
The impact of food allergy on the daily activities of children and their families

Mary E. Bollinger, DO*; Lynnda M. Dahlquist, PhD†; Kim Mudd, RN, MSN*; Claire Sonntag, BA†; Lindsay Dillinger, BA†; and Kristine McKenna, MS†

Background: Food allergy affects a significant number of children, and its management requires considerable time and vigilance.

Objective: To determine the impact of food allergy on the daily activities of food allergic children and their families.

Methods: Caregivers of food allergic children from a university-based allergy practice completed a questionnaire that evaluated their perception of the impact of their child's food allergy on family activities.

Results: Of the 87 families who completed the study, more than 60% of caregivers reported that food allergy significantly affected meal preparation and 49% or more indicated that food allergy affected family social activities. Forty-one percent of parents reported a significant impact on their stress levels and 34% reported that food allergy had an impact on school attendance, with 10% choosing to home school their children because of food allergy. The number of food allergies had a significant impact on activity scores, but the existence of comorbid conditions such as asthma and atopic dermatitis did not significantly affect the results.

Conclusions: Food allergy has a significant effect on activities of families of food allergic children. Further study is needed to determine more detailed effects of food allergy on parent-child interactions and development.

Ann Allergy Asthma Immunol. 2006;96:415–421.

INTRODUCTION

Food allergy, or an abnormal immunologic response to food protein, affects a significant number of children, with an estimated prevalence of 2% to 8%.¹ Some groups of children are particularly susceptible, such as children with atopic dermatitis, where prevalence rates can be greater than 30%.² Reactions to foods can range from isolated skin symptoms to respiratory symptoms, gastrointestinal symptoms, and anaphylaxis.³ Food allergy is the No. 1 cause of anaphylaxis cases seen in US emergency departments, with an estimated 30,000 cases per year.⁴ It is estimated that 150 to 200 people die per year of food-induced anaphylaxis.⁵

Strict avoidance of offending food proteins is essential to the safety and well-being of food allergic individuals. A study of peanut allergic patients predicts that 50% of peanut allergic patients will have an allergic reaction if they ingest 3 mg of peanut (approximately [1/50] of a peanut).⁶ Maintaining a diet that strictly avoids food allergens is a formidable task. A study by Joshi et al⁷ found that with current labeling guidelines, parents of food allergic children often were unable to correctly identify common allergenic food ingredients. Until the Food Allergen Labeling and Consumer Protection Act of 2004 is implemented, the Food and Drug Administration allows manufacturers to list spices, additives, flavorings, and

colorings collectively without naming the individual ingredients they contain.⁸ As a result, families frequently have to contact manufacturers to determine if a food is safe for their food allergic child.

In addition, families need to be educated about possible cross-contamination issues that may not be included on package labels. Simple tasks such as grocery shopping become time-consuming and often expensive endeavors for families of food allergic children. Providing safe and nutritious foods for children with multiple food allergen restricted diets is particularly challenging. The planning required to attend parties or eat out can make these social events a source of anxiety and stress.

Despite the best attempts of families to maintain a safe diet for their children, unintentional ingestions invariably occur, particularly outside the home. A study by Nowak-Węgrzyn et al⁹ found that 18% of the 132 food allergic children whom they studied had at least 1 food-induced allergic reaction in school within the last 2 years. Many of these reactions were severe, with 36% involving 2 or more organ systems and 32% resulting in wheezing.

It is conceivable that caregivers of a food allergic child could develop some degree of anxiety and protectiveness given the potential for severe reactions and the lack of control (real or perceived) in some situations. A food allergy diagnosis could lead to isolation of the child, from limiting the child to eating school lunch at a peanut-free table to the extreme of home schooling solely to avoid exposure to potential food triggers. Some children and families may restrict many social activities because of fear of exposure.

* Division of Pediatric Pulmonology/Allergy, University of Maryland School of Medicine, Baltimore, Maryland.

† Department of Psychology, University of Maryland, Baltimore County, Maryland.

Received for publication April 18, 2005.

Accepted for publication in revised form May 31, 2005.

Food allergy can thus have a significant effect on quality of life. However, there have only been a few empirical studies of the psychosocial consequences of food allergy.^{10–13} Primeau et al¹⁰ evaluated quality of life and family relations in 153 peanut allergic children vs 69 children with rheumatologic disease using the Impact on Family Questionnaire. They found that the parents of the food allergic children reported more significant disruption of daily activities and more impairment in the family-social dimension of the Impact on Family Questionnaire. Sicherer et al¹¹ surveyed 253 parents of children who were allergic to a variety of foods. Using the Children's Health Questionnaire,¹⁴ they found that parents of food allergic children scored significantly lower than the published norms on 2 dimensions—perception of the child's overall health and family activities—and higher than published norms on the scale that measured parental distress and worry related to the child's condition. However, neither of these studies provided information regarding the specific aspects of daily life that are most affected by food allergy.

In a study of 20 children with peanut allergy and 20 children with diabetes conducted by Avery et al,¹² peanut allergic children reported a greater need to be careful about eating and more anxiety about activities than did diabetic children. Although Avery et al¹² evaluated more specific aspects of daily activities, their sample was small, was limited to peanut allergy, and did not include parents.

A recent study by Cohen et al¹³ used a 19-question survey to evaluate health-related quality of life and parental burden in 88 families of children with food allergy. However, most of their subjects were members of the Food Allergy and Anaphylaxis Network, a support group for families with food allergy. Furthermore, their sample was primarily composed of white families, half of whom had a family annual income of more than \$100,000 (the median household income in the US is \$43,318) (US Census Bureau). The generalizability of their measure or findings to a more diverse or representative population has not yet been determined.

More specific information regarding the activities of daily living that are affected by food allergy would help health care professionals provide better anticipatory guidance to parents and may aid in early identification of adjustment problems. The purpose of the present study was to develop and conduct a preliminary evaluation of a brief questionnaire designed to evaluate parents' perceptions of the degree to which food allergy interfered with various aspects of their children's and their family's daily lives. We were particularly interested in identifying practical aspects of daily family life and the aspects of child and family social interactions that might be affected by food allergy.

METHODS

Recruitment and Informed Consent

This study was approved by the University of Maryland School of Medicine Human Research Protections Office and by the University of Maryland Baltimore County Institutional

Review Board. All families of children from birth to 18 years of age diagnosed as having food allergy who were able to understand the English language were approached by the principal investigator during their regularly scheduled specialty clinic visit to the University of Maryland Allergy Practice and invited to participate in the study. Caregivers were excluded if they were unable to sign informed consent or if the child lived in another primary residence from the caregiver. Consent was obtained by the research coordinator.

Measures

Basic demographic information, such as the child's age, sex, ethnicity, and current grade in school, were obtained via questionnaire. In addition, caregivers were asked to indicate which foods they avoided because of food allergy, the type of reactions the child had experienced in the past, and any comorbid diagnoses, such as atopic dermatitis and/or asthma. Additional space was made available for caregivers to include information about their child's food allergy they deemed important that was not addressed by the study questionnaires.

The Food Allergy Impact Scale is a 32-item questionnaire, designed for the present study, that evaluated the caregiver's perception of the impact of the child's food allergy on 8 aspects of daily family activities: meal preparation, family social activities, caregiver-supervised child social activities, autonomous child social activities, school activities, family relations, caregiver stress and free time, and employment and finances. Item content was derived from the few existing studies of quality of life in pediatric food allergy, qualitative interviews with parents of food allergic children, and interviews with health care providers and adapted from other measures such as the Pediatric Rhinoconjunctivitis Quality of Life Questionnaire¹⁵ and the widely used Impact on the Family Scale.¹⁶ The preliminary item pool was then revised after content validity evaluation by 3 health professionals with extensive food allergy experience, 3 psychologists with experience with families of chronically ill children, and a mother of a food allergic child.

Caregivers were asked to rate the degree to which the child's food allergy affected each child or family activity on a 7-point Likert scale^{17,18} (1 indicating not at all and 7 indicating very much). If the family avoided the activity entirely because of food allergy, a score of 8 was assigned. If the family did not engage in the activity for other reasons (eg, child was too young), that item was excluded from the participant's score. For analysis purposes, Likert ratings of 5 or greater were considered evidence that food allergy had a significant effect on the activity. A mean perceived impact score was then calculated for the 8 content domains of the scale: meal preparation, family social activities, family relations, parental stress and free time, finances and employment, school or structured child activities, caregiver-supervised child social activities, and autonomous child social activities.

Procedures

Questionnaires were collected between September 2003 and April 2004. Participants either completed the questionnaires during their scheduled clinic time (most participants) or mailed them to the research coordinator in a self-addressed envelope that was provided for them. The principal investigator and coinvestigators were kept blinded to the identities of participants. The questionnaires were assigned identification numbers that were not linked to patient information to ensure confidentiality in data entry and storage. The data were entered into and analyzed with SPSS statistical software, version 11.5 (SPSS Inc, Chicago, IL). Cronbach α coefficients were calculated to examine the internal consistency of the individual subscales. Pearson product moment correlation analyses were conducted to examine the relations among the variables. Hierarchical multiple regression analyses were used to examine the relative contributions of the number of food allergies and comorbid diagnoses such as atopic dermatitis and asthma to reported interference with daily activities.

RESULTS

All of the 101 caregivers of food allergic children who were approached agreed to participate in the study. One caregiver was excluded for not being the custodial guardian for the child. Of the 101 who completed informed consent, 87 (86%) completed the questionnaire. Most (69%) of the participants chose to complete their survey during the clinic visit, 17% completed the surveys at home and mailed them back, and the remainder took the surveys home but did not return them. Surveys were completed by the caregivers in less than 15 minutes. Approximately 35% of the food allergic children were African American, 56% were white, and 10% were of other races. The sample was 52% male and 48% female, and they ranged in age from 8 months to 17 years (mean age, 5.14 years). Socioeconomic data were not collected, but using insurance coverage as a proxy, roughly 35% of the allergy practice patients had medical assistance as their insurance provider, with the remainder covered by private insurance and health maintenance organizations.

Approximately 8% of the patients had self-reported comorbid asthma, 38% had atopic dermatitis, 28% had allergic rhinitis, 12% had latex allergy, 41% had both asthma and atopic dermatitis, and 13% had only food allergy. The children were allergic to a range of 1 to 10 foods, with a mean of 4.48 foods (median, 4 foods) that were avoided due to food allergy. Parent-reported data regarding the type of food reactions experienced by the children were available for 67 of the patients. The remainder failed to complete the reaction questions (access to medical records was not approved for this study). Thirty-one percent of those patients reported skin reactions to foods, 6% reported gastrointestinal reactions, 51% reported severe or anaphylactic reactions, and 12% reported other reactions. The types of food allergy represented in the sample are given in Table 1. Most children

Table 1. Types of Food Allergy Represented in the Sample

Allergen	Allergic children, % (N = 87)
Peanut	85
Tree nut	70
Shellfish	65
Eggs	51
Scaled fish	41
Milk	38
Other	23
Fruit	20
Soy	18
Wheat	14
Vegetables	13
Other grain	7

(>60%) had reported food allergy to peanut, tree nuts, and/or seafood.

The 8 content-based subscales reflecting different types of child and family activities are presented in Table 2. Preliminary analyses revealed that the subscales had acceptable internal consistency, with all scales coming close to or exceeding the .70 Cronbach α coefficient typically recommended for subscales.^{17,18} The α coefficients for each subscale were as follows: .94 for meal preparation, .85 for family social activities, .68 for caregiver-supervised child social activities, .68 for autonomous child social activities, .76 for school activities, .86 for family relations, .87 for caregiver stress and free time, and .82 for employment and finances.

Table 2 gives the individual items that comprise the subscales, accompanied by the percentage of caregivers who reported a significant food allergy impact for the item (ie, a Likert rating of 5 or greater). (The responses of parents who reported that they did not perform an activity because of their child's age or for reasons unrelated to the child's health were not included in these statistics.) More than 60% of participants reported that food allergy affected meal preparation activities. Approximately 50% or more of the participants indicated that food allergy significantly affected their family social activities. Forty-one percent of parents reported a significant impact on their stress levels due to their child's food allergy. Responses from the child social activity subscale showed that 58% of the caregivers thought that food allergy affected their child's "playing at friends' houses." Furthermore, 53% to 70% of parents reported that the activities included in the autonomous social activities subscale, such as birthday parties and sleepovers, were significantly affected by food allergy.

Although food allergy did not appear to have quite as significant an impact on school attendance as meal preparation and child social activities, approximately one third of caregivers reported a significant impact and 10% of caregivers did not send their child to school due to food allergy. An even greater percentage reported that other school activities, such as field trips (59%) and school parties (68%), were significantly affected by food allergy.

Table 2. Food Allergy Impact Scale Items and Percentage of Respondents Reporting a Significant Impact on Family Life for Each Item

	No. of respondents*	Rated item ≥5, %	Reported that they do not do this activity because of food allergy, %
Meal preparation			
Meal planning for my child	86	71	7
Meal planning for the family	85	60	7
Grocery shopping	85	76	9
Preparing meals for my child	84	75	8
Preparing meals for the family	83	67	8
Meals or snacks on the run	83	76	8
Family social activities			
Going to restaurants	84	79	16
Family outings, recreation	81	49	5
Activities with relatives	83	58	10
Activities with other parents	80	55	9
Going on vacation or out of town	83	51	6
Caregiver-supervised child social activities			
Playing at friends' houses	71	58	11
Playing with friends at your house	71	21	6
Family relations			
Parents' relationship	79	19	3
Sibling relationships	71	17	3
Discipline	78	13	1
Stress and free time			
Your stress	80	41	NA
Your free time	81	26	4
Your sleep	83	23	4
School or structured activities			
Daycare or aftercare	66	64	14
School attendance	67	34	10
School parties	62	68	11
Sports	54	39	11
Other extracurricular activities	58	40	7
Field trips	61	59	8
Autonomous social activities			
Birthday parties	83	70	10
Sleepover at friends' houses	50	68	26
Camp	47	53	26
Employment and finances			
Your employment	68	28	7
Your spouse's employment	73	5	3
Family finances	75	27	NA

Abbreviation: NA, not applicable.

* Parents who reported that they do not do this activity for other reasons (eg, age of child) were excluded from these calculations.

Avoiding activities due to their child's food allergy was reported by a number of caregivers. In addition to the 10% of caregivers who chose to home school their children because of food allergy, 16% of caregivers avoided going to restaurants, 11% avoided allowing their child to play at friends' houses, 14% avoided daycare or aftercare, 10% to 11% avoided parties and sports, and 26% avoided camp and sleepovers because of the child's food allergy. In contrast, items that comprised the subscales of parental employment and finances and family relations were not as significantly affected by childhood food allergy. The percentage of caregivers who reported impact ratings of 5 or greater ranged from 5% to 28% and 17% to 19%, respectively.

The total number of food allergies for each child was significantly positively associated with the impact of food allergy on the following subscale scores: meal preparation ($r = 0.417$, $P < .001$), family social activities ($r = 0.375$, $P = .001$), family relations ($r = 0.398$, $P < .001$), stress and free time ($r = 0.401$, $P < .001$), school activities ($r = 0.445$, $P < .001$), autonomous social activities ($r = 0.243$, $P = .030$), and employment and finances ($r = 0.408$, $P < .001$). Whether or not the child had a history of a previous anaphylactic reaction to food was not related to any of the subscale scores ($P > .05$ for all). The specific food to which the child was allergic also was not related to any of the subscale scores.

Because many of the children also experienced asthma and/or eczema, which also could have important effects on the daily activities of children and their families, a series of stepwise regression analyses were conducted to determine the degree to which the number of food allergies predicted impact on family activities over and above the impact of comorbid illness. In the first step of the regression analysis, the presence or absence of comorbid diagnoses of asthma and eczema were entered. In the second step of the analysis, the number of different food allergies was entered. As indicated in Table 3, after controlling for the presence of comorbid eczema and asthma, the number of food allergies was still significantly related to the parents' report of impact on the family. Number of food allergies significantly predicted approximately 12.2% of the variance in meal preparation impact scores, 11.7% of the variance in family social activities impact scores, 10.8% of the variance in family relations impact scores, 10.6% of the variance in stress and free time impact scores, 17.3% of the variance in school or structured activities impact scores, 8.5% of the variance in autonomous social activities impact scores, and 11.1% of the variance in employment and finances impact scores. Number of food allergies did not appear to contribute to caregiver-supervised child social activities scores.

DISCUSSION

When one considers the significant time and effort that it takes to provide a safe environment for children with food allergy, logic dictates that food allergy would have a significant impact on daily life. Our data showed a significant impact of food allergy on almost all aspects of daily life that were queried. One of the most striking effects noted by this study was the impact on family meal preparation, with approximately 70% of families reporting a significant impact. The other significant impact was on social activities outside the home, particularly more autonomous activities where the caregiver may not be present, such as daycare, sleepovers, birthday parties, and field trips. Another enlightening result of the study was the number of families that avoided activities altogether because of their child's food allergy. Simple activities that most families take for granted, such as going to restaurants, school, parties, and other social events, may be so overwhelming for these families that they avoid them.

The written comments shared by many of the caregivers further illustrate this point. As one caregiver stated, "We are unable to leave our daughter in the care of others, which greatly impacts on social relationships as well as our marriage. We are not able to let her play or sleep at friend's homes without one of us, and we as a couple have been unable to go out for an evening or a vacation without children." Additional comments from participants included, "[His] allergies have impacted our daily lives a great deal especially in terms of eating out, vacations, and my working. I don't work because of his food allergies" and "We find it difficult to let go of our son. I go on every field trip and attend every class party. No one other than us and one grandparent EVER prepare ANY meals for our son."

The large number of caregivers who reported a significant effect of food allergy on school activities (34% to 68%) and social activities outside the home (reported by half or more of respondents) may be due to the limitations of the food selections at these events. Unless the child brings their "safe" foods with them to outside events, the families are relying on others (as well as their child) to have sufficient knowledge of label reading and cross-contamination issues to provide a safe diet. The reality is that even in the most careful and educated environments, most food allergic children have exposures that lead to reactions.⁹ Indeed, their concern about activities outside the home appears warranted, since most people who have died of food allergy reactions did so outside the home environment.⁵

The present findings also suggest that children with food allergy may be at increased risk of social-emotional developmental difficulties. Caregivers reported that food allergy greatly interfered with a number of important peer activities, such as sleepovers, playing at friends' houses, and parties. These more autonomous social contacts afford children the opportunity to solidify friendships, make new friends, develop autonomy, expand their social skills, and improve their independent social problem-solving skills. If these opportunities are restricted, children with food allergy may have more difficulty accomplishing these developmental tasks. Excessive or long-standing restrictions could result in increased social isolation and concomitant feelings of depression or social anxiety.¹⁹

Parents of children with more food allergies reported a greater degree of impact on daily activities. Similar findings were obtained by Sicherer et al.,¹¹ with an older (mean age, 10.8 years) group of children with fewer comorbid conditions and by Cohen et al.¹³ in their survey of Food Allergy and Anaphylaxis Network members. Children with more than 2 food allergies and their parents had lower quality-of-life scores. This finding makes sense given the greater burden of reading labels and watching for additional food triggers associated with more food allergens. In contrast, the presence or absence of a prior anaphylactic or severe allergic reaction was not related to perceived impact on the family, suggesting that what really matters is the parents' perceptions of the food allergy and the consequences of ingestion of contraindicated substances and the precautions they need to take to keep their children healthy regardless of the type of reaction that their child has experienced in the past.

We found a significant relation between comorbid health conditions and daily family activities. However, the impact of the number of food allergies still held when the potential confounding conditions of asthma and/or atopic dermatitis were statistically controlled. Therefore, the impact of food allergy alone appears to account for some of the difficulties that these families are experiencing in their daily lives.

A limitation of this study is that the effect of food allergy on daily activities was evaluated entirely by caregiver report and the children were not questioned about the impact on their lives, although with a mean age of 5 years, it would be difficult to adjust a questionnaire to capture an impact on such a young group. In addition, we did not collect data to

Table 3. Summary of Regression Analyses for Variables Predicting Individual Subscales*

Variables in the model	β	R^2	R^2 change	F change
Meal preparation				
Step 1		0.083	0.083	3.550†
Eczema	-.289†			
Asthma	.000			
Step 2		0.205	0.122	11.806§
Eczema	-.185			
Asthma	.033			
Sum of all food allergies	.367†			
Family social activities				
Step 1		0.034	0.034	1.400
Eczema	-.123			
Asthma	-.126			
Step 2		0.151	0.117	10.71‡
Eczema	-.024			
Asthma	-.097			
Sum of all food allergies	.357†			
Caregiver-supervised child social activities				
Step 1		0.010	0.010	0.378
Eczema	-.015			
Asthma	-.099			
Step 2		0.029	0.019	1.392
Eczema	.024			
Asthma	-.089			
Sum of all food allergies	.144			
Family relations				
Step 1		0.129	0.129	5.471‡
Eczema	-.205			
Asthma	-.285†			
Step 2		0.237	0.108	10.317‡
Eczema	-.117			
Asthma	-.255†			
Sum of all food allergies	.342†			
Stress and free time				
Step 1		0.143	0.143	6.444‡
Eczema	-.203			
Asthma	-.304†			
Step 2		0.249	0.106	10.685‡
Eczema	-.110			
Asthma	-.273†			
Sum of all food allergies	.340†			
School or structured activities				
Step 1		0.027	0.027	1.031
Eczema	-.150			
Asthma	-.052			
Step 2		0.200	0.173	15.776§
Eczema	-.040			
Asthma	-.008			
Sum of all food allergies	.434†			
Autonomous child social activities				
Step 1		0.011	0.011	0.439
Eczema	.098			
Asthma	.031			
Step 2		0.096	0.085	7.107‡
Eczema	.189			
Asthma	.054			
Sum of all food allergies	.306†			
Employment and finances				
Step 1		0.112	0.112	4.648†
Eczema	-.310†			
Asthma	-.112			
Step 2		0.222	0.111	10.385‡
Eczema	-.226†			
Asthma	-.086			
Sum of all food allergies	.344†			

* Numbers exclude participants who reported they do not do the activity for reasons other than food allergy.

† $P < .05$.‡ $P < .01$.§ $P < .001$

determine the duration of the child's food allergy, and we did not have approved access to medical records. For example, it is conceivable that families who had dealt with food allergy for many years may have reported less of an impact than families with a more recent diagnosis who were still adjusting to the impact, although certainly the converse could be true. Since all study patients were recruited from an allergy practice, this population is somewhat of a select group, although families in this practice received extensive education about food allergen avoidance and, if anything, had the necessary tools to practice appropriate avoidance procedures.

Although the pattern of results obtained in this study provide preliminary support for the validity of the Food Allergy Impact Scale, further study of the psychometric properties of the scale and its concurrent discriminate and predictive validity is needed. For example, the internal consistency of the scale appears to be adequate but should be confirmed with an independent sample. Similarly, the stability of scores on the Food Allergy Impact Scale over time should be evaluated. Future research also should examine the degree to which Food Allergy Impact Scale scores relate to scores on other measures of illness impact and quality of life and ultimately predict psychosocial outcomes in children with food allergy and their families.

The fact that we did not find a significant impact of food allergy on caregiver stress suggests that using a single question is not likely to be a sensitive measure of stress. Furthermore, emotional stress fallout may be indirect. Parents did not report a significant impact on their emotional functioning or on family relationships, but many admitted difficulty in separating from their child particularly in the open comments section of the survey. This may reflect a phenomenon observed in other conditions, where a daily life event does not necessarily have a one-time overwhelming or even noticeable emotional impact, but the daily accumulation of hassles, frustrations, and demands undermines quality of life and contributes to stress-related problems.²⁰ More extensive evaluation of parenting stress and available supports should be considered in future studies.

Although this brief questionnaire has not been validated in a large population, this pilot study confirmed our suspicion that food allergy, which affects 8% or more of the pediatric population, has an impact on activities of daily living. Further study is needed to determine the impact of food allergy on parent-child interactions, family relationships, and child development. In the interim, it is important for pediatric health care practitioners to provide anticipatory guidance and, if indicated, referral to mental health services to assist families in dealing with food allergy.

REFERENCES

1. Wood RA. The natural history of food allergy. *Pediatrics*. 2003;111:1631-1637.
2. Burks AW, James JM, Hiegel A, et al. Atopic dermatitis and food hypersensitivity reactions. *J Pediatr*. 1998;132:132-136.
3. Sampson HA, Burks AW. Mechanisms of food allergy. *Ann Rev Nutr*. 1996;16:161-177.
4. Yocum MW, Butterfield JH, Klein JS, Volcheck GW, Schroeder DR, Silverstein M. Epidemiology of anaphylaxis in Olmstead County: a population-based study. *J Allergy Clin Immunol*. 1999;104:452-456.
5. Bock SA, Munoz-Furlong A, Sampson HA. Fatalities due to anaphylactic reactions to foods. *J Allergy Clin Immunol*. 2001;107:191-193.
6. Wensing M, Penninks AH, Hefle SL, Koppelman SJ, Bruijnzeel-Koomen CAFM, Knuist AC. The distribution of individual threshold doses eliciting allergic reactions in a population with peanut allergy. *J Allergy Clin Immunol*. 2002;110:915-920.
7. Joshi P, Mofidi S, Sicherer S. Interpretation of commercial food ingredient labels by parents of food-allergic children. *J Allergy Clin Immunol*. 2002;109:1019-1021.
8. Altschul AS, Scherrer DL, Munoz-Furlong A, Sicherer SH. Manufacturing and labeling issues for commercial products: relevance to food allergy. *J Allergy Clin Immunol*. 2001;108:468.
9. Nowak-Wegrzyn A, Conover-Walker MK, Wood RA. Food-allergic reactions in school and preschools. *Arch Pediatr Adolesc Med*. 2001;155:790-795.
10. Primeau MN, Kagan R, Joseph L, et al. The psychological burden of peanut allergy as perceived by adults with peanut allergy and the parents of peanut allergic children. *Clin Exp Allergy*. 2000;30:1135-1143.
11. Sicherer SH, Noone SA, Munoz-Furlong A. The impact of childhood food allergy on quality of life. *Ann Allergy Asthma Immunol*. 2001;87:461-464.
12. Avery NJ, King RM, Knight S, Hourihane JO'B. Assessment of quality of life of children with peanut allergy. *Pediatr Allergy Immunol*. 2003;12:378-382.
13. Cohen BL, Noone S, Munoz-Furlong A, Sicherer SH. Development of a questionnaire to measure quality of life in families with a child with food allergy. *J Allergy Clin Immunol*. 2004;114:1159-1163.
14. Landgraf J, Abetz L, Ware JE Jr. *The Child Health Questionnaire (CHQ): A User's Manual*. Boston, MA: The Health Institute; 1996.
15. Juniper EF, Howland WC, Roberts NB, Thompson AK, King DR. Measuring quality of life in children with rhinoconjunctivitis. *J Allergy Clin Immunol*. 1998;101:163-170.
16. Stein R, Jessop DJ. The impact on family scale revisited: further psychometric data. *J Dev Behav Pediatr*. 2003;24:9-16.
17. DeVellis RF. *Scale Development: Theory and Application*. 2nd ed. Thousand Oaks, CA: Sage; 2003.
18. Nunnally JC, Bernstein IH. *Psychometric Theory*. 3rd ed. New York: McGraw Hill; 1994.
19. Parker J, Rubin K, Price J, DeRossier M. Peer relationships, child development and adjustment: a developmental psychopathology perspective. In: Cicchetti D, Cohen D, eds. *Developmental Psychopathology*. New York: Wiley; 1995;2:96-161.
20. Crnic KA, Greenberg MT. Minor parenting stress with young children. *Child Dev*. 1990;61:1628-1637.

Requests for reprints should be addressed to:
 Mary E. Bollinger, DO
 Division of Pediatric Pulmonology/Allergy
 University of Maryland School of Medicine
 Suite 314
 737 W Lombard St
 Baltimore, MD 21201
 E-mail: mbolling@peds.umaryland.edu