

ORIGINAL ARTICLE

How do teenagers manage their food allergies?

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Experimental
Allergy

Summary

Background The peak incidence of deaths from anaphylaxis associated with nut allergy occurs in teenagers and young adults. During adolescence, the management of food allergy shifts from being the responsibility of parents to that of the young person. This is a group who therefore need special attention in the clinic.

Objective This study aimed to understand the practical challenges that teenagers with food allergy experience using a qualitative approach and generate potential interventions for tackling these.

Methods Teenagers aged 11–18 years with food allergy completed a questionnaire about their food allergy and underwent a focused, semi-structured interview with open questions guided by *a priori* topic areas. Interviews were recorded, transcribed and analysed using a thematic approach.

Results The study enrolled 18 teenagers with a median age of 15 years (10 females); the most common food allergens were peanuts and tree nuts. Three key themes emerged: avoidance of allergens, preparation for reactions and the treatment of reactions. The majority of teenagers reported eating foods labelled as 'may contain' an allergen as they perceive that they are actually very unlikely to contain an allergen. Many of the teenagers only carried their self-injectable adrenaline when they thought they are particularly at risk of a reaction. Some do not know how to appropriately treat an allergic reaction. More than half believed that educating other students at school about the seriousness of food allergies would make it easier to live with their food allergy.

Conclusions A significant number of teenagers demonstrate risk-taking behaviour in the management of their food allergies. Teenagers also felt it would be helpful for their peers to be educated about food allergy. This novel strategy might help them to avoid trigger foods and enable teenagers to access help more readily if they suffer a reaction.

Keywords food allergy, paediatrics, quality of life

Submitted 16 December 2009; revised 4 May 2010; accepted 17 June 2010

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Introduction

Food allergy affects 2.3% of 11- and 15-year-old children [1] and anaphylaxis related to food allergy is responsible for about 10 deaths annually in the United Kingdom [2]. Teenagers are a particularly high-risk group, with the peak incidence of deaths from anaphylaxis associated with nut allergy occurring in the 15–24-year age group [3]. The management of food allergy comprises the avoidance of trigger foods, and preparation for, recognition of and management of reactions. Previous studies have highlighted the difficulty in allergen avoidance including insufficient education and guidance, unclear ingredient information on food products and the lack of knowledge

among food establishment personnel [4–7]. Patients at risk of anaphylaxis should carry a self-injectable adrenaline (SIA) device (an autoinjector) at all times and, along with family, friends and teachers, need to be educated in when and how to administer it [8–10]. However, previous research has demonstrated that patients with food allergy and parents of children with food allergy often do not carry their adrenaline as recommended and are poorly equipped to deal with reactions [11–13].

Adolescence is a time of rapid physical, cognitive, psychological and social development. Young people must adapt to their additional rights and responsibilities and develop greater self-reliance [14]. The health of the individual switches from being the responsibility of their

parents to that of themselves [15]. Their risk of exposure increases as, for example, they are increasingly eating out with friends rather than family. Unfortunately, this increased risk does not always result in greater vigilance [16]. A recent North American internet-based survey found that many teenagers with food allergy engage in risk-taking behaviour such as eating food labelled as 'may contain' and not always carrying rescue medication [13].

The practical problems faced by teenagers with food allergy, and their rationale for their approach to their food allergy, have not been examined in detail. To understand the teenager's perspective, an interview-based, qualitative approach is required to explore their views [17]. The aim of this study was to determine how teenagers actually manage their food allergies and identify the barriers to appropriate management in order to generate ideas for improving concordance.

Methods

Design and participants

A qualitative study with focused semi-structured interviews was conducted with teenagers with food allergy. Participants were recruited from the Children's Allergy Clinic at Southampton University Hospital Trust. The 11–18-year age group was chosen as this is a period of increasing autonomy from their parents. The other inclusion criterion was IgE-mediated food allergy diagnosed on the basis of a typical history with a positive skin prick test, serum-specific IgE or food challenge. Participants were excluded if their quality of life (QoL) was impaired by other co-morbidities excluding asthma and allergic rhinitis. Purposive sampling was used to ensure that there was representation from both male and females and both younger and older teenagers. Sampling ceased when data saturation had been achieved. Informed consent was obtained from all participants and their parents, where they were <18 years of age. Ethical approval was obtained from the Southampton and South West Hampshire Research Ethics Committee (08/H0504/108).

Questionnaire assessment

All participants completed a questionnaire developed from one that has been used previously in an internet-based survey of adolescents with food allergy [18]. This was designed to provide a description of their demographic features, food allergies, co-morbid disease and how they managed their food allergy.

Interview

Focused semi-structured interviews were conducted with open questions guided by topic areas developed from our

own clinical experience and our own and others' research experience [19]. Topics included food allergy, avoidance, managing allergic reactions, family/home, friends/peers, school/work, hobbies, travelling away from home and education/support. Questions were flexible and responsive to each teenager's narrative. Interviews took place in a quiet room in the paediatric outpatient clinic. Parents were not present during the interview to ensure that the young person's views were heard. Interviews lasted 30–60 min and were audiotaped. Recordings of interviews with participants were then transcribed into an anonymized transcript in Microsoft Word. All interviews were conducted by one investigator (H. M.) between October 2008 and April 2009.

Data analysis

Questionnaire data are presented as the number and percentage of subjects. The median values and interquartile ranges were calculated.

Interview transcripts were analysed using a thematic approach. Transcripts were coded into the topic areas described above and thematic content analysis was used to draw themes from the data. The emerging themes were explored in greater depth in later interviews. The results are presented in terms of the concepts that emerged. Reference was made to the number of participants fitting into each theme or sub-theme (great majority/most means more than three-quarters, majority/many means half to three-quarters, some/a minority equates to a quarter to under a half, a small minority/a few means under a quarter [20]).

The validity of the qualitative data was ensured in a number of ways. Firstly, several of the interview transcripts were coded independently by two investigators (H. M. & G. R.) to ensure that coding was similar. Secondly, the results were compared with the questionnaire data. Finally, emerging themes were externally validated in discussion with an experienced multidisciplinary team including paediatricians, clinical nurse specialists, dietitians, psychologists and patient representatives.

Results

Twenty-five teenagers were approached and 18 participated. The most common reason for refusal was lack of time. Participants (10 females) were all white British, aged 11–18 (median 15) years, and represented the breadth of socio-economic status in terms of maternal education. All had peanut or tree nut allergies and almost all had co-existing atopic disease (Table 1). They had experienced a median of 5 (range 1 to 'lots') food-related allergic reactions; 14 had experienced reactions within the previous 2 years. Many reported breathing difficulties during a reaction, suggesting that they had experienced a severe

Table 1. Characteristics of the participants

Food allergies	Allergic reactions	Positive skin-prick test (mm)*	Positive specific IgE (kU/l)*	Positive food challenge	Associated medical conditions
Peanut, tree nuts	Rhinitis, conjunctivitis, itchy throat	6 (almond)	—	—	None
Tree nuts	DIB, tingling throat, angiooedema, rash	9 (hazelnut)	30.8 (Brazil)	—	A
Peanut, tree nuts	DIB, angiooedema	11 (peanut)	—	—	A, E
Tree nuts	DIB, vomiting, angiooedema	9 (cashew)	—	—	A, E, PA, H, HDMA
Peanut	Itchy throat, wheeze	10	1.4	—	A, E, PA, H, HDMA
Peanut, tree nuts	Shaking, feeling unwell	9 (peanut)	—	—	A, E, PA, HDMA
Peanut, tree nuts, seafood	Angiooedema, itchy throat, DIB, vomiting	11 (Brazil)	1.63 (Brazil)	Yes (Brazil)	A, H
Peanut, tree nuts	Sore tickly throat, cough, urticaria	8 (peanut)	16.1 (peanut)	Yes (peanut)	A, PA
Peanut, tree nuts	DIB, tight chest, angiooedema, collapse	13 (Brazil)	—	—	E, H
Peanut, tree nuts, egg white	Tingling tongue, throat and lips, urticaria, angiooedema, itchy neck	9 (peanut)	—	Yes (egg, walnut)	A, E, PA
Peanut, tree nuts	Urticaria, angiooedema, erythema	19 (cashew)	—	—	A, E, PA, H, HDMA
Egg, tree nuts	Wheeze, diarrhoea, angiooedema, rash	3 (egg)	—	Yes (egg, cashew)	A, E, PA, H, HDMA
Peanut, tree nuts	Pruritus, urticaria, diarrhoea, vomiting, rash	13 (peanut)	—	—	H, HDMA
Egg, peanut	Angiooedema	9 (peanut)	95.5 (egg)	—	A, E, PA, H
Peanut, soya, tree nuts	Urticaria, angiooedema	9 (peanut)	—	—	A, E, PA, H
Peanut	Tingling throat, nausea, vomiting	7 (peanut)	0.65 (peanut)	Yes (peanut)	A, E, PA, H
Peanut, tree nuts	Pruritus, DIB, wheezy, lower lip swelling	4 (peanut)	43.2 (hazelnut)	—	A, H
Tree nuts	Urticaria, angiooedema	3 (hazelnut)	1.43 (hazelnut)	Yes (hazelnut)	A, PA, H, HDMA

To maintain anonymity, participant ages are not displayed in this table.

*Where individuals have more than one food allergy, the largest skin-prick test weal or greatest specific IgE result is stated. Results from the previous 3 years.

DIB, difficulty in breathing; A, asthma; E, eczema; PA, pet allergy; H, hayfever; HDMA, house dust mite allergy.

reaction. All had been prescribed SIA devices but only two had used them, although 16 reported a previous allergic reaction in which they experienced breathing problems.

Qualitative data – emerging themes

Three main management themes emerged from the interviews: avoidance of allergens, being prepared for reactions and treating reactions. Other themes included family and home, school and work, friends and peers, and allergy education.

Allergen Avoidance

Reading and responding to food labels (Box 1). Interviews revealed that the majority of teenagers only checked the labels of new foods or when they felt unsure. A third cited, in the questionnaire, not checking ingredients as the reason for their last reaction (Table 2). More than three-quarters ate foods labelled with 'may contain' labels (Table 2). At interview, teenagers explained that they avoid different 'may contain' foods depending on the wording.

For example some would eat items labelled 'may contain' nuts unless it was made in a peanut factory (Box 1). This assumed that the food labelling indicated the risk that the product contains nuts. More than half admitted trying food that might contain an allergen (Table 2). A few said that they initially try a small amount of such a food and then wait to see what happens. In general, responses did not relate to whether or not participants had previously experienced an anaphylactic reaction. Several ideas emerged for making avoidance easier; these were an increase in the availability of nut-free foods; simpler, more consistent allergy warnings; and less use of defensive 'may contain' warnings to provide a wider choice of products.

Avoiding allergens in different situations. It emerged that teenagers adjusted their approach to allergen avoidance depending on the situation. In familiar environments, with people they knew or with their SIA to hand, the majority would take more risks with what they eat. The majority of interviewees also acknowledged difficulties when eating restaurant or take-away food (Box 1):

Box 1. Reasons for avoiding or not avoiding particular foods

Unclear or confusing labelling

P14 (F11): *Well I think some of it's, like, 'this product has no nuts' and then below it says 'cannot guarantee that this product is nut-free'. So I find that a bit strange, because they say it hasn't got nuts and then suddenly they say they can't guarantee it, so it's a bit annoying*

Not believing labels

P9 (F18): *Yeah, so it's just a judgement thing really because most companies put it on there just in case to save their backs really*

Believe the chance of the food actually containing the allergen is low

P10 (F17): *I have all the 'may contain traces of nuts' things because the chances are quite small, even though I know it has happened*

Avoidance behaviour depends on the form of words used on the label

P3 (M11): *I read the labels and if it says 'may contain traces of nuts' but it's not made in a peanut factory or something like that then I'd eat it, but if it said 'may contain traces of peanuts' then I definitely wouldn't eat it*

Eaten product before with no reaction

P4 (F11): *... if it's something that I've had before and it says 'may contain' on it then I'll probably eat it, but if it says 'may contain' or 'not suitable' and I haven't had it before then I probably won't eat it*

Challenging situation, e.g. restaurant

P10 (F17): *I think it's quite good in some restaurants though that they put by the side of it an 'N' or something... and at the bottom of the menu it sometimes says if you have a nut allergy or a fish allergy or whatever, to contact the chef and he'll be able to help you and that's quite useful as well because then you know you can talk to them and it won't be such a problem*

Quotes are labelled as participant number (sex and age in years).

P14 (F11): *... sometimes they just say 'Oh yeah that's fine' and in one restaurant we said 'Has it got egg?' it was pizza, 'Has it got any egg in?' and they said 'Oh no I promise it's not got any egg in' and we said 'Can you just check?' and he said 'No it's fine' and we said 'Can you please go and check with the chef?' He came back saying 'Yeah there is egg in it'. So it was a good job we asked.*

Parents were more likely to ask about ingredients in restaurants (Table 3). Suggestions for making eating out easier included providing allergy information on menus and encouraging teenagers to enquire about nut-free food.

Self-injectable adrenaline

Expiry dates. The majority of study participants did not know the expiry date of their SIA. However, they did say that expiry dates were checked regularly by someone. Half checked it themselves, while the others left it to their parents or schools.

Carrying self-injectable adrenaline. Only a minority had their SIA with them in clinic. Some participants did not find carrying their SIA a problem but the majority did not carry them all the time (Table 3).

Table 2. Previous reactions, avoidance behaviour and preparation for further allergic reactions

Reason for most recent reaction?	
Did not ask or check the ingredients	5 (31%)
Did not know they were allergic to the food	5 (31%)
Unexpected ingredient in usually safe food	4 (25%)
Cross-contamination of food	1 (6%)
If a food label says 'may contain' an allergen to which you could have a reaction, what do you do?	
Don't eat it	4 (24%)
Try a little bit and wait a few minutes to see if I have a reaction	4 (24%)
Eat it because chance of it actually containing allergen is very low	3 (18%)
Eat it because I have eaten it before and did not have a reaction	3 (18%)
Eat it but only if my parents are around	1 (6%)
Other*	2 (12%)
Tried a food that they were not sure was completely safe for them?	10 (59%)
When have taken a risk before and eaten food that could have caused an allergic reaction it was?†	
While with their parents	5 (36%)
When the label said 'may contain' the allergen	5 (36%)
While hanging out with friends	2 (14%)
When they wanted to test to see if still allergic	2 (14%)
Because they don't think that they are very allergic	2 (14%)
When all friends were eating the food	1 (7%)
When it looked good and they wanted to eat it	1 (7%)
When did not want to ask about the ingredients	0 (0%)
If yes, how often do you take such risks?‡	
Only once or twice ever	8 (53%)
A few times a year	4 (27%)
A few times a month	1 (7%)
About once a week or more often	2 (13%)
How confident in recognizing symptoms of reaction?	
Very confident	10 (59%)
Somewhat confident	6 (35%)
Not very	1 (6%)
How prepared are you to manage an allergic reaction?	
Very prepared	8 (47%)
Somewhat prepared	8 (47%)
Not at all	1 (6%)
Frequency of carrying EpiPen or other medication?	
Always	9 (53%)
Most of the time	4 (24%)
About half the time	2 (12%)
Rarely	2 (12%)
Had EpiPen or other medication with them at time of last reaction?*	12 (80%)
Who most often carries EpiPen?	
Me	11 (65%)
Parents	2 (12%)
About equal	4 (24%)

Figures are numbers (%).

*Other: Donot eat unless from one particular supermarket.

†Not all participants answered this question.

Table 3. Situation-dependent carrying of self-injectable adrenaline (SIA)

How often do you carry SIA?	Never	Sometimes	Usually	Always
At school	2 (13%)	0 (0%)	1 (7%)	12 (80%)
At friends' houses	1 (6%)	3 (18%)	4 (24%)	9 (53%)
At relatives' houses	1 (6%)	1 (6%)	5 (29%)	10 (59%)
At restaurants	0 (0%)	2 (12%)	3 (18%)	12 (71%)
When travelling/on holiday	0 (0%)	0 (0%)	2 (12%)	15 (88%)
When hanging out with friends	3 (18%)	3 (18%)	3 (18%)	8 (47%)
When playing sports	7 (44%)	3 (18%)	3 (19%)	3 (19%)
When at a party	1 (6%)	2 (12%)	5 (29%)	9 (53%)
At school dance/other event	2 (13%)	2 (14%)	1 (7%)	10 (67%)
When not easy or convenient	3 (19%)	3 (19%)	3 (19%)	7 (44%)
If have not had reaction in a while	0 (0%)	4 (25%)	3 (19%)	9 (56%)
When know you will be careful	1 (6%)	5 (29%)	2 (12%)	9 (53%)
When you are not with parents	0 (0%)	3 (19%)	4 (25%)	9 (56%)
On a date	1 (8%)	3 (23%)	1 (8%)	8 (62%)
At a bar or dance club	4 (36%)	1 (9%)	1 (9%)	5 (46%)
If you are wearing tight clothing	0 (0%)	2 (17%)	2 (17%)	8 (67%)
If you are a girl, if carrying a small bag	0 (0%)	1 (10%)	2 (20%)	7 (70%)

Data presented as number of subjects (%). Some participants ticked N/A if the situation did not apply to them.

Box 2. Preparation for and treatment of an allergy reaction

Carrying self-injectable adrenaline

P10 (F17): *I don't have it because I'm not going to eat anything. It's only, like, if I think I'm going to be around food then I'll take it with me*

P2(M15): *If I didn't take them with me I'd probably do the same but I'd be extra careful with what I buy and what I'm going to eat and everything*

P1(F15): *It's alright. I don't mind because I've got a handbag that I take with me and I just keep them in there. So if I need to go out I know where they are*

Poor understanding of how to treat an allergic reaction

P11 (M15): *I might be covered in wheals and also I might find it hard to breathe and my eyes would swell up. My lips would swell as well*

HM: *What would you do if that happened?*

P11(M15): *Well I might take a cetirizine tablet, then if it still doesn't help I'd take my EpiPen, use that*

Needle phobia

P6 (M16): *I know how to use it but I wouldn't do it. I would do it if I needed to, but before I'd do it I'd get someone else to do it like my mum. . . because. . . I had a blood test and I fainted; I don't like needles*

Quotes are labelled as participant number (sex and age in years).

P9 (F18): It was hard, like at my prom I wanted a little handbag but obviously I couldn't because I had to fit an EpiPen in it. So it is hard with things like that, like when you're going out clubbing you don't want to carry a handbag.

Whether they carried it depended on the circumstances; they were most conscientious when travelling or going on holiday (Table 3). Often it was their parent who carried the SIA (Table 3). Various explanations were provided for not carrying their SIA. Many participants acknowledged that they sometimes forgot to take it with them. Some found

the SIA devices difficult to carry and impractical because they will not fit easily in a pocket (Box 2). Some carried out a risk assessment and only carried their SIA if they anticipated eating something, while others altered their behaviour to minimize the risk of having a reaction when were not carrying their SIA (Box 2). Teenagers say they would carry their SIA more frequently if the devices were smaller. Experiencing a severe allergic reaction did not seem to influence the behaviour of most participants, although a few subjects felt that they would carry their SIA more if they had experienced an allergic reaction.

Treatment of reactions

The majority, but not all, of participants knew how to treat an allergic reaction and when it was appropriate to use their SIA (Box 2). A number of teenagers were worried about using the SIA because they did not like needles. Some would prefer that someone else administered it but most said that they would use it if necessary despite their needle phobia (Box 2). A few who were not needle phobic would still rather prefer someone else administered their SIA because they did not feel confident to use it in the panic of a reaction.

Education about food allergy

Half of the questionnaire respondents identified classmates as the group who most needed to receive education and information compared with themselves, teachers, friends and parents. Some had experienced teasing related to their food allergy and many felt that other pupils at school did not appreciate how serious food allergy can be

Box 3. Education about food allergy

Being teased about having food allergy, need for education of peers

P16 (M13): *it's just one of those things which they just sort of brush aside. Maybe if they knew well this person could die or be seriously injured or whatever then they might, sort of take it a bit more seriously*

Need for frankness about the consequences of taking risks with food

P9 (F18): *Dr xxxxx said to me, 'One more slip and you may die' and that hit home. . . The fear makes you more alert, I mean ever since then I've been checking everything. . . I think him scaring me has helped me so much more. . . I think, make them aware of actually how serious it is. . . I never really saw that it really could be life-threatening. . . maybe not scare them half to death with it but, you know, have it drummed into them that it is more than just a little wobble and an injection afterwards*

P6 (M16): *'Show people what could happen. . . if they're allergic to nuts; show them how someone reacts when they've just had a nut . . . and if they watch a video it will show them how to know that it's an allergic reaction and not just ignore it. . .'*

The desire for practical training

P16 (M13): *I also think, like, maybe one of those Annies that you get, you know the ones you learn CPR on? Well if you can get, like, Annie legs and maybe do it on that and actually have, like, a real injector so you know what it feels like to do it*

Peer education

P9 (F18): *I sometimes think that somebody that's grown up with a nut allergy themselves or any, like a shellfish allergy. I think that would probably be the best person, because they could talk from personal experience, because I think sometimes people sit and think 'Oh yeah doctors do say that, they just say that', whereas somebody who's experienced it themselves, lives with it themselves, they're more likely to listen to*

P8 (M11): *I think they should get a person with food allergy to talk to them and tell them that it is a pain in the bum but you have to deal with it, it's you. . . Yeah because they're the people who know most about it really. Doctors can learn as much as they want but people with that themselves I think know the most, because doctors know a hell of a lot but I think we just know that little bit more that can make all the difference*

Quotes are labelled as participant number (sex and age in years).

(Box 3). The majority thought that it would make things easier for them if their peers understood more about food allergy.

Education on avoidance. Several suggestions were made as to how best to educate teenagers with food allergy about allergen avoidance. These included giving patients more detailed information on which products they should be avoiding and labelling practices. A few teenagers suggested that being frank about the consequences of taking risks with food would make individuals of their age more conscientious with allergen avoidance (Box 3).

Recognition and treatment. The majority of teenagers felt that they were able to recognize an allergic reaction and understood how to use SIA after some training. Most participants received regular sessions in a clinic on how to use a SIA; they found these helpful. Some found it useful to practice at home, either with trainer pens or used expired SIA on fruit.

Education in clinic. The great majority felt that they were given enough information and support in a clinic and a few had also been involved with the Anaphylaxis Campaign, which they found helpful. Numerous suggestions were made as to the best ways to educate teenagers in a clinic. These included the use of a film showing what happens when someone has an allergic reaction. This may add to the suggestion that teenagers should be made more aware of the consequences of risk-taking (Box 3). Teenagers were interested in practical approaches to SIA training. A few thought that training with a real SIA

rather than trainer pens would be beneficial. This might help to improve confidence and help them to feel better prepared to treat an allergic reaction. Only a minority believed that doctors and nurses were the best people to educate teenagers about their food allergy; many thought that speaking to someone else with a food allergy would be beneficial (Box 3).

Discussion

This study assessed eighteen 11–18-year-olds with food allergy using a questionnaire and semi-structured interviews. The key findings that emerged concerned food labelling and risk assessment, carrying and using SIA and the allergy knowledge among peers.

Avoidance of allergens

As in other studies, the teenagers found it difficult to gauge the risks involved in eating foods labelled with different allergy warning phrases [21, 22]. The widespread use of 'may contain' labelling is unhelpful and succeeds only to dilute its impact or restrict food choices for people with allergies. Many do not check the labels of foods that they have eaten before and classify them as 'safe' regardless of the allergy warning. Misunderstandings regarding food labelling could be addressed by specific education about manufacturing and food labelling practices. Additionally, government could bring in legislation to tackle the practice of defensive labelling. Various factors affect the decision to eat a product; some teenagers took more risks in situations where they feel reassured that reactions could be treated

[23] but fatalities can still occur despite the use of SIA [2]. A few implied that experiencing a reaction or being made more aware of the dangers of allergic reactions would improve teenagers' adherence [23, 24].

Preparation for and managing reactions

As demonstrated in other studies, our results show that individuals with food allergy do not always carry SIA as recommended and compliance in this area needs to be improved [11–13, 16, 25, 26]. In agreement with Sampson et al, the frequency of carrying SIA among teenagers in this group also varies with the perceived risk of reaction, social circumstances and convenience of carrying [18]. Some teenagers are reluctant to use their SIA due to needle phobias. Previous investigations have also documented under-use or delayed use of adrenaline among those experiencing severe symptoms of allergic reactions, which, in some cases, has led to fatalities [11, 25, 27]. These misunderstandings highlight the need to educate patients about when to use their SIA. Some teenagers expressed an interest in practicing with real SIA devices to increase their confidence in treating a reaction; this might increase the likelihood that a SIA is used with a future reaction [23].

Friends and peers

The overarching theme that emerged was the lack of understanding of the seriousness of food allergy among classmates. Teenagers did not feel that their peers appreciate the difficulties they faced and felt there was a need for education of their peers [18]. Many of the teenagers involved in this study had, however, informed friends about their food allergy and found them to be supportive. As this age group increasingly spends time away from parents, it becomes more likely that an individual would be among friends at the time of an allergic reaction. Ensuring that they are properly educated in how to treat a reaction therefore seems sensible, particularly considering that several subjects in the study revealed that they were worried about using SIA on themselves due to needle phobia or because of panicking while experiencing a reaction. Such an approach has not been documented in food allergy but similar interventions have been tried with asthma. Within a randomized-controlled study, training for teachers and whole class asthma workshops for 7–9 year olds resulted in all pupils having a better understanding of asthma, with the pupils with asthma needing less medication and having an improved self-esteem and QoL [28]. A similar intervention in the 12–15-year age group has been shown to be equally beneficial in two other randomized-controlled studies [29, 30]. Food allergy shares several similarities with asthma, making it likely that a similar approach would be beneficial. Both

can be triggered by environmental exposures; engaging peers can help a teenager with food allergy to avoid exposure to the trigger allergen by shared vigilance and in advocacy in social situations. Also, both may lead to the development of symptoms in an unpredictable manner and so their management is likely to be improved if a teenager feels able to ask a peer to help give rescue medication or call for help.

Taking responsibility

Teenagers have to make the transition between childhood, where their parents take responsibility for their food allergy, and adulthood, where the responsibility lies with them. Many of the subjects still relied on their parents to some extent with managing their food allergy. Parents helped with label-checking and asking about food in restaurants; they sometimes carried SIA or had to remind teenagers to take it and some were involved with treating reactions. It would have been interesting to have heard from the parents of the participants about their view of their children's autonomy in relationship with managing their food allergy.

Study limitations

A relatively small number of participants were involved in this study. Although it is similar in size to other studies [16, 31], and of an appropriate size for a qualitative study, it is important that results are replicated in other populations. Given the size, we were not able to thoroughly assess the impact of severity of previous allergic reactions on participants' behaviour. In general terms, there seemed to be surprisingly little relationship with severity, perhaps because many of these reactions had occurred when the participants were very young [19]. Similarly, the small size prevented us from examining how behaviour changes across early adolescence. It is also important to understand how this changes later in adolescence, given that the process of gaining full autonomy may not be complete until 25 years of age. The homogenous nature of the study population in terms of ethnicity may reduce the generalizability of the results. Finally, teenagers may not have been completely honest about their allergy management as the interviews were undertaken by a medical student who may have been perceived as being close to their medical team.

Conclusions and future directions

This study has identified a number of barriers to the appropriate management of food allergy in adolescence that might be tackled within the allergy clinic [32]. For example a video clip showing an allergic reaction could be used to emphasize the potential seriousness of food allergy and practicing with a real SIA device on a piece

of fruit might increase the use of these devices. A video clip might also prove to be a useful way of educating patients' peers. By engaging this important group for the adolescent, our patients may be more likely to practice adequate avoidance precautions and to be able to respond to reactions more appropriately. Finally, the challenges associated with labelling will need government intervention to deliver uniform, non-defensive, labelling practices.

Acknowledgements

We would like to acknowledge Kate Grimshaw for her assistance in critically reviewing the manuscript and the help of the children's outpatient team at the Southampton University Hospital Trust. We would also like to thank the teenagers and their families. Funding was provided by the University of Southampton School of Medicine.

References

- Pereira B, Venter C, Grundy J, Clayton CB, Arshad SH, Dean T. Prevalence of sensitization to food allergens, reported adverse reaction to foods, food avoidance, and food hypersensitivity among teenagers. *J Allergy Clin Immunol* 2005; **116**:884–92.
- Pumphrey RSH, Gowland MH. Further fatal allergic reactions to food in the United Kingdom, 1999–2006. *J Allergy Clin Immunol* 2007; **119**:1018–9.
- Pumphrey RSH. Anaphylaxis: can we tell who is at risk of a fatal reaction? *Curr Opin Allergy Clin Immunol* 2004; **4**:285–90.
- Gowland H. Food allergen avoidance – the patient's viewpoint. *Allergy* 2001; **56** (Suppl. 67):117–20.
- Ahuja R, Sicherer SH. Food-allergy management from the perspective of restaurant and food establishment personnel. *Ann Allergy Asthma Immunol* 2007; **98**:344–8.
- Joshi P, Mofidi S, Sicherer SH. Interpretation of commercial food ingredient labels by parents of food-allergic children. *J Allergy Clin Immunol* 2002; **109**:1019–21.
- Furlong TJ, DeSimone J, Sicherer SH. Peanut and tree nut allergic reactions in restaurants and other food establishments. *J Allergy Clin Immunol* 2001; **108**:867–70.
- Muraro A, Roberts G, Clark A *et al.* The management of anaphylaxis in childhood: position paper of the European academy of allergology and clinical immunology. *Allergy* 2007; **62**:857–71.
- Baral VR, Hourihane JO'B. Food allergy in children. *Postgrad Med J* 2005; **81**:693–701.
- Al-Muhsen S, Clarke AE, Kagan RS. Peanut allergy: an overview. *Can Med Assoc J* 2003; **168**:1279–85.
- Bock SA, Munoz-Furlong A, Sampson HA. Fatalities due to anaphylactic reactions to foods. *J Allergy Clin Immunol* 2001; **107**:191–3.
- Sicherer SH, Forman JA, Noone SA. Use Assessment of Self-Administered Epinephrine Among Food-Allergic Children and Pediatricians. *Pediatrics* 2000; **105**:359–62.
- Greenhawt MJ, Singer AM, Baptist AP. Food allergy and food allergy attitudes among college Students. *J Allergy Clin Immunol* 2009; **124**:323–7.
- Zimmer-Gembeck MJ, Collins WA. Autonomy development during adolescence. In: Adams GR, Berzonsky MD, eds. *Blackwell handbook of adolescence*. Oxford: Blackwell Publishing, 2003:175–204.
- Christie D, Viner R. Adolescent development. In: Viner R, ed. *ABC of adolescence*. Oxford: Blackwell Publishing and BMJ Books, 2005:1–4.
- Akeson N, Worth A, Sheikh A. The psychosocial impact of anaphylaxis on young people and their parents. *Clin Exp Allergy* 2007; **37**:1213–20.
- Gallagher M, Worth A, Sheikh A. Clinical allergy has much to gain from engagement with qualitative research. *Allergy* 2009; **64**:1117–20.
- Sampson MA, Munoz-Furlong A, Sicherer SH. Risk taking and coping strategies of adolescents and young adults with food allergy. *J Allergy Clin Immunol* 2006; **117**:1440–5.
- MacKenzie H, Roberts G, Van Laar D, Dean T. Teenagers' experiences of living with food hypersensitivity: a qualitative study. *Ped Allergy Immunol* 2010; **21**:595–602.
- Gabe J, Bury M, Ramsay R. Living with asthma: the experience of young people at home and at school. *Soc Sci Med* 2002; **55**:1619–33.
- Food Standards Agency. *Nut allergy labelling – report of research into the consumer response*. London: Food Standards Agency Publications, 2002. Available at <http://www.food.gov.uk/multi-media/pdfs/nutallergyresearch.pdf> (accessed 1 May 2010).
- Warner JO. European Food Labelling Legislation – a nightmare for food manufacturers and allergy sufferers alike. *Pediatr Allergy Immunol* 2005; **16**:1–2.
- Pumphrey RSH. When should self-injectable epinephrine be prescribed for food allergy and when should it be used? *Curr Opin Allergy Clin Immunol* 2008; **8**:254–60.
- Avery NJ, King RM, Knight S, Hourihane JO'B. Assessment of quality of life in children with peanut allergy. *Pediatr Allergy Immunol* 2003; **14**:378–82.
- Bock SA, Munoz-Furlong A, Sampson HA. Further fatalities caused by anaphylactic reactions to food, 2001–2006. *J Allergy Clin Immunol* 2007; **119**:1016–8.
- Cummings AJ, Knibb R.C., Erlewyn-Lajeunesse M, King RM, Roberts G, Lucas JS. Management of nut allergy influences quality of life and anxiety in children and their mothers. *Pediatr Allergy Immunol* 2009; **21**:586–94.
- Uguz A, Lack G, Pumphrey R *et al.* Allergic reactions in the community: a questionnaire survey of members of the anaphylaxis campaign. *Clin Exp Allergy* 2005; **35**:746–50.
- McCann DC, McWhirter J, Coleman H, Calvert M, Warner JO. A controlled trial of a school-based intervention to improve asthma management. *Eur Respir J* 2006; **27**:921–8.
- Henry RL, Gibson PG, Vimpani GV, Francis JL, Hazell J. Randomized controlled trial of a teacher-led asthma education program. *Pediatr Pulmonol* 2004; **38**:434–42.
- Shah S, Peat JK, Mazurski EJ *et al.* Effect of peer led programme for asthma education in adolescents: cluster randomized controlled trial. *BMJ* 2001; **322**:583–5.
- Marklund B, Wilde-Larsson B, Ahlstedt S, Nordström G. Adolescents' experiences of being food-hypersensitive: a qualitative study. *BMC Nursing* 2007; **6**:8.
- Kapoor S, Roberts G, Bynoe Y, Gaughan M, Habibi P, Lack G. A multidisciplinary consultation within a paediatric allergy clinic improves parental knowledge and decreases the rate of allergic reactions to foods. *Allergy* 2004; **59**:185–91.