

# Helpful Hints: Caregiver-Generated Asthma Management Strategies and Their Relation to Pediatric Asthma Symptoms and Quality of Life

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Received July 10, 2011; revisions received December 30, 2011; accepted December 31, 2011

**Objective** This mixed-methods study examined the relation between caregiver-generated asthma management strategies and asthma severity in a sample of 200 children with persistent asthma (ages 5–12 years). **Methods** Caregivers were interviewed about asthma management strategies they found helpful in controlling their child's symptoms. A qualitative content analysis was used to identify household strategies. Indicators of asthma severity included lung functioning (FEV<sub>1</sub>) and functional severity (FSS). Child quality of life was also assessed (PQLQ). **Results** Six primary household strategies were identified: *Reactive*, *Planning Ahead*, *Social*, *Emotional*, *Avoiding Triggers*, and *Cleaning*. In general, strategies offered by caregivers did not differ by socioeconomic status. Caregivers who endorsed *Avoiding Triggers* as effective strategies had children with better lung functioning. Caregivers who endorsed *Planning Ahead* or *Emotional* strategies had children with better asthma-related quality of life. **Conclusion** These household strategies hold promise for reducing pediatric asthma symptoms and improving child quality of life.

**Key words** asthma; health behavior; quality of life.

Asthma is an inflammatory disease of the airways and is currently the most common childhood chronic illness, affecting more than 7 million children in the United States (American Lung Association, 2009). Managing asthma is a daily affair with the need for environmental control, medication management, and monitoring of stress and family disruptions (NHLBI, 2007). In the case of pediatric asthma, such management must be accomplished by the family system, including multiple caregivers and the child in collaboration with healthcare providers. As children are dependent upon their caregivers for access to health care, symptom monitoring, medication administration and other ongoing care, the responsibility and burden of pediatric asthma management extends to the entire family (Fiese & Everhart, 2006; Kaugars, Klinnert, & Bender, 2004). There is evidence to suggest that how the

family folds management strategies into the course of its daily routines is related to asthma morbidity (Fiese, Wamboldt, & Anbar, 2005; Schreier & Chen, 2010). However, we know very little about which specific routines contribute to more optimal outcomes for children with asthma. The purpose of this study was to determine which daily routines caregivers found most helpful in managing their child's asthma and to determine whether these strategies were related to children's asthma severity.

## **Family Routines and Severity of Asthma Symptoms**

Over three decades ago, Boyce and colleagues identified the relation between respiratory illness and regularity of family routines (Boyce et al., 1977). Recent evidence has provided

direction in terms of the underlying elements of routines (Fiese, 2007; Fiese et al., 2005) and biological pathways associated with asthma severity (Schreier & Chen, 2010; Walker, Chim, & Chen, 2009). There appear to be two broad features to family routines associated with the severity of asthma symptoms. The first is regularity of management associated with medication (e.g., filling prescriptions, having a regular location for medication) and environmental control (e.g., avoiding triggers). Regularity of these routines, assessed through parent questionnaires, has been found to be related to medication adherence (Fiese et al., 2005). The second feature of routines includes the emotional investment or commitment to family activities (Fiese, 2006). In terms of asthma severity, the emotional connection identified in questionnaires about routines has been associated with pediatric and caregiver quality of life (Fiese et al., 2005).

Family routines may have a direct effect on children's biological functioning associated with the severity of asthma symptoms. Schreier and Chen (2010) reported on the longitudinal association between biological markers of health (mitogen-stimulated production of cytokines implicated in asthma) and levels of family routines over an 18-month period. They found that as levels of family routines increased, levels of interleukin-13 (which induces many features of allergic lung disease) decreased. Given that the routines assessed in this study were general and not asthma-specific, the exact behaviors and routines which may predict clinical asthma outcomes remain unclear. Findings implied medication use as one possible mechanism by which family routines could affect biological outcomes. Thus, combined with the findings that regularity of routines is associated with medication adherence (Fiese et al., 2005), one potential avenue to examine is which specific routines families use to promote better asthma management in their daily lives.

### ***Topic Generation Through Qualitative Interviewing***

Pediatric researchers have found interviewing parents an effective way to identify strategies related to asthma symptoms and their severity. For example, the Family Asthma Management System Scale (FAMSS) is a semi-structured interview (McQuaid, Walders, Kopel, Fritz, & Klinnert, 2005) comprised of open-ended questions pertaining to asthma knowledge, symptom assessment, response to symptoms, environmental control, medication adherence, collaboration with healthcare providers, and integration of asthma and family life. The interview is coded on a 1–9 Likert scale indicating strength of adaptive management. Scale scores have been found to be related

to parent knowledge, medication adherence, and asthma morbidity.

Using the Health Beliefs Model as a framework (Rosenstock, Strecher, & Becker, 1988), Walker and colleagues (Walker et al., 2009) adapted the FAMSS and incorporated questions pertaining to how experiences in the parents' daily life competed with taking care of their children with asthma. The responses were coded and compared to biological markers and lung function (forced expiratory volume; FEV<sub>1</sub>). Parents who reported more competing demands in their daily lives had children with an increased inflammatory profile. Furthermore, the link between parent interview responses pertaining to daily life and a clinical composite score including FEV<sub>1</sub> was mediated by inflammatory markers.

The semi-structured interviews provide evidence that caregiver verbal report is a reliable method for ascertaining perceptions and beliefs about management strategies. However, a semistructured interview relying on a rating system does not allow for content analysis of specific strategies employed by caregivers in the home. To further the understanding of family management strategies in relation to children's asthma symptoms, it is important to know how caregivers actually go about folding asthma management strategies into the course of their daily routines. To this end, we employed an open-ended, qualitative approach to generate a list of tactics that caregivers have found helpful in managing their children's asthma. These content themes were then investigated for their association with child symptom severity, lung functioning, and quality of life.

There is precedence in using a qualitative, content-based approach to examining asthma management strategies. Douglass et al. (2002) interviewed 62 asthma patients (18–70 years of age) about their use of action plans. It was found that most patients who were given action plans reinterpreted plans based on their own experiences, suggesting that how prescribed management strategies are employed is influenced by personal experiences. Fiese and Wamboldt (2003) interviewed 80 caregivers with a child with persistent asthma and identified three main management styles; reactive, coordinated care and family partnerships. These distinct generalized approaches to asthma management were related to healthcare utilization and medication adherence one year following the interview. Gallo and Knafel (1998) also interviewed families of children with chronic health conditions and identified "tricks of the trade" in managing their child's illness. The authors identified three general, unique strategies created by the families to address similar challenges, which differed in relation to how closely they

adhered to health provider recommendations. While studies have revealed that unique strategies are often utilized by families, less is known about health outcomes of more specific, individualized coping behaviors. To this end, we used a mixed-methods design (i.e., using a qualitative semistructured interview along with quantitative measures of asthma functioning). In extracting thematic content from open-ended interviews this study expanded upon previous studies by identifying more precise idiosyncratic strategies used by families and exploring their relation to the severity of pediatric health symptoms. Few studies in this area have used quantitative methods in conjunction with qualitative methods to identify parents' use of individual strategies in relation to child physical outcomes. Qualitative aspects are important in understanding the individual approach that families take in designing methods for managing their child's asthma while quantitative measures allow researchers to identify the potential outcomes of these idiosyncratic approaches.

### **Study Goals**

There are three primary goals of this study. First, we aimed to identify a topical listing of asthma management strategies generated by caregivers of children with persistent asthma. We expected that there would be considerable variability across a sample of 200 caregivers. However, we expected to be able to distill the content into clusters of primary themes. Based on previous research, we expected that some families would express strategies which were more reactive while others would reveal the use of more planful means of asthma management. Furthermore, given that some studies have identified family or coordinated types of care, we proposed that a more discriminating examination of specific categories would reveal social themes and strategies relating to asthma management. Second, we aimed to examine whether these content themes were related to asthma symptom severity, lung functioning and pediatric quality of life. Based on these a priori categories, we generated the following hypotheses: (a) families who expressed reactive strategies would have children with the lowest rate of lung functioning as measured by the pulmonary function test, (b) families who expressed planful strategies or proactive approaches such as avoiding triggers would have children with higher lung functioning and greater quality of life, and (c) families who endorsed the use of emotional and/or social strategies would have children who reported greater quality of life. Finally, in accordance with experts who have called for consideration of children's developmental status in relation to asthma management strategies (Wamboldt & Wamboldt, 1995), we specifically

focused on an age range in which families must establish home based routines around disease management (Kaugars et al., 2004; Fiese, 2006). Considerable attention has been paid to adolescence as a time when adherence rates go down potentially due to growing autonomy from the family and the shifting responsibility of asthma management routines as children grow and develop. However, we know less about the role the family plays in setting up management strategies during the school-age years.

## **Method**

### **Participants**

Data were drawn from a larger study of family life and asthma. Families were recruited through an ambulatory clinic at a teaching hospital, a pediatric pulmonary clinic, and area group pediatric practices in a mid-size city. A child was enrolled in the study if, at the time of recruitment, he or she: (a) was between the ages of 5 and 12 years, (b) had an asthma diagnosis (of at least 1 year) as indicated by physician notes in medical records and by a spirometric test conducted by a licensed respiratory therapist and analyzed by a pediatric pulmonologist, (c) was prescribed daily asthma controller medication for at least 6 months, and (d) was not diagnosed with another chronic medical condition that required a daily medication. Participants in this report include 215 children (136 boys and 79 girls), ages 5–12 years ( $M = 7.9$ ;  $SD = 2.18$ ), and their primary caregivers (94% mothers, 3.7% fathers, and 2.3% grandmothers). Caregiver-reported child race was 53% non-Hispanic White, 31% African-American, 0.5% Asian-American, and 3% Hispanic, 12.5% other (typically mixed ethnicity). Socioeconomic status, as indexed by the Hollingshead index (Hollingshead, 1975), ranged from 8.0 to 66.0 ( $M = 38.58$ ;  $SD = 16.34$ ). Forty-seven percent of primary caregivers reported being in their first marriage, 11% living with a partner, 7% remarried, 23% single or widowed, and 12% separated or divorced. Thirty percent of the mothers reported having a high school education or less. Family size ranged from 2 to 11 members, with a median household size of four members. Disease severity (as determined through parent report of child symptoms) was relatively equally distributed (mild, 22%; mild persistent, 30%; moderate persistent, 37%; severe, 11%).

Out of the original 215 interviews, 15 were dropped from further analysis due to technological recording errors which interfered with accurate transcribing and coding. The demographics of those excluded did not differ in any

manner from our final sample. We report on a final sample consisting of 200 recorded caregiver interviews.

### **Procedure**

Families were recruited to participate in the *Family Life and Asthma Project*. Families were told that the researchers were interested in learning more about how asthma had affected their daily lives. In this Institutional Review Board approved study, caregiver written consent and child verbal assent were obtained and then children and caregivers were interviewed in a laboratory setting (a research home adjacent to a university). Also during the laboratory visit, lung functioning was determined through a pulmonary function test conducted by a licensed respiratory therapist. Both mothers and fathers were invited to participate in this study. When both parents came to the laboratory, both completed questionnaires and were interviewed jointly about the effects of asthma on their daily lives. These interviews lasted approximately 20 min and were conducted by trained research associates (doctoral students in clinical psychology or full time research staff with advanced degrees in behavioral science). Children did not participate in this portion of the interview. We utilized mixed quantitative and qualitative methods in the research design, interview strategy, analysis, and inference, giving equal weight to both sets of methods. Statistical analysis was conducted by using JMP (SAS institute, Cary, NC, USA) and SPSS V17.0.

### **Measures**

#### **Asthma Impact Interview**

The Asthma Impact Interview is a semi-structured interview designed to capture caregivers' experiences of raising a child with asthma (Wamboldt & O'Connor, 1997). It includes a series of open-ended questions designed to assess the impact of asthma on the family, including the emotional impact on individual members, relationships with school and health personnel, and planning around daily routines. For the purpose of this study, we analyzed responses from a single question: "We know that raising a child with asthma includes a lot of extra chores like doctor's appointments, house cleaning and filling prescriptions. We would like for you to think of some of the things that have worked for you and imagine you were helping out a family who has just learned that their child has asthma. What are some of the helpful hints you might share?" Furthermore, as part of the interview, caregivers discussed the exact age which their child received an asthma diagnosis. In order to calculate *time since diagnosis* the age of diagnosis indicated by the child's caregiver was subtracted from the child's current

age at the time of the interview. Interviewers were trained by the principal investigator through the use of archival videotapes. Periodic integrity checks were made by a postdoctoral fellow to insure that the interview protocol was followed precisely. Weekly supervision meetings were held to discuss any problematic or difficult interview cases.

#### **Functional Severity Scale**

The Functional Severity Scale (FSS; Rosier, 1994) is a six-item inventory that assesses a caregiver's perception of the severity of their child's asthma symptoms (wheezing, night wakening, speech limitations, and activity limitations) over the previous year. Consistent with previous research, a total score was derived by summing responses across items; internal consistency as indexed by intra-class correlation was .71 in this sample. The FSS has been validated by associations with school days missed, medication usage, pulmonary lung function, and number of medical care visits over the past year (Rosier et al., 1994).

#### **Lung Functioning**

Consistent with standard procedures, testing was performed by a respiratory therapist using a PDS 313100-WSU KOKO Spirometer and yielded measurements of forced vital capacity (FVC), forced expiratory flow in one second (FEV<sub>1</sub>), and forced expiratory flow, 25–75% of vital capacity (FEV<sub>25–75</sub>). Each child performed three FVC maneuvers into a spirometer while at rest, and the test with the largest sum of FVC and FEV<sub>1</sub> was used for analysis. Spirometry was repeated 10 min after Albuterol<sup>®</sup> was administered by metered dose inhaler with aid of an Aerochamber. A board-certified pulmonologist classified level of asthma severity based on National Heart, Lung, and Blood Institute guidelines (NHLBI, 2007), and assigned ratings along a 4-point scale on which higher scores indicate more compromised lung function.

#### **Pediatric Quality of Life**

The Pediatric Asthma Quality of Life Questionnaire (PAQLQ; Juniper, 1993) is a 23-item asthma specific measure of quality of life that assesses physical (10 items), emotional (eight items), and social (five items) impairment due to asthma over the past week. Children rate their responses on a 7-point scale that ranges from all of the time/extremely bothered (rating of 1) to none of the time/not at all bothered (rating of 7) with higher scores representing no impairment. Internal consistency, indexed by Cronbach's alpha for this sample was: Symptoms = .86,

Emotion = .87 and Total Score = .92. The PAQLQ was developed for children 8 years of age and older. For younger children in our sample (5- to 7-years old) we used the Pictorial Version of the PAQLQ (Everhart & Fiese, 2009). In this version of the PAQLQ, children respond to pictures of thermometers ranging from empty, half full, to full to indicate how much their asthma symptoms bothered them in the past week. The factor structure of the pictorial version identified two factors, including symptoms and emotional functioning (Everhart & Fiese, 2009). A total score may also be generated. The pictorial version demonstrates predictive validity with the PAQLQ (Everhart & Fiese, 2009). Cronbach's alpha for the Pictorial version was .83 for the symptoms subscale, .71 for the emotions subscale, and .87 for Total in this sample.

### Demographic Characteristics

Caregivers completed a demographics questionnaire as part of their interview. Education level and socioeconomic status were ascertained through the Hollingshead index of social status (Hollingshead, 1975). Caregivers indicated highest level of education completed and current occupation for themselves and any adult partner living in the household.

### Interview Content Analysis

All interviews were audio and videotaped for the purpose of verbatim transcription. To allow the coders to analyze the response to this question without being biased by other content from the main interview, a member of the research team who was not involved in the coding process separated out the transcribed responses to the "Helpful Hints" question. To ensure agreement at all phases of coding and categorization, two research team members independently reviewed the transcripts at all phases using content analysis to identify themes and categories within the data. Weekly consensus meetings were held to first identify and agree upon emerging concepts and then to finalize the subcategories and categories. Additionally, to guard against coder drift, meetings were also used by the coding team as a means of reviewing and documenting discrepancies and to address any further developing themes in order to complete an exhaustive list of subcategories. Areas of discrepancies were discussed at great length between the coders and were reconciled to arrive at a single "best fit" category. Inter-rater reliability was calculated for each category using Cohen's  $\kappa$  between each pair of raters. All categories had  $\kappa$ -statistics exceeding .94.

An exhaustive list was established in our first stage of coding in a manner consistent with Strauss and Corbin's (Strauss & Corbin, 1998) "Open Coding" which is a method of identifying the most elemental meaning units. According to Strauss and Corbin (1998), line-by-line analysis is the most generative, therefore each line of response was examined to identify the informants' strategy or "hint" and each unique idea in the data was given a conceptual name. Tentative classifications were then formed based on similarities of concepts found in the interviews, and more specific properties and dimensions of the categories were defined. Over 80 content codes were originally identified with this line-by-line process. In the next phase of analysis, the elemental statements which had emerged during open coding were sorted into piles based on broad, generalized similarities or connections and then further collapsed into subcategories and then eventually, main categories. For example, basic strategies mentioned by caregivers, such as "Keeping meds in the same location" and "Pretreating" were combined to create the subcategory of "Medication Planning." Other basic strategies such as "Cleaning when the child is not around" and "Using unique strategies (to prevent environmental dust and allergens)" were combined into the subcategory of "Planning ahead cleaning." Both of these individual subcategories were then collapsed into the main category "Planning Ahead" based on their shared planning element. As the subcategories became saturated and the relationships among them became clear, six separate main categories emerged from the caregivers' responses unifying and connecting these subcategories.

## Results

### Strategies/Helpful Hints

The open coding and synthesis phase revealed six primary categories of asthma management. The main categories that evolved and united the subcategories were *Reactive*, *Planning Ahead*, *Social*, *Emotional*, *Avoiding Triggers*, *Cleaning* (Table I). Close to one quarter (24%) of the sample offered strategies that we classified as *Reactive*. These included such strategies as ignoring symptoms, only going to the doctor when the child was sick, or dealing with symptoms once they expressed themselves. For example, one caregiver stated when prompted to discuss the handling of their child's physician appointments: "Well actually, we just go when he needs it, he is all caught up on his shots and everything."

The majority of caregivers (88%) offered strategies that included some form of planning ahead. Responses

Table I. Major Categories and Subcategories of Useful Household Strategies Reported by Primary Caregivers of Children with Persistent Asthma

Category	Examples	Percentage Endorsed (% endorsing)
Reactive		24
	Disregard symptoms	4
	Deal with symptoms as they occur	22
	Only go to doctor when child is sick	18
Planning Ahead		88
Health care		75
	Allergy tests	8
	Plan ahead for appointments	18
	Schedule well visits	68
Household Organization		76
	Keep charts and checklists	3
	Keep calendars	10
	Keep journals	4
	Any mention of a routine	6
Medication Planning		51
	Fill prescriptions ahead of time	30
	Take medications as prescribed	11
	Monitor child's medication use	12
	Don't run out of medications	7
	Keep same location for medications	4
	Keep medications in multiple locations	8
	Always take medications with you	4
	Pretreat	3
Planning Ahead Cleaning		25
	When child is not around	17
	Unique strategies—e.g., use of cheesecloth for vents	10
Emotional		26
	Normalizing	13
	Statements of self-encouragement	12
	Keep calm	4
Social		44
	Collaboration	26
	Involve children	13
	Keep positive relationships in family	14
	Have one expert in family	7
Avoiding triggers		77
	Stuffed animals	14
	Mold	3
	Dust and dustmites	10
	Pets	35
	Tobacco smoke	29
	Food	7
	Temperature	18
	Plants	5
	Scents	13
	Grass	10

(continued)

Table I. Continued

Category	Examples	Percentage Endorsed (% endorsing)
Cleaning		64
	Dusting	42
	Vacuuming	25
	Mopping	4
	Sweeping	5
	General cleaning	32
	Clothes washing	16
	Keep rugs clean	4
	Major purchases	42
	Air purifiers	11
	Air conditioner	4
	Humidifier	3
	De-humidifier	2
	Vacuum cleaners	7
	Mattress covers	20
	Structural changes	32
	Window treatments	8
	Hardwood floors	20
	New furnace	11
	Eliminate clutter	6
	Moved/choice of home	5

Note. Percentages within subcategories and categories may not add up to 100%.

classified as “Planning Ahead” contain an element of deliberate premeditation and thinking ahead with regard to management activities, including making appointments with health-care professionals, organizing the household through the use of reminders such as charts and journals, filling medications ahead of time, and cleaning ahead of time when the child is not present so he or she is not exposed to extra dust or cleaning supplies. For example, one caregiver stated: “I found that cleaning the house at night worked the best because you can't vacuum, you can't dust when they are around you.”

Slightly more than a quarter (26%) of the caregivers offered strategies that included some form of emotional component. Responses coded as “Emotional” strategies tend to suggest methods which assist in facilitating calmness and acceptance when dealing with the illness. The themes revolve around stress reduction and attempts to make the child feel like he or she is the same as other children. For example, one caregiver suggested that her approach is to: “Stay calm. That is the number one thing because when they get the attack you've got to slow the breathing down.”

Close to half of the caregivers (44%) offered strategies that included some form of social collaboration such as

involving other family members and maintaining positive relationships. “Social” strategies delineated ways in which communication, social support, and family involvement in health management may help ease the burden associated with raising a child with asthma. One caregiver, for example, shared that her approach is to: “Talk to people, see how they’ve handled it, ask them who their doctors are, what they’ve liked, what they haven’t liked.”

More than three quarters (77%) of the caregivers mentioned avoiding triggers such as tobacco smoke and pets. Responses categorized as “Avoiding Triggers” tend to highlight strategies families use to evade circumstances, environments and objects which may activate their child’s asthma. One caregiver stated: “I do not let him near anyone who smokes. He has a friend whose mom smokes and he is not allowed in that house and he can never go in her car.” Over half of the caregivers described cleaning strategies ranging from daily dusting to structural changes in their home such as putting in hardwood floors or moving. One caregiver whose 5-year-old son had asthma explained that: “Dust is an issue, keeping the dust down is a big thing. That means more cleaning and regular vacuuming.”

### **Helpful Hints in Relation to Demographic Characteristics**

We first examined whether these strategies differed by demographic characteristics of the caregivers and children. Overall, results of analyses indicated no differences in the relative presence of categories by level of maternal education, time since diagnosis, child age, or the Hollingshead index. Chi-squared tests of independence indicated that caregivers in single versus dual adult households were more likely to mention “Planning Ahead” cleaning strategies ( $\chi^2 = 6.50, p < .01$ ; 35% single adult households, 19% of dual adult households). Caregivers in single adult households were less likely to mention “Social Strategies” than caregivers in dual adult households ( $\chi^2 = 6.56, p < .01$ ; 32% single adult, 51% dual adult).

### **Helpful Hints in Relation to Child Asthma Symptom Severity, Lung Function, and Asthma-Related Quality of Life**

Examination of parent-reported child asthma symptom severity using independent samples *t*-test revealed that caregivers who endorsed *Avoiding Triggers* as an effective strategy during the Asthma Impact Interview (AII) had children with less severe asthma symptoms as measured by FSS compared to those caregivers who did not endorse “Avoiding Triggers” as an effective strategy  $t(204) = 1.95, p = .05$ , two-tailed,  $d = .27$ , 95% CI (−3.05 to 0.19).

“Avoiding Triggers” also distinguished child lung functioning as assessed during the pulmonary function test as caregivers who endorsed “Avoiding Triggers” as an effective strategy had children with better lung functioning compared to children of caregivers who did not mention the avoidance of triggers as a strategy  $F(1, 205) = 3.79, p > .05$ .

Furthermore, caregivers who endorsed the use of “Emotion Strategies” during the AII had children who reported better overall asthma-related quality of life  $t(200) = 2.60, p = .01$ , two-tailed,  $d = .37$ , better emotional quality of life  $t(200) = 3.54, p < .001$ , two-tailed,  $d = .50$ , 95% CI .25–.86, and were less bothered by their symptoms as measured by the Symptoms subscale  $t(200) = 1.81, p = .07$ , two-tailed,  $d = .26$ , 95% CI (−.03 to .60) on the Pediatric Asthma Quality of Life Questionnaire (PAQLQ). Children also reported more optimal quality of life on the PAQLQ when their caregivers mentioned “Planning Ahead” cleaning strategies on the AII in comparison to those children whose caregivers did not [Total  $t(200) = 2.12, p = .03$ , two-tailed,  $d = .30$ ; Emotion  $t(200) = 1.96, p = .05$ , two-tailed,  $d = .28$ ; Symptoms  $t(200) = 2.33, p = .02$ , two-tailed,  $d = .33$ , 95% CI −.001–.63.

### **Discussion**

Findings were interpreted from the results of content analyses and the statistical analysis of standardized instruments in relation to lung functioning and quality of life. We set out in this study to identify a set of specific strategies used by caregivers of children with persistent asthma. We examined whether these strategies would be associated with the severity of children’s asthma symptoms, lung function and asthma-related quality of life. By utilizing a mixed-methods design which integrated both qualitative and quantitative components, we were able to arrive at “meta-inferences” (Teddlie & Tashakkori, 2009) regarding the actual asthma strategies families use and their associated health outcomes. A mixed-method approach resulted in a superior design which incorporated the use of qualitative content analysis that allowed us to explore caregiver-generated strategies taken directly from the parents’ perspective. We found six recurring themes that did not differ across sociodemographic class but did differ in some cases by number of adults in the household. We also found that three of the caregiver-generated strategies were associated with the severity of child asthma symptoms. We structure our discussion around the topical content of the strategies, limitations of the study, and clinical applications.

Avoiding triggers such as reducing exposure to environmental allergens was mentioned by the vast majority of the caregivers in the study. Parents who mentioned avoiding triggers as a strategy both perceived their child's symptoms as less severe and had children with less severe FEV<sub>1</sub> readings. The strategies endorsed by the caregivers resonate with national guidelines for effectively managing pediatric asthma (NHLBI, 2007). The most prevalent triggers mentioned were pets and tobacco smoke. Previous reports have found that strict rules about exposure to tobacco smoke does reduce second smoke exposure in the household (Wamboldt et al., 2008). Our findings expand the previous work by including a link to child asthma severity and lung functioning. Identifying how families create rules and routines to reduce exposure to environmental toxins such as tobacco smoke is an area ripe for primary care practice as rules for avoiding tobacco smoke are discussed only about half of the time during pediatric visits (Winickoff et al., 2003).

Caregivers also offered strategies associated with child asthma-related quality of life. These strategies were labeled "Emotional Strategies" because they included techniques for keeping the child (or caregiver) calm, providing verbal support to the child that reduced feelings of being different from other children, and promoting feelings of self-efficacy. Although these strategies were offered by only about one quarter of the caregivers, they highlight the more emotional aspect of family routines. Indeed, these findings are consistent with previous reports linking child quality of life and the emotional aspects of carrying out asthma management routines ascertained through questionnaires (Fiese et al., 2005). What this study adds to the literature is a more precise identification of the type of strategies caregivers use. Our findings are not inconsistent with those of Gallo and Knafelz (1998) and Fiese and Wamboldt (2003), as our study equally identified differences in the manner in which families manage their child's asthma. However, slight methodological changes allowed us to expand upon these studies to identify the actual specific management behaviors utilized by families, rather than mere generalized management typologies and to explore potential outcomes of these strategies in relation to asthma symptoms and quality of life. For example, we found that some families may actively promote a calm environment and may use playful approaches to cleaning, which in turn may allow children to experience a better quality of life. Children may feel less anxious about their asthma overall and better equipped to handle an emergency or symptoms based on the calm, nonreactive, clean environment that their families have provided. Young

school-age children such as those reflected in our sample (ages 5–12 years) may be more dependent on the overall family's ability to organize tasks (Kaugars et al., 2004) and management strategies. However, the findings of our study may not hold true for older children when asthma responsibilities begin to shift from parent to child as children grow and develop.

Although there was little variation according to demographic characteristics, single parent households were more likely to use planning ahead cleaning strategies than households with two or more adults. This may have been the result of two factors. First, caregivers in single parent households may need to be more strategic in their use of time as they have less overall time available to spend with their children (Kendig & Bianchi, 2008) and need to carefully allocate the time they have to protect their children from exposure to environmental dust and other allergens. Another point to consider is how we coded this category. Although "Planning Ahead Cleaning" was a subcategory of "Planning Ahead", it did include cleaning tips, a primary category endorsed by over 75% of the caregivers. We struggled with whether this subcategory was a part of the cleaning category or a part of the "Planning Ahead" category. We decided to include it within "Planning Ahead" because it involved a more "meta" perspective on cleaning such that the routine involved waiting until the child was out of the house and arranging the day around someone else's schedule rather than picking up the vacuum cleaner. While this may seem like a subtle distinction, planning ahead is a core aspect of organized family routines found to be predictive of children's health outcomes including adhering to treatment regimens (Greening, Stoppelbein, Konishi, Jordan, & Moll, 2007). Nevertheless, we recognize that this is a fine distinction that may require further follow up.

There are other limitations to our study that deserve attention. First, a limitation of qualitative inquiry is that the available themes are restricted to those offered by the caregivers. We do not know if there are, in actuality, other strategies that the caregivers employ that they did not include nor do we know if some of the caregivers used strategies mentioned by others but did not offer themselves. Our next step of inquiry will be to generate a listing of these helpful hints and discuss them with another group of caregivers to determine how useful they may be and whether these are strategies currently employed. In this regard, we will apply a systematic incorporation of qualitative responses to generate a self-report questionnaire—one of the advantages of using a qualitative mixed methods approach (Plano-Clark, Huddleston-Casas, Churchill, Green, & Garrett, 2008).



A second limitation is that we did not triangulate our content analysis with the caregivers themselves. It would have been useful to return to the caregivers and ask them if the content codes we generated matched their perception of the helpful hints they generated. However, due to the amount of time expended between transcribing and coding the records, it was not possible to recontact the families in the study. Third, future studies would be informed to include a more ethnically diverse sample. Specifically, greater attention to the routines created by Latino families is needed. There appear to be some variations by culture and ethnic background that we were not able to identify with this sample.

### Clinical Applications

There are direct clinical applications from this study. First, the six categories can be used as a guide for identifying daily household routines that families use to manage their child's asthma. It is clear from the findings that caregivers who are not able to provide strategies that include some planning ahead or specific routines may be at greater risk for poor adherence patterns and management difficulties (Fiese et al., 2005; Greening et al., 2007; Schreier & Chen, 2010). In this regard, practitioners should be alert to families who find it difficult to identify any daily routines they use to reduce symptoms for their children with asthma. Furthermore, the active avoidance of triggers appears to have significant impacts on severity and lung functioning. Thus, specific discussions about how to go about avoiding triggers in daily life may help to reduce symptoms. Encouraging caregivers to endorse rules about tobacco smoke, creating effective personal strategies about pets and identifying allergens specific to an individual child may then be folded into daily routine life. Finally, for some families it is crucial to address strategies that involve the emotional connections made during conversations and normalizing the experience of asthma. Identifying stress reducing routines that work for each individual family and assigning roles that capitalize on family strengths may improve the child's quality of life.

### Summary

With the move towards more tailored interventions (Drotar & Lemanek, 2001; Farmer, Marien, Clark, Sherman, & Selva, 2004), it is important to build an evidence base that starts with family experiences. We provide preliminary evidence that caregiver generated "helpful hints" about managing their child's asthma could be reliably identified and were associated with the severity of child asthma symptoms and quality of life.

Future efforts are warranted to consider how the perspectives of children and caregivers can inform treatment methods to insure that they are easily folded into the routines of daily life.

### Funding

This study was supported, in part by grants from National Institute of Health (MH 51771, HD057447 to B.H.F.).

*Conflicts of interest:* None declared.

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