School allergy training promotes internal policy review and enhances staff's preparedness in managing pupils with allergies

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Abstract

Recently non-statutory allergy management guidance for schools has been produced in the United Kingdom however there has been limited progress in implementing this. The aim of this study was to evaluate the effect of face-to-face training on self-reported school staff preparedness in managing the severely allergic child and whether it would stimulate schools' allergy policy review. A preparedness survey was conducted prior and 2 months post-intervention to assess the effect of training on self-reported preparedness and perceived confidence to manage children with food allergies. A sample of 18 (10%) primary schools that consented to participate were selected. Of the trained schools, 89% felt confident in dealing with an allergy emergency compared to 39% prior training (p=0.016). Post intervention all but one had arranged/were considering introducing allergy awareness sessions to help pupils manage their allergies (45% pre-training vs post-training 93%, p=003). Preventative measures for accidental exposure to food allergens (i.e. no food sharing policy) were adopted by all (pre-training 61% vs post- training 100%, p=0.03). A face-to-face school allergy training programme enhances self-reported staff preparedness and promotes internal allergy policy review in managing the needs of these children, hence addressing the current gap between recommendations and practice in schools.

INTRODUCTION

Allergic diseases are estimated to affect approximately 25-30% of the European population and are regarded as a major public health concern (1). Hospital admission rates for anaphylaxis increased by 72% in the last 5 years for those [?]18yrs (2).The extent to which allergy debilitates individual patients, families and society as a whole is often overlooked by those unaffected (3).

Up to 20% of anaphylaxis cases occur within school grounds and of these, 1 in 4 occurs in pupils not previously deemed at risk (4, 5). Previously, we reported that school preparedness for anaphylaxis was below the safety standards set by the Department for Education at that time (6), and those recommended by the European Academy of Allergy and Clinical Immunology (1, 7). These findings coincide with previous international research (8-11).

When surveyed, school staff expressed a desire for training and a preference for face to a face-to-face format (7). This type of training has been shown to elicit a more efficient response to an anaphylaxis scenario, compared with online training (12) and to be effective at improving school staff awareness and knowledge of allergic diseases (13-16). In comparison, the effect of training on whole school preparedness in the overall management of the severely allergic child and triggering policy review has rarely been studied (17, 18).

UK schools have a statutory duty of care for children with medical needs, for which the Department for Education has published robust guidance (6). However, the implementation of the recommended safety measures at school is suboptimal. Gaps in the current management of pupils with severe allergies has led to call for action from a legislative perspective (19).

This pilot study aimed to evaluate the effect of a face-to-face training programme for schools in England, on school's self-reported preparedness in managing the needs of the severely allergic child. It also investigated whether the delivery of the training programme stimulated an allergy policy review within the school and a change in attitude towards the management of such pupils.

METHODS

Participants

Primary and secondary schools across Cumbria, North West of England, UK were invited to take part in a survey of school preparedness for anaphylaxis between 2015-2016. The results of this survey have been reported previously (7). Upon completion of the survey, schools were invited to participate in an intervention to receive training in allergy management.

The schools that responded and consented to receive training (n=183) were stratified into 6 groups according to their catchment area. Based on the resources available to the research team, a 10% convenience sample of consented schools (18 primary schools) were selected (every fourth school on the list) for onsite training intervention.

Intervention

Training was arranged after school hours and all staff (including teachers, teacher assistants, administrative, catering and cleaning personnel, bus driver etc.) were invited to attend. The training material and teaching structure were developed (and delivered) by allergy specialists, reviewed by schools, and adapted as per their suggestions.

We delivered a 90 minutes training session which consisted of a theoretical and a practical workshop. The training included an interactive presentation covering the overall management of the child with severe food allergy and drills in the management of severe allergic reactions/anaphylaxis. The main thematic sections of the training session are presented in Table 1.

In order to tailor the training programme to schools' needs, this was first delivered to a group of primary school teachers outside the surveyed area. Upon receiving feedback, the training programme was revised to expand on the administration of the adrenaline autoinjector (AAI) (pupil positioning, restraining etc.).

Post training session assessment

Eight weeks after the training, head teachers (or those deputized by the school and who attended the training) were asked to complete the follow-up questionnaire; a 26-item, structured questionnaire.

The three main aspects that were surveyed prior to the workshop were surveyed again (presented in Table 2). The questions were designed as dichotomous or Likert scales and free text options were also available for some questions (7). For the design of the questionnaire, to collect and transfer the data, the Teleform information capture system (OpenText) was used. Participants were asked to return the questionnaire within two weeks. Those who failed to do so were sent two further reminders and were also telephoned to encourage response.

Statistical analysis

The pre and post survey responses were analysed in conjunction. In order to assess the school preparedness pre and post training, missed responses (min=1, max=6, median=2) and 'don't know' responses (min=1, max=5, median=1) to the baseline survey questions which were answered in the post training survey were

considered as negative answers. It was felt that lack of awareness of specific preventative measures for example from the senior management team, was likely to indicate that those measures were not in place.

The McNemar test was used to examine if training improved schools' preparedness, and it was reported as binary outcomes. A p-value < 0.05 was considered statistically significant. The IBM SPSS Statistics v22 was used for the analysis.

Ethical approval

Permission to conduct the survey and the training intervention in schools was sought from the Local Educational Authority which advised that the decision to participate lied with each individual school. Schools were given the study's information pack to read and were asked to participate voluntary by returning the questionnaire.

RESULTS

The training programme was delivered to 18 primary schools; a total of 191 school personnel, that ranged from 3-25 attendees per school (median=9, IQR=6). Participating schools originated from all six districts in the county. 44% (8/18) of the schools were from the most densely populated district. All schools were state-funded and there were of small-to-medium size ranging from 29-428 pupils (median=128, SD±119).

29% (5/18) of the schools had pupils at risk of anaphylaxis and carried an AAI; two of these schools (12%) reported that a Personalised Allergy Action Plan (PAAP) was not available.

The response rate to the follow up survey was 78% (14/18). The schools' characteristics (number of pupils registered, locality, socioeconomic status or size) of non-respondents did not differ compared to the respondents.

Fewer than half of the schools (39%, 7/18) reported confidence in dealing with an allergic reaction at baseline survey. Following the intervention, 86% (12/14) of schools stated they felt confident if faced with such emergency (p=0.016).

The majority of schools (94%, 17/18) reported that they had both procedures on identification of pupils with allergies on enrolment at school, and reduction of risks and management of allergic reactions (Table 3). Following training, all schools, 100% (14/14) reviewed their practice regarding the identification of pupils with allergies on admission and setting up a management plan. While only 45% (8/18) of the respondents reported that they helped pupils to manage their allergies (providing teaching material and practical skills) prior to training, all but one (93%, 13/14) had arranged or considered introducing such teaching sessions following the intervention (p=0.03).

Compared with 44% (8/18) of the schools who reported that they were prepared to manage a severe allergic reaction in a child with no previous history of allergy at baseline, 93% (13/14) reported so following the intervention (p=0.016) (Table 4).

It is of note that 35% (5/14) of the respondents stated that they introduced a standard management protocol for the first time following the training and all schools updated or implemented a standard management protocol (pre-training 78% vs post training 100%, p=0.25).

Arrangements for regular staff training were in place in the majority of schools (78%, 14/18). However, 50% (9/18) of the schools reported not offering in depth training for those who had frequent contact with children with severe allergies. In 44% (8/18) of the schools there were no arrangements in place to offer specialist training for those responsible for the health of these children. Post-training, 93% (13/14) of the schools reported that arrangements were made for regular training of all staff (pre-training 78%, vs post-training 93%, p=0.63) and 86% (12/14) offered in depth training (pre training 50% vs post-training 86%, p=0.57). However, only 57% (8/14) offered specialist training at follow-up (pre training 56%, vs post-training 57%, p=0.69).

More than one third of the schools, (39%, 7/18) reported that preventative measures for accidental exposure to food allergens such as a no food sharing policy were not in place prior to the training taking place. Post training, all schools reported they had adopted such a policy (pre-training 61% vs post- training 100%, p=0.03). 71% (10/14) of schools put in place special supervision for high risk pupils during meal times (pre training 56% (10/18), p=0.45). While 78% (14/18) of the schools reported initially that they followed a nuts-free policy, post intervention, only 57% (8/14) reported so (p=0.25) (Table 5).

Also, only one third of the schools, (33%,6/18) reported to have a 'no eating policy on transport to and from school'. Following the intervention, the majority of the schools, (79%, 11/14) seemed to have reviewed this policy (pre-training 33% vs post training 79%, p=0.07).

The majority of schools (83%, w15/18) expressed the need for national guidelines on the management in school of children with severe allergies at the baseline survey and all of them did so post training (100% (14/14), p=0.63).

Similarly, post training 93% (11/18) schools either agreed or strongly agreed with the generic provision of AAI to be kept at school (pre-training 61% (11/18), p=0.125).

DISCUSSION

This pilot study explored whether a training programme would improve school staff's overall self-reported preparedeness in the management of the child with severe allergies. We moved beyond the focus of other studies (impact of training on school staff and confidence [16-18; 25; 26]), and assessed the head teacher's response to policy review and implementation of preventative measures.

The fact that a number of trained schools, implemented an emergency management protocol for the first time following the training, confirms the value of training programmes in supporting schools with and without registered pupils with allergies (7).

A key element of the emergency management protocol is the storage and accessibility of the emergency medication (1). During the training, staff were encouraged to visit the emergency kit location to assess whether this was the most appropriate should an emergency arise. Post-training all schools had reviewed the accessibility of the emergency kit by staff.

Special supervision for children at high risk during meals is one of the fundamental recommendations for schools (1, 20, 21). As a minimum, young children with severe food allergies should be supervised by designated staff member(s) during mealtimes and also during indoor/outdoor activities (1, 20). This recommendation was adopted by a significant number of trained schools.

An area of practice which the majority of schools needed to review as a matter of urgency was the food consumption during pupils' transfer. A 'no eating policy on transport to and from school' (unless medically necessary) was not in place. Schools seemed to respond to this call however further reinforcement is required.

Evidence suggests that the 'no-nut' policy does not offer additional protection as it has not been proven to reduce the antigen exposure. In addition, measures such as a general allergen-ban on their own are inefficient in preventing anaphylaxis as it is not possible to eliminate all allergenic foods from the school environment (21). Instead, holistic approaches to the management of allergies should be encouraged (1). Our training helped schools improve this holistic approach and they proceeded to review their 'no-nut' policy

Similarly, following training, schools reported that they had started providing pupils with teaching material and practical skills to self-manage their allergies. By engaging children as active participants in the management of their allergies, it is hoped that this may lead them to develop adaptive behavioural strategies in responsibility taking and self-management of their condition (22).

Trained schools also seemed to acknowledge the need for regular and specialised staff training in anaphylaxis. This correlated with the increased number of requests received by the local allergy services following training for further support. However school nurses, who would be the most suitable group of school staff to receive

more specialised allergy training in mananging the needs of the severely allergic child, have been redeployed to other community posts (23).

Yearly training and practice drills for all school staff are recommended (1, 6, 21). We have previously reported that schools recognize that there is a lack of standardization in the management of the pupil with severe allergies and believe that a national policy along with support in implementing this are needed to enhance safety at school (7).

Several of the requirements for a safe school environment for children with allergies have been set out in detail in the recent published guidance from the Department of Education (6). However very little has been done to support schools in implementing these measures (19). We showed that schools require support, guidance, and regular training in order to feel confident in managing pupils with allergies. Several schools here reported willingness to implement additional measures to improve preparedness and agree with the generic provision of AAI.

The majority of the trained schools reported increased confidence and preparedness in dealing with the severely allergic child, even in pupils with no previous history of severe allergic reactions. Retention of knowledge and skills over time were not measured here. It has previously been reported that levels of self-rated confidence, preparedness, remain significant after 4-12 weeks follow ups (15) and decline 6 months after training (14, 24). A combination of yearly face-to-face training with online training after six months has been recommended before (6). A clear step by step 'manual' that guides school staff and offers troubleshooting if an issue arises along with face-to-face training for the implementation of an allergy policy and emergency protocol are required. This should be generated centrally and made available to all schools for implementation as mandatory. Schools should be able to prove their competency towards a safer environment for pupils with allergies; their performance in this area should be measured yearly and they should receive constructive feedback along with recommendations for those areas of practice that require improvement.

We acknowledge a number of limitations in this study. Due to the sample being small, not all of the areas tested post training reached statistical significance, however a general trend towards improving preparedness was observed. The results would have been strengthened by comparing the intervention group to a control group and by recording changes in self-reported preparedness over time to assess retention of knowledge. Lastly, it has been suggested that staff perceived confidence is a good indicator of the school preparedness in managing severe allergic reactions (25). However, self-reported confidence and preparedness may be an ineffective way of measuring actual preparedness on its own.

CONCLUSIONS

This face to face training programme is effective in improving schools' self-reported preparedness in managing children with severe food allergies. It has also stimulated an allergy policy review within schools to address staff training needs and those of the allergic child. These two factors can contribute to the fundamental need to improve the safety and quality of life of the allergic child through an allergy aware society.

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Authors' contributions

George Raptis , planned and conducted the research including the delivery of the training sessions, run the data analysis and wrote the manuscript. **Rebecca Totterdell** , contributed to the data analysis, writing parts of the first draft of the manuscript and reviewed several of its drafts. **Konstantinos Gerasimidis**contributed to the data interpretation and reviewed several drafts of the manuscript. **Louise Jane Michaelis** contributed to the planning of the study and reviewed the manuscript. **Mercedes Perez-Botella**

contributed to the planning and the conduction of the study, the data analysis and reviewed and edited the manuscript, ensuring overall cohesiveness.

Key Messages

Schools are willing to implement additional measures to improve preparedness and agree with the generic provision of adrenaline autoinjectors (AAIs) for allergic pupils who might develop a severe allergic reaction for the first time at school. Schools also understand the importance of allergy awareness sessions to help pupils manage their allergies and are keen to introduce them.

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TABLES

Table 1. allergy management workshop (90min)

THEORETICAL SESSION **Allergy Management Awareness Presentation (45min)** Setting up an allergy management health care plan Training for school staff, parents, and pupils Allergy and Anaphylaxis prevention measures **Round table; resources and demonstration (15min)**	THEORETICAL SESSION **Allergy Management Awareness Presentation (45min)** Setting up an allergy management health care plan Training for school staff, parents, and pupils Allergy and Anaphylaxis prevention measures **Round table; resources and demonstration (15min)**	THEORETICAL SESSION **Allergy Management Awareness Presentation (45min)** Seamless communication with all involved Crisis management Psychological aspects of food allergy associated anaphylaxis **Round table; resources and demonstration (15min)**

Handbook for Developing School Emergency Protocol on Anaphylaxis Management	A guide, based on national guidelines (1, 20), peer reviewed and tailored to UK statutory guidance (6) in how to develop an anaphylaxis management protocol, was offered to the head teachers. Schools were advised to cross-check their existing emergency protocol with the guide provided.	A guide, based on national guidelines (1, 20), peer reviewed and tailored to UK statutory guidance (6) in how to develop an anaphylaxis management protocol, was offered to the head teachers. Schools were advised to cross-check their existing emergency protocol with the guide provided.
Allergy action plans (British Society Allergy & Clinical Immunology)	Advice was offered on the schools' existing allergy care plans	Advice was offered on the schools' existing allergy care plans
Emergency bag demonstration.	Guidance on the storage of emergency kits in schools, including which medications are required and their labelling, as per published guidance (1). A practical demonstration with a highly identifiable bag was conducted.	Guidance on the storage of emergency kits in schools, including which medications are required and their labelling, as per published guidance (1). A practical demonstration with a highly identifiable bag was conducted.
PRACTICAL SKILLS SESSION	PRACTICAL SKILLS SESSION	PRACTICAL SKILLS SESSION
Hands on session (30 min)	**Hands on session (30 min)**	**Hands on session (30 min)**
Anaphylaxis Management Drills	Scenarios on the management of a severe allergic reaction presenting with respiratory difficulties and signs of hypotension (reduced consciousness, collapse etc) were used. Training drills demonstrated and explained included: (i) the appropriate positioning of the patient; (ii) the administration of the AAI and (iii) role play scenarios of the necessary communication between the school staff during the crisis management period to both emergency services and parents.	Scenarios on the management of a severe allergic reaction presenting with respiratory difficulties and signs of hypotension (reduced consciousness, collapse etc) were used. Training drills demonstrated and explained included: (i) the appropriate positioning of the patient; (ii) the administration of the AAI and (iii) role play scenarios of the necessary communication between the school staff during the crisis management period to both emergency services and parents.
Practical Administration of AAI	All school staff attending the training day practised the administration of the AAI through role play.	All school staff attending the training day practised the administration of the AAI through role play.

Resources used from the **Anaphylaxis Campaign** (Allergy Wise Online Training for Healthcare Professionals, https://www.anaphylaxis.org.uk/information-training/allergywise-training/for-healthcare-professionals/) and the **Australasian Society of Clinical Immunology and Allergy** (Anaphylaxis e-training for schools and childcare https://etraining.allergy.org.au/) after granted permission for their use.	Resources used from the **Anaphylaxis Campaign** (Allergy Wise Online Training for Healthcare Professionals, https://www.anaphylaxis.org.uk/information-training/allergywise-training/for-healthcare-professionals/) and the **Australasian Society of Clinical Immunology and Allergy** (Anaphylaxis e-training for schools and childcare https://etraining.allergy.org.au/) after granted permission for their use.	Resources used from the **Anaphylaxis Campaign** (Allergy Wise Online Training for Healthcare Professionals, https://www.anaphylaxis.org.uk/information-training/allergywise-training/for-healthcare-professionals/) and the **Australasian Society of Clinical Immunology and Allergy** (Anaphylaxis e-training for schools and childcare https://etraining.allergy.org.au/) after granted permission for their use.

Table 2. Follow up survey

FOLLOW UP QUESTIONNAIRE
Areas surveyed: School staff confidence and preparedness. Survey of staff's confidence in managing pupils with severe all

Table 3. Mangement of children with allergies at school.

Question	**Question**
Does your school ensure adequate management of allergies for individual children by:	
Respondents % (n)	**Respondents % (n)**
Developing specific procedures to identify children with allergies on enrollment?	Pre
	Post
Developing a plan for reducing risk of allergic reactions and managing them when they occur?	Pre
	Post
Helping pupils manage their allergies (e.g. by providing teaching material and practical skills)?	Pre
	Post
**Data are presented as the percentage and p-values*	**Data are presented as th*

Table 4. School preparedness on the management of severe allergic reactions

Question:	**Questio**
Has your school prepared for allergy emergencies by:	Has your
Setting up communication systems within the school that are easy to use in emergencies?	Pre
	Post
Making sure staff can get to the AAI quickly and easily?	Pre
	Post
Making sure that AAI is used when needed and that someone contacts emergency medical services immediately	Pre
	Post

Identify the role of each staff member in an allergy emergency	Pre
	Post
Preparing for allergic reactions in children without a prior history of allergies	Pre
	Post
Documenting the role of the staff to an allergy emergency	Pre
	Post
**Data are presented as the percentage and p-values*	**Data ar*

Table 5. Preventative Measures

Questions
Is there guidance for staff handling food on the prevention of anaphylaxis?
Is there special supervision for high risk children at eating times?
Is there a no food-sharing policy for children at your school?
Is there a no eating utensil sharing policy for children in place at your school?
Is there a no-nut policy for children at your school?
Have relevant teaching session (i.e. cooking classes) been reviewed, to ensure no potential trigger foods for anaphylaxis are
Is there a no eating policy on transport and from schools?
Is there a protocol on food provided for special activities taking place outside the school?
**Data are presented as the percentage and p-values*