

ORIGINAL ARTICLE

Practices in the prescription of adrenaline autoinjectors

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Abstract

Background: Anecdotally, the prescription of adrenaline autoinjectors seems to be very variable. We aimed to survey the practice in this area and look at the differences between paediatric allergists and general paediatricians, the factors influencing prescription and implementation of current guidelines.

Methods: We developed an online survey containing 10 paediatric allergy cases and emailed a link to paediatricians. Respondents were asked to identify their prescribing decision in each case, the factors influencing their decisions and which guidelines they had read.

Results: Responses were collated from 54 paediatric allergists and 27 general paediatricians. Almost all respondents had read at least one guideline. Prescribing decisions were very inconsistent, and significant influencing factors included peanut or tree nut allergy, trace reactions, remote facilities and parental anxiety.

Conclusions: This study demonstrates that most paediatricians have read at least one anaphylaxis guideline. However, reading the guidelines does not seem to have influenced their daily practice. This suggests that there is a need for improved implementation of anaphylaxis guidelines amongst paediatricians.

Allergy is an increasingly common problem in paediatric practice, and anaphylaxis is being recognized more frequently in the paediatric population (1–3). Guidelines regarding the management of anaphylaxis and subsequent prescription of adrenaline autoinjectors have been published by the United Kingdom (UK) Resuscitation Council (4), the European Academy of Allergology and Clinical Immunology (1) and the American Academy of Allergy, Asthma and Immunology (5). Despite this, anecdotally, the practice of prescribing adrenaline autoinjectors varies between paediatricians. We planned to survey both practice and knowledge, and awareness of guidelines on anaphylaxis amongst paediatricians in the UK to describe and evaluate current practice in this area. We aimed to describe the differences in prescribing practice between paediatric allergists and general paediatricians, and look at the concordance between their prescribing decisions and current guideline recommendations. We also investigated the factors influencing their prescribing decisions.

Methods

We developed 10 case histories based on typical paediatric allergy presentations (Table 1). They contained brief information on relevant medical history, results from allergy skin prick testing and information regarding any special family or social circumstances. The cases were put into a web-based survey format (<http://www.freeonlinesurveys.co.uk>). After each case history, respondents were asked to decide whether they would prescribe an adrenaline autoinjector, not prescribe one, or offer the patient and parents the choice after discussing the risks and benefits with them. Respondents were asked to select from a list which factors had influenced their decision in each case; these were a previous cardiorespiratory reaction, coexistent persistent asthma, a diagnosis of nut allergy (referring to both peanuts and tree nuts), a previous reaction to a trace of the allergen, remote medical facilities, the patient's age, patient anxiety, parental anxiety, local policies or guidelines and finally any official guidelines from

Table 1 Prescription of an adrenaline autoinjector in each case

Case	Respondent	Would not prescribe autoinjector (%)	Offer patient choice (%)	Would prescribe autoinjector (%)	p-Value*	Choice recommended by European guidelines (1)
Case 1: A 10-month-old girl with a previous cutaneous reaction to a trace of peanut	Allergists	17 (31.5)	19 (35.2)	18 (33.3)	0.182	Prescribe
	Generalists	5 (18.5)	7 (25.9)	15 (55.6)		
	All	22 (27.2)	26 (32.1)	33 (40.7)		
Case 2: A 2 yr old girl with a previous respiratory reaction to peanut	Allergists	2 (3.7)	4 (7.4)	48 (88.9)	0.855	Prescribe
	Generalists	1 (3.7)	3 (11.1)	23 (85.2)		
	All	3 (3.7)	7 (8.6)	71 (87.7)		
Case 3: A 7-yr-old girl with a previous cutaneous reaction to traces of nuts	Allergists	21 (38.9)	13 (24.1)	20 (37)	0.608	Prescribe
	Generalists	8 (29.6)	9 (33.3)	10 (37)		
	All	29 (35.8)	22 (27.2)	30 (37)		
Case 4: A 10-yr-old boy with a previous cutaneous reaction to walnut and coexistent asthma	Allergists	2 (3.7)	4 (7.4)	48 (88.9)	0.210	Prescribe
	Generalists	3 (11.1)	4 (14.8)	20 (74.1)		
	All	5 (6.2)	8 (9.9)	68 (84.0)		
Case 5: A 3-yr-old boy with a cutaneous reaction to cow's milk and coexistent viral associated wheeze	Allergists	52 (96.3)	2 (3.7)	0 (0.0)	0.270	Not prescribe
	Generalists	24 (88.9)	2 (7.4)	1 (3.7)		
	All	76 (93.8)	4 (4.9)	1 (1.2)		
Case 6: A 3½-yr-old-boy with a cutaneous reaction to lentils who lives in remote location	Allergists	27 (50.0)	21 (38.9)	6 (11.1)	0.344	Consider prescription
	Generalists	9 (33.3)	14 (51.9)	4 (14.8)		
	All	36 (44.4)	35 (43.2)	10 (12.3)		
Case 7: A 9-yr-old boy with oral allergy syndrome	Allergists	54 (100)	0 (0)	0 (0.0)	<0.001	Not prescribe
	Generalists	20 (74.1)	4 (14.8)	3 (11.1)		
	All	74 (91.4)	4 (4.9)	3 (3.7)		
Case 8: A 14-yr-old girl with a cutaneous reaction to mussels	Allergists	40 (74.1)	13 (24.1)	1 (1.9)	0.546	Not prescribe
	Generalists	19 (70.4)	6 (22.2)	2 (7.4)		
	All	59 (72.8)	19 (23.5)	3 (3.7)		
Case 9: A 15-yr-old boy with idiopathic anaphylaxis	Allergists	0 (0)	3 (5.6)	51 (94.4)	0.543	Prescribe
	Generalists	0 (0)	2 (7.4)	25 (92.6)		
	All	0 (0)	5 (6.2)	76 (93.8)		
Case 10: A 1-yr-old girl who is sensitized to peanut but has never consumed them	Allergists	41 (75.9)	9 (16.7)	9 (16.7)	0.678	Not prescribe
	Generalists	23 (85.2)	3 (11.1)	3 (11.1)		
	All	64 (79.0)	12 (14.8)	5 (6.2)		

A total of 54 paediatric allergists and 27 paediatric generalists responded to the questionnaire. Figures are numbers (percentages) of respondents for each option.

*p Values derived using Fisher's exact test for differences between allergists and generalists.

colleges or societies. Lastly, respondents were asked which guidelines they had read.

A link to the survey web page was emailed out to two groups of practitioners in the UK. The first group, defined as 'allergists', consisted of paediatric allergists and paediatricians with a specific interest in allergy across the whole of the UK. They consisted of all the members of the British Society of Allergy and Clinical Immunology paediatric mailing list and the paediatric allergy Yahoo group mailing list. The second group, defined as 'generalists', was made up of all the general paediatricians from the Wessex region of UK and were emailed through local email contact lists. In total, the survey was sent to 130 paediatricians (72 allergists and 58 generalists). Survey responses were collected by the website and downloaded as a data file. In the analysis, respondents were allocated to the 'allergist' or 'generalist' group according to their response to the first question of the survey, where they were asked to identify themselves as either a tertiary allergy special-

ist or a paediatrician with a special interest in allergy (grouped together as 'allergists'), or a general paediatrician with no special interest in allergy ('generalist'). Data were then analysed using STATA v9.2 (STATA Corps, College Station, TX, USA). Chi-squared test or Fisher's exact test, as appropriate, was used to look at differences in practice between paediatric allergists and generalists and the significance of the influencing factors in each case. A p-value of <0.05 was taken to be significant for the differences in practice between paediatric allergists and generalists. When examining the significance of influencing factors, a p-value of <0.001 was taken to be significant allowing for multiple testing (Bonferroni correction).

Results

Survey respondents

The survey was run from February 2009 to October 2010 and had a total of 81 respondents (overall response rate of

Table 2 Anaphylaxis guidelines

Guideline	All (%)	Allergists (%)	Generalists (%)	p-Value*
UK Resuscitation Council Guidelines (4)	63/81 (77.8)	46/54 (85.2)	17/27 (63.0)	0.025
European Academy of Allergology and Clinical Immunology guidelines (1)	43/81 (53.1)	39/54 (72.2)	4/27 (14.8)	<0.001
American Academy of Allergy, Asthma and Immunology guidelines (5)	24/81 (29.6)	24/54 (44.4)	0/27 (0.0)	<0.001
Other†	9/81 (11.1)	2/54 (3.7)	7/27 (25.9)	0.005
Any	70/81 (86.4)	51/54 (94.4)	19/27 (70.4)	0.005

Figures are number over the total of respondents (percentages) of paediatric allergists and general paediatricians who had read each of the guidelines.

*p Values derived using chi-squared or Fisher's exact tests for differences between allergists and general paediatricians.

†Others included British National Formulary, Drugs and Therapeutics Bulletin and local guidelines.

62%). They were 27 generalists and 54 allergists (response rates of 47% and 75%, respectively).

Knowledge of guidelines

Most of the paediatric allergists and general paediatricians had read at least one of the published anaphylaxis guidelines (Table 2). Allergists were significantly more likely to have read any of the relevant guidelines than generalists.

Decision to prescribe adrenaline autoinjector

Table 1 shows the prescribing decisions of the allergists and generalists in each case, together with an indication of the choice advocated by the European guidelines (1). The table demonstrates that, for many cases, there is almost no consensus as to whether a patient should be prescribed an adrenaline autoinjector. Most paediatricians prescribed according to the guidelines for some cases but not for others. There were no significant differences between the prescribing patterns of the allergists and generalists, with the exception of oral allergy syndrome where only generalists would prescribe an autoinjector.

Factors influencing decision to prescribe an adrenaline autoinjector

The factors influencing prescribing decisions were dependent on the nature of the case. A history of a previous reaction to traces of the offending allergen had a significant effect on prescribing decisions in the two cases involving previous cutaneous reactions to traces of nuts (cases 1 and 3, $p < 0.001$). In both these cases, parental anxiety and the diagnosis of nut allergy also significantly influenced prescribing decisions ($p < 0.001$ for all). Interestingly, the presence of coexistent persistent asthma had a significant effect on the prescribing decision for one of the cases involving a child with coexistent asthma (case 4, $p < 0.001$), but not the other (case 5). The decision to prescribe or offer choice in case 6 (a cutaneous reaction to lentils in a remote location) was significantly influenced by both the remote medical facilities and the parental anxiety ($p < 0.001$ for each). Parental anxiety also significantly influenced prescribing decisions in the case of

sensitization (case 10, $p < 0.001$), whereas patient anxiety only significantly influence prescribing the case involving a 14-yr-old girl with a cutaneous reaction to mussels (case 8, $p < 0.001$). In the case of oral allergy syndrome (case 7), the presence of cardiorespiratory symptoms significantly influenced prescribing decisions ($p < 0.001$), though of note only generalists chose to prescribe for this case. Guidelines did not have a significant effect on prescribing decision in any of the cases.

Discussion

This survey demonstrates that most UK general paediatricians and paediatric allergists have read at least one of the anaphylaxis guidelines. Despite this, there was still considerable variation in prescribing practice even for absolute indications for an autoinjector. Cases involving cutaneous allergic reactions in the absence of coexistent medical problems such as asthma (cases 1, 3, 6 and 8), tended to lead to a fairly even distribution of respondents between prescribing, not prescribing and offering a choice. This is despite the guidelines indicating that cases 1 and 3, where there has been previous cutaneous reactions to peanuts or tree nuts, should be prescribed this potentially life-saving treatment. Conversely, similar cases of cutaneous reactions complicated by coexistent asthma (case 4) or viral associated wheeze (case 5) tended to lead to more of a consensus amongst respondents in terms of prescribing decisions. However, even within these cases, there was still not a complete consensus.

It is perhaps surprising that a significant minority of allergists would not prescribe an adrenaline autoinjector in the case of a previous respiratory reaction to peanut (case 2), despite the guidelines being clear that an autoinjector should be prescribed (1, 4, 5). Similarly, a significant minority of generalists would prescribe an adrenaline autoinjector for isolated oral allergy syndrome, a condition that the guidelines suggest does not require one (1, 4, 5), indicating that general paediatricians need better education about this condition. The main factors influencing prescribing decisions were parental anxiety (four cases), the diagnosis of a nut allergy (two cases) and a previous reaction to a trace of the allergen (two cases). This is not surprising given the high-profile nature of anaphylaxis, as well the well-known poten-

tial for nut allergy to cause anaphylaxis (2, 3). Interestingly, our preparatory work on the study methodology did not identify any factors that reduced the likelihood of autoinjector prescription.

As a greater percentage of allergists responded to the survey compared to generalists, it is difficult to make absolutely definitive comparisons of prescribing habits between the two groups. However, this study demonstrates that despite several recent publications of guidelines on the prescription of adrenaline autoinjectors for paediatric allergy, there continues to be large variation in prescribing practice. This is despite the fact that the majority of paediatricians had read at least one relevant guideline, demonstrating that they have not influenced daily practice. Whilst this survey had a reasonable response rate, it is important to note that those with more of an interest (and therefore knowledge) in this area are more likely to have responded meaning that, in practice, awareness of guidelines amongst paediatricians may be less than that demonstrated here. In addition, this was a hypothetical prescribing situation and that real life prescribing may be more variable than the practice seen in this study. The effectiveness of implementation of recent allergy guidelines has not been

assessed in the general paediatric community. Where a comprehensive implementation policy is put into action, the management habits of clinicians can be successfully changed for paediatric acute asthma care (6) and demonstrating the use of adrenaline autoinjectors (7). This study suggests a need for more active implementation of the anaphylaxis guidelines to improve prescribing policy of paediatricians. The next challenge is to improve the adherence of our patients to their management plans (8, 9).

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