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Communication and Education About Triggers and Environmental Control Strategies During Pediatric Asthma Visits

Karin Yeatts, PhD,

Research Assistant Professor, Department of Epidemiology, UNC McGavran-Greenberg Hall at Chapel Hill, USA

Deidre Washington, PhD,

Postdoctoral Associate in Pharmaceutical Outcomes & Policy, University of North Carolina at Chapel Hill Eshelman School of Pharmacy, USA

Betsy Sleath, PhD,

George H Cocolas Distinguished Professor and Chair, University of North Carolina Eshelman School of Pharmacy & Research Associate, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, USA

Guadalupe X. Ayala, PhD, MPH,

Associate Professor in the Division of Health Promotion and Behavioral Science in the Graduate School of Public Health at San Diego State University, USA

Chris Gillette, PhD Candidate,

PhD student in Pharmaceutical Outcomes & Policy, University of North Carolina at Chapel Hill, Eshelman School of Pharmacy, Chapel Hill, USA

Dennis Williams, PharmD,

Associate Professor, University of North Carolina Eshelman School of Pharmacy, University of North Carolina at Chapel Hill, USA

Stephanie Davis, MD, and

Associate Professor in Pediatrics, University of North Carolina at Chapel Hill School of Medicine, Chapel Hill, USA

Gail Tudor, PhD

Professor, Department of Science and Mathematics, Husson College, Bangor Maine, USA

Abstract

Objective—To determine the extent to which providers, caregivers, and pediatric asthma patients discussed environmental trigger control during primary care visits, and any demographic characteristics associated with having these discussions

Methods—Children ages 8 through 16 with persistent asthma and their caregivers were recruited at five pediatric practices in non-urban areas of North Carolina. All of the medical visits were audio-tape recorded. We administered questionnaires to the child's caregiver following the visit.

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Correspondence to: Betsy Sleath.

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Results—Two hundred and ninety-six patients had useable audio-tape data. Providers typically discussed at least one type of asthma trigger during these visits (86% of visits). The most common discussions were about exercise (70%), the weather/season (42%), and allergies/pollen (35%). Environmental control strategies were discussed less frequently (27% of visits). Providers educated the patient and their caregiver about environmental control strategies during 14% of the visits.

Conclusion—Although providers frequently discuss some environmental triggers and provide education, there is room for more comprehensive discussions of these issues, which may contribute to decreased asthma exacerbations.

Practice Implications—Providers, or alternatively, asthma health educators, should devote more time to discussing environmental asthma triggers and control strategies with pediatric asthma patients and their families, as they are important components of overall asthma control.

1. Introduction

Asthma is the most common chronic illness among U.S. children, with approximately 9% of children in the U.S. having a diagnosis of asthma [1]. Children with asthma have increased primary care visits, emergency department visits, and school days missed compared to children without asthma [2–4]. The National Heart, Lung, and Blood Institute of the National Institutes of Health has issued Guidelines for the Diagnosis and Management of Asthma (Guidelines), with the most recent update in 2007 [5, 6]. The Guidelines emphasize the importance of environmental trigger control including, but not limited to: allergens, tobacco smoke, smoke from wood-burning stoves and fireplaces, pets, and dust mites that may be present in pillows and other bedding [5]. There is substantial evidence that environmental trigger control reduce asthma exacerbations as illustrated by results of the National Cooperative Inner-City Asthma Study and others [7–9].

Health care providers serve an important role in educating the caregivers of children with asthma about environmental triggers, and require the providers to use effective communication skills. Consequently, effective doctor-caregiver-patient communication is also mentioned in the Guidelines.

Little is known about the extent to which environmental trigger control is discussed among providers, caregivers, and their children during primary care visits with children with asthma. It has been reported, using caregiver self-report or medical records only, that triggers and environmental control are discussed in 42% to 61% of visits with providers [10, 11]. Controlling a child's exposure to environmental triggers may be a cost-effective approach to reducing asthma symptom days and as a result, reducing activity limitations and overuse of rescue medications [12]. If caregivers and providers are not communicating effectively about these matters, opportunities to improve a child's overall asthma management may be missed. To inform future communication and organizational interventions, it is important to understand the extent to which these topics are discussed in primary care visits. Multimodal studies in which communication is captured via audio- or video-recording provide the most solid evidence for what transpires among doctor, caregiver, and child during the visit [13].

Using audio-recorded and caregiver-reported data from five practices, this study (a) describes the frequency of discussions about environmental trigger control and (b) examines the association between patient and caregiver demographic factors and visit characteristics and discussion of environmental trigger control. A notable aspect of this study is the involvement of practices with patients who are at higher risk of asthma exacerbations (e.g. those living in poverty [14], and African-American children [1]).

2. Methods

2.1 Procedures

The study was approved by the University of North Carolina Institutional Review Board. Providers were recruited at five pediatric practices in North Carolina and consent was obtained [15,16]. Children and their caregivers of these participating providers were recruited. Data collection was conducted from 2005–2008.

2.2 Participants

Children were eligible if they: (a) were ages 8 through 16 years, (b) were able to speak English, (c) could read the assent form, (d) had been seen at the clinic at least once before, (e) were present at the visit with an adult caregiver (caregiver or legal guardian) who could read and speak English and who was at least 18 years of age, and (f) had mild, moderate, or severe persistent asthma. Persistent asthma was defined as experiencing asthma-related daytime symptoms more than twice a week, asthma-related nighttime symptoms more than twice a month, or receiving one or more long-term controller therapies for asthma [17, 18].

Clinic staff referred potentially eligible patients who were interested in learning more about the study to a research assistant. The research assistant explained the study, obtained caregiver consent and child assent, and administered the eligibility screener [4]. All of the medical visits were audio-recorded. Providers, caregivers, and patients were aware that the conversation was being audio-taped but they did not know the study hypotheses. Children were interviewed after their medical visits. Caregivers completed self-administered questionnaires.

2.3 Measurement

2.3.1 Provider-Patient Communication—The primary outcome variables for this study were provider-patient communication about asthma triggers and environmental control strategies. Communication included both discussion and education about asthma triggers and environmental control strategies.

All of the medical visits audio-tapes were transcribed verbatim. A detailed coding tool was developed over a one year period. The transcripts were reviewed by two research assistants who met twice a month with the investigators to develop and refine the coding rules until themes were saturated. Using the detailed coding tool, all of the transcripts were coded.

The coding instrument was divided into two parts, asthma triggers and environmental control strategies. Coders noted whether any discussion of the following specific asthma triggers occurred during the visit: allergies/pollen, colds, exercise, laughter, perfume, pets, mold, roaches, dust, the weather/season, and other triggers. In addition to noting the occurrence of a discussion, the coders also noted whether the provider educated the patient about each of the specific triggers. Variables titled “any communication about asthma triggers” or “any education about asthma triggers” were created after the transcripts of the audio-tapes were coded. In addition, due to the infrequency of their discussion, the categories of laughter, perfume, mold, roaches, dust, and other were combined into one “other” category.

A separate section of the coding sheet focused on discussion and education about environmental control strategies. The coders recorded if any discussion and if any education occurred about the following specific environmental control strategies: bedding, carpet, fireplace/wood stove, heating system, mattress, plush toys, smokers, and other environmental control strategies. Variables titled “any communication about environmental

control strategies” or “any education about environmental control strategies” were created after the transcripts of the audio-tapes were coded. In addition, due to the infrequency of their occurrence, the categories of bedding, carpet, fireplace/wiildstove, heating system, mattress, plush toys, and other were combined into one “other” category.

Two research assistants coded 20 of the same transcripts throughout the study period to assess inter-coder reliability. Inter-coder reliability was 1.0 for discussion of asthma triggers and discussion of environmental control during the visits. Inter-coder reliability was 0.81 for the provider educating about triggers and 0.91 for the provider educating about environmental control.

2.3.2 Socio-demographic characteristics—A variety of demographic and socio-cultural factors were examined as potential confounders. Number of years the provider has been in practice was measured as a continuous variable. Provider and patient age were measured as continuous variables. However, patient age was later recoded into child (≤ 11 years) and adolescent (≥ 12 years). Provider, patient, and caregiver gender were measured as dichotomous variables. For descriptive purposes, patient and provider race was recorded four categories: White, African American, Native American/American Indian, or Other (includes categories of: Hispanic, Asian American, other). However, for the bivariate analyses, patient race was recoded into a dichotomous variable (White versus non-White). The patient’s insurance status was measured using the following categories: none, private insurance, Medicaid, State Child Health Insurance Program, and other. The State Child Health Insurance Program covers low income children whose caregivers make more money than would qualify them for Medicaid. Insurance was then recoded into a dichotomous variable (private insurance or other). Caregiver education was measured in years; caregiver education was then collapsed into any secondary education (>12 years) or no secondary education (≤ 12 years).

Caregivers were also asked the reason for their child’s visit to the clinic that day. Caregivers could respond with ‘asthma’ or ‘other’, and were able to specify what the ‘other’ reason was. The reason for the visit was collapsed into three categories: 1) asthma or allergies 2) physical or 3) other.

The NHLBI criteria for asthma severity was used by a certified research assistant to classified the patient as mild persistent or moderate/severe persistent asthmatic. We used recent symptoms and medication use data reported by the caregivers in the study eligibility screener [17, 18]. Our eligibility screener utilized the primary asthma severity classification system [6] still in effect when the study was conducted [17–19].

All relevant child study information was reviewed by a pediatric pulmonologist or a clinical pharmacist with expertise in asthma to verify the severity classification as mild or moderate/severe persistent asthma. Severity was classified using two different methods. In situations where the two methods resulted in discordant classification, the more severe category was used. The first method was medication use; any patient receiving a single long-term control agent was considered to have mild persistent asthma. Any patient receiving two or more long-term control agents was categorized as moderate to severe persistent asthma. The second method classified severity based on symptom frequency. Any patient who reported the occurrence of any one of eight symptoms as occurring two or more times a week, or who reported awakening with asthma symptoms two or more times a month was classified as mild persistent. Reports of daily symptom occurrence, or awakening \geq five times a month resulted in a classification as moderate or severe persistent.

2.4 Statistical Analysis

All analyses were conducted using SPSS and SAS. First, we present descriptive statistics for the provider, patient, and caregiver socio-demographic characteristics and the visit characteristics. Second, we present frequencies for the discussions of triggers and environmental control strategies. Third, we examine bivariate relationships between the demographic variables, visit characteristics, and patient-caregiver-provider communication regarding asthma triggers and environmental control strategies using Pearson chi-square statistics, t-tests, or correlation coefficients.

3. Results

The five participating clinics were all primary care pediatric practices. Forty-one providers agreed to participate in the study. Two providers refused to participate for a participation rate of 95.3%. Eighty-eight percent of the families approached agreed to participate in the study. Two-hundred and ninety six patients had useable audio-tape data and these patients were seen by 35 of the 41 providers who agreed to participate in the study. Fifty-one percent of the providers were female. Twenty-seven of the providers were White, two were American Indian, three were African American, one was Asian, and two classified their race as other. Providers ranged in age from 30 to 70 years (mean=44.8 years, standard deviation=9.4). Provider years in practice ranged from 1 to 43 (mean=17.29, standard deviation=10.3).

Table 1 presents the patient, caregiver, and visit characteristics. Fifty-four percent of patients were male. Fifty-eight percent of the children were ages 8 through 11. Forty-two percent of caregivers had 13 or more years of education. Twenty-six percent of the patients were covered by private insurance. Almost 60% were visiting the doctor for asthma or allergies, 24% for a physical, and 17% for other reasons. The average length of the visit was 15.2 minutes (SD=8.5 minutes). The length of the visit was not significantly associated with the reason for the visit (results not shown).

Table 2 presents the extent to which specific asthma triggers and environmental control areas were discussed and whether the provider provided education. A discussion of at least one asthma trigger occurred in 86% of the visits, with exercise (70%) being the most common topic discussed. The weather/change of season was discussed during 42% of the visits, and allergies/pollen was discussed during 35% of the visits. Providers educated the patient and their caregiver about asthma triggers during 46% of the visits. Education was provided most frequently about exercise (30%), allergies/pollen (15%), and weather/change of season (13%).

As shown in Table 2, a discussion of environmental control strategies occurred during 27% of the visits. Smoking control was discussed during 26% of the visits. Other environmental control strategies were discussed during only 2% of the visits. Providers educated the patient and their caregiver about environmental control strategies during 14% of the visits. Providers with fewer years in practice were significantly more likely to discuss asthma triggers during visits (t-test=-3.26, p=0.001). Provider age, gender, and race were not significantly related to discussion of asthma triggers. Table 3 presents the relationship between: (a) patient, caregiver, and visit characteristics and (b) discussion of asthma triggers. Reason for visits was significantly associated with discussion of asthma triggers. More specifically, during visits for asthma/allergies, or visits for physicals, any asthma trigger was more likely to be discussed (90% and 86%, respectively), as were exercise (74% and 69%) and weather/season (44% and 49%) compared to visits for other reasons (triggers: 70%; p≤0.001; exercise: 54%; p≤0.05; weather: 24%; p≤0.05). Providers were more likely to discuss colds with White patients (29%) and those with private insurance (35%)

compared to non-White patients (19%; $p \leq 0.05$) and those with public or no insurance (20%; $p < 0.01$), respectively.

Table 4 shows the relationship between: (a) patient, caregiver, and visit characteristics and (b) education about asthma triggers. Reason for visit was significantly associated with education about triggers. More specifically, patients being seen for asthma/allergies or for a physical were more likely to receive education regarding the weather/change of season than if the patient was being seen for another reason ($p \leq 0.05$). Providers were more likely to educate about asthma triggers with patients who had private health insurance (20%) compared to those with public or no insurance (5%; $p \leq 0.01$), including more education on exercise (39% versus 27%; $p \leq 0.05$).

None of the provider characteristics were significantly related to the discussion of or education about environmental control strategies. Table 5 presents the relationship between patient, caregiver, and visit characteristics and discussion and education about environmental control strategies. Environmental control was more likely to be discussed if the patient was being seen for asthma/allergies (31%) or a physical (24%) than if the patient was being seen for another reason (14%) ($p \leq 0.05$).

4. Discussion and Conclusion

4.1 Discussion

This study examined the extent to which asthma triggers and environmental control strategies were discussed during pediatric asthma visits and whether providers educated patients and their caregivers about asthma triggers and environmental control strategies. It also examined whether provider, patient, and caregiver demographic characteristics and visit characteristics were associated with a higher likelihood of those discussions occurring and providers educating families about these areas. To our knowledge, no study has examined discussion of and education on these topics during primary care visits through direct observations, and our study fills an importance gap in the literature.

We found that during most primary care visits (86%), providers discussed at least one type of asthma trigger. Providers with fewer years in practice were significantly more likely to discuss at least one asthma trigger and they were significantly more likely to educate patients and their caregivers about asthma triggers. The most common trigger discussed was exercise (70%). Since children need daily exercise for overall health and to prevent obesity, regardless of their asthma severity, it is essential that families communicate with their doctors about exercise and asthma. Such communication requires consideration of both the limiting aspect of asthma/allergies on the ability to engage in physical activity (e.g., encouraging child to engage in less active in-door play to minimize potential for an asthma attack) and the need for physical activity to prevent other health problems that exacerbate asthma [20].

In addition to exercise, the next most frequent areas discussed were weather/change of season and allergies/pollen. This is consistent with other research conducted in relatively rural areas where more activities may naturally occur outdoors [21]. Our results of environmental triggers discussed in 35–86% of visits is wider than that reported by studies using self-report or medical records, which indicate that triggers and environmental control are discussed in 42% to 61% of visits with providers [6, 10, 11].

While discussions occurred in a variety of areas, overall, we found that there was significant room for improving patient-caregiver-provider communication. For example, doctors did not discuss important asthma triggers such as colds, pets, mold, and dust, possibly missing an

opportunity to improve a patient's at-home management of asthma. These findings are important for future intervention efforts. Although all areas will not be relevant to all patients, even a brief discussion may help the provider determine other triggers of past and current asthma exacerbations.

Somewhat similar patterns were observed in the environmental control strategies discussions. For example, smoking was discussed in only 26% of the visits. Caregivers should be aware of the danger posed by exposure to second-hand smoke, or environmental tobacco smoke (ETS) [22]. If the provider knows that there is a smoker in the house, primary care visits present an opportunity to educate caregivers about the harmful effect of smoke on patients with asthma and advise those who smoke to stop, or at least minimize the patient's exposure by ensuring that they are not smoking around the patient in the house or car. Given the substantial under reporting of smoking by the caregivers in this study, it may be best to consistently provide smoking education; regardless of caregivers self-reported smoking status.

Other environmental control factors, such as bedding, carpet, and mattresses, were rarely discussed. Table 6 lists these common environmental triggers and their related home management strategies (adapted from NHLBI Asthma guidelines 2007) [5] that providers can share with caregivers and patients. Environmental trigger and control strategies discussions and education must be tailored to the specific needs of the patients and their caregivers.

Preventive measures such as discussing colds occurred more frequently among white patients and those with private health insurance, suggesting that health disparities will continue among non-whites and the uninsured. All sectors of the health care system and society in general, need to continue providing basic preventive messages to minimize the functional impact of a chronic disease such as asthma. However, most of our patient/caregiver demographic factors, including the patient's race, age, insurance status, or caregiver education were not consistently associated with the likelihood of discussion of environmental trigger control. Patients being seen for asthma/allergies or for a physical were more likely to discuss exercise, the weather/season and other environmental factors. This finding suggests that this aspect of asthma management may be included as a standard of care for patients receiving these types of care. Potentially more importantly, for patients with asthma visiting the doctor for other reasons, such as an upset stomach or common cold, doctors may miss an opportunity to address a complex chronic condition such as asthma.

Our results suggest that there is room for improvement regarding discussion and education of environmental asthma triggers, and especially environmental control, to help reduce asthma symptoms and improve overall at-home management. Most children with mild persistent or moderate-to-severe persistent asthma will experience symptoms at least occasionally. Rescue and long-term controller medications can be effective in treating the symptoms, and are often the first resort, but caregivers and patients should also be aware of other measures that should be undertaken to reduce symptoms exacerbations, or reduce the frequency and severity of symptoms when they do occur. Actions such as removing mold or cleaning the carpet may have a significant impact on asthma. Discussing and addressing these issues during a primary care visit can prevent more serious problems, reducing the need for emergency department or hospital visits.

The presence of asthma educators in the primary care clinic may provide a way to improve communication with patients and their caregivers during these visits. Due to time constraints that pediatricians face when seeing patients in the exam room, they may not be able to provide all of the asthma management education that they would like. Having an asthma

educator meet separately with the patient and their caregiver after seeing the provider would allow for a more comprehensive discussion of at-home asthma management, which would include environmental trigger control. It would also allow for more follow-up questions about asthma medications and how to use them [23]. Only one of the clinics in this study reported having an asthma educator on staff, but it is unknown how much he or she actually met with patients. Finally, asthma education provided by a lay professional, such as a promotora, have also been found to be effective [24].

Limitations of this study include limited generalizability; pediatric practices in non-urban areas of North Carolina may differ from those in other parts of the United States. Providers and caregivers knew they were being recorded and may have changed their communication, but they did not know the study hypotheses. Another limitation is that we did not recode who initiated the discussion of triggers and environmental control strategies (child, caregiver, or provider). Also, we did not collect information on the type of asthma visit (i.e. well or acute) so we cannot examine potential differences by type of asthma visit. Future research should examine these factors. Another limitation is that discussion of environmental triggers may have differed by season. However, we did not have sufficient statistical power to evaluate discussions of triggers and environmental control strategies by season. This was a primarily descriptive study where bivariate associations were examined, so this is a limitation. However, this is the first study to actually independently measure and describe communication about asthma triggers and environmental control strategies during pediatric visits.

In summary, the results from our study show that there is substantial room for improving communication about environmental trigger control in primary care visits with pediatric asthma patients and their caregivers. Better patient-caregiver-provider communication and education about environmental triggers should, in turn, lead to better at-home management of asthma symptoms by patients and their caregivers.

4.2 Conclusion

Providers frequently discuss certain environmental control triggers and provide education to the patient and caregiver during primary care visits. However, there is room for improvement and more comprehensive discussions of these issues that may contribute to asthma exacerbations.

4.3 Practice Implications

Providers who treat children with asthma should make sure to discuss environmental asthma triggers that may contribute to asthma exacerbations and also to educate caregivers on environmental control strategies. Perhaps, there needs to be better training for providers to learn how to effectively communicate with patients about asthma with effective communication, while not necessarily adding time to a visit. For example, the PACE program has been found to improve communication and reduce visit time [25].

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Table 1

Child, Caregiver, and Visit Characteristics (N=296)

	Percent (N)
Child Age	
Mean (SD) Range	11.1 (2.4) 8–16 years
8–11 years	58.1 (172)
12–15 years	41.9 (124)
Child Gender	
Male	53.7 (159)
Female	46.3 (137)
Child Race	
White	61.5 (182)
African American	30.1 (89)
Native American/American Indian	10.1 (30)
Other	6.1 (18)
Asthma Severity	
Mild Persistent	28.0 (83)
Moderate/Severe Persistent	72.0 (213)
Caregiver Years of Education	
Mean (SD) Range	12.8 (5.5) 2–20 years
2–12 years	56.7 (168)
13–20 years	41.9 (124)
Missing	1.4 (4)
Insurance Type	
None	1.0 (3)
Private	26.4 (78)
Medicaid	51.7 (154)
State Child Health Insurance Program	17.6 (52)
Other	2.7 (8)
Reason for Visit	
Asthma/ Allergies	59.5 (176)
Physical	23.6 (70)
Other	16.9 (50)

Table 2

Discussion and Education About Asthma Triggers and Environmental Control Strategies (N=296)

	Topic Discussed Percent (N)	Education Provided Percent (N)
Asthma Triggers (Any)	85.5 (253)	45.6 (135)
Allergies/Pollen	35.1 (104)	14.9 (44)
Colds	24.7 (73)	9.5 (28)
Exercise	69.6 (206)	30.1 (89)
Pets	11.8 (35)	2.7 (8)
Weather/Season	41.9 (124)	12.8 (38)
Other ^a	19.9 (59)	7.8 (23)
Environmental Control (Any)	26.7 (79)	14.2 (42)
Smoking	26.0 (77)	12.8 (38)
Other ^b	1.7 (5)	1.7 (5)

^aIncludes Laughter, Perfume, Mold, Roaches, Dust, and others

^bIncludes Bedding, Carpet, Fireplace/Woodstove, Heating System, Mattress, Plush Toys and Other

Table 3
Patient, Caregiver, and Visit Characteristics and Discussion of Asthma Triggers during Visits (N=296)

	Topic discussed during the visit						
	Asthma triggers (Any)	Allergies/pollen	Colds	Exercise	Pets	Weather/ season	All Other ^d
Asthma Severity							
Mild	80.7 (67)	33.7 (28)	24.1 (20)	66.3 (55)	12.1 (10)	38.6 (32)	24.1 (20)
Moderate-to-Severe	87.3 (186)	35.7 (76)	24.9 (53)	70.9 (151)	11.7 (25)	43.2 (92)	18.3 (39)
Gender							
Male	88.1 (140)	35.2 (56)	26.4 (42)	71.7 (114)	10.7 (17)	40.3 (64)	18.9 (30)
Female	82.5 (113)	35.0 (48)	22.6 (31)	67.2 (92)	13.1 (18)	43.8 (60)	21.2 (29)
Reason for Visit							
Asthma/Allergies	89.8 (158)*	38.6 (68)	25.0 (44)	74.4 (131)*	14.8 (26)	44.4 (78)*	27.3 (48)*
Physical	85.7 (60)	35.7 (25)	27.1 (19)	68.6 (48)	10.0 (7)	48.6 (34)	11.4 (8)
Other	70.0 (35)	22.0 (11)	20.0 (10)	54.0 (27)	4.0 (2)	24.0 (12)	6.0 (3)
Race							
Non-White	84.0 (110)	32.1 (42)	19.1 (25)*	67.2 (88)	13.0 (17)	40.5 (53)	22.9 (30)
White	86.7 (143)	37.6 (62)	29.1 (48)	71.5 (118)	10.9 (18)	43.0 (71)	17.6 (29)
Age							
Child	84.3 (145)	36.1 (62)	26.2 (45)	66.3 (114)	9.9 (17)	38.4 (66)	19.2 (33)
Adolescent	87.1 (108)	33.9 (42)	22.6 (28)	74.2 (92)	14.5 (18)	46.8 (58)	21.0 (26)
Insurance							
Private	89.4 (76)	41.2 (35)	35.3 (30)*	75.3 (64)	10.6 (9)	36.5 (31)	21.2 (18)
Other	83.7 (175)	33.0 (69)	20.1 (42)	67.0 (140)	12.4 (26)	43.5 (91)	19.6 (41)
Caregiver Education							
High School	83.1 (103)	31.5 (39)	26.6 (33)	66.1 (82)	11.6 (20)	40.3 (50)	20.4 (35)
Secondary	87.2 (150)	37.8 (65)	23.3 (40)	72.1 (124)	12.1 (15)	43.0 (74)	19.4 (24)

^aIncludes Laughter, Perfume, Mold, Roaches, Dust, and Other

* p<0.05

Table 4
Patient, Caregiver, and Visit Characteristics and Provider Education About Asthma Triggers During Visit (N=296)

Characteristic	Percent (N)						
	Asthma triggers (any)	Allergy/pollen	Colds	Exercise	Pets	Weather/Season	All Other ^a
Asthma Severity, (%)							
Mild	37.4 (31)	10.8 (9)	6.0 (5)	26.5 (22)	0.0 (0)	7.2 (6)	9.6 (8)
Moderate-to-Severe	48.8 (104)	16.4 (35)	10.8 (23)	31.5 (67)	3.8 (8)	15.0 (32)	7.0 (15)
Gender, (%)							
Male	45.3 (72)	13.2 (21)	8.2 (13)	30.2 (48)	2.5 (4)	12.6 (20)	8.2 (13)
Female	46.0 (63)	16.8 (23)	11.0 (15)	29.9 (51)	2.9 (4)	13.1 (18)	7.3 (10)
Reason for Visit, (%)							
Asthma/Allergies	49.4 (87)	17.1 (30)	9.7 (17)	34.6 (61)	3.4 (6)	14.2 (25)*	11.4 (20)*
Physical	45.7 (32)	11.4 (8)	10.0 (7)	27.1 (19)	2.9 (2)	17.1 (12)	1.4 (1)
Other	32.0 (16)	12.0 (6)	8.0 (4)	18.0 (9)	0.0 (0)	2.0 (1)	4.0 (2)
Race, (%)							
Non-White	46.6 (61)	14.5 (19)	8.4 (11)	27.5 (36)	3.1 (4)	15.3 (20)	9.9 (13)
White	44.9 (74)	15.2 (25)	10.3 (17)	32.1 (53)	2.4 (4)	10.9 (18)	6.1 (10)
Age							
Child	48.8 (84)	16.3 (28)	9.9 (17)	34.3 (59)	1.7 (3)	11.6 (20)	8.7 (15)
Adolescent	41.1 (51)	12.9 (16)	8.9 (11)	24.2 (30)	4.0 (5)	14.5 (18)	6.5 (8)
Insurance							
Private	54.1 (46)	21.2 (18)	20.0 (17)*	38.8 (33)*	4.7 (4)	12.9 (11)	10.6 (9)
Other	42.6 (89)	12.4 (26)	5.3 (11)	26.8 (56)	1.9 (4)	12.9 (27)	6.7 (14)
Caregiver Education							
High School	45.2 (56)	12.1 (15)	11.3 (14)	33.1 (41)	4.0 (5)	10.5 (13)	8.1 (14)
Secondary	45.9 (79)	16.9 (29)	8.1 (14)	27.9 (48)	1.7 (3)	14.5 (25)	7.3 (9)

^a Includes Laughter, Perfume, Mold, Roaches, Dust, and Other

^b p<0.05

Table 5
Patient, Caregiver, and visit Characteristics and Discussion and Provider Education about Environmental Control Strategies (N=296)

Characteristic	Percent (N)					
	Topic discussed during visit			Provider educated child/caregiver on topic		
	Environmental control	Smoking	All Other ^a	Environmental Control	Smoking	All Other ^a
Asthma Severity						
Mild	27.7 (23)	26.5 (22)	2.4 (2)	16.9 (14)	14.5 (12)	2.4 (2)
Moderate-to-Severe	26.3 (56)	25.8 (55)	1.4 (3)	13.2 (28)	12.2 (26)	1.4 (3)
Gender						
Male	28.9 (46)	27.7 (44)	2.5 (4)	14.5 (23)	12.6 (20)	2.5 (4)
Female	24.1 (33)	24.1 (33)	0.7 (1)	13.9 (19)	13.1 (18)	0.7 (1)
Reason for Visit						
Asthma/Allergies	31.3 (55) ^b	30.1 (53)	1.1 (2)	16.5 (29)	15.3 (27)	1.1 (2)
Physical	24.3 (17)	24.3 (17)	2.9 (2)	12.9 (9)	11.4 (8)	2.9 (2)
Other/Unknown	14.0 (7)	14.0 (7)	2.0 (1)	8.0 (4)	6.0 (3)	2.0 (1)
Race						
Non-White	31.3 (41)	30.5 (40)	2.3 (3)	16.0 (21)	13.7 (18)	2.3 (3)
White	23.0 (38)	22.4 (37)	1.2 (2)	12.7 (21)	12.1 (20)	1.2 (2)
Age						
Child	25.6 (44)	24.4 (42)	1.7 (3)	15.1 (26)	13.4 (23)	1.7 (3)
Adolescent	28.2 (35)	28.2 (35)	1.6 (2)	12.9 (16)	12.1 (15)	1.6 (2)
Insurance						
Private	22.4 (19)	21.2 (18)	2.4 (2)	15.3 (13)	14.1 (12)	2.4 (2)
Public or no insurance	28.2 (59)	27.8 (58)	1.4 (3)	13.9 (29)	12.4 (26)	1.4 (3)
Caregiver Education						
High School	27.4 (34)	26.6 (33)	1.7 (3)	15.3 (19)	14.5 (18)	1.7 (3)
Secondary	26.2 (45)	25.6 (44)	1.6 (2)	13.4 (23)	11.6 (20)	1.6 (2)

^aIncludes Bedding, Carpet, Fireplace/Woodstove, Heating System, Mattress, Plush Toys and Other

^b p<0.05

Table 6

Common Environmental Triggers and Related Home Management Strategies (adapted from NHLBI guidelines 2007)

Environmental Trigger	Related Home Management Strategy
Pollens (from trees, grasses, weeds)	Those with allergies should stay indoors with windows closed, during periods of peak pollen exposure, usually during the midday and afternoon. This may be challenging for children.
Indoor Mold	Fix all leaks and eliminate water sources associated with mold growth; clean moldy surfaces. Reduce indoor humidity to or below 60 percent (ideally 30–50%). Dehumidify basements if possible.
Animal dander	Remove animal from house, or at minimum keep animal out of the patient's bedroom
Dustmites	Encase mattresses and pillows in allergen-impermeable covers; wash sheets and blankets on the patient's bed in hot water weekly. Reduce indoor humidity to or below 60 percent (ideally 30–50%); remove carpets from the bedroom and any carpets laid on concrete.
Cockroaches	Use poison bait or traps to control insects; Conduct intensive cleaning to reduce reservoirs. Do not leave food or garbage exposed.
Tobacco Smoke	Advise caregivers who smoke to stop smoking or to smoke outside the home. Advise adolescents to stop smoking, and warn against initiating smoking.
Other indoor air pollutants	Discuss ways to reduce exposures to the following: Unvented gas stoves (NO ₂ exposure) Other irritants (perfumes, cleaning agents, sprays) Volatile organic compounds (VOCs) such as new carpeting, painting, particle board Wood burning stoves or fireplaces