TITLE:

Dissemination of EAACI food allergy guidelines using a flexible, practical, Whole School allergy awareness toolkit.

SHORT TITLE:

A template Whole School allergy awareness process toolkit

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For more information visit: www.allergyuk.org or contact schools@allergyuk.org

ABSTRACT

Background

Essential training for emergency adrenaline auto-injector administration alone provides inadequate safeguard in school environments. Recent UK deaths have reinforced the urgency for embedding whole school (WS) allergy awareness to minimise risk. We document development of a practical, flexible WS Food Allergy Awareness Toolkit for UK secondary schools.

Methods

We used a multidisciplinary participatory action research methodology, involving successive modification and retesting of a pragmatic toolkit in 3 case study schools. A **S**chool **A**llergy **A**ction **G**roup drives WS risk assessment, helping schools gradually implement best practice policy in line with their particular needs. Additional schools self-piloted the resulting toolkit with only remote monitoring. School surveys, based on EAACI guidelines were developed to identify priorities and assess change.

Results

Effectiveness of the resulting process toolkit, now available online, was independently demonstrated via pre/post intervention questionnaires from 24/10 pupils with food allergy (FA) and 97/6 pupils without FA, respectively. Pearson correlational analysis showed strong negative relationships between Food Allergy Quality of Life Questionnaire (FAQLQ) at T0 and School Support (SS) at T0 ($r=-0.8$, $p<0.01$), and between SS and Self-Efficacy (SE) ($r=0.73$, $p<0.05$). Mean FAQLQ scores improved between T0 (3.3) and T1 (2.5). SE improved for those with FA (mean difference =1.0). In those without FA, SE (mean difference =0.9) and Attitudes and Knowledge (mean difference =0.7) also improved.

Conclusions

Full stakeholder involvement in toolkit development encourages usage and therefore improves WS community awareness; reduces risk of reactions; fosters a more accepting societal attitude; and empowers pupils with/without allergies to self-manage effectively.

KEYWORDS: adolescent, food allergy, participatory action research, risk assessment, self-efficacy.

Abbreviations: AAI, adrenaline auto-injectors; AUK, Allergy UK; CS, case study; EAACI, European Academy of Allergy and Clinical Immunology; EAPs, emergency action plans; FA, food allergy; FASEQ, food allergy self-efficacy questionnaire; FAQLQ, food allergy quality of life questionnaire; HRQL, health related quality of life; IHPs, individual health care plans; NFA, without food allergy; PAR, participatory action research; QoL, quality of life; SAAG, School Allergy Action Group; SE, self-efficacy; SS, school support; T0, baseline; T1, at follow up; WS, whole school.

BACKGROUND

Allergen avoidance education is primarily focussed on the home setting, however children spend at least 20% of their waking hours in school.[1] Anaphylaxis due to food allergy (FA), occurs in schools more than in any other community location with 18% of FA reactions and 25% of first-time anaphylactic reactions occurring at school.[1,2] Approximately 20 fatalities occur annually from anaphylaxis in the UK.[3] It has been reported that the primary reason for fatalities is a lack of readily accessible adrenaline auto-injectors (AAIs).[4] The age group 16-24 years are at highest risk for anaphylaxis,[5] yet guidelines principally focus on young children. Targeting secondary schools and community settings with educational support is therefore crucial[1] in order to raise general awareness, to empower adolescents to confidently self-manage FA, and to enable schools to develop a protocol to prevent or minimise the impact of accidental adverse events if they occur.

National school guidelines are written by clinicians and health agencies and published in medical journals,[2,6,7] whilst consumer-oriented guidelines are written by patient organisations;[8,9] however, there are few co-written guidelines for education settings.[10] Against a backdrop of schools being under increasing pressure to maximise performance with less resources, it is unsurprising that many schools are slow to embrace effective risk minimisation FA management policies,[1] since this is not directly relevant to academic attainment targets.

Research exploring FA policies in schools remains limited.[11] Teachers are often unaware of school management plans, with many not competent to manage severe allergic reactions.[12] Current school management practices appear to have evolved without considering their impact, or evaluating their effectiveness. Assessment and evaluation of practice is vital to ensure quality.

Although there is continuing progress on Allergy Immunotherapy, it is generally accepted that food allergen avoidance is the only current effective strategy to minimise the likelihood of a reaction. However, simply banning food allergens is not a risk-free solution, because it

may provide a false sense of security for the food allergic student.[2,13] This blanket policy may also lead to stigma and a sense of difference. Restrictive policies focusing on school peanut bans are not backed by evidence of success, appear not to reduce incident numbers and may contribute to poorer health related quality of life (HRQL).[1] Furthermore, banning all 14 major food allergens[14] would make the provision of a cost-effective, healthy, balanced school lunch impossible.[15]

A more effective strategy may be to raise awareness across the whole school (WS) community.[2,16,17] A WS approach recognises that all aspects of the school community can impact pupil health and wellbeing.[17,18] The approach targets skills for self-awareness; self-management; social awareness; relationships; and social decision-making. This approach is therefore likely to help reduce the social stigma and bullying associated with allergies through correcting current misconceptions, improving knowledge, empathy and overall management awareness. An important part of the strategy is to develop age-appropriate individual health care plans (IHCPs), together with emergency action plans (EAPs) and standardisation.[1,19,20]

Prevention is more effective than intervention. With increasing numbers of pupils experiencing allergies,[21] a WS approach ensures that schools are effectively able to manage this responsibility in an ongoing manner, so that they are *always* prepared.[2,22] Schools are encouraged to undergo emergency anaphylaxis training and have EAPs and generic AAIs,[23] essential to promptly and effectively treat anaphylaxis. Current practice means that training for emergency AAI administration does not take account of the context in which it occurs, and is therefore an insufficient safeguard for the school environment. To use an analogy, *fire drill training is beneficial for a fire, whereas reducing the risk of fire ever occurring is preferable*. WS risk assessment and appropriate *daily* risk management aims to prevent incidents occurring, as well as raise awareness, which may in turn positively impact the quality of life (QoL) of pupils with FA[24,25]; and reduce anxieties within school management teams.

Eight deaths between 2014 and 2019 in UK 11-19yrs[26] have underscored the urgent need to improve risk minimisation in schools. Embedding WS allergy awareness policies are a vital step in achieving this goal. The EAACI Food Allergy and Anaphylaxis guidelines, developed to reduce the risk of accidental allergic reactions to foods in the community, including schools[2] provide a sound basis for directing EU school allergy policy. However, EAACI recognise that their clinically focussed documents require awareness of need as well as practical interpretation and application for schools, so that they can be implemented in real world contexts. Similarly, standard allergy policies, such as those supplied by Local Authorities, may lack school-specific practical solutions, necessary for effective implementation.

Consistent with the WS approach methodology, community based participatory action research (PAR) offers a rigorous research mechanism for implementing public health initiatives, within community settings.[27] Pragmatic resources can be developed using a case

study (CS) model, recognising that delivery of prototype interventions must occur prior to evaluation to ensure quality.[28]

Participatory research is a collaborative approach involving active engagement of school community participants at various levels and stages of the research design and delivery (research questions, data collection, analysis, decision on consequent actions).[29] This equips individuals and communities to make sustainable changes to processes and behaviour[30] and the sense of universal responsibility encouraged by this approach is ideally suited for management of FA.[31]

This paper documents the development of an accessible WS Food Allergy Awareness and Practical Action Management toolkit in UK secondary schools. We aimed to provide overburdened schools with a supportive bridge from clinical guidance to effective implementation. The template framework uniquely focuses on practical solutions for schools to adopt and develop individualised school policy around best practice for WS risk management. We hope that the toolkit will act not just as a resource to minimise risk of allergic reactions through increased knowledge and awareness but also to foster a more accepting attitude generally, within the school community.

METHODS

To ensure validity, we used multiple methods across six stages to develop the toolkit, based on key guidelines and recommendations for UK schools[2,13,32,33] (Figure 1).

Stage 1: A key stakeholder cross-disciplinary training and ideas workshop, with expertise in education, policy development, allergy and health explored the development of age-specific, WS allergy awareness and management policies.[34]

Stage 2: Successive CSs were recruited on a first come, first served basis, via invitation to secondary schools in north London and south west England and selected to ensure diversity of school types. The established policy development model for changing school food culture was followed.[35,36,37,38]

Stage 3: Initial resource materials for facilitating each school meeting were developed by the Health Education Trust[35] using a thorough risk assessment/ risk management approach and focussing on priorities for action identified in stage 1. A 'working group' structure (**School Allergy Action Group** (SAAG)) was established, using pupil-centred teaching aids to simplify clinical content.

Using PAR, each sequential CS enabled refinement of these practical resources via hands-on, school-led, iterative evaluation of support materials, with user feedback justifying staged modification, ready for re-testing.

Stage 4: Collaboration with **Allergy UK** (AUK) enabled creation of website pages showcasing progress so that interested parties could immediately benefit from the experiences and solutions learned during the CSs.[39]

Stage 5: The 'toolkit' was further piloted by other schools, with only remote support and monitoring (email/telephone). This tested the ease with which schools could independently progress through the toolkit.

Stage 6: Further toolkit refinements and training were provided to AUK by the research team, for adaptation, to a more cost-efficient automated programme, ready for nationwide uptake by schools through AUK's online portal.

Measures

A range of appropriate survey tools were developed to assist schools in determining their priorities for action and demonstrate change across different parameters over time (Table 1). School survey questions were based on EAACI guidelines[2] and designed to tease out specific issues of concern. Inclusion of a series of validated and study specific questionnaires completed online provided a measure for effectiveness of the toolkit development process.

The Food Allergy Quality of Life Questionnaires (FAQLQ) are disease-specific developmentally appropriate measures of outcome that assess HRQL in FA for all age groups and are the most frequently used HRQL tools in FA research and practice. Research has shown that FA specific measures are valid, reliable and responsive to important clinical changes following treatment. The FAQLQ-FA and the FAQLQ-NFA are multi-dimensional instruments, and include questions on the impact of food allergy on social, psychological, and dietary domains. The measures use a 7-point response scale, with a higher score indicating increased burden on QoL due to FA.

The Food Allergy Self-Efficacy Questionnaire (FASEQ) assesses a sense of personal competence to deal effectively with a variety of management situations, including keeping safe in social environments. The measure uses a 7-point response scale, with a higher score indicating increased self-efficacy, i.e. higher level of confidence.

A series of study-specific questions[40,41] (scale = 1-5) were developed for this research to evaluate the level of (school specific) attitudes and knowledge for both those with FA and NFA, higher/lower scores (depending on the question content) indicating more positive attitudes and better knowledge, for example, *'If someone with a FA recognises or suspects that a food contains an allergen to which they are allergic, how safe do you think it is for them consume it anyway?'* (1= not safe at all, 5= extremely safe); perception of the level of school support (SS) for students with FA, with higher scores indicating better perceived support, for example, *'Please rate how difficult you think it may be for someone with a FA to avoid foods to which they are allergic.'* (1= not difficult at all, 5= very difficult); and SS, for example, *'Are foods labelled for allergen content in your dining hall or other food service areas (e.g. cafes, restaurants, athletic dining areas) at school?'* YES/NO (data not shown).

Generic versions of the FAQLQ and FASEQ were used for those NFA so that results could be more easily compared.

Data analysis

Means and standard deviations or percentage, as appropriate, are used to describe the data. Pearson or Spearman correlational analysis, as appropriate, are used to examine relationships between the measured variables. Simple Linear regression analysis with scores categorised as above and below the mean at baseline as predictor and scores (scale) at follow up (T1) as outcome is used to control for FAQLQ scores at baseline (T0). Paired t-tests are used to determine significant mean differences in measured scores at T0-T1.

Ethics

Approval for working with each school was given through the school headteachers and all interactions with each school were conducted formally via school-nominated key contacts. The principles of GDPR[42] were adopted throughout to ensure personal confidentiality. Each CS approved all website content describing their progress. All pupil, parent and staff surveys were administered directly by the schools themselves. Parental consent was secured via the Headteachers for pupils captured in photographs within the materials.

RESULTS

Three CS schools were recruited to be representative of different school types. CS1, a 1500 pupil urban private, outer London school, with strong committed leadership successfully completed the SAAG process within one school year. CS2, a 600 pupil city state school took nearly 3 years to complete the SAAG programme due to conflicting school priorities. CS3, a 280 pupil provincial Steiner school was unable to progress beyond SAAG4 due to insufficient supportive senior leadership (Table S1). All were mixed and had separate primary and secondary sites, however the focus of the CS programme was with 11-18yrs only. No school was able to confirm with accuracy their numbers of pupils with FA at the outset and this information evolved during the SAAG process (Table S2). Two SAAG meetings were set per term, although schools progressed at their own pace. Each CS school and their progress through the SAAG toolkit is summarised online.[43]

Stage 1: A multidisciplinary workshop took place February 2015,[34] with recordings available for post event use by CS schools.[44,45] A key outcome was the need for multidisciplinary collaboration, recognising the operational differences between clinical and education worlds.[46] Pragmatic messages emerging from the discussions informed the programme resources (Figure S1).[45] It was also recognised that implementing policy effectively requires *both* WS awareness *and daily* practical action management.

Stage 2 and 3: Table 2 and Figure 2 outline the structure and content of the refined 7-module, process toolkit for secondary schools to independently progress through. SAAG toolkit samples are provided via *supporting information 1-5*. Registering schools receive an introduction to WS allergy policy (SuppInfo1). Each SAAG module includes template meeting agendas, pupil-friendly educational activities and resources, and all necessary materials to run effective meetings and to focus attention towards actions needed for implementing change (e.g. SuppInfo2). Planning and progress monitoring report forms are aligned with the UK education system, to facilitate and streamline adoption (SuppInfo3). Each module ends with a process review checklist, requiring headteacher signature (a prerequisite for releasing the next module), thus reinforcing school recognition of their responsibilities around allergy management (SuppInfo2, SuppInfo4). Schools then receive a '*Progress Report'* detailing achievements to date. The final module, designed to help schools stay current and avoid complacency, stresses the importance of regular review, essential for ever-changing school populations (SuppInfo5).

Stage 4 and 5: The SAAG website pages[47] provide access to the initial workshop content, as resource material for schools; display CS progress updates with tips for other schools[43]; invite secondary schools to take a quick anonymous audit[48]; and offer online school registration for the SAAG toolkit process.[44] Since going live (11/2016) to 11/2018, despite no specific external promotion, there were over 6000 visits to the 'WS awareness and management' website pages; and from the 1500 visits specifically to the SAAG resource kit pages, 57 secondary and 32 primary school registered for the SAAG programme. Eleven schools commenced on the programme and one school completed the SAAG programme unaided.

Stage 6: The full, automated SAAG programme is now available through AUK[39] enabling schools to register online freely and download SAAG modules sequentially, following successful completion of each unit. Continuous review plus annual external audit are embedded to maintain momentum.

Qualitative and quantitative changes in CS schools allergy awareness, pre and post input

The implementation process was iterative in that issues and obstacles experienced during the CSs directed successive process and tool modifications. ***Critical outcomes*** relating to these modifications are summarised in Table 3, for example, the importance of *effective* WS (two way) communications became apparent for this age group, as distinct from simply reporting 'allergen bans', for risk minimisation[13] (SuppInfo2). Toolkit content modifications ensured that solutions are dependent on local conditions (e.g. availability of school nurse; mealtime arrangements) and may differ from school to school, hence the resource *content* is flexible for different scenarios.

Evaluation using the online survey[49] has guided schools to assess their initial priorities and measure progress. Eighteen schools completed the baseline survey (totalling 181 surveys), results from which were provided via a simple summary report to each CS school. CS1 secured results from pre, mid-point and post SAAG surveys, for utilisation in their SAAG meetings. The survey methodology is unique to each school and provides a simple approach to engage each school in prioritising their actions towards developing WS awareness. This starts with improving staff awareness of numbers of pupils with FA, since this awareness was identified as inaccurate from the online surveys, for all CSs (Table S1).

Schools registering to utilise the SAAG toolkit are invited to participate in our independent validated QoL survey and to date 200 completed surveys are currently being analysed. Preliminary analysis of CS1 questionnaires, completed by FA individuals at baseline (n=11) and on completion of the SAAG process (n=10) suggest that confidence in ability to manage a reaction; and perception that the school is supportive have increased.[50]

Collective data from the AUK quick online audit (Table S2) represents schools that have actively and independently sought to find out more about school allergy policy. This audit offers a first step for schools to raise awareness of the need to improve practices and the results are worrying, with on average only 53% correct answers. Particularly concerning are that well over a third of secondary schools completing the survey still lock AAIs away and do not encourage pupils to self-carry their AAIs; and that 20% record having no policy around any nuts.

Quantitative analysis

Quality of Life, Self-Efficacy and School Support (Table 4)

At baseline, CS1 and CS2 showed a similar pattern of results for FAQLQ, SE and SS, with no significant difference across scores at T0. The mean difference (0.8) exceeded the minimally important difference for FAQLQ (0.5). CS2 had a lower score on SS compared to CS1, corresponding with the slightly poorer FAQLQ and SE scores at baseline. For those NFA, SE also improved.

Pearson correlational analysis showed a strong negative relationship (using data from both CS to boost power) between FAQLQ at T0 and SS at T0 ($r=-0.8$, $p<0.01$), and between SS and SE ($r=0.73$, $p<0.05$) that is, poor QoL and low SE was associated with poor perceived level of SS.

Spearman correlational analysis showed a strong negative relationship (using data from CS1 only) between participants who scored above (coded 1) and below (coded 2) the FAQLQ mean at T0 and at follow up ($r=-0.75$, $p=0.02$), suggesting that those who had the lowest QoL at T0 improved most at T1. This result was confirmed using a simple linear regression

with scores above and below the mean at baseline as predictor and scores at follow up (T1) as outcome (B=-2.6, p=0.05).

Attitudes and Knowledge

CS1 and CS1 had similar scores at baseline. Attitudes and knowledge increased from baseline (T0) to follow up (T1) both for those with and without FA in CS1.

Pearson correlational analysis showed a strong negative relationship (using data from both schools to boost power) between FAQLQ at T0 and Knowledge and Attitudes at T0 (r=-0.8, p<0.01), indicating that worse QoL corresponds with poorer knowledge and attitudes for those with and without FA (Table 4).

DISCUSSION

We adopted a collaborative, multidisciplinary, PAR approach to identify practical solutions to raise WS awareness and develop and pilot a practical toolkit for schools. The series of iterative 'loops' of diagnosing, planning, taking action and evaluating solutions[51] via three CS schools, enabled development of a toolkit that is fit for purpose, dynamic and flexible, to accommodate the individuality of every school (e.g. number of pupils with FA; regionality differences; staffing numbers; access to school nurse).

The simplicity of the SAAG toolkit and its modular structure helps overcome barriers to establishing effective FA policies in secondary schools. The stepwise analytical framework helps schools *immediately* begin to improve their WS practices. The resources guide the SAAG committee to drive WS risk assessment, enabling creation of bespoke action plans that address school-identified priorities. WS community education[52] results from implementation of robust allergy policy that embraces best practice and has automatic reappraisal firmly embedded.[2,32,33]

A recurring theme throughout the project is emphasis on 'making a start' rather than completion and by simply *commencing* the SAAG process, schools raise their awareness. The modular structure enables schools to progress at their own pace, critical for facilitating school-specific changes and actual implementation. Whilst ideally schools would complete all SAAG stages swiftly, in reality, schools are overstretched for resources and time. Thus, from the perspective of school management, engaging in what seems to be an arduous and complex initiative, not directly related to educational targets, (with often a backdrop of misinformation and anxiety) tends to be repeatedly postponed, *until* an incident occurs. These CSs have shown that providing this step by step comprehensive toolkit is appreciated by schools committed to establishing WS policy. However, by the completion of this project, CSs aside, only one registered school had progressed beyond SAAG1, illustrating that simply making this available to schools is insufficient motivation to complete the process. High profile supportive and persuasive educational communications, encouraging schools to

prioritise allergy risk management are needed. Engaging with parents and pupils to challenge schools to raise awareness of the toolkit *before* the process is begun, could stimulate uptake. A WS approach has proven effective for developing healthier food cultures in schools[37] and reducing bullying,[53] two pastoral issues that, like allergies can have long lasting effects after pupils leave school.[54] The SAAG toolkit will help schools to constructively appreciate the practical benefits for pupil well-being (reducing allergy incidents, opportunities for learning, skills for self-management of allergy and life preparation), as well as the contribution that is made to raising community awareness of allergy.

As reported by others using the WS approach,[53] we identified the fundamental need for active senior management commitment throughout the process, without which progress can be impaired (Table 3). Only schools motivated by a shared consensus will engage with WS allergy awareness, so supporting and promoting these school exemplars will develop a momentum over time, encouraging more schools to follow suit, as occurred with changing food culture in UK schools.[55] More fatalities arise in young adults,[22] so it is likely that too many adolescents are leaving school without gaining some of the necessary skills for the larger world. With an increasing prevalence, it is likely that increased numbers of adolescents and young people will enter secondary schools with an FA, hence the urgency for improvements to school allergy management practices.[2,56]

This development phase content is based on current best practice for moving towards risk minimisation for UK secondary schools and results from the AUK quick online audit reinforce the task ahead. Although not a random survey population, this suggests that even proactive schools are not able to correctly answer basic questions around FA school practices, with key identified issues including storage of AAIs and nut bans (Table S2).

Distinguishing between the stepwise *process* (Figure 2), designed to better engage schools and the *content* will aid appreciation of the potential usage for the SAAG toolkit. This framework can accommodate future recommendations for best practice in schools. Furthermore being a *process* toolkit, transferability to other settings, with relevant *content* modification is easy. Management methods are very similar regardless of the allergy[1] and SAAG7 explores adaption to accommodate non-food allergies. Sharing tools will hasten progress towards whole community allergy awareness. Automation of the online SAAG toolkit has reduced overhead costs for allergy organisations (e.g. AUK in the UK), equipped to manage the interface between end user and allergy experts. This provides opportunity for wider utilisation of the toolkit, with local updates and audits for continued quality assurance.

A perceived shortcoming is the small number of CSs, however this research tests a methodological process. Using a PAR approach, we have evidenced successive modification and re-testing of the toolkit by each subsequent CS school, using hands-on facilitation to tease out iterative improvements. Furthermore, early collaboration on validated QoL

questionnaires suitable for schools provided a concurrent, independent evaluation mechanism within the original CS design, adding a measure of success. Data collected from this baseline could be used to measure impact on schools going forward, providing proof of effectiveness.[40,41]

Continuous testing of this co-production model via facilitation of widescale access to the toolkit will immediately benefit risk minimisation, whilst simultaneous further development work continues. Adoption of the collaborative ethos so established will stimulate collective feedback and ongoing refinements to the toolkit. We believe that the unpredictability of FA means the toolkit should remain under constant review and annual external audit of registered schools can help maintain standards and drive school progress. Future updates to this development phase baseline SAAG toolkit will be managed through AUK.[39]

Our CSs have illustrated[43] that person-centred, pupil-entry and emergency action strategies (e.g. IHCPs and EAPS) alone are not enough to curtail incident scenarios. Although more difficult to achieve, embedding co-produced WS management policy, within which pupil-specific IHCPs and anaphylaxis emergency training reside, is essential for effective risk minimisation anywhere across the school. Ensuring that the undiagnosed pupil who first presents at school can be effectively accommodated may reduce school, parent and pupil anxieties around allergies, which schools themselves will increasingly see as a benefit.

CONCLUSIONS

Providing secondary schools with the appropriate tools to enable them to become WS allergy aware, confidently, is as important for safeguarding young people as providing age-appropriate IHCPs and EAPs for individuals with FA. Improving awareness of the WS community has the potential to reduce risk of allergic incidents and empower adolescents with allergies to live independent lives, assisted by consequent, changing societal attitudes.

Table 1: Survey tools used during case studies to assess change over time and adopted within SAAG toolkit

Survey tools **similar prime questions that address the most common, current issues facing UK schools.*	**How survey used**	**Validity of survey tools**
Secondary school self-audit tool* to encourage initial enquiry by concerned schools who are looking for support online https://www.allergyuk.org/evaluation-and-assessment/self-	Head teachers can assess gaps/compliance of their current policy anonymously. Provides scoring system and feedback plus contact	Questions were based on EAACI guidelines and focussed on key issues of concern as identified at the multi-disciplinary workshop (stage 1).

audit	portal. Freely accessible.	
School telephone survey* - provided baseline for assessing current status in secondary schools	Adopted as baseline survey for first two CS schools	Survey questions first developed and tested in 2012 for a telephone survey of 'current practice' across 40 English Secondary Schools, conducted through HET in conjunction with Bath Spa University nutrition undergraduates.
School online survey* [49] replaced telephone survey; serves as baseline for schools to assess current status and help inform SAAG priorities. Repeat use of same survey gauges change over time and for reassessing priorities	All schools registering to follow SAAG process encourage their staff to complete the Survey Monkey questionnaire prior to SAAG1; results are supplied to the school with correct answers to inform SAAG discussions and help prioritise actions.	Questions standardised from telephone survey above for conversion to Survey Monkey format.
SAAG in-house survey template - additional survey questions and survey tips included within SAAG1 enabling schools to develop bespoke investigations	SAAG encourages schools to develop their own survey of pupils, parents and staff to help identify school-specific needs. In-house results provide school-specific priorities for action within the SAAG working group.	In-house surveys not validated by project- sample questions and survey tips provided to encourage ownership of process by each school.
Self-efficacy and attitudes to management of food allergy [40,41]	Validated questionnaire completed online (via University of Cork).	External to project and included within original CS design, to allow for future pre and post toolkit evaluation.

Abbreviations: CS, Case study; SAAG, School Allergy Action Group.

Table 2: Whole School Allergy Awareness Process stages with module objectives

School Allergy Action Group (SAAG) programme and meeting objectives *Each module includes a self-report checklist (Progress Report) requiring headteacher signature confirming that the relevant module objectives have been completed- essential before advancing onto the next module. For each successfully completed module Schools receive a Progress Report to display goals achieved to date towards WS Allergy Awareness.*
Pre SAAG: Telephone introductions: To register and discuss the current situation in your school; and outline the process involved. To ensure the working group has the power to be effective across the WS, SAAG membership representation from school management is essential, plus teachers, pupils, parents, caterers and school nurse.
SAAG1: Where are we NOW in relation to food allergies? To introduce the project; explain the role of the SAAG; and find out what is currently happening in school in relation to FA management.
SAAG2: Where do we want to be in relation to food allergies? To provide information on why a WS Allergy Awareness Policy on FA Management is important; to give the whole group an insight into what it is like to live with a FA; to consider results of the pupil, parent and staff surveys carried out by SAAG members.
SAAG3: Empowering the consumer: To explore how the school can empower pupils with FA to make informed choices for themselves and thereby help prepare them for living in the wider world.
SAAG4: How are we going to get there? To reflect on the importance of time management when treating anaphylaxis and how this may inform practice in school; to compare current FA management practice in relation to the EAACI guidelines; and to start raising awareness of FA throughout school.
SAAG5: Drawing it altogether and creating policy: To draw on the conversations and discussions that have taken place in SAAG's 1-4 in order to: 1) Draft the *WS Allergy Awareness and Practical Action Management Policy*; 2) Draft the schools associated *Action Plan*.
SAAG6: The End Product: To consider the first drafts of the *WS Allergy Awareness and Practical Action Management Policy* and *Action Plan*; To agree how to disseminate the policy and action plan throughout the school; and to celebrate the work done.
SAAG7$^{(+)}$: Regular re-assessment of the impact of your school's WS Allergy Awareness and Management Policy: To recap on the requirements of effective allergy management; to recruit, update and inform new SAAG members; to review progress against your action plan; to assess the impact of your policy and plan; to consider how the SAAG process could be utilised to start to consider non-food allergens; to troubleshoot as appropriate; and to embed timeline for regular review.

Abbreviations: FA, food allergy; SAAG, School Allergy Action Group; WS, whole school.

Table 3: Critical Outcomes (lessons learned)

School Allergy Action Group (SAAG) *critical outcomes:* *Identified solutions to problems encountered during CSs were built back into the toolkit. Future adaptions of the toolkit should not overlook these subtleties.*
• **'Bite-sized', step by step content** is more manageable for schools. Staged approach was an early lesson learned from the CSs so as not to overwhelm schools with the enormity of the task ahead for them
• **What if schools do not complete the SAAG?** Each SAAG step sheds light and increases awareness somewhere in the school- this all contributes to reducing risks, hence better to progress partway along the path than not to start the climb at all (Figure 2). Progress starts at registration, so efforts should focus on encouraging schools to 'make a start', accepting that completion of the process will take time.
• **Time pressures** are cited for schools not readily engaging with the process and our results suggest that schools appear insufficiently motivated to actively engage with 'allergy awareness' until they experience an incident that re-prioritises allergy management, relative to their other management activities. • Schools only engage with project when they have had an issue: **Quote from Workshop:** *'Schools do not know what they don't know until something goes wrong!'*
• **Anonymity of quick online self audit**[48] allows schools to assess their current situation *without* registering. Tool remains a useful adjunct to the SAAG process since all users receive full *answer sheet* with solutions to problems so identified.
• **Who in school need to be involved?** Experience during the CSs showed that it is essential to have school senior management on the SAAG group from very early on in the process, with ideally at least 2 staff fully engaged, providing leadership to ensure agreement on progress and timelines for implementation. Now integral in toolkit as an objective for SAAG1.
• **Regular SAAG meetings** help develop better two-way communications with parents on allergy matters, which reassures and improves cooperation. One CS school elected to continue termly SAAG meetings following completion of the SAAG process for this reason. This is now built into the SAAG7 review module.
• **Raising awareness of EAACI best practice guidance** enables schools to tease out current bad practices and take control to rectify, at the same time as develop their own bespoke allergy policy to embed better practices as suited to their school systems. Common issues included: not having full records of all pupils with allergies on roll; incorrectly advising pupils having allergic incidents to go to reception; AAIs only available in a locked cupboard in a locked room. • Providing template policy for schools to adapt fast-tracks progress. Sample policy is available on the Allergy UK website.52
• **What happens after SAAG?** School staff and pupil populations are ever-changing, hence continuous review is cemented into the toolkit for risk reduction with SAAG7 providing a recurring agenda. • To maintain freshness of this final review module an education resource around allergy in the news was designed to assess and address current allergy issues/ content. Hence the material informing each SAAG7 agenda is fluid. (SuppInfo5) • To maintain standards achieved and drive progress forward in school, it is recommended that **annual external audit of registered schools** is built into the process.
• **What about liabilities?** The following aspects of the toolkit should provide reassurance to organisations considering their role in promoting the toolkit for their local schools. o Effective WS allergy awareness can only be achieved when school management take responsibility for ensuring allergy policy is integral with the school system and the school community is fully engaged. Therefore the SAAG toolkit offers a modular self- certification award ('school report') system, providing step-wise notification and reinforcement of achievements to date and what is still to do. This can be displayed within the school giving transparency around expectations (e.g. 'work in progress'). o Toolkit framework is a conduit facilitating schools to engage with official best practice recommendations, guidance and legislation around FA; aiding schools to dovetail these within school management structures.
• **Does toolkit address all recommendations?** Toolkit developed as a process framework to enable regular

update of content by operators and hence it lends itself to constant adaptation so remains fit for purpose. It is designed for evolution and adaption.
• **Is it realistic to reverse a nut-free policy?** Recognising the potential dangers of simply stopping a nut-free policy, before assured WS awareness is the norm, SAAG3 focuses on the importance of appropriate *communication* around FA to encourage constant vigilance by all. A key lesson is that *talking* about 'nut-bans' is not a *policy* for WS awareness. Alternative communication mechanisms for school catering are explored, to encourage pupils with allergy to ask questions and not assume the dining room is safe, recognising this as a more helpful approach for preparing pupils for independent living. In reality this may mean that whilst the caterer would not reintroduce nuts, they would stop promoting their nut-free menu, instead focussing on thorough and effective communications with the school community around ingredients.
• **Administration costs for liaising with individual schools will be prohibitive?** Developing a sustainable system that is cost effective was considered a key objective, recognising budget limitations for AUK or other organisations tasked with operating the SAAG toolkit process. As such the SAAG process was adapted to become a fully automated, online tool. As such organisations (e.g. AUK for UK) can move into fully operational mode relatively quickly and with low cost- to put themselves into a leading position to oversee/ manage schools through to developing WS awareness, with minimal time/resource input but also enable updates and audits to ensure quality assurance.

Abbreviations: AUK, Allergy UK; Case study; FA, food allergy; SAAG, School Allergy Action Group; WS, Whole school.

Table 4: Mean and SD scores for quality of life; self-efficacy (FA and NFA); perceived school support for students with FA; and attitudes and knowledge for students (FA and NFA) for CS1 (T0 and T1) and CS2 (T0).

	Quality of life†	Self-efficacy‡		School support§	Attitudes and knowledge¶	
		FA	NFA		FA	NFA
Case Study 1						
T0 (mean, SD)	3.3 (1.5)	3.6 (1.7)	3.2 (1.4)	3.0 (1.4)	3.7 (0.8)	3.1 (0.6)
T1 (mean, SD)	2.5 (1.4)	4.6 (1.1)	4.1 (1.3)	4.2 (0.8)	4.0 (0.7)	3.8 (0.8)
Case Study 2						
T0 (mean, SD)	3.4 (2.3)	3.4 (2.4)	2.9 (1.4)	2.3 (1.4)	3.8 (1.0)	3.2 (0.9)

†Higher scores denote worse quality of life; Higher scores denote higher ‡self-efficacy; §perceived school support; ¶level of attitudes and knowledge. CS1, students with FA: T0 n=11, T1 n=10; students with NFA: T0 n=16, T1 n=6. CS2, students with FA: T0 n=13; students with NFA: T0 n=81. Scales used: 0-6 for quality of life and self-efficacy; and 1-5 for attitudes and knowledge and school support. Abbreviations: CS, Case study; T0, Baseline; T1, At follow up; FA, Food allergy; NFA, Without food allergy; SD, Standard deviation.

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