United Kingdom, two groups were evaluated (one in which asthma self-management

Table 2 – Possible predisposing factors and/or asthma triggers in the households of children with asthma before and after an educational intervention carried out by community health agents. Iguatu, Brazil, 2009.

Variable	Before the intervention		After the intervention		p
	(n = 84)				
	n	%	n	%	
Smoking in the household					
Yes	39	46.4	37	44.0	0.87*
No	45	35.6	47	56.0	
Material used for cleaning the furniture					
Damp rag	39	46.4	36	42.9	0.76**
Dry rag	09	10.7	12	14.3	
Furniture polish	36	42.8	36	42.8	
Use of brooms for cleaning the floor					
Yes	68	80.9	54	64.3	0.028*
No	16	19.1	30	53.7	
Use of coal-burning stoves					
Yes	35	41.7	19	22.6	0.01*
No	49	58.3	65	77.4	

*Chi-square test with Yates' correction. **Chi-square test.

Table 3 – Environmental conditions in the households (bedrooms) of children with asthma before and after an educational intervention carried out by community health agents. Iguatu, Brazil, 2009.

Variable	Before the intervention		After the intervention		p*
	(n = 84)				
	n	%	n	%	
Rugs/Carpets					
Yes	32	38.1	30	35.7	0.87
No	52	61.9	54	64.3	
Curtains					
Yes	27	32.1	32	38.1	0.59
No	57	67.9	52	61.9	
Humidity on bedroom walls					
Yes	29	34.5	19	22.6	0.12
No	55	65.5	65	77.4	
Well-ventilated environment					
Yes	33	39.2	38	45.2	0.53
No	51	60.8	46	54.8	
Pets					
Yes	41	48.8	43	51.2	0.88
No	43	51.2	41	48.8	
Sleeping hammocks					
Yes	39	46.4	47	56.0	0.28
No	45	53.6	37	44.0	
Hammock washing					
Once a week	26	66.7	38	80.9	-
Every 15 days	11	28.2	07	14.9	
Once a month	02	5.1	02	4.2	
Stuffed toys					
Yes	11	13.1	03	3.6	0.05
No	73	86.9	81	96.4	

*Chi-square test with Yates' correction.

education was delivered by nurses and one in which this education was delivered by lay people trained for the task). Patients in both groups were provided with individualized action plans and received telephone follow-up. The results reported, in terms of unscheduled medical visits, courses of corticosteroids, and patient satisfaction, were similar between the two groups.⁽¹⁶⁾ However, in the present study, we did not analyze this aspect (the type of instructor). Instead, we analyzed changes in environmental control, changes that in fact occurred, indicating that most of the CHAs understood the content of the educational intervention and provided information to the caregivers, which resulted in changes in the aeroallergen levels within the home environments. Nevertheless, the findings of the aforementioned study conducted in the United Kingdom indicate that, when properly

trained, mid-level professionals, such as CHAs, can provide counseling that is appropriate to the situation of asthma patients, making it possible to improve the environmental control of aeroallergens, which can improve patient quality of life. In a study conducted in Canada, children, adolescents, and their parents participated in small focus groups of six to eight families for four weeks, during which time educational brochures and leaflets were distributed and families exchanged experiences.⁽¹⁷⁾ The authors reported that, within a one-year period, there was a significant reduction in the rate of hospitalization, the number of courses of oral corticosteroids required, and the number of workdays missed by parents. Those findings differ from the results reported in the aforementioned study conducted in the United Kingdom.⁽¹⁶⁾ Therefore, we should be

Table 4 – Environmental control in the households (n = 84) of children with asthma before and after an educational intervention carried out by community health agents. Iguatu, Brazil, 2009.

Variable	Before the intervention		After the intervention		p*
	(n = 84)				
	n	%	n	%	
Environmental control counseling by a CHA					
Yes	49	58.3	68	81.0	0.002
No	35	41.7	16	19.0	
Environmental control in the bedroom					
Appropriate	30	35.7	50	59.5	0.003
Inappropriate	54	64.3	34	40.5	
Environmental control in the living room					
Appropriate	13	15.5	16	19.0	0.68
Inappropriate	71	84.5	68	81.0	

CHA: community health agent. *Chi-square test with Yates' correction.

careful about generalizations, always taking into consideration the socioeconomic and cultural characteristics of the population under study.

A study of an educational intervention for low-income adults with asthma, conducted in the American city of Chicago and involving, for the intervention group, focus group sessions led by a social worker and home visits by community health workers, reported satisfactory results in terms of self-care and quality of life, although there was no statistically significant difference in terms of clinical parameters.⁽¹⁸⁾ In that study, although there were several educational moments for the patient, environmental control, which was the objective of our study, was not addressed.

There is still considerable discussion about which allergens might increase the risk of developing asthma, of asthma attacks, and of poor asthma control. Regarding the role played by pet dander, a meta-analysis of cohort studies, published in 2008, found that early exposure to cats might protect against the development of asthma (relative risk = 0.72; 95% CI: 0.55-0.93). It was hypothesized that this protective effect is associated with tolerance to cat allergens or with genetic or environmental characteristics of the populations included in the studies analyzed. In contrast, the same meta-analysis demonstrated that early exposure to dogs increases the risk of developing asthma (relative risk = 1.14; 95% CI: 1.01-1.29), a fact attributed to the small number of studies involving dogs. In terms of the effect of exposure to any furry animal, no conclusions have been drawn.⁽¹⁹⁾

The differences in effects between exposure to dogs and exposure to cats could have several explanations. It is likely that sensitization to dog allergens requires a shorter exposure time and a lower dose than does sensitization to cat allergens. In addition, cat allergens can be found in environments from which cats are absent, being transported by objects such as clothing, leading to the development of tolerance to these allergens.⁽¹⁹⁾

A study of schoolchildren between 5 and 13 years of age showed that asthma control was poor in 115 (75%) of the 153 children evaluated. Of those 115 children, 59 (51%) had been exposed to cigarette smoke, compared with only 8 (21%) of the 38 children in whom asthma control was considered acceptable. The children exposed to cigarette smoke were found to be four times more likely to have poor asthma control. Each hour of smoke exposure per week increased the risk of poorly controlled asthma by 33%.⁽²⁰⁾

In the present study, we found that a high proportion of children were from households in which people smoked—39 (46.4%) before the educational intervention and 37 (44.0%) after the intervention—although there was no significant difference between the pre- and post-implementation time points in terms of this variable. We believe that one of the reasons for this is that measurements were taken a short time after the CHA-led educational intervention.

In our study, 63.1% of the mothers (who also constituted the majority of the caregivers) worked exclusively within the home. This indicates that the proposition of implementing

preventive measures in the household is highly viable.

Various interventions to optimize disease control, including the use of impermeable mattress covers, improved cleaning practices, adequate ventilation of the environment, and parental education, have been proposed, and these measures, when applied in conjunction, have been shown to have a positive effect, reducing the number of asthma attacks and improving overall health status. Conversely, education alone has not proven effective in changing parental behaviors, such as the habit of smoking in the home.⁽²¹⁾

A review of the impact of environmental interventions on the health of children with asthma analyzed 32 studies conducted between 1992 and 2005, in which the focus was on the use of one or more mechanical methods in the home environment, on education of children and parents, or on a combination of interventions.⁽²¹⁾ Mechanical methods were found to reduce the levels of exposure to dust mite allergens, although there is controversy regarding the impact that such methods have on the health status of children. Some of the studies reviewed demonstrated positive outcomes after health education, with lower school absenteeism, fewer emergency room visits, and fewer symptoms, whereas others show no positive outcomes resulting from parental behavior changes. The combination of educational interventions and mechanical removal of major allergens was found to have a greater impact on the health status of children with asthma than does the implementation of either type of intervention alone.⁽²¹⁾

Visits to the homes of asthma patients have been an additional resource for asthma control and patient self-care, because these visits allow the on-site identification of asthma triggers, as well as providing a favorable setting for the introduction of educational measures that will allow users to change the adverse conditions that might be contributing to the lack of disease control.

We found only one study using an educational intervention to improve the environmental conditions in the households of children with asthma in Brazil, and that intervention was aimed only at literate parents, because the information was provided in writing.

⁽²²⁾ In that study, 27.8% of the family members did not adopt any of the proposed measures.

⁽²²⁾ Our study involved a reflective educational intervention, administered by health workers who share a common vocabulary with the patients and work on site with them. This can provide considerable advantage over traditional educational approaches.

The present study has several limitations, one of which is that it involved caregivers with various levels of education. In addition, because there were no tools to assess the performance of the CHAs responsible for the counseling of the families of the children with asthma, 16 caregivers (19.0%) did not receive home visits, which prevented the adoption of preventive measures to improve the environmental conditions in those households. It is speculated that failures to carry out home visits are attributable to the large number of activities undertaken by the CHAs, activities that include bureaucratic tasks, records, and attention to other policies of the Brazilian National Ministry of Health, such activities receiving more attention and closer monitoring. In practice, however, there is no national asthma control policy promoting the continuity of follow-up at primary health care clinics and involving all of the social actors (health care managers, health professionals, and community leaders).

The items that showed statistical significance after the intervention were the use of brooms for cleaning the floor and the use of coal-burning stoves, both of which decreased. Appropriate environmental control in the bedroom, which increased by 23.8%, was attributed to the replacement of mattresses with hammocks, to more frequent cleaning of the sleeping hammock/mattress, and to a decrease in the number of stuffed toys. Conversely, more costly measures, such as removing curtains, which are often used for privacy and for dividing rooms, as well as encasing mattresses in impermeable covers and having the couch upholstered with leatherette, all of which were mentioned in the environmental assessment, became unfeasible because of economic constraints. Improved environmental control in the living room did not improve significantly after the educational intervention, probably because the measures implemented, such as more frequent cleaning of curtains and carpets, did not appear in the

final evaluation section of the instrument used. A study investigating environmental control in the households of children with asthma in the city of Camaragibe, Brazil, found that environmental control was appropriate in 67.1% of the households,⁽²³⁾ a value higher than the 59.5% found in the final evaluation of our study sample.

We observed that, although the FHP clinics prioritize health promotion and prevention, there are discrepancies between theory and practice, between what needs to be done and what is done. We attribute that to a number of factors, such as the hospital-centered model that is ingrained in health professionals and users, as well as political and institutional factors that impede the introduction of transformative educational practices to the population.

Environmental control in the households of children with asthma remains a complex issue. In analyzing compliance with the proposed recommendations, it is necessary to investigate the relationship between instructor and learner and, particularly in the present study, the interaction between CHA and health care user, because receiving and processing information, as well as changing practices, are fundamentally dependent on this factor. Future studies should examine this variable.

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