

## ORIGINAL ARTICLE

Food Allergy and Gastrointestinal Disease

# Dissemination of EAACI food allergy guidelines using a flexible, practical, whole school allergy awareness toolkit

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Email: jennette@foodtofit.com**Abstract**

**Background:** Essential training for emergency adrenaline auto-injector administration alone provides an inadequate safeguard in school environments. Recent UK deaths have reinforced the urgency for embedding whole school (WS) allergy awareness to minimise risk. We documented the 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 School Allergy Action Group 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.

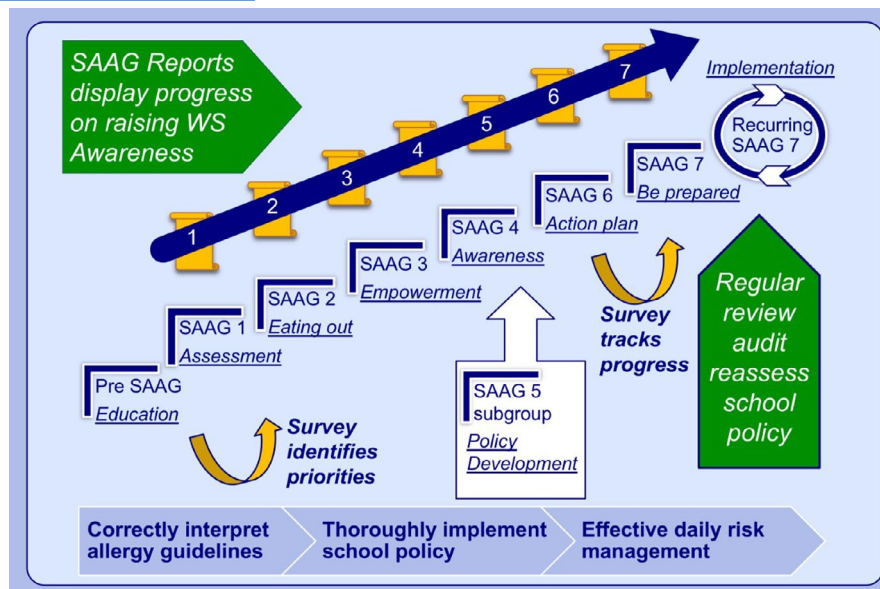
**KEYWORDS**

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; FAQLQ, food allergy quality of life questionnaire; FASEQ, food allergy self-efficacy 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.

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## GRAPHICAL ABSTRACT

Complementary to staff training, appropriate WS tools are urgently needed to embed policy and practices for minimising risk. Stepwise toolkit (SAAG) now available following development and retesting using multidisciplinary, participatory action research. Full stakeholder involvement encourages usage, so improves confidence and WS community awareness; reduces risk; fosters a more accepting societal attitude; and empowers pupils with/without allergies to self-manage effectively.

Abbreviations: SAAG, school allergy action group; WS, whole school

## 1 | BACKGROUND

Allergen avoidance education is primarily focused on the home setting, however, children spend at least 20% of their waking hours in school.<sup>1</sup> 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.<sup>1,2</sup> Approximately, 20 fatalities occur annually from anaphylaxis in the UK.<sup>3</sup> It has been reported that the primary reason for fatalities is a lack of readily accessible adrenaline auto-injectors (AAIs).<sup>4</sup> The age group 16-24 years are at the highest risk for anaphylaxis,<sup>5</sup> yet guidelines principally focus on young children. Targeting secondary schools and community settings with educational support is, therefore, crucial<sup>1</sup> 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,<sup>2,6,7</sup> whilst consumer-oriented guidelines are written by patient organisations<sup>8,9</sup>; however, there are few co-written guidelines for education settings.<sup>10</sup> Research exploring FA policies in schools remains limited.<sup>11</sup> Teachers are often unaware of school management plans, with many not competent to manage severe allergic reactions.<sup>12</sup> Current school management practices appear to have evolved without considering their impact. Assessment and evaluation of practice is vital to ensure quality. The EAACI Food Allergy and Anaphylaxis guidelines, developed to reduce the risk of accidental allergic reactions to foods in the community, including schools<sup>2</sup> provide a sound basis for directing EU

school allergy policy. However, EAACI recognises that their clinically focused 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.

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.<sup>2,13</sup> 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).<sup>1</sup> Furthermore, banning all 14 major food allergens<sup>14</sup> would make the provision of a cost-effective, healthy, balanced school lunch impossible.<sup>15</sup>

A more effective strategy may be to raise awareness across the whole school (WS) community.<sup>2,16,17</sup> A WS approach recognises that all aspects of the school community can impact pupil health and well-being.<sup>17,18</sup> 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.

Prevention is more effective than intervention. With increasing numbers of pupils experiencing allergies,<sup>19</sup> a WS approach ensures that

schools are effectively able to manage this responsibility in an ongoing manner so that they are always prepared.<sup>2,20</sup> Schools are encouraged to undergo emergency anaphylaxis training and utilise standardised age-appropriate individual healthcare plans (IHCPs), emergency action plans (EAPs)<sup>1,21,22</sup> and generic AAls,<sup>23</sup> all 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<sup>24,25</sup>; and reduce anxieties within school management teams.

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,<sup>1</sup> since this is not directly relevant to academic attainment targets. Multidisciplinary training is proving an effective way forward to improve self-efficacy of school staff.<sup>26</sup> However, to maximise the potential impact such trained staff could then achieve, they also require the practical tools to equip them to embed effective WS allergy awareness policies for risk minimisation throughout their school community. 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.<sup>27</sup> 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.<sup>28</sup>

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).<sup>29</sup> This equips individuals and communities to make sustainable changes to processes and behaviour,<sup>30</sup> and the sense of universal responsibility encouraged by this approach is ideally suited for management of FA.<sup>31</sup>

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.

## 2 | METHODS

To ensure validity, we used multiple methods across six stages to develop the toolkit, based on key guidelines and recommendations for UK schools<sup>2,13,32,33</sup> (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 (Supplementary Material 1, Table S2).

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.<sup>34-37</sup>

Stage 3: Initial resource materials for facilitating each school meeting were developed by the Health Education Trust<sup>34</sup> using a thorough risk assessment/ risk management approach and focusing 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 (Supplementary Material 1, Table S2).

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.

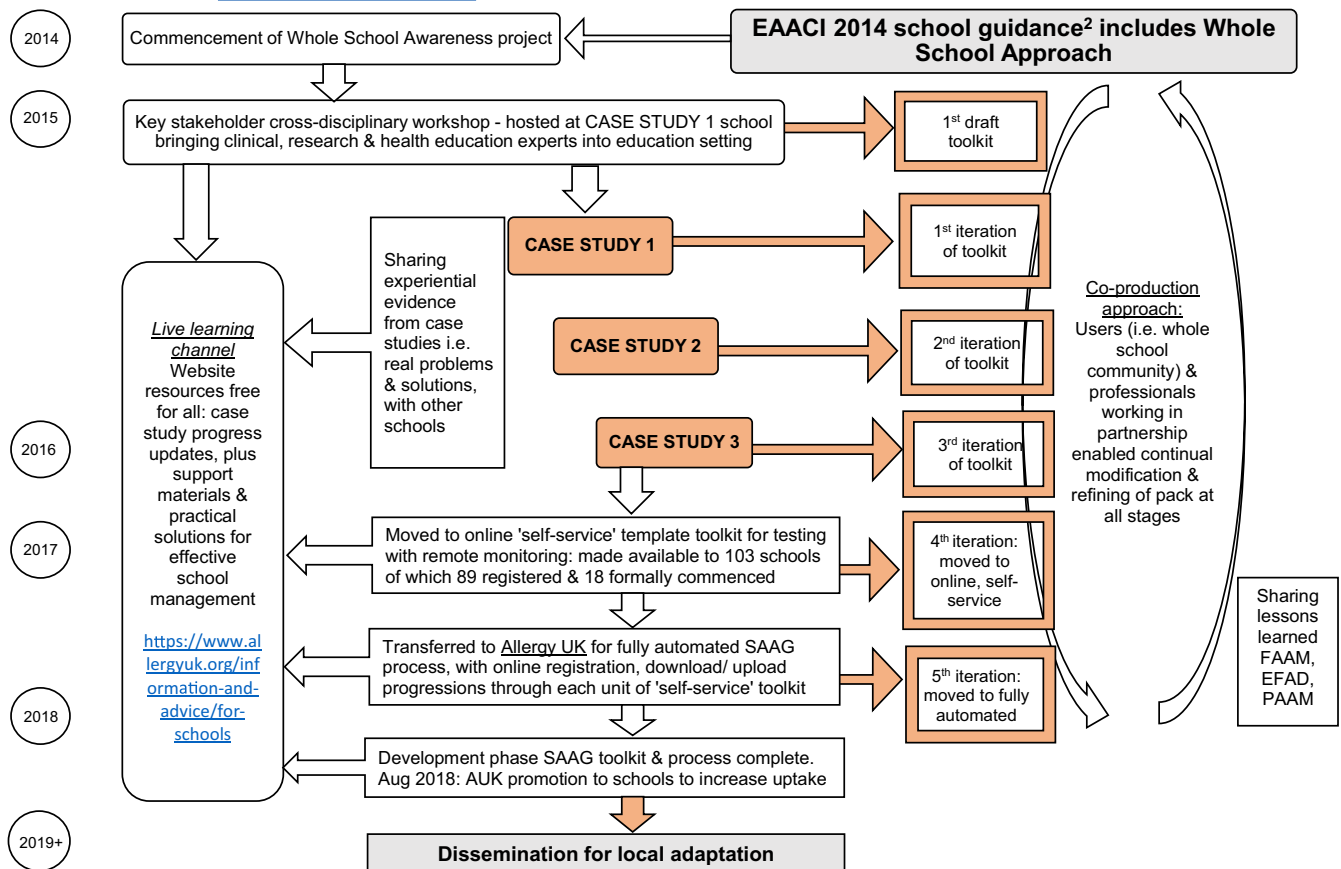
### 2.1 | Measures

A range of appropriate survey tools was developed to assist schools in determining their priorities for action and demonstrate change across different parameters over time (Supplementary Material 1, Table S1). School survey questions were based on EAACI guidelines<sup>2</sup> 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.

Schools registering to utilise the SAAG toolkit were invited to participate in our independent validated QoL survey (Supplementary Material 1, Table S1). 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.

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.

A series of study-specific questions (scale = 1-5) were developed for this research to evaluate the level of (school-specific) attitudes



**FIGURE 1** Project flow diagram and timeline, illustrating all interfacing stages. Iterative approach enabled continuous modification and refinement of the Whole School Allergy Awareness toolkit, via establishment of a School Allergy Action Group (SAAG) within each case study. Abbreviations: AUK, Allergy UK; EFAD, The European Federation of the Associations of Dietitians; FAAM, Food Allergy and Anaphylaxis Meeting; SAAG, School Allergy Action Group; PAAM, Paediatric Allergy and Asthma Meeting. Each iteration equates to further modification of toolkit

and knowledge for both those with FA and NFA (Supplementary Material 1, Table S1). Generic versions of the FAQLQ and FASEQ were used for those NFA so that results could be more easily compared.

## 2.2 | 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 an 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.

## 2.3 | 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<sup>38</sup> 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.

## 3 | RESULTS

The initial material for resource development emanated from the (Stage 1) multidisciplinary workshop (Supplementary Material 1, Table S2). Three CS schools were recruited (Stage 2) 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. All were mixed and had separate primary and secondary sites, however, the focus of the CS programme was with 11-18 years 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. 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 (Supplementary Material 1, Table S3).

Table 1 outlines the structure and content of the refined 7-module, process toolkit for secondary schools to independently progress through (Stage 3). SAAG toolkit samples are provided via supporting information (Supplementary Material 2-6). The SAAG website pages (Supplementary Material 1, Table S2) offer secondary schools a quick anonymous audit (Supplementary Material 1, Table S1) and online registration. In addition to the 3 CS, 57 secondary and 32 primary schools registered for the SAAG programme during the 2 years project phase. Eighteen schools commenced on the programme and one school had completed the SAAG programme unaided by project close (Stage 4 and 5). Finally, automation of the SAAG programme (stage 6) was facilitated via AUK (Supplementary Material 1, Table S2).

### 3.1 | 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 2, for example, the importance of *effective WS* (two way) communications became apparent for this age group (SupplInfo2). Toolkit content modifications ensured that solutions are dependent on local conditions (eg 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 survey methodology (Supplementary Material 1, Table S1) guided schools to assess their unique initial priorities and measure progress. 181 baseline surveys were completed by eighteen schools, results from which were provided via a simple summary report to each CS school. Staff awareness of numbers of pupils with FA was identified as inaccurate from the online surveys, for all CSs (Supplementary Material 1, Table S3), making this a key priority for improvement. CS1 utilised results from pre-, mid-point and post-SAAG surveys, at their SAAG meetings.

### 3.2 | Quantitative analysis

#### 3.2.1 | Quality of life, self-efficacy and school support

At baseline, CS1 and CS2 showed a similar pattern of results for FAQLQ, SE and SS, with no significant difference across scores at T0 (Table 3). The mean difference (0.8) exceeded the minimally important difference for FAQLQ (0.5). CS2 had a lower score on SS

**TABLE 1** 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 on how to disseminate the policy and action plan throughout the school and to celebrate the work done.

**SAAG7<sup>(4)</sup>: 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.

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 ( $r = 0.73$ ,

TABLE 2 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 adaptations 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. 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** (Supplementary Material 1, Table S1) 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; AAls 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 (Supplementary Material 1, Table S3).

**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. (Supplementary Material 6) 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.

(Continues)

TABLE 2 (Continued)

School Allergy Action Group (SAAG) critical outcomes: **Identified solutions to problems encountered during CSs were built back into the toolkit. Future adaptations of the toolkit should not overlook these subtleties.**

**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.

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 (eg 'work in progress').

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 adaptation.

**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 (eg 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.

$P < 0.05$ ) 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 ( $B = -2.6$ ,  $P = 0.05$ ).

**TABLE 3** Independent validated questionnaire- 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 <sup>a</sup>	Self-efficacy <sup>b</sup>		School support <sup>c</sup>	Attitudes and knowledge <sup>d</sup>		
		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)	

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. Example question used to evaluate the level of (school-specific) attitudes and knowledge for both those with FA and NFA: '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 to consume it anyway?'

<sup>a</sup>Higher scores denote worse quality of life; Higher scores denote higher.

<sup>b</sup>self-efficacy.

<sup>c</sup>perceived school support.

<sup>d</sup>level of attitudes and knowledge.

### 3.2.2 | Attitudes and knowledge

CS1 and CS2 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's 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 3).

## 4 | DISCUSSION

We adopted a collaborative, multidisciplinary, PAR approach to identify practical solutions to raise awareness, embedding best practice firmly across WS systems and policies. The series of iterative 'loops' of diagnosing, planning, taking action and evaluating solutions<sup>28</sup> via three CS schools, enabled development and piloting of a practical toolkit that is fit for purpose, dynamic and flexible, to accommodate the individuality of every school (eg number of pupils with FA; regionality differences; staffing numbers; access to school nurse).

Strengths of this project include the simplicity of the SAAG toolkit which helps overcome barriers to establishing effective FA policies in secondary schools; the recurring emphasis on 'making a start' rather than completion, which encourages schools to raise their awareness, by simply *commencing* the SAAG process; the stepwise analytical framework that enables schools to progress at their own pace, critical for facilitating school-specific changes to *immediately* begin to improve their WS practices; and resources that guide the SAAG committee to drive WS risk assessment, enabling creation of bespoke action plans that address school-identified priorities.

These CSs have shown that committed schools (Supplementary Material 1, Table S3) can implement robust allergy policy that embraces best practice and has automatic reappraisal firmly embedded.<sup>2,34,35</sup> However, CSs aside, by the completion of this project only one school had independently progressed beyond SAAG1, illustrating that simply making this available to schools cannot compensate for insufficient capacity and motivation to complete the process. 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. 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 could stimulate uptake. A WS approach has proven effective for developing healthier food cultures in schools<sup>36</sup> and reducing bullying,<sup>39</sup> two pastoral issues that, like allergies can have long lasting effects after pupils leave school.<sup>18</sup> 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,<sup>39</sup> we identified the fundamental need for active senior management commitment throughout the process, without which progress can be impaired (Table 2). 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.<sup>40</sup> More fatalities arise in

young adults,<sup>20</sup> 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 a FA, hence the urgency for improvements to school allergy management practices.<sup>2,41</sup> 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 AAls and nut-bans (Supplementary Material 1, Table S4).

A further strength of the SAAG toolkit is the division between the *process* and the *content*, which extends its potential usage. The framework can accommodate future recommendations for best practice in schools; and being a *process* toolkit, transferability to other settings, with relevant *content* modification is straightforward. Management methods are similar regardless of the allergy<sup>1</sup> 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 (eg 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 retesting 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 (Supplementary Material 1, Table S1). Continuous testing of this co-production model via facilitation of widescale access to the toolkit will immediately benefit risk minimisation. Adoption of the collaborative ethos so established will stimulate collective feedback and ongoing refinements to the toolkit. 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 (Supplementary Material 1, Table S2).

The value of implementing the SAAG toolkit in secondary schools is the realisation from our CSs, that reliance on person-centred, pupil-entry and emergency action strategies (eg 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.

## 5 | 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.

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## CONFLICT OF INTEREST

JH reports grants from American Peanut Council, during the conduct of the study; personal fees from American Pistachio Growers, personal fees from Frucom, outside the submitted work; KS reports personal fees from Food To Fit Limited, during the conduct of the study; SB reports personal fees from Food To Fit Ltd, during the conduct of the study; AW has nothing to disclose; ADG has nothing to disclose.

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#### SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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