

Original Article

Heterogeneity in Parent Preferences for Peanut Desensitization Therapy

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What is already known about this topic? Current approaches to managing peanut allergy include avoidance, emergency medications for accidental exposure, and most recently, oral immunotherapy.

What does this article add to our knowledge? This study quantifies parent preferences related to novel peanut desensitization therapies and differed by parent age, child age, income, parent perception of child's ability to manage allergic reactions, past reactions, and effect on precautionary behaviors.

How does this study impact current management guidelines? Parents' acceptability thresholds for treatment effectiveness and tolerability help quantify the perceived value of therapies and should be taken into account when considering treatment options.

BACKGROUND: Recently developed peanut desensitization treatment reduces the incidence of allergic reactions, the anxiety associated with the risk of accidental exposure, and the burden of precautionary behavior. Eliciting parent preferences for tradeoffs involving treatment effectiveness, tolerability, costs, and convenience quantifies the burden of juvenile peanut allergy and the perceived value of peanut desensitization therapies.

OBJECTIVE: To understand heterogeneity in parents' treatment preferences and the role of personal characteristics in explaining differences.

METHODS: An Internet-based, discrete-choice experiment survey was administered to a national sample of 500 parents of children aged 4 to 17 years with peanut allergy to quantify parents' preferences for peanut desensitization therapies for their children. Latent-class, mixed-logit analysis estimated relative importance coefficients for groups of participants with distinctly different preferences.

RESULTS: Parents' choice patterns fell into 1 of 4 preference subgroups: (1) Cost-sensitive, (2) Protreatment (but Side-Effect-Averse), (3) Trader, and (4) Inconsistent. Mode of administration had little relative importance across all subgroups. Characteristics associated with belonging to a given preference subgroup included parent age, child age, income, parent perception of child risk and ability to manage allergic reactions, past allergic reactions, and changes in precautionary behaviors posttreatment.

CONCLUSIONS: We found distinct differences in parent preferences for tradeoffs involving effectiveness, tolerability, and costs of peanut desensitization treatments. Parents' treatment preferences help quantify the burden of juvenile peanut allergy and the perceived value of new therapies. Such information can inform patient-centric clinical and regulatory decision making. © 2021 American Academy of Allergy, Asthma & Immunology (J Allergy Clin Immunol Pract 2021;■:■-■)

Key words: Peanut allergy; Desensitization treatment; Oral immunotherapy; Parent preferences

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This work was supported by a research agreement between Duke University and Aimmune Therapeutics. Aimmune Therapeutics provided comments, but had no substantial role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication. A.H. and F.R.J. had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Conflict of interest: A. Hung reports past grants from the Agency for Healthcare Research and Quality and Pharmaceutical Research and Manufacturers of America, as well as past employment with Blue Cross Blue Shield Association and CVS Health outside the scope of this work. J.-C. Yang reports current and past fees for consulting from Duke University (US), past fees for consulting from the University of Washington (US) and Hanoi Medical University (Vietnam), and past employment with RTI Health Solutions (US) and RTI International (US). S. Hass reports consultancy with Aimmune Therapeutics. E. Kim reports clinical medical advisory board membership with DBV Technologies; consultancy with Aimmune Therapeutics, DBV Technologies, AllerGenis, Allakos, Ukko, and Vibrant America; and receives grant support to his institution from the National Institute of Allergy and Infectious Diseases, National Center for Complementary and Integrative Health, Food Allergy Research & Education, and the Wallace Research Foundation. The rest of the authors declare that they have no relevant conflicts of interest.

Received for publication November 22, 2020; revised March 8, 2021; accepted for publication April 25, 2021.

Available online ■■

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<https://doi.org/10.1016/j.jaip.2021.04.058>

INTRODUCTION

In the United States, peanut allergy is the most common childhood food allergy, affecting approximately 2% of children.¹⁻³ Current approaches to managing peanut allergy include avoidance and emergency medications for accidental exposure, and most

recently, treatment in the form of oral immunotherapy.^{4,5} In January 2020, the first commercial peanut oral immunotherapy was approved by the Food and Drug Administration for children aged 4 to 17 years,⁶ and other peanut desensitization treatments are actively in development.⁷ These treatments induce clinical desensitization,⁸⁻¹⁰ which can reduce the future risk of allergic reaction to accidental exposure¹¹ and may improve quality of life by reducing food-related anxiety and need for allergen avoidance involving dietary and social precautions.^{12,13} Whether immunologic tolerance lasts in the long-term remains unknown and thus achieving these benefits requires sustained adherence to therapy, potentially indefinitely. However, because these treatments use progressive exposures to peanut protein in peanut-allergic patients, desensitization therapy itself can cause allergic reactions,^{8-10,13-15} and can result in discontinuation.

Dietary avoidance makes severe reactions to accidental peanut exposure uncommon. However, strict dietary avoidance is burdensome, and the fear of possibly severe allergic reactions is a cause of distress for many parents. Most providers agree that the contribution of these treatment options to effective management of children's peanut allergy depends on caregiver assessment of accidental exposures and perceived inconvenience and effectiveness of precautionary behavior in reducing exposure risks.^{5,16,17} Better understanding of the relative values of active therapy versus avoidance alone can help providers assess the perceived burden of peanut allergy and identify strategies that align with caregiver preferences. Through shared decision making, clinicians and families can identify the best approaches to treatment and can promote the necessary adherence to achieve treatment objectives.

To understand parents' perceptions of treatment and behavior related to managing exposures to peanut, we conducted a discrete-choice experiment to quantify parents' stated preferences for peanut desensitization treatments relative to avoidance alone. We evaluated how these preferences differed by therapy characteristics, perceived sensitivity to peanut, and experience with allergic reactions, as well as sociodemographic indicators.

METHODS

Discrete-choice experiments increasingly are being used in health care to understand patient and provider preferences related to treatment characteristics (termed attributes) such as treatment efficacy and side effects.¹⁸ A choice experiment elicits respondents' evaluations of tradeoffs among treatment features. Choice-experiment respondents answer a series of choice questions consisting of 2 or more constructed therapeutic options based on predetermined attribute levels set by an experimental design with known statistical properties. Choice experiments quantify the relative importance of treatment attributes and thus can determine the minimum amount of benefit a treatment must provide for patients to accept a given level of treatment risk, or the maximum amount of treatment risk patients would tolerate in return for a given level of benefit.

Survey and participants

We conducted an Internet-based discrete-choice experiment survey of a national sample of 500 parents in the United States from October 11, 2019, to October 24, 2019. Participants were members of a large national online panel of individuals maintained by Dynata, an international survey-research firm. In accordance with American Association for Public Opinion Research reporting guidelines for

survey recruitment using a nonprobability online panel, the response rate could not be calculated and was not reported.¹⁹ Parents with at least 1 child aged 4 to 17 years who reported a physician diagnosis of peanut allergy and who had not previously undergone peanut desensitization treatment were eligible to participate in the survey. This study received approval from a major research university's Institutional Review Board.

Survey measures

The online survey collected information about parents' socio-demographic characteristics, such as age, sex, race, ethnicity, educational attainment, health insurance, and income. The survey also collected information about the number of children in the household, how many of these children were diagnosed with peanut allergy, and whether the parent had primary responsibility for making decisions around minimizing peanut exposure for the child. If parent participants had more than 1 child with a peanut allergy, they were asked to answer the survey questions for the child with the most serious reaction to peanuts. These questions included child age, sex, presence of other food allergies, type of testing for peanut allergy, and past number of mild, moderate, and severe allergic reactions.

Participants were asked questions adapted from the Food Allergy Independent Measure about the perceived risks of the following: the child would be exposed to peanut, would have a severe reaction, would not be able to manage his or her allergic reaction, and would die because of peanut exposure.^{20,21} Parents also were asked what they thought was the minimum amount of peanut that could cause a serious allergic reaction in their child.

Questions were crafted on the basis of recommendations from the Food Allergy & Anaphylaxis Connection Team, which included strategies used to prevent cross-contact and accidental environmental exposure.²² Respondents indicated on a 5-point Likert scale how often they performed each of the following: avoided restaurants, checked the menu for safe foods before going to a restaurant, checked with the restaurant manager or waiter to ensure preparation surfaces had not been in contact with peanut, and used a detergent wipe before sitting at a restaurant. To assess how parent behaviors could change after improvement in child peanut tolerance, we repeated these same questions at the end of the survey, but this time asking parents to assume that a treatment had improved the child's tolerance to 4 peanuts.

Discrete-choice experiment

The online survey (in this article's Online Repository at www.jaci-inpractice.org) included a discrete-choice experiment that was designed and conducted in accordance with good-practice guidance for health applications.^{18,23,24} Respondents answered 12 choice questions consisting of 2 peanut desensitization treatment options and a "No Treatment" (ie, current self-management of peanut allergy) option. We identified a list of the most salient attributes and levels to include in the choice experiment based on a literature review and discussions with specialists who treat children with peanut allergy. We also pretested a draft survey in face-to-face interviews with 12 parents with peanut-allergic children to test survey readability, attribute saliency and completeness, and cognitive burden. The final list of attributes included treatment type (ie, mode of administration), effectiveness measured as average amount of peanut tolerated after 1 year, tolerability indicated by how many discontinued treatment by 1 year because of side effects, and personal cost of treatment. We measured effectiveness as the average amount

TABLE I. Study attributes and levels*

Attributes	Levels
Treatment type	Powder in capsule Patch on skin
Average amount of peanut tolerated after 1 y	Increased from 1/2 peanut to 4 peanuts Increased from 1/2 peanut to 2 peanuts Increased from 1/2 peanut to 1 peanut
How many stopped treatment by 1 y because of side effects?	0 of 10 (0%) 2 of 10 (20%) 5 of 10 (50%)
Personal cost of treatment	\$300/y (\$25/mo) \$600/y (\$50/mo) \$1200/y (\$100/mo) \$2400/y (\$200/mo)

*For the “no treatment” option, attribute levels were set at NONE or NO CHANGE as seen in the survey in this article’s Online Repository at www.jaci-inpractice.org.

TABLE II. Maximum acceptable risk for a given level of efficacy

Tolerance	Class	Maximum acceptable discontinuation rate due to side effects, mean (95% CI)
2 Peanuts	Cost-Sensitive	29% (11% to 41%)
	Protreatment (but Side-Effect—Averse)	12% (3% to 23%)
	Trader	27% (24% to 30%)
	Inconsistent	31% (–3% to 95%)
3 Peanuts*	Cost-Sensitive	37% (24% to 50%)
	Protreatment (but Side-Effect—Averse)	18% (8% to 26%)
	Trader	34% (31% to 38%)
	Inconsistent	45% (11% to 100%)
4 Peanuts	Cost-Sensitive	46% (32% to 61%)
	Protreatment (but Side-Effect—Averse)	22% (12% to 30%)
	Trader	41% (37% to 46%)
	Inconsistent	59% (16% to 100%)†

*Interpolated value.

†Extrapolated beyond the highest discontinuation rate (50%) shown in the choice questions.

of peanut tolerated after 1 year and tolerability as how many discontinued treatment by 1 year because of side effects to align with evidence provided from clinical trials. Two to 4 levels were assigned to each attribute, as shown in Table I. We ensured that the ranges of levels shown included estimates found from a literature review of existing clinical trial evidence and passed face validity checks with specialists who treat children with peanut allergy. Most importantly, the pretest in-person interviews with draft surveys helped verify that the attribute list was complete and salient and that ranges were wide enough to elicit tradeoffs. The specific levels shown in each choice question were determined on the basis of a fractional factorial design, and survey participants were randomized to 1 of 10 designs with known statistical properties. We generated these designs using SAS

9.4 (SAS Institute, Cary, NC). The 10 designs were similar if not the same in terms of D-efficiency, level balance, and orthogonality. Each design contained 12 choice questions.

Data analysis

Internal-validity tests on the data were performed to assess data quality, including identification of respondents who never varied their choice (ie, always chose No Treatment, Treatment A, or Treatment B), who failed between-question consistency tests, and who always dominated on a single attribute (ie, always chose the alternative with the better level of a single attribute).²⁵ We also included quiz questions to check respondent comprehension of the background information. The number of quiz questions survey respondents answered correctly provided an indication of comprehension and attentiveness to the survey.

A probit analysis identified respondent characteristics associated with always opting out of treatment. In accordance with good-practice guidance to account for heterogeneity in preferences, we used a latent-class analysis with random parameters within classes to estimate relative importance weights for each attribute level.²⁴ This model identified similar patterns of responses among participants and grouped them probabilistically into classes. The random parameters accounted for unexplained variation in respondents’ preferences within classes. Parent and child sociodemographic and allergy-related characteristics were used to explain respondents’ probability of class membership. We determined the number of latent classes on the basis of Bayesian information criterion, parsimony, and interpretability of results. In sensitivity analysis, because some of the respondent sample reported only experiencing mild reactions, we tested whether specifying covariates for respondents who reported their children only having lifetime mild reactions would change the preference subgroups identified.

Using model estimates, we calculated the class-specific minimum acceptable tolerability (as measured by discontinuation rates due to side effects) that respondents were willing to accept for a given level of peanut tolerance achieved after 1 year of treatment. Conversely, we also calculated the class-specific minimum acceptable improvement in peanut tolerance that respondents were willing to accept for a given discontinuation rate due to side effects. 95% CIs were estimated on the basis of 10,000 draws using the Krinsky and Robb²⁶ procedure. Statistical significance for all tests was 2-sided and determined at the *P* less than .05 level. Analyses used Stata/SE 16 (StataCorp LLC, College Station, TX) and LatentGOLD 5.1 (Statistical Innovations Inc, Arlington, MA).

RESULTS

Study participants

Five hundred parents with at least 1 child aged 4 to 17 years with a peanut allergy completed the survey. Detailed respondent sociodemographic characteristics are presented in Table E1 in this article’s Online Repository at www.jaci-inpractice.org. On average, parents were aged 40 years and mostly female (76%) and White (72%). Parents reported a mean number of 2 children, 1 of which was diagnosed with peanut allergy. More than 90% of respondents said they either have primary responsibility or share primary responsibility with another caregiver for making decisions to minimize the child’s accidental exposure to peanut.

The mean age of the child with the peanut allergy was 10 years and more than half were boys. Approximately three-quarters of children had required medication or treatment in a medical facility for an allergic reaction to peanut, and three-quarters of

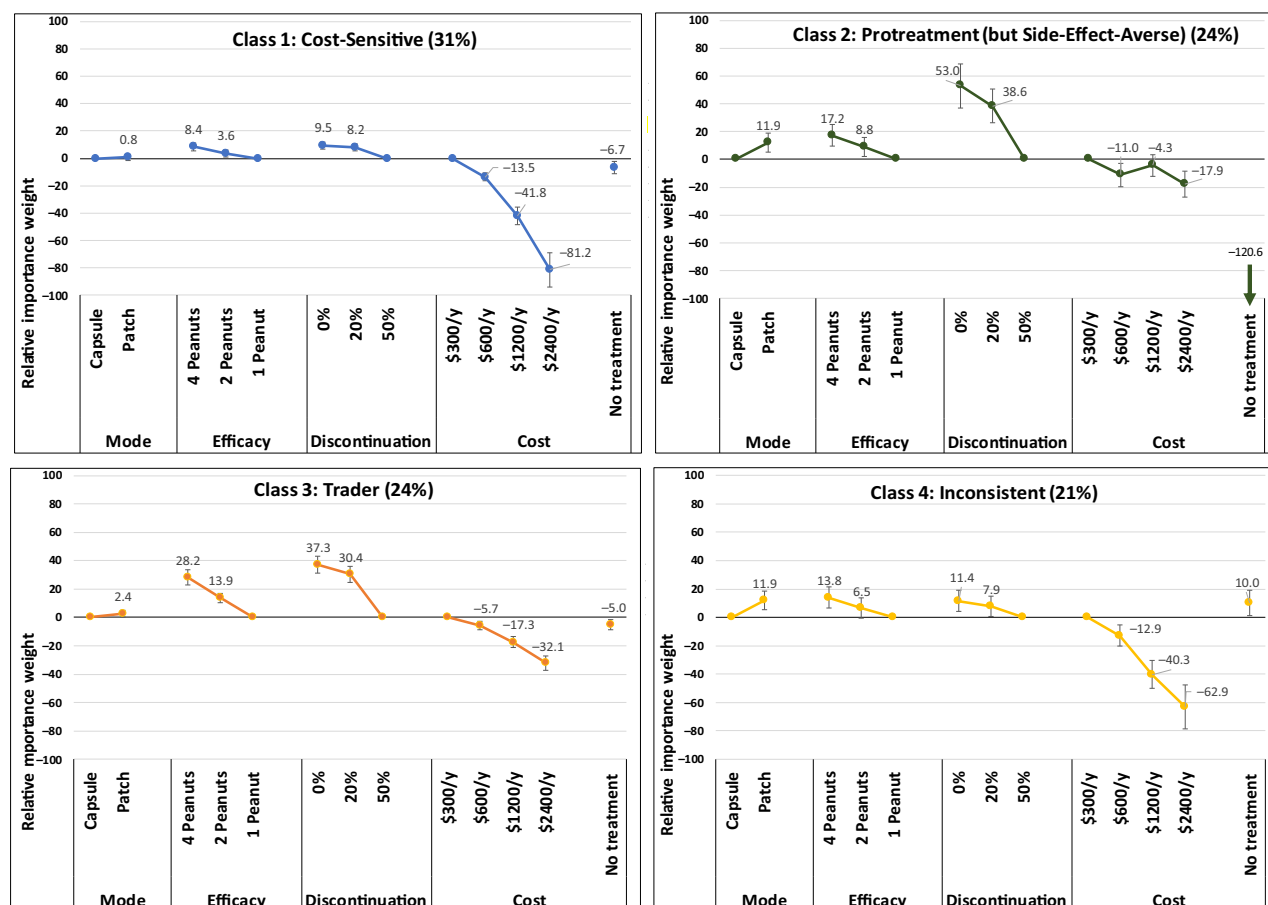


FIGURE 1. Relative importance weight estimates from latent-class analysis (N = 446). The 4 panels show differing preferences for the 4 latent classes of parents. Error bars indicate 95% CIs.

children always or almost always had an epinephrine injector pen available. Parents reported that in the last 12 months their children had an average of 1.5, 2.9, and 0.5 mild, moderate, and severe allergic reactions, respectively. Parents also reported that over the lifetime their children had a mean of 6.7, 5.6, and 1.3 mild, moderate, and severe allergic reactions, respectively. Approximately a quarter of parents believed that less than one-eighth of a peanut was enough to cause a serious allergic reaction in the child.

Internal-validity tests

Results of internal-validity tests for always choosing the same alternative, always choosing the alternative with the better level of 1 attribute, and between-question consistency are presented in Tables E2 to E4 in this article's Online Repository at www.jaci-inpractice.org. Our results are as good or better than those of previous studies.²⁵ Approximately 11% always chose "No Treatment" (ie, current self-management of peanut allergy) across all 12 choice questions (Table E2). We excluded these respondents from the choice model because they provided no information about the relative importance of treatment attributes. However, a probit analysis of characteristics positively associated with always rejecting treatment is presented in Table E5. Significant characteristics included older parent age, being a mother, being Asian, as well as a strong belief that the

child would be able to manage an allergic reaction, perceived inconvenience of therapy, and perceived relative importance of treatment cost.

Heterogeneity in preferences

Of the 500 respondents, 446 selected a treatment at least once across the 12 choice questions and were retained for the latent-class mixed-logit model (fit statistics provided in Tables E6-E8 in this article's Online Repository at www.jaci-inpractice.org). Four latent classes had distinctly different preferences (Figure 1) with respect to the relative importance of attributes over the ranges of attribute levels included in the study design. Respondents with class 1 preferences (31%) were highly sensitive to cost levels shown ("Cost-Sensitive" class). Respondents with class 2 preferences (24%) were concerned about the discontinuation rate resulting from side effects, but were insensitive to cost. Class 2 also had a very large negative coefficient for "No Treatment," indicating that they chose a treatment alternative in all or nearly all questions. We therefore labeled class 2 the "Protreatment (but Side-Effect-Averse)" class. Respondents with class 3 preferences (24%) found efficacy, discontinuation, and cost ranges similarly important ("Trader" class). Cost also was most important for class 4 (21%), but these respondents were more interested in efficacy and tolerability than class 1. We labeled class 4 the "Inconsistent" class because it was the only class with a large,

TABLE III. Minimum acceptable benefit for a given level of tolerability

Discontinuation rate	Class	Minimum acceptable peanut tolerance, mean (95% CI)
10%*	Cost-Sensitive	1.2 (0.8-1.9)
	Protreatment (but Side-Effect—Averse)	1.8 (1.4-3.4)
	Trader	1.2 (1.2-1.3)
	Inconsistent	1.3 (0.6-2.8)
20%	Cost-Sensitive	1.4 (0.6-2.5)
	Protreatment (but Side-Effect—Averse)	3.3 (1.7-6.9)
	Trader	1.5 (1.3-1.7)
	Inconsistent	1.5 (0.2-4.0)
40%*	Cost-Sensitive	3.3 (1.9-5.3)
	Protreatment (but Side-Effect—Averse)	9.5 (5.8-27.2)†
	Trader	3.9 (3.3-4.6)
	Inconsistent	2.6 (1.2-6.1)
50%	Cost-Sensitive	4.4 (3.0-7.2)†
	Protreatment (but Side-Effect—Averse)	12.5 (7.5-38.4)†
	Trader	5.3 (4.5-6.3)†
	Inconsistent	3.3 (1.4-8.2)

*Interpolated value.

†Extrapolated beyond the highest discontinuation rate (50%) shown in the choice questions.

positive coefficient for failing 1 or more between-question consistency tests. Across all 4 classes, mode of administration had very little importance relative to the other attributes.

Tables II and III contain maximum acceptable discontinuation rates because of side effects for a given level of efficacy and minimum acceptable benefits for a given level of tolerability, respectively. The maximum acceptable discontinuation rate due to side effects for a treatment that offered 4-peanut tolerance ranged from 22% for Protreatment/Side-Effect—Averse parents to more than 50% for Inconsistent parents. This means that Protreatment/Side-Effect—Averse parents were willing to accept a maximum discontinuation rate due to side effects of 22% to choose a treatment that would allow them to be able to tolerate 4 peanuts after 1 year, whereas Trader, Cost-Sensitive, and Inconsistent parents were willing to accept higher discontinuation rates (46%, 41%, and 59%, respectively). In addition, the minimum acceptable peanut tolerance required for a 20% discontinuation rate due to side effects was about 1.5 peanuts for all classes (ie, 1.4, 1.5, and 1.5 peanuts for the Cost-Sensitive, Trader, and Inconsistent groups, respectively) except the Protreatment/Side-Effect—Averse class, who required more than twice as much benefit (3.3 peanuts; Table III). This means that if treatment discontinuation rates due to side effects were 20%, Cost-Sensitive, Trader, and Inconsistent parents would require the treatment to provide tolerance to 1.4, 1.5, and 1.5 peanuts, respectively, and Protreatment/Side-Effect—Averse parents would require the treatment to provide higher tolerance (3.3 peanuts).

Characteristics associated with parents being categorized in a class are presented in Table IV. Unlike the Trader parents, Cost-Sensitive parents were not likely to have a high income, a young

child, perceive chance of death after accidental exposure to be large, or report changes in their peanut allergy behavioral management even after achieving tolerance to 4 peanuts. Protreatment (but Side-Effect—Averse) is the only class for whom previous experience with severe allergic reactions had a significant association with class membership. Being older was the only personal characteristic that was statistically significant in explaining membership likelihood for all 4 classes, and the effect was negative only for the Inconsistent class. In sensitivity analysis, the additional covariate to indicate respondents who reported their children only having lifetime mild reactions (35%) was not statistically significant and did not significantly change the preference subgroups identified.

DISCUSSION

Avoidance of peanut remains standard practice in the management of peanut allergy, but recently approved, and the continuing development of, peanut desensitization therapies will provide new options for providers and parents with children who suffer from peanut allergy. In a national sample of parents, we used a choice experiment to quantify differences in parent trade-off preferences related to peanut desensitization treatments. These preferences could help inform treatment decisions through a shared decision-making process between clinicians and parents. Past studies have evaluated the clinical efficacy⁸⁻¹⁰ and quality-of-life impacts^{12,13} of such peanut desensitization treatments, but to our knowledge, this is the first study to quantify parent preferences related to peanut desensitization treatments. We found 4 unique parent preference subgroups: (1) Cost-Sensitive, (2) Protreatment (but Side-Effect—Averse), (3) Trader, and (4) Inconsistent. Factors influencing which parents belonged to a preference subgroup included age and income level, past allergic-reaction experiences, perceived risk and the child's ability to manage allergic reactions, and impact of treatment on precautionary behaviors. Attention to these factors can help clinicians identify likely patient priorities in evaluating treatment options.

This study found that parents with children who previously had experienced at least 2 severe allergic reactions were more likely to be part of the Protreatment (but Side-Effect—Averse) subgroup. Compared with other subgroups, this subgroup was willing to accept a mean maximum discontinuation rate due to side effects of 12% to 22% to achieve tolerance to 1 to 4 peanuts, respectively. This means that if the treatment being offered allowed recipients to achieve tolerance to 1 peanut after 1 year, then parents in this subgroup would need the discontinuation rate due to side effects associated with the treatment to be 12% or less to choose to have their child take the treatment. Alternatively, if the treatment being offered allowed recipients to achieve tolerance to 4 peanuts after 1 year, parents in this subgroup would need the discontinuation rate due to side effects associated with treatment to be 22% or less to choose to have their child take the treatment. This is in contrast to the Cost-Sensitive, Trader, and Inconsistent parent subgroups, who were willing to tolerate higher discontinuation rates, ranging from 27% to 31% and 41% to 59%, to achieve tolerance to 1 to 4 peanuts, respectively. Current clinical trial evidence suggests that 1-year discontinuation rates (for all reasons and not only side effects) for peanut desensitization treatments range between approximately 10% and 20%,⁸⁻¹⁰ suggesting it is close to the acceptable range for this subgroup, and within the acceptable range for the other preference subgroups. However, not all

TABLE IV. Characteristics positively and negatively associated with latent-class membership

Variable	Cost-Sensitive	Protreatment (but Side-Effect—Averse)	Trader	Inconsistent
Demographic characteristics				
Age >45 y	Positive*	Positive†	Positive*	Negative†
Income >\$120,000	Negative*			
Child age <8 y	Negative*	Negative†		Positive†
Experienced reactions, perceived risk, and ability to manage				
No. of severe allergic reactions in lifetime >1		Positive*		
Perceived minimum amount of peanut that could cause a serious reaction was <1/8 peanut			Positive*	Negative*
Perceived chance of child being able to manage an allergic reaction was less than small (never to very small)	Negative*		Negative*	Positive*
Perceived chance of child being able to manage an allergic reaction was more than great (very big to always)	Negative*		Negative*	Positive†
Perceived chance of death after accidental exposure was less than small (never to very small)	Positive†			
Behavioral management after increase in tolerance to 4 peanuts				
“Always” wiped before sitting at restaurant if tolerance increased to 4 peanuts	Positive*	Positive†		Negative†
Wiped less frequently than baseline if tolerance increased to 4 peanuts	Negative*			
Attention to survey				
Failed at least 1 between-question consistency test	Negative*	Negative†		Positive†
No. of quiz failures			Negative†	Positive*

* $P < .05$.† $P < .01$.‡ $P < .001$.

patients in the clinical trials achieved a 4-peanut tolerance level,⁸⁻¹⁰ and whether the discontinuation rates and treatment benefits seen in real-world settings will be similar to what is seen in clinical trials is not yet known. As evidence emerges, clinicians can use the maximum acceptable risks (discontinuation rates) and minimum acceptable benefits (peanut tolerance) threshold amounts reported in this study to help gauge whether taking a given treatment would be aligned with a parent's preferences, given their preference patterns.

A previous qualitative study involving interviews with parents of children who had undergone peanut desensitization treatments found that these parents wanted their child to develop a buffer against unintentional peanut exposure, but that the perception and impact of the buffer varied.²⁷ Advancing this work, our study reveals how parents' stated treatment preferences differed on the basis of these varying factors. For example, we found that parents who would decrease their precautionary behaviors after treatment were less likely to focus only on costs (Cost-Sensitive subgroup) or side effects (Protreatment, but Side-Effect—Averse subgroup) when selecting treatments. This means that these parents would be more likely to accept larger discontinuation rates due to side effects for the benefit of decreased burden in terms of precautionary behaviors. In addition, parent perception that there was a very small risk of death after accidental exposure also distinguished the Cost-Sensitive subgroup from the Trader subgroup, who considered treatment benefit of similar importance to cost and risk. These findings imply that it is important for clinicians to assess parent perceptions around child ability to manage allergic reactions and potential treatment impacts on the burden of precautionary behavior to help guide treatment decisions.

Peanut allergy management is highly preference-sensitive. Risks of accidental exposure depend on the degree of sensitivity and precautionary behavior. Effective treatment to reduce sensitivity could offer decreased parent anxiety and burden of enforcing social and dietary restrictions on their children.^{5,12,16,17} This study's findings on preference dissimilarities and personal characteristics associated with different preference subgroups are important for helping parents choose how best to manage their child's peanut allergy. Future extensions of this research should explore creation and implementation of shared decision-making tools to help inform provider and patient conversations around optimal preference-aligned management of the child's peanut allergy. Such tools should both account for caregiver preference subgroup heterogeneity and also accurately present complex therapeutic concepts, including how the safety, efficacy, and convenience of therapies change over time. In addition, results from this study could help guide the development of future patient-centered treatments for peanut allergy.

This study's findings should be assessed in light of several limitations. Survey respondents were included in the survey on the basis of being a parent of a child who had received a self-reported physician diagnosis of peanut allergy. Although our online sample was drawn from a national panel, it was not necessarily nationally representative of parents of children who are seen in allergy clinics. In particular, some of the children had little or no experience with severe allergic reactions, and clinicians might assume they would not be interested in desensitization treatment. However, our sensitivity analysis demonstrated our final model and identified preference subgroups were robust and successfully sorted these respondents. In addition, it is not uncommon for families to come to an allergy clinic seeking treatment when the children have had mild or even no allergic

reactions due to the desire to decrease the overall anxiety and burden from avoiding accidental exposure. Furthermore, for feasibility, we used an online sample and limited the sample only to those who spoke English; therefore, we may be under-representing parents who would not engage in an English-only, online survey.

It is important to note that choice experiments elicit stated preferences for tradeoffs. Results should not be used for inferences about actual medication-utilization patterns in the complexity of real-world settings. To fill this knowledge gap, future claims-based studies should evaluate the uptake and adherence to peanut desensitization treatments.

Acknowledgments

We thank Shelby Reed for suggestions on the study design and results presentation, Marcel Jonker for advice on the experimental design, and Ishaan Kumar for research support.

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ONLINE REPOSITORY TEXT

Table E1. Sociodemographic and Allergy-related Characteristics (n=500)

Table E2. Straight-lining

Table E3. Attribute Dominance (Non-compensatory Preferences)

Table E4. Across-Set Dominated-Pair Tests

Table E5. Characteristics Associated with Always Choosing No Treatment

Table E6. Fit and Classification Statistics for Final Latent Class Model

Table E7. Modal Classification Table for Final Latent Class Model

Table E8. Proportional Classification Table for Final Latent Class Model

Appendix. Survey Instrument

Table E1. Sociodemographic and Allergy-related Characteristics (n=500)

Characteristic	
PARENT	
Age, mean (SD)	40.1 (8.9)
Gender, n (%) ^a	
Female	380 (76.0%)
Male	119 (23.8%)
Hispanic, n (%)	41 (8.2%)
Race, n (%)	
White	359 (71.8%)
Black	86 (17.2%)
Asian	51 (10.2%)
Other ^b	21 (4.2%)
Highest level of education, n (%)	
High school or less	64 (12.8%)
Some college but no degree, technical school, associate's degree, or 2-year college degree	165 (33.0%)
4-year college degree (such as BA, BS)	146 (29.2%)
More than a 4-year college degree	125 (25.0%)
Health insurance, n (%)	
Through employer or union	344 (68.8%)
Through state or federal exchange	41 (8.2%)
Medicare	45 (9.0%)
Medicaid	66 (13.2%)
VA or other	24 (4.8%)
None	12 (2.4%)
Income, n (%)	
<\$25,000	32 (6.4%)
\$25,000 - \$49,999	97 (19.4%)
\$50,000 - \$74,999	88 (17.6%)
\$75,000 - \$99,999	91 (18.2%)
\$100,000 - \$149,999	99 (19.8%)
\$150,000 or more	61 (12.2%)
Don't know or prefer not to answer	32 (6.4%)
Number of children, mean (SD)	2.3 (1.1)
Number of children 4-17 years of age diagnosed with peanut allergy, mean (SD)	1.1 (0.3)
Primary responsibility for making decisions about minimizing child's accidental peanut exposure belongs to..., n (%)	
Me	283 (56.6%)
Spouse/partner	39 (7.8%)
Equal responsibility between me and spouse/partner	174 (34.8%)
CHILD WITH PEANUT ALLERGY	

Age, mean (SD)	10.2 (4.2)
Female child, n (%)	205 (41.0%)
Has other food allergies, n (%)	317 (63.4%)
Tree nut	224 (70.7%)
Milk	69 (21.8%)
Egg	97 (30.6%)
Shellfish	78 (24.6%)
Wheat	40 (12.6%)
Soy	52 (16.4%)
Fish	45 (14.2%)
Other	67 (21.1%)
Has required over-the-counter or prescription medicine or treatment in a medical facility for an allergic reaction to peanut, n (%)	371 (74.2%)
Always or almost always has an epinephrine injector pen available, n (%)	388 (77.6%)
Tested for peanut allergy, n (%)	
Skin-prick test	380 (76.0%)
Blood test	327 (65.4%)
Food challenge test	165 (33.0%)
None of the above	28 (5.6%)
Number of mild allergic reactions in last 12 months, mean (SD)	1.5 (3.7)
Number of moderate allergic reactions in last 12 months, mean (SD)	2.9 (45.4)
Number of severe allergic reactions in last 12 months, mean (SD)	0.5 (2.9)
Number of mild allergic reactions in lifetime, mean (SD)	6.7 (16.6)
Number of moderate allergic reactions in lifetime, mean (SD)	5.6 (53.2)
Number of severe allergic reactions in lifetime, mean (SD)	1.3 (6.8)
PARENT'S PERCEPTION OF CHILD'S PEANUT ALLERGY	
Chance that child will eat something to which he/she is allergic, n (%)	
Never (0% chance)	41 (8.2%)
Very small chance	124 (24.8%)
Small chance	128 (25.6%)
Fair chance	135 (27.0%)
Great chance	36 (7.2%)
Very big chance	21 (4.2%)
Always (100% chance)	15 (3.0%)
Chance that child will have severe reaction if he/she accidentally eats something to which he/she is allergic, n (%)	
Never (0% chance)	20 (4.0%)
Very small chance	64 (12.8%)
Small chance	85 (17.0%)
Fair chance	135 (27.0%)
Great chance	71 (14.2%)
Very big chance	75 (15.0%)

Always (100% chance)	50 (10.0%)
Chance that child will die if he/she accidentally eats something to which he/she is allergic, n (%)	
Never (0% chance)	78 (15.6%)
Very small chance	137 (27.4%)
Small chance	93 (18.6%)
Fair chance	93 (18.6%)
Great chance	46 (9.2%)
Very big chance	40 (8.0%)
Always (100% chance)	13 (2.6%)
Chance that child cannot manage his/her allergic reaction, n (%)	
Never (0% chance)	94 (18.8%)
Very small chance	141 (28.2%)
Small chance	111 (22.2%)
Fair chance	66 (13.2%)
Great chance	43 (8.6%)
Very big chance	27 (5.4%)
Always (100% chance)	18 (3.6%)
Smallest amount of peanut parent thinks could cause a serious allergic reaction in child, n (%)	
Less than 1/8 peanut	121 (24.2%)
About the equivalent of 1/8 peanut	46 (9.2%)
About the equivalent of 1/4 peanut	40 (8.0%)
About the equivalent of 1/2 peanut	112 (22.4%)
About the equivalent of 1 peanut	55 (11.0%)
About the equivalent of 2 peanuts	23 (4.6%)
Greater than 2 peanuts	34 (6.8%)
Don't know or not sure	69 (13.8%)
PARENT MANAGEMENT OF CHILD'S PEANUT ALLERGY	
How often one avoids going to restaurants because one is concerned about ability to protect child from accidental exposures in restaurants, n (%)	
Always	38 (7.6%)
Frequently	108 (21.6%)
Sometimes	163 (32.6%)
Rarely	139 (27.8%)
Never	52 (10.4%)
AT BASELINE	
How often one checks the restaurant's web site before dining out to see if there are safe foods on the menu, n (%)	
Always	139 (27.8%)
Frequently	109 (21.8%)
Sometimes	111 (22.2%)
Rarely	84 (16.8%)
Never	57 (11.4%)

How often one checks with the restaurant manager or waiter to make sure utensils, pots/pans, plates, and preparation surfaces have not had contact with peanut, n (%)	
Always	142 (28.4%)
Frequently	89 (17.8%)
Sometimes	94 (18.8%)
Rarely	75 (15.0%)
Never	100 (20.0%)
How often one uses a detergent wipe before sitting at a restaurant to clean the eating area and chair, n (%)	
Always	76 (15.2%)
Frequently	84 (16.8%)
Sometimes	95 (19.0%)
Rarely	88 (17.6%)
Never	157 (31.4%)
ASSUMING TREATMENT INCREASED TOLERANCE TO 4 PEANUTS	
How often one checks the restaurant's web site before dining out to see if there are safe foods on the menu, n (%)	
Always	125 (25.0%)
Frequently	89 (17.8%)
Sometimes	116 (23.2%)
Rarely	86 (17.2%)
Never	84 (16.8%)
How often one checks with the restaurant manager or waiter to make sure utensils, pots/pans, plates, and preparation surfaces have not had contact with peanut, n (%)	
Always	110 (22.0%)
Frequently	80 (16.0%)
Sometimes	109 (21.8%)
Rarely	95 (19.0%)
Never	106 (21.2%)
How often one uses a detergent wipe before sitting at a restaurant to clean the eating area and chair, n (%)	
Always	71 (14.2%)
Frequently	59 (11.8%)
Sometimes	93 (18.6%)
Rarely	106 (21.2%)
Never	171 (34.2%)

^a One participant reported non-binary/third gender

^b Other race includes American Indian or Alaska Native; and Native Hawaiian or other Pacific Islander

Internal-validity tests

Table E2. Straight-Lining

Response Pattern	
Always chose 'No Treatment'	54 (10.8%)
Always chose 'Treatment A'	3 (0.6%)
Always chose 'Treatment B'	1 (0.2%)

Table E3. Attribute Dominance (Non-Compensatory Preferences)

Dominated on...	
Capsule ^a	4 (0.8%)
Patch ^a	4 (0.8%)
Higher Peanut Tolerance ^b	21 (4.2%)
Lower Risk of Discontinuation due to Side Effects ^b	42 (8.4%)
Lower Cost ^{**}	86 (17.2%)

^a Defined as participants who always chose capsule (or patch), when provided as a treatment alternative

^b Defined as participants who always chose the treatment alternative with the higher peanut tolerance, lower risk of discontinuation due to side effects, or lower cost, respectively, when they chose a treatment (i.e., excluding when they chose no treatment)

Table E4. Across-Set Dominated-Pair Tests^a

Number of Failures	
0 Failures	410 (82%)
1 Failure	35 (7%)
>1 Failure	55 (11%)

^a Defined as choosing alternatives in subsequent questions that are better than alternatives that previously were chosen.

Table E5. Characteristics Associated with Always Choosing No Treatment

Characteristic	Marginal-Probability (95% CI)
Mother	0.087 (0.015 – 0.159)
Reports 100% chance of being able to manage an allergic reaction	0.079 (0.021 – 0.136)
Perceives capsule to be ‘very inconvenient’	0.113 (0.053 – 0.173)
Reports cost to be ‘most important’	0.063 (0.011 – 0.115)
Asian	0.077 (0.008 – 0.146)
Age (in one-year increments)	0.005 (0.002 – 0.007)

Table E6. Fit and Classification Statistics for Final Latent Class Model

	Final model
Log-likelihood	-3391.6373
Bayesian information criterion (BIC)	7460.4101
Akaike information criterion (AIC)	7005.2747
Entropy R-squared	0.8938

Table E7. Modal Classification Table for Final Latent Class Model^a

	Class 1	Class 2	Class 3	Class 4	Total
Class 1	132.4464	3.8839	3.2936	0.1106	139.7345
Class 2	4.3133	101.1840	2.6539	0.2371	108.3883
Class 3	3.8852	3.6334	96.6810	0.8095	105.0090
Class 4	0.3551	0.2987	0.3715	91.8429	92.8682
Total	141.0000	109.0000	103.0000	93.0000	446.0000

^a Generated from cross-classifying the latent classes (based on modal classification) by the actual probabilistic classes

Table E8. Proportional Classification Table for Final Latent Class Model^a

	Class 1	Class 2	Class 3	Class 4	Total
Class 1	127.6812	5.9350	5.6946	0.4238	139.7345
Class 2	5.9350	97.2801	4.7246	0.4486	108.3883
Class 3	5.6946	4.7246	93.6521	0.9377	105.0090
Class 4	0.4238	0.4486	0.9377	91.0581	92.8682
Total	139.7345	108.3883	105.0090	92.8682	446.0000

^a Generated from cross-classifying the latent classes (based on proportional classification) by the actual probabilistic classes

APPENDIX. SURVEY INSTRUMENT

YOUR CONCERNS ABOUT TREATMENTS FOR PEANUT ALLERGY

[Insert screener text for physician diagnosis of peanut allergy and no previous experience with desensitization treatment.]

Thank you for agreeing to participate in our study. In this survey, we will ask you questions about avoiding exposure to peanut and possible treatments to reduce sensitivity to peanut. Some of these questions are about choices you already have made, while other questions will ask you to think about future decisions about treatments that might not currently be available.

Understanding your thoughts about peanut allergy is important to doctors and health officials who are helping people who are living with this challenging condition.

About You

S1. What is your age? _____ years

[TERMINATE IF UNDER 18]

S2. What is your gender?

☐

Female

☐

Male

☐

Non-binary/third gender

☐

Prefer not to say

S3. How many children do you have currently living at home with you, and are under your care? _____

DROP DOWN MENU FOR NUMBER OF CHILDREN: 0 TO 10

[TERMINATE IF "0"]

S4. How many children between ages 4 and 17 have been diagnosed with peanut allergy, currently live at home with you, and are under your care? _____

DROP DOWN MENU FOR NUMBER OF CHILDREN: 0 TO 10

[TERMINATE IF "0"]

[NUMBER REPORTED HERE SHOULD BE LESS THAN THE NUMBER IN S3.]

[PARENT VERSION]

S5. [IF ONLY 1 CHILD IN S4] Please use the table below to indicate the age and gender of the child between ages 4 and 17 who has been diagnosed with peanut allergy, currently lives at home with you, and is under your care.

[IF MORE THAN 1 CHILD IN S4] Please use the table below to indicate the age and gender of the children between ages 4 and 17 who have been diagnosed with peanut allergy, currently live at home with you, and are under your care.

	Child #1	Child #2	Child #3
Sex			
Age			

[DROP DOWN MENU FOR AGE: 4 TO 17 AND SEX: MALE, FEMALE. ADD COLUMNS AS NEEDED TO MATCH THE NUMBER OF CHILDREN REPORTED IN QUESTION S4.]

[PARENT VERSION]

S6. [IF ONLY 1 CHILD IN S4] For the child, please indicate “true” or “false” for each of the following statements.

[IF MORE THAN 1 CHILD IN S4] For each of these children, please indicate “true” or “false” for each of the following statements.

	Child #1	Child #2	Child #3
a. This child has other food allergies in addition to peanut allergy.	☐ True ☐ False	☐ True ☐ False	☐ True ☐ False
b. Because of a reaction to peanut, this child required over-the-counter or prescription medicine or treatment in a doctor’s office, urgent care clinic, or emergency room.	☐ True ☐ False	☐ True ☐ False	☐ True ☐ False
c. This child always or almost always has an epinephrine injector pen (such as EpiPen or Auvi-Q) available to treat an allergic reaction to peanut.	☐ True ☐ False	☐ True ☐ False	☐ True ☐ False

[PARENT VERSION]

[IF ONLY 1 CHILD IN S4]

In this survey, we will be asking questions about your child, who is [AGE-SHOW NUMBER ONLY] and [GENDER].

Please think of this child in answering the rest of the questions in this survey.

[IF MORE THAN ONE CHILD IN S4]

S7. Please indicate which of your children has had the most serious reaction to peanuts. When thinking about severity, you should consider allergy symptoms (such as throat swelling, hives, rash, vomiting, or difficulty breathing) and allergy-related unscheduled visits to their doctor or hospital.

- ☐ Child #1 who is [AGE-SHOW NUMBER ONLY] and [GENDER]
- ☐ Child #2 who is [AGE-SHOW NUMBER ONLY] and [GENDER]
- ☐ Child #3 who is [AGE-SHOW NUMBER ONLY] and [GENDER]

In this survey, we will be asking questions about your child with the most serious reaction to peanuts. This is the child you indicated as [CHILD#], who is [AGE-SHOW NUMBER ONLY] and [GENDER].

Please think of the child with the most serious allergy in answering the rest of the questions in this survey.

[If the chosen child also has other food allergies (answered TRUE to QS6.a):]

S8. In addition to peanut, what other food allergies does your child have?

- ☐ Tree nut
- ☐ Milk
- ☐ Egg
- ☐ Shellfish
- ☐ Wheat
- ☐ Soy
- ☐ Fish
- ☐ Other

[PARENT VERSION]

1. Who would you say has the primary responsibility for making decisions about minimizing this child's accidental peanut exposure?

- ☐ I have primary responsibility.
- ☐ My spouse or partner has primary responsibility.
- ☐ My spouse or partner and I have about equal responsibility.
- ☐ Other

2. Which tests for peanut allergy has this child had?

(Check all that apply.)

- ☐ Skin-prick test Result: _____ [Drop-down menu: Positive, Negative or Don't know/not sure]
- ☐ Blood test Result: _____ [Drop-down menu: Positive, Negative or Don't know/not sure]
- ☐ Food challenge Result: _____ [Drop-down menu: Positive, Negative or Don't know/not sure]
- ☐ None of the above

3. Please tell us the kind and number of allergic reactions to peanut your child has experienced in [his or her] lifetime and in the last 12 months.

	Allergic Reaction Severity	Number in the last 12 months	Number during [his or her] lifetime
Mild	Typical Symptoms Hives, rash or swelling; runny nose, sneezing; itching of the mouth or throat; wheeze or shortness of breath; mild abdominal pain. Treatment Oral antihistamines (Benadryl) or albuterol inhaler.		
Moderate	Typical Symptoms Trouble swallowing, hoarseness, shortness of breath, wheezing, or increased work to breathe; abdominal cramping pain, repeated vomiting. Treatment Oral antihistamines (Benadryl), albuterol inhaler, oral steroids. Possibly epinephrine auto injector.		
Severe	Typical Symptoms Severe difficulty breathing with blue coloring of the lips/fingers, confusion, loss of consciousness, loss of control of bowels or bladder. Treatment Epinephrine auto injector or by vein, oxygen, intravenous fluids. May require medical attention by EMS (911) and/or emergency department. Could require hospitalization.		

[PARENT VERSION]

4. How big do you think the chance is that your child:	Never (0% chance)	Very small chance	Small chance	Fair chance	Great chance	Very big chance	Always (100% chance)
Will accidentally eat something to which [he or she] is allergic?	☐	☐	☐	☐	☐	☐	☐
Will have a severe reaction if [he or she] accidentally eats something to which [he or she] is allergic?	☐	☐	☐	☐	☐	☐	☐
Will die if [he or she] accidentally eats something to which [he or she] is allergic?	☐	☐	☐	☐	☐	☐	☐
Cannot do the right things for [his or her] allergic reaction should [he or she] accidentally eat something to which [he or she] is allergic?	☐	☐	☐	☐	☐	☐	☐

Treatment Options for Peanut Allergy

There are treatments being developed for people who have allergic reactions to peanut in their food. These treatments use increasing amounts of medicine containing peanut to help the body gradually develop an ability to tolerate more exposure to peanut.

In this survey, we will ask you to think about 2 kinds of treatments: powder in a capsule and a medicine patch.

Treatment Type: Powder in Capsule

The first treatment is done at a doctor's office. For the next 6 months, your child will visit the doctor every 2 weeks.

During each visit, the doctor will increase the dose of the medicine, and your child will be watched for possible allergic reactions, which usually occur within a few minutes of treatment. Each visit will last about 1 hour.



The table below describes how your child would take the medicine and when [he or she] will take the medicine at the doctor's office and at home during the first 6 months. After the first 6 months, your child will have to continue treatment to maintain or increase [his or her] ability to tolerate peanut. Because your child is taking the treatment by mouth, the amount of peanut in the capsule indicates how much peanut [he or she] can tolerate.

How to Use It	Treatment Schedule at <u>Doctor's Office</u>	Treatment Schedule at <u>Home</u>
▪ Pull the capsule apart, mix the contents with 3-4 spoonfuls of food such as yogurt, applesauce, or pudding, and eat ▪ Take the medicine <u>daily</u> ▪ Avoid taking a bath or shower or vigorous exercise immediately before and within 2 hours after treatment	<u>First 6 months:</u> Treatment in doctor's office every 2 weeks	<u>First 6 months:</u> Once a day at home between doctor visits <u>After first 6 months:</u> Once a day at home

Treatment Type: Patch on Skin

The first patch is applied at a doctor's office. While at the doctor's office, your child will be watched for possible allergic reactions, which usually occur within a few minutes of treatment. The visit will last about 1 hour.



After the first patch, you will apply the patches at home. The table below describes how you will apply the patch and how long your child will need to wear the patch each day during the first month and later. After the first month, your child will have to continue treatment to maintain or increase [his or her] ability to tolerate peanut. Because the treatment is not taken by mouth, your child would need a test by a doctor if you wanted to know how much peanut [he or she] can tolerate.

How to Use It	Treatment Schedule at Doctor's Office	Treatment Schedule at Home
▪ Patch is placed on the child's back. ▪ Change the patch <u>daily</u>	Only the first treatment	▪ <u>First week:</u> 3 hours a day with gradual increase to 6 hours a day ▪ <u>Second week:</u> 12 hours a day ▪ <u>Third week on:</u> 24 hours a day

[PARENT VERSION]

5. Which treatment requires a doctor's visit every two weeks for the first 6 months?
- ☐ Powder in capsule
 - ☐ Patch on skin
 - ☐ Both
 - ☐ Don't know or not sure
6. During each doctor's visit, which treatment requires watching for possible allergic reactions?
- ☐ Powder in capsule
 - ☐ Patch on skin
 - ☐ Both
 - ☐ Don't know or not sure
7. Which treatment requires continued use to maintain or increase ability to tolerate peanut?
- ☐ Powder in capsule
 - ☐ Patch on skin
 - ☐ Both
 - ☐ Don't know or not sure
8. Which treatment allows you to know how much peanut your child can tolerate without a test?
- ☐ Powder in capsule
 - ☐ Patch on skin
 - ☐ Both
 - ☐ Don't know or not sure

9. How convenient do you think each of these treatments is?

	Very Inconvenient	Somewhat Inconvenient	Neither Convenient Nor Inconvenient	Somewhat Convenient	Very Convenient
 Powder in capsule	☐	☐	☐	☐	☐
 Patch on skin	☐	☐	☐	☐	☐

Treatment Benefit: Average amount of peanut tolerated after 1 year of treatment

People who are allergic to peanuts could have a serious allergic reaction from an accidental exposure to peanut. A serious allergic reaction causes your child's immune system to over-react. Blood pressure drops suddenly, airways narrow, and [he or she] has a hard time breathing, may lose consciousness, or may lose control of bowels or bladder. Milder symptoms can include a rapid, weak pulse; a skin rash; stomach pain; itching or tingling of the mouth and throat; and nausea and vomiting.

If your child experiences a serious allergic reaction, [he or she] will need immediate medical attention with adrenaline (epinephrine) to avoid serious health problems. Adrenaline can be self-administered using an injector pen (such as EpiPen) or given in an emergency room or hospital. Epinephrine also can be used after an accidental exposure with milder symptoms to prevent the reaction from becoming more serious.

People with peanut allergy take care to avoid situations where they could have an accidental exposure to peanut. The allergy medicines we have described can increase the amount of peanut they can tolerate, which lowers the chance of serious reaction following an accidental exposure. As a result, people could decide they don't have to worry so much about accidental exposures.



[PARENT VERSION]

Each year about 6% of children with peanut allergy have a serious allergic reaction from accidental peanut exposure. However, children's ability to tolerate peanut varies and different parents take different actions to reduce their children's chances of an accidental exposure.

10. Eating a restaurant meal is a possible situation that could result in an accidental exposure. How often do you avoid going to restaurants because you are concerned about your ability to protect your child from accidental exposures in restaurants?

- ☐ Always
- ☐ Frequently
- ☐ Sometimes
- ☐ Rarely
- ☐ Never

11. Please indicate how often you take each of the following actions.

Action	Always	Frequently	Sometimes	Rarely	Never
Check the restaurant's web site before dining out to see if there are safe foods on the menu.	☐	☐	☐	☐	☐
Check with the restaurant manager or waiter about whether utensils, pots/pans, plates, and preparation surfaces have not had contact with peanut.	☐	☐	☐	☐	☐
Use a detergent wipe before sitting at a restaurant table to clean the eating area and chair.	☐	☐	☐	☐	☐

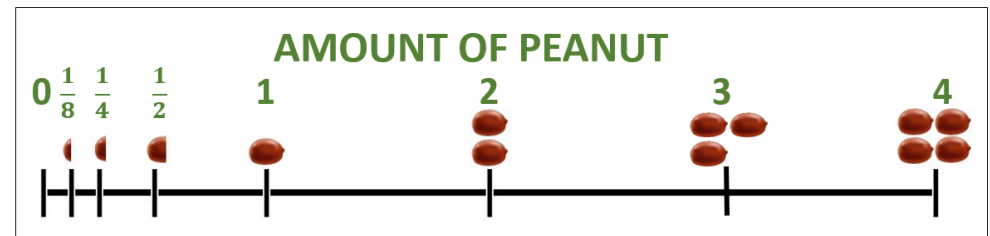
[PARENT VERSION]

About half of accidental exposures involve less than the equivalent of about ½ peanut.

12. What is the smallest amount of peanut exposure that you think could cause a serious allergic reaction in your child?

Remember: A serious reaction can involve a sudden drop of blood pressure, airway narrowing, difficulty breathing, loss of consciousness, or loss of control of bowels or bladder. The person with allergy or family member often can treat it with an epinephrine injector pen. It may not require a visit to an urgent-care or emergency room.

- ☐ Less than $\frac{1}{8}$ peanut
- ☐ About the equivalent of $\frac{1}{8}$ peanut
- ☐ About the equivalent of $\frac{1}{4}$ peanut
- ☐ About the equivalent of $\frac{1}{2}$ peanut
- ☐ About the equivalent of 1 peanut
- ☐ About the equivalent of 2 peanuts
- ☐ Greater than 2 peanuts
- ☐ Don't know or not sure

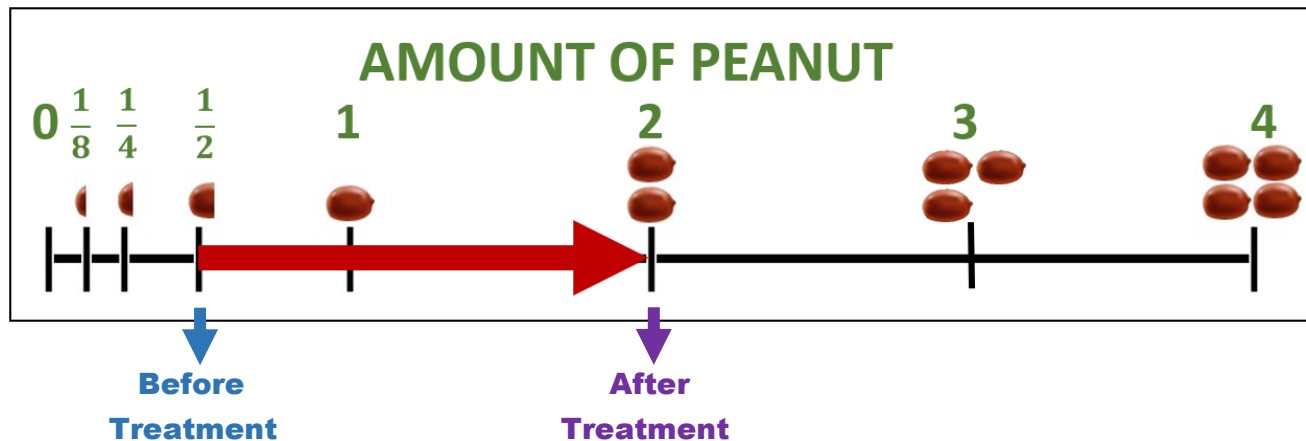


Peanut-allergy treatments can reduce sensitivity so that a child can tolerate up to 4 peanuts.

[PARENT VERSION]

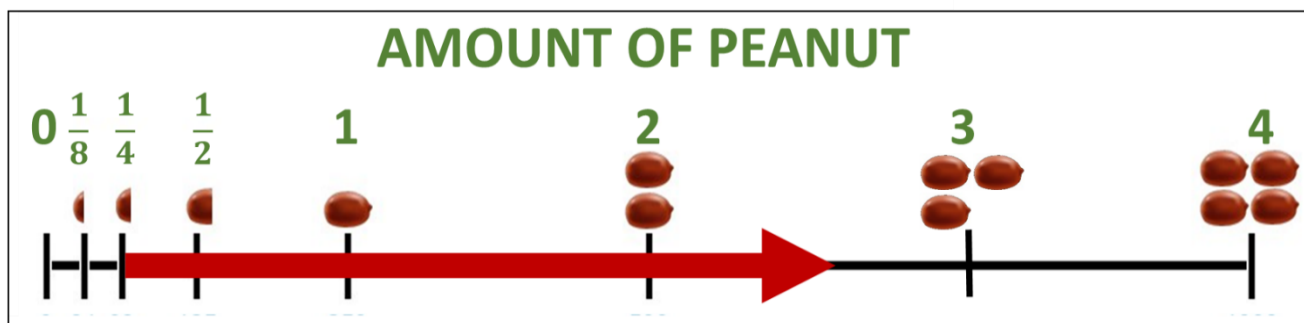
Doctors do not know how much benefit people will get from treatment with capsules or patches. However, based on their experience with large numbers of patients, doctors know how many people on average have benefited. That information can help you think about your child's chance of benefiting from treatment.

Later in this survey, we will use pictures like this to help you think about treatments that can increase the amount of peanut your child could be exposed to without having a serious allergic reaction.



This picture shows that before treatment, accidental exposure to about $\frac{1}{2}$ peanut could cause a serious allergic reaction.

After 1 year of treatment, the picture shows that on average, people could tolerate about 2 peanuts without causing an allergic reaction. That means the average ability to tolerate peanut increased from $\frac{1}{2}$ peanut to 2 peanuts.



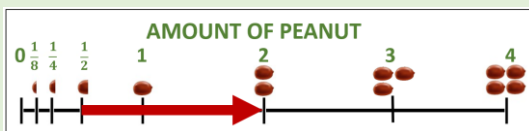
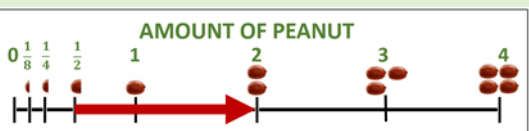
13. According to this picture, how much peanut could cause a serious allergic reaction before treatment?

- ☐ $\frac{1}{4}$ peanut
- ☐ 2 peanuts
- ☐ $2\frac{1}{2}$ peanuts
- ☐ 3 peanuts

14. According to this picture, on average how much peanut could be tolerated after treatment?

- ☐ $\frac{1}{4}$ peanut
- ☐ 2 peanuts
- ☐ $2\frac{1}{2}$ peanuts
- ☐ 3 peanuts

This table shows two treatments that have the same improvement in ability to tolerate peanut.

	Treatment A	Treatment B
Treatment type	 Powder in capsule	 Patch on skin
Average amount of peanut tolerated after 1 year	 Increased from $\frac{1}{2}$ peanut to 2 peanuts	 Increased from $\frac{1}{2}$ peanut to 2 peanuts

15. Using the information we have given you, which treatment would you choose?

- ☐ Treatment A
- ☐ Treatment B
- ☐ Either one would be OK.

Treatment Side Effects: How many people stopped treatment by 1 year because of side effects

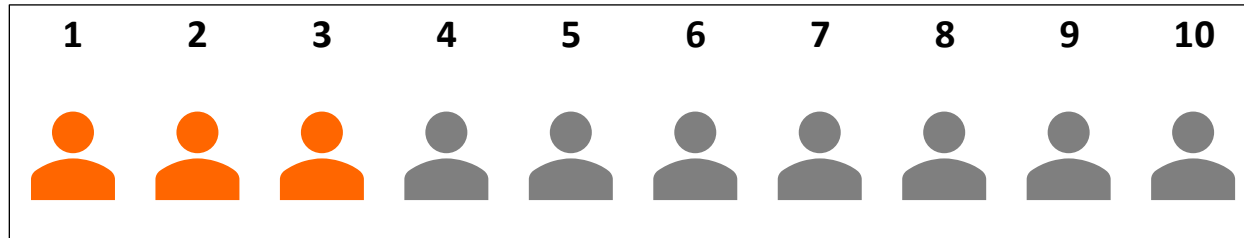
Because the peanut-allergy treatments contain small amounts of peanut, they may cause allergic-reaction symptoms. These side effects usually can be treated with over-the-counter or prescription medicines. However, the treatment itself could result in a serious allergic reaction. These side effects have caused some people to stop particular peanut-allergy treatments.

These allergic reactions are caused by intentional exposure to peanut, instead of by accidental exposure. Intentional exposure involves small and increasing amounts of peanut in a supervised setting such as a home or doctor's office. In a supervised setting, there is someone available to use an epinephrine injector pen at the first sign of allergic reactions. In contrast, accidental exposures are far more dangerous because they can occur under any circumstances and there may not always be someone present to provide help.

[PARENT VERSION]

Later in this survey, we will use pictures like this to show how many people stopped treatment because of side effects.

This picture has 10 figures. Each figure represents a person who started a peanut-allergy treatment.

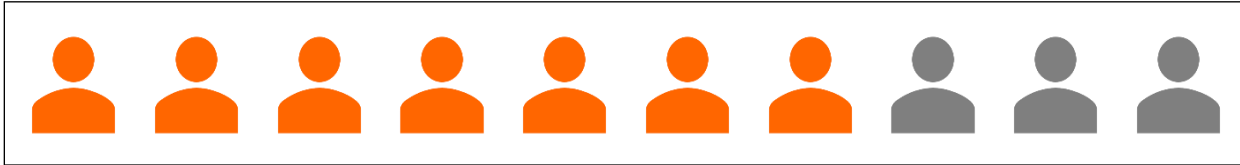


The **orange** figures show the number of people who stopped treatment by 1 year because of side effects. The picture has 3 **orange** figures. That means 3 out of 10 people (30%) stopped treatment by 1 year.

The **gray** figures show the number of people who did not stop treatment by 1 year because of side effects. The same picture above has 7 **gray** figures. That means 7 out of 10 people (70%) did not stop treatment by 1 year.

[PARENT VERSION]

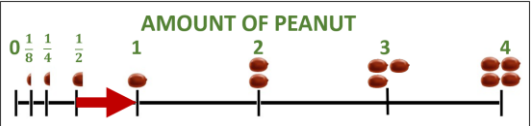
Based on what you just read, please answer the following question using this picture.



16. How many people stopped treatment by 1 year because of side effects?

- ☐ 3 out of 10 people (30%)
- ☐ 5 out of 10 people (50%)
- ☐ 7 out of 10 people (70%)
- ☐ 9 out of 10 people (90%)
- ☐ Don't know / not sure

Here are another two possible treatments.

	Treatment A	Treatment B
Treatment type	 Powder in capsule	 Patch on skin
Average amount of peanut tolerated after 1 year	 Increased from $\frac{1}{2}$ peanut to 2 peanuts	 Increased from $\frac{1}{2}$ peanut to 1 peanut
How many stopped treatment by 1 year because of side effects	 5 out of 10 (50%)	 2 out of 10 (20%)

Please use the information in this table to answer the questions on the next page.

17. True or false

After 1 year of treatment, people who took the medicine by mouth, on average, could tolerate a greater amount of peanut without causing an allergic reaction than people who used the patch.

- ☐ True
- ☐ False
- ☐ Don't know / not sure

18. True or false

Compared to people who used the patch, people who took the medicine by mouth were less likely to stop treatment by 1 year because of side effects.

- ☐ True
- ☐ False
- ☐ Don't know / not sure

19. If these were the only options for your child, which treatment would you choose?

- ☐ Treatment A
- ☐ Treatment B
- ☐ Neither
- ☐ Don't know / not sure

Treatment Cost: Personal Cost of Treatment

We would like you to think about what you personally would pay for these peanut-allergy treatments. These costs include not only copays for the medicine and doctor visits to administer the drug, but also over-the-counter medicines, travel, parking and other costs not covered by insurance.

In this survey we will ask you to consider different amounts of costs that you personally would have to pay related to your child's treatment.

Choices Among Treatment Options

We now will ask you 13 questions in which you will compare treatment options. Please think about what you would do if you really had to decide whether your child should get a treatment for peanut allergy or not.

As you consider your choices, please keep these things in mind.

- The contents of the capsule are mixed with yogurt, applesauce, or pudding and must be taken daily.
- The patch is placed on the child's back and must be changed daily.
- Peanut-allergy treatment is not a cure. Most people will have to continue taking the medicine indefinitely to keep or improve the amount of peanut tolerated.

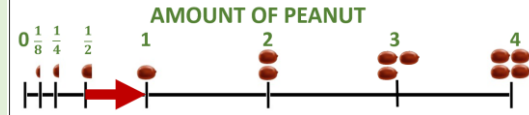
The options we will show you do not necessarily describe actual treatments now available. However, better and more convenient treatments could be developed in the future.

It is possible that your child's allergy experience has been different from what is described in the survey. Please use the information we provide in answering these questions. It is important that everyone who takes this survey use the same information.

Your answers are very important for this study. They will help patients and doctors make better decisions about peanut-allergy treatments.

20. Here are 2 possible peanut allergy medicines and No Treatment.

Which one of the 3 alternatives would you choose if these were your only options?

	No Treatment	Treatment A	Treatment B
Treatment type	NONE	 Powder in capsule	 Patch on skin
Average amount of peanut tolerated after 1 year	NO CHANGE	 Increased from $\frac{1}{2}$ peanut to 4 peanuts	 Increased from $\frac{1}{2}$ peanut to 1 peanut
How many stopped treatment by 1 year because of side effects	NONE	 5 out of 10 (50%)	 0 out of 10 (0%)
Personal cost of treatment	NONE	\$480 per year (\$40 per month)	\$480 per year (\$40 per month)

☐

No treatment

☐

Treatment A

☐

Treatment B

- 21. Choice question #2
- 22. Choice question #3
- 23. Choice question #4
- 24. Choice question #5
- 25. Choice question #6

26. Which one of the 3 alternatives do you think your spouse or partner would choose?

☐ No treatment

☐ Treatment A

☐ Treatment B

☐ Not applicable

27. [If child is between the ages of 12 and 17]

If your child preferred a different option to the one you chose, would you change your choice?

☐ Yes

☐ No

We have several more choice questions to ask you, but we are interested in how you have been thinking about these questions so far.

28. In answering the choice questions, what feature has been most important to you and what feature has been least important to you?

	MOST Important (Check <u>one</u>)	LEAST Important (Check <u>one</u>)
Treatment type	☐	☐
Average amount of peanut tolerated after 1 year	☐	☐
How many stopped treatment by 1 year because of side effects	☐	☐
Personal cost of treatment	☐	☐

- 29. Choice question #7
- 30. Choice question #8
- 31. Choice question #9

32. Please check the answer below that best describes how difficult the choice questions are for you.

- ☐ Very easy
- ☐ Somewhat easy
- ☐ Neither easy nor difficult
- ☐ Somewhat difficult
- ☐ Very difficult

33. Please check the answer below that best describes how certain you are about your answers.

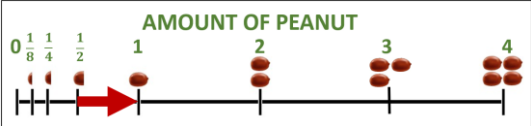
- ☐ Very certain
- ☐ Somewhat certain
- ☐ Neither certain nor uncertain
- ☐ Somewhat uncertain
- ☐ Very uncertain

We appreciate the time and attention you are giving to this important study. We need your help in answering a few more choice questions.

- 34. Choice question #10
- 35. Choice question #11
- 36. Choice question #12

37. [HEAD-TO-HEAD COMPARISON. Will appear at a random position in the question sequence.]

Which one of the 3 alternatives would you choose if these were your only options?

	No Treatment	Treatment A	Treatment B
Treatment type	NONE	 Powder in capsule	 Patch on skin
Average amount of peanut tolerated after 1 year	NO CHANGE	 Increased from $\frac{1}{2}$ peanut to 4 peanuts	 Increased from $\frac{1}{2}$ peanut to 1 peanut
How many stopped treatment by 1 year because of side effects	NONE	10 out of 100 (10%)	1 out of 100 (1%)
Personal cost of treatment	NONE	\$1,200 per year (\$100 per month)	\$600 per year (\$50 per month)

☐

No treatment

☐

Treatment A

☐

Treatment B

38. [If chose Treatment A or Treatment B in Q37]

How many stopped because of side effects is an overall average. How likely do you think it is that people like you would stop treatment during the first year?

- ☐ They would be very unlikely to stop treatment
- ☐ They would be unlikely to stop treatment
- ☐ They would be somewhat likely to stop treatment
- ☐ They would be likely to stop treatment
- ☐ They would be very likely to stop treatment

39. [If chose Treatment A or Treatment B in Q37]

Which feature do you think would have the greatest influence on your own decision to stop treatment?

- ☐ Type of treatment
- ☐ Effect on amount of peanut tolerated
- ☐ Side effects
- ☐ Cost
- ☐ Other

Peanut Allergy Treatment Cost

So far, in this survey we have asked about your preferences for peanut-allergy treatments that could increase peanut tolerance to up to the equivalent of 4 peanuts after 1 year of treatment. The next set of questions will ask you to think about a treatment that could increase peanut tolerance to the equivalent of 8 peanuts after 2 years of treatment.

Suppose a new treatment could increase peanut tolerance to the equivalent of 8 peanuts after 2 years.

Treatment type	 Powder in capsule
Average amount of peanut tolerated after 2 years	 Increased from 1/2 peanut to 8 peanuts
How many stopped treatment by 2 years because of side effects	10 out of 100 (10%)

[Randomly assign respondents to an initial cost. The levels are \$600 over two years (\$25 per month), \$1,200 over two years (\$50 per month), \$2,400 over two years (\$100 per month), and \$4,800 over two years (\$200 per month.)]

40. Would you pay [\$600 over two years (\$25 per month) **OR** \$1,200 over two years (\$50 per month) **OR** \$2,400 over two years (\$100 per month) **OR** \$4,800 over two years (\$200 per month)] for this treatment?

- ☐ Yes [GO TO Q43]
- ☐ No [GO TO Q41]
- ☐ Don't know or not sure [GO TO Q41]

[If No or Don't know to Q40]

41. Would you pay [half of the amount shown in Q40] for the same treatment?

- ☐ Yes [GO TO Q45]
- ☐ No [GO TO Q42]
- ☐ Don't know or not sure [GO TO Q42]

[If No or Don't know to Q41]

42. Would you pay anything for the same treatment?

- ☐ Yes [GO TO Q44]
- ☐ No [GO TO Q45]
- ☐ Don't know or not sure [GO TO Q45]

[If Yes to Q40]

43. Would you pay [twice the amount shown in Q40] for the same treatment?

- ☐ Yes [GO TO Q44]
- ☐ No [GO TO Q45]
- ☐ Don't know [GO TO Q45]

[If Yes to Q42 or Yes to Q43]

44. What is the most you would pay for the same treatment?

\$ _____ per month [IF YES TO Q42, AMOUNT REPORTED SHOULD BE LESS THAN THE AMOUNT SHOWN IN Q41. IF YES TO Q43, AMOUNT REPORTED SHOULD BE GREATER THAN THE AMOUNT SHOWN IN Q43]

Avoiding Accidental Exposures

Now we would like you to think about how treatments that help make your child less sensitive to peanut could affect actions you take to reduce your child's chance of an accidental exposure.

45. [\[If response to Q12 was <1 peanut\]](#) We asked you earlier about how often you take each of the following actions. Here are your responses:

[\[Show previous responses from Q11.\]](#)

Suppose treatment increased peanut tolerance to the equivalent of 1 peanut. How often do you think you would do the following?

Action	Always	Frequently	Sometimes	Rarely	Never
Check the restaurant's web site before dining out to see if there are safe foods on the menu.	☐	☐	☐	☐	☐
Check with the restaurant manager or waiter about whether utensils, pots/pans, plates, and preparation surfaces have not had contact with peanut.	☐	☐	☐	☐	☐

[PARENT VERSION]

Use a detergent wipe before sitting at a restaurant table to clean the eating area and chair.	☐	☐	☐	☐	☐
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46. Again, here are your earlier responses:

[\[Show previous responses from Q11.\]](#)

Suppose treatment increased peanut tolerance to the equivalent of 4 peanuts. How often do you think you would do the following?

Action	Always	Frequently	Sometimes	Rarely	Never
Check the restaurant's web site before dining out to see if there are safe foods on the menu.	☐	☐	☐	☐	☐
Check with the restaurant manager or waiter about whether utensils, pots/pans, plates, and preparation surfaces have not had contact with peanut.	☐	☐	☐	☐	☐
Use a detergent wipe before sitting at a restaurant table to clean the eating area and chair.	☐	☐	☐	☐	☐

A Few More Questions About You

Thank you again for your help with this important survey. We are almost finished. We would appreciate your giving us some additional information about you and your family.

B1. Do you consider yourself Hispanic/Latino?

☐ Yes

☐ No

B2. Which of the following racial descriptions best describes you?

(More than one choice is acceptable.)

☐ American Indian or Alaska Native

☐ Asian

☐ Black or African American

☐ Native Hawaiian or Other Pacific Islander

☐ White

B3. What is the highest level of education you have completed?

(Check only one answer.)

- ☐ Less than high school
- ☐ Some high school
- ☐ High school or equivalent (such as GED)
- ☐ Some college but no degree
- ☐ Technical school
- ☐ Associate's degree or 2-year college degree
- ☐ 4-year college degree (such as BA, BS)
- ☐ Some graduate school but no degree
- ☐ Graduate or professional degree (such as MBA, MS, MA, MD, PhD)

B4. How do you get your health insurance?

- ☐ Through a state or federal insurance exchange
- ☐ Through my (or another person's) employer or union
- ☐ Medicare
- ☐ Medicaid
- ☐ Veterans affairs
- ☐ Other
- ☐ I do not have health insurance

B5. What was your total household income before tax and other deductions in 2018?

- ☐ Less than \$25,000
- ☐ \$25,000 to \$49,999
- ☐ \$50,000 to \$74,999
- ☐ \$75,000 to \$99,999
- ☐ \$100,000 to \$149,999
- ☐ \$150,000 to \$199,999
- ☐ \$200,000 or more
- ☐ Do not know or not sure
- ☐ Prefer not to answer

Thank you for participating in this study.

Your answers to our questions will help doctors and health officials make decisions about new treatments for people who are living with peanut allergy.