

POSITION PAPER

The management of the allergic child at school: EAACI/GA²LEN Task Force on the allergic child at school

A. Muraro¹, A. Clark², K. Beyer³, L. M. Borrego⁴, M. Borres⁵, K. C. Lødrup Carlsen⁶, P. Carrer⁷, A. Mazon⁸, F. Rancè⁹, E. Valovirta¹⁰, M. Wickman¹¹ & M. Zanchetti¹²

¹Department of Pediatrics, Referral Centre for Food Allergy, Veneto Region, Padua General University Hospital, Padua, Italy; ²Addenbrookes Hospital, Cambridge, UK; ³Department of Pediatric Pneumology and Immunology, Children's Hospital Charité, Humboldt University, Berlin, Germany; ⁴CEDOC, Department of Immunology, Faculty of Medical Sciences, New University of Lisbon and Dona Estefânia Hospital-Immunoallergy Department, Lisbon, Portugal; ⁵Göteborg University, Gothenburg, Sweden; ⁶Department of Pediatrics and The Faculty of Medicine, Oslo University Hospital, Ullevål, Norway; ⁷Department of Occupational and Environmental Health, Hospital Luigi Sacco Unit, University of Milan, Milan, Italy; ⁸Children's Hospital La Fe, Valencia, Spain; ⁹Hôpital des Enfants, Allergology and Pulmonology, Toulouse, France; ¹⁰Pediatrics and Pediatric Allergology, Turku Allergy Center, Turku, Finland; ¹¹Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden; ¹²Faculty of Law, 'Carlo Cattaneo' University, Varese, Italy

To cite this article: Muraro A, Clark A, Beyer K, Borrego LM, Borres M, Lødrup Carlsen KC, Carrer P, Mazon A, Rancè F, Valovirta E, Wickman M, Zanchetti M. The management of the allergic child at school: EAACI/GA²LEN Task Force on the allergic child at school. *Allergy* 2010; **65**: 681–689.

Keywords

allergy; anaphylaxis; children; legislation; prevention; school.

Correspondence

Antonella Muraro, MD, PhD, Department of Pediatrics, Food Allergy Centre, Veneto Region, University of Padua, Padua, Italy.
Tel.: +39 049 8212538
Fax: +39 8218091
E-mail: muraro@pediatria.unipd.it

Accepted for publication 14 January 2010

DOI:10.1111/j.1398-9995.2010.02343.x

Edited by: Hans-Uwe Simon

Abstract

Allergy affects at least one-quarter of European schoolchildren, it reduces quality of life and may impair school performance; there is a risk of severe reactions and, in rare cases, death. Allergy is a multi-system disorder, and children often have several co-existing diseases, i.e. allergic rhinitis, asthma, eczema and food allergy. Severe food allergy reactions may occur for the first time at school, and overall 20% of food allergy reactions occur in schools. Up to two-thirds of schools have at least one child at risk of anaphylaxis but many are poorly prepared. A cooperative partnership between doctors, community and school nurses, school staff, parents and the child is necessary to ensure allergic children are protected. Schools and doctors should adopt a comprehensive approach to allergy training, ensuring that all staff can prevent, recognize and initiate treatment of allergic reactions.

Aim

The aim of this Task Force document is to describe an ideal model of care centred on the allergic children at school (Box 1), which is appropriate for use by all stakeholders. Despite a substantial body of literature on allergy management, the evidence available on how to best care for such children at school is inadequate. Furthermore, legislation, education, facilities and health care practices vary between countries. We have presented the information in such a way that individuals will be able to adopt the advice within the context of their local or national facilities to improve care for all children with allergy at school. Where local facilities are not able to support such an approach, this document may be used as a reference to inform national policy.

How to use the recommendations

Our key recommendations are presented as 'action points' for schools. Some of these are generic and apply to all allergic children at school (Box 2), and others are presented as disease-specific action points. To facilitate the implementation of these recommendations, specific responsibilities for each stakeholder have been identified (Box 3). A comprehensive protective package for children with allergy at school can therefore be provided within this framework. These recommendations are based upon the available evidence and expert opinion.

Allergy at school manifests in multiple ways: eczema, bronchial asthma (hereafter asthma), rhinitis and/or conjunctivitis, food allergy and less commonly venom allergy and

Box 1: Rights of the allergic child

1. To be educated in a safe and healthy environment, with as few provoking allergens and irritants as possible and to breathe clean air in schools.
2. Not to be stigmatized as a result of their condition.
3. To be able to participate in all educational and recreational school activities to the same extent as their peers.
4. To have access to medication and other measures to relieve symptoms.
5. To have access to trained personnel who are able to treat acute reactions.
6. To have their education adapted to their condition if necessary (e.g. physical education).

urticaria. Children may present with various symptoms such as wheezing and dyspnoea related to asthma, which may be triggered by allergen contact, airway infection or physical exercise. Children with allergic rhinitis (or rhinoconjunctivitis) might have a runny nose, sneeze frequently, mouth-breath persistently and have itchy eyes in spring and/or summer, or they may have all-year-round symptoms. Indoor pollutants can be particularly harmful for students already affected by allergies or asthma. Exacerbation of asthma and allergic illnesses is often linked to exposure to allergens, such as house-dust mite, cat, dog, cockroach, fungi and mould, and to irritants such as tobacco smoke (1–3). Exposure to chemicals (e.g. volatile organic compounds or formaldehyde) may also exacerbate asthma and allergy (4–6). In addition, poor indoor ventilation may worsen asthma and rhinoconjunctivitis leading to a reduced ability to concentrate (7).

Textile materials such as mattresses and pillows are provided in preschools for daytime sleep periods, but these materials can act as reservoirs for dust mites, which may cause worsening of asthma and/or rhinitis in mite-allergic children (8).

Staff should be aware that allergies including food allergy reaction can present for the first time on school premises and those reactions may be severe (9). The most severe allergic reactions present as anaphylaxis (10) although severe asthma may also occur. Allergy to latex, insect venom or medicines occurs rarely at school. Allergic disease can reduce quality of life through fear of reactions and constrained life-style choices as well as lethargy caused by chronic inflammation, nasal obstruction and disturbed sleep (11, 12).

Overall, school performance might be affected and teachers should be aware of this. Preparation of school staff to cope with an allergic reaction is often inadequate. For example, in a UK survey, only 48% of schools with a child at risk of anaphylaxis had a teacher trained in its management, and only 12% of such schools had adrenaline available (13). A comprehensive approach to managing allergies in school is therefore essential in promoting good health and equality amongst allergic school children. School programmes for children with allergy already exist in some countries (e.g. France and Sweden).

Box 2: Action points for all children with allergic disease at school

1. Schools should enquire about allergic disease at the registration of new pupils, and parents should inform the school of any new allergy diagnosis.
2. A written allergy management plan should be obtained from the doctor, including allergens/triggers to avoid, medications and contact information (Box 4).
3. The allergic child should be readily identifiable to all school staff.
4. Reasonable measures should be instituted to ensure appropriate allergen avoidance.
5. Tobacco smoking should be banned.
6. School staff should be educated in allergen avoidance and recognition and emergency treatment of allergic reactions.
7. Relieving and emergency medication should be available at all times.
8. School staff should be indemnified against prosecution for the consequences of administering emergency or relieving medication.
9. Ensure protective measures continue on school trips/holidays.

After a description of the epidemiology of allergy in children, each individual allergic disease will be considered both for treatment of acute episodes and for long-term management.

Executive summary

1. Allergy affects at least one of four schoolchildren, it reduces quality of life and may impair school performance; there is a risk of severe reactions and, in rare cases, death.
2. Severe food-allergic reactions may present for the first time at school and overall 20% of food reactions occur at school.
3. Allergy is a multi-system disorder, and children often have several co-existing diseases, i.e. allergic rhinitis, asthma, eczema and food allergy.
4. Many schools are currently poorly prepared for children with allergy.
5. A cooperative partnership between doctors, community and school nurses, parents, school staff and the child will ensure allergic children are protected.
6. Schools should adopt a comprehensive approach to allergy training, ensuring all staff can prevent, recognize and initiate treatment of allergic reactions.

Epidemiology**The prevalence of allergic diseases***Asthma, eczema and rhinoconjunctivitis*

Asthma, eczema and rhinitis frequently occur amongst European school-age children. In 6- to -7-years-olds, the annual

Box 3: Roles of stakeholders*Role of the family:*

1. Comply with recommended management including relevant allergen avoidance.
2. Know when and how to use their allergy medication and maintain medication within expiry dates especially adrenaline injections, this knowledge should be reinforced regularly.
3. Inform school of diagnosis e.g. a written letter to an identified staff member.
4. Where appropriate, obtain a written allergy management plan from the doctor and provide a copy for the school.
5. Ensure medication is provided to the school.

Role of the family doctor/allergist:

1. Diagnose or exclude allergies and communicate the results to the family.
2. Provide a written allergy management plan, in plain language with clear identification of the allergens, the main symptoms of an allergic reaction and how to treat them, with instructions for administration of emergency medication (Box 4).
3. Where possible liaise with the school authorities to provide training for staff in all aspects of allergy and asthma. Repeat the training regularly.

Role of the school:

1. The head teacher is responsible for school policy and planning for children with asthma and allergy.
2. Schools should arrange regular allergy training for staff, facilitated by liaison with relevant health care providers.
3. Staff should enquire about allergic disease at the registration of new pupils. There should be a mechanism by which temporary or new staff can identify the allergic child.
4. Implement a written allergy management plan.
5. Ensure that emergency and relieving medication is always available.
6. Ensure prevention and treatment continues on school trips/holidays.
7. Schools should aim to maintain healthy indoor and outdoor air quality, including environmental allergen control.

Role of patient organizations:

1. Provide advice, practical help and support to allergy sufferers with special reference to schooling.
2. Provide appropriate allergy advice and support and facilitate training for schools.
3. Act as advocate of allergy sufferers and lobby for improved services where they are found to be inadequate.

Role of policy makers:

1. Change legislation where it prevents school staff from providing life-saving medication to school children with allergy.
2. Develop a coordinated national strategy to facilitate education of school staff in allergy management establishing and harmonizing educational training programmes.
3. Provide adequate numbers of allergy specialists and trainees in each country.

Box 4: Individualized anaphylaxis management plan: specific issues (11)

1. Personal identification data: name and address; contact details of the parents, allergist, the family doctor and the local ambulance service; and preferably a photograph.
2. Clear identification of the allergens to be avoided; further information may be included on alternative names for allergens (e.g. lecithin for soya or arachis for peanut).
3. Copy of plan to be kept by the child, his/her relatives, preschool care givers, school nurse, school staff, family doctor and be stored with the emergency medication.
4. Individualized instructions:
 - Written clearly in simple, nonmedical language.
 - Stepwise approach with simple instructions for each step, e.g.:
 - At the beginning of an allergic reaction (e.g. 'any swelling or redness of the face, itching of the mouth or nausea') immediately administer a liquid antihistamine.
 - Monitor closely the child for signs of breathing problems or collapse.
 - Call emergency numbers.
 - Keep the child lying down on his/her side unless he/she has severe breathing problems.
 - Clear description of symptoms of bronchospasm and laryngeal oedema in nonmedical language (e.g. If there is wheezing or whistling from the chest, tightness in the throat or difficulty in breathing) so can rapidly administer adrenaline and call emergency medical services.
 - Detailed instructions, possibly with photographs, on how to correctly administer the child's particular self-injectable adrenaline device.
 - Recommendation to inject a second dose of adrenaline if there is no apparent improvement after 5–10 min.
5. Ensure that self-injectable adrenaline is readily accessible to every care-giver.

prevalence for wheezing varies considerably from 5% to 21% between different countries across Europe. The prevalence of rhinitis and eczema in 13- to -14-years-olds varies from 4.5% to 20.2% and 1.8 to 15.6, respectively, although the majority have mild disease (14). In general, there is an increase in the prevalence of allergic disease from south-eastern Europe where it is relatively low (e.g. in Albania) to the northwest (e.g. the United Kingdom) (14).

Anaphylaxis

It is estimated that anaphylaxis occurs at a rate of 1 episode per 10 000 children per year and 82% of such episodes occur in school-age children (15). For adults and children overall, hospital admissions for anaphylaxis in the United Kingdom has increased by sevenfold over the past decade (16, 17). According to a UK survey, 61% of schools had at least one child at risk of anaphylaxis (i.e. had a history of anaphylaxis or carried injectable adrenaline) (15). Between 10% and 18% of food allergy or anaphylaxis reactions occur at school (18, 19).

Allergic diseases co-morbidity

Childhood is the time of greatest allergy burden, and children are often affected by more than one allergic disease at the same time. Fifteen per cent of 13- to 14-year-old children have a diagnosis of two or more allergic diseases such as wheezing, eczema and allergic rhinitis (17). Approximately 95% of children with peanut or nut allergy also has asthma/eczema/rhinitis (20). It is recognized that the presence of asthma, especially if poorly controlled may increase the severity of food-allergic reactions. Further, the presence of food allergies in asthmatic children predisposes to more severe asthma attacks after accidental food allergen exposure (21).

Allergens at school

The most frequent allergens involved in allergic reactions at school vary from region to region. In some countries, pollen and dust mite exposure triggering allergic rhinitis and asthma are responsible for the majority of allergy burden (8), whereas alternative inhalant allergens (e.g. of pets) may be more problematic in other regions (1, 2). Food allergens, mostly milk, egg, nuts, are often involved in allergic reactions and some (e.g. fruits) can cross react with pollens (oral allergy syndrome, where the immune system responds to similar proteins in pollens, fruit and some nuts). Contact with latex, medicines or insect venom is rare at school.

Asthma

Introduction

Asthma is a chronic lung condition characterized by reversible narrowing and excessive mucus production of the airways. This manifests as wheezing, coughing and breathlessness. Asthma is an important health cause of school absenteeism (22).

The majority of children have well-controlled asthma; however, under-recognition and inappropriate management may lead to considerable ill-health (23–25). For some children, exercise-induced asthma, night-time cough and sleep disturbance interfere with physical and educational activities thereby reducing their quality of life (26, 27). Considering the large number of students with asthma and the fact that children spend much of their time at school, it is important that asthma management is optimized in the school environment.

Asthma triggers

The most common asthma triggers in school children are viral infections (such as a common cold) and exercise, particularly if cold air is inhaled.

Children with allergic asthma may have acute attacks triggered by exposure to pollen or animal allergens at school (3). It should be recognized that wheezing may also be a feature of an acute food-allergic reaction (e.g. to peanut) during which visible features of urticaria or angioedema are not always present (11).

Exercise and asthma

All students with asthma should be encouraged to exercise, but children should be able to decline or stop exercise depending on their symptoms. Most children and adolescents with asthma will complain of exercise-induced symptoms at some time; however, repeated asthma attacks during physical activities may indicate that the asthma or associated rhinoconjunctivitis is under-treated. These children and their caregivers should be encouraged to see their allergy specialist or a physician with competence in allergy for treatment adjustment. Children should be allowed to use inhaled reliever medication before exercise, although a persistent requirement for this may be an indicator of inadequate asthma control.

Challenges for the school

The first step in school management is the identification of asthmatic students. Each child should then be individually managed to ensure that their specific needs are addressed, through a partnership between the child's doctor, parents and school staff (9). A model for 'asthma friendly schools' has been described (28).

Action points for the school

1. Identification of children with significant asthma.
2. Asthma education should ideally be provided to appropriate staff members.
3. For children with significant asthma, a written individualized management plan should be obtained from a physician including details regarding specific symptom triggers, an individualized emergency treatment plan, medication doses and emergency contact information.
4. An inhaled bronchodilator and spacer device should be available for emergency use in case of an asthma attack or before/during exercise.
5. Children with a suspected allergic component for their allergic asthma may benefit from reduction of indoor allergen exposure.
6. Students with frequent school absences, school health office or emergency department visits because of asthma should be identified and urged to contact their physician.
7. Schools should aim to include asthma education in the health curriculum.
8. Children with asthma benefit from normal physical exercise. Premedication with reliever medication, individualized and careful warming up and down can facilitate participation.
9. Encourage full participation in physical activities when students are well, offer reduced/modified activities if experiencing symptoms.

There are many examples of successful education programmes for school children with asthma which incorporate some of the above-mentioned principles (28–31).

Eczema

Introduction

Eczema (atopic dermatitis) is a chronic inflammatory condition of the skin, which is common amongst school children and manifests with itching and excoriation. Eczema exacerbations may be provoked by allergens. Food allergens (e.g. egg) may cause acute eczema after inadvertent ingestion. Inhalant allergens (e.g. house-dust mite, cat dander) as well as staphylococcal skin infection may also contribute to poor eczema control.

Management of eczema is based on hydrating topical treatment, topical anti-inflammatory treatment and avoidance of specific and nonspecific provocation factors (32).

Challenges for the school

The physical, psychological and social effects of childhood eczema are considerable and often underestimated. In contrast to children at risk of anaphylaxis or asthma, emergency situations do not play a role. However, chronic symptoms such as itching disturb daytime concentration and interfere with sleep leading to tiredness and mood changes, further worsening daytime functioning (32). Teasing, embarrassment and bullying cause social isolation and may lead to school avoidance. Stress during examinations may worsen eczema. Children with eczema require frequent application of topical treatments during the school day to prevent dryness, and subsequent scratching and infection. Eczema exacerbations occur most commonly after physical triggers (e.g. infection), but may also be provoked by allergen exposure (e.g. animal allergens).

Action points for the school

1. Eczema education may be provided for appropriate staff members.
2. Ensure that avoidance measures are in place (e.g. indoor allergen reduction) for specific provoking factors.
3. Allow children to apply topical eczema treatment at any time throughout the school day. Staff members might also be permitted to apply topical treatments to young children at a frequency recommended by the child's parents or doctor.
4. Ensure students are allowed to use alternatives to scratching, such as cool packs, at all times (even during tests).
5. With prior permission, the teacher may discuss eczema as a class topic, with the aim of dispelling myths about eczema (e.g. that it is contagious) and aim to reducing embarrassment and teasing.
6. Allow children to stop or temporarily reduce swimming pool exposure in special cases and to shower and reapply creams after physical education.

Rhinoconjunctivitis

Introduction

Rhinitis is defined as an inflammation of the lining of the nose and is characterized by nasal symptoms including rhinorrhoea

(nasal secretions), sneezing, nasal blockage and/or itching of the nose. Allergic rhinitis is the most common form of noninfectious rhinitis and is usually associated with an IgE-mediated immune response against allergens e.g. grass pollen, house-dust mite or pets. It is often associated with eye symptoms (rhinoconjunctivitis) that may be the dominant problem.

Rhinitis is the most prevalent chronic allergic disease in children. It causes nasal irritation and blockage with secondary effects of reduced sleep and daytime sleepiness. Many patients with asthma have rhinitis, supporting the concept of 'one airway, one disease'. The presence of allergic rhinitis commonly exacerbates asthma, increasing the risk of asthma attacks, emergency visits and hospitalizations for asthma.

Challenges for the school

Although not life threatening, rhinoconjunctivitis has a significant detrimental effect on the quality of life and may exacerbate co-morbid allergies such as asthma (33, 34). A study from the United Kingdom showed impaired examination performance in teenagers with allergic rhinitis symptoms (12). Impairment of mental activity may also occur in children taking antihistamines.

Action points for the school

1. Students should be able to take reliever medication at school, as required.
2. Students should not be criticized for frequently displaying allergic symptoms such as sneezing or sniffing repeatedly, or using the 'allergic salute'.
3. Teachers should anticipate increased symptoms during outdoor exercise activities in peak seasons.
4. Schools should aim to maintain healthy indoor and outdoor air quality, including environmental allergen control.
5. Teachers should be aware that rhinoconjunctivitis can impair examination performance and worsen asthma. Schools are encouraged to make allowances for this.

Food allergy

Introduction

Food allergy is common amongst school children, with an estimated overall prevalence of 4–7%. The symptoms in a child with food allergy can affect many organ systems and may include hives or swelling (facial angioedema), vomiting, abdominal pain, and diarrhoea, hoarseness or voice changes, wheezing, dyspnoea and sneezing and/or cardiovascular problems as dizziness or loss of consciousness. Cow's milk, hen's egg, peanuts, tree nuts, wheat, soy, fish and crustaceans are the most common foods causing allergic reactions. In some countries, in addition, pollen-associated food allergies results in allergic reactions to fruits, nuts and vegetables and may cause mouth and throat swelling and itching. Cow's milk, egg allergy and wheat allergy may resolve by school age. When persistent, they may cause severe reactions as seen with peanut and tree nuts.

Challenges for the school

Allergic food reactions can occur in the classroom or playground as well as in the canteen. The initial symptoms may be mild and are difficult to interpret without training. Food allergy has been presenting for the first time on school premises in a significant proportion of cases (10). It is not possible to predict the final severity of reactions from the initial symptoms, and allergy deaths have been associated with a delay in the administration of intramuscular adrenaline. All school staff should be trained in the early recognition and treatment of allergic reactions so that emergency medication may be administered without delay. There is, however, minimal risk of anaphylaxis from cutaneous contact with food allergens. Therefore, there is no need to separate children from their peers during mealtimes, although sharing or swapping of food must be prevented. Inhalation of aerosolized or other airborne food proteins e.g. fish, hen's egg or milk protein (powdered cheese) may cause wheezing in sensitive individuals, in particular, if they are suffering from asthma.

Action points for the school

1. Ensure there is a system to identify food-allergic children to staff, especially catering or new/temporary staff.
2. Clear allergen labelling should be available for any food provided by the school. Menus should be available to the family in advance with ingredients clearly stated.
3. Staff should be made aware of how to handle potential food allergens safely, including effective cleaning of surfaces and utensils.
4. Schools should avoid providing food containing peanuts and tree nuts and major allergens relevant to the country, e.g. sesame (including meals, snacks and vending machines). This measure should not be enforced in isolation, but should complement the educational and protective environment for allergic children.
5. Food-allergic children may benefit from an individually labelled box, containing allergen-free 'treat' foods for class celebrations or rewards.
6. Discourage trading or sharing food, and sharing utensils or containers.
7. Ensure lessons avoid the use of provoking food allergens (e.g. using peanuts during science or art lessons).
8. Educate classmates regarding allergen avoidance and recognition of food allergy reactions.
9. Separating children from their peers during mealtimes is unnecessary, provided the other measures described are instituted.

Anaphylaxis

Introduction

Overall, anaphylaxis is a rare event in school-age children, but anaphylaxis and food allergy deaths have been reported at school (35). The most common cause in this group is food allergy (36, 37) with peanuts/tree nuts and

cow's milk being most often responsible for reactions. New allergens are emerging e.g. Kiwi fruit (38), lupine and mustard. Life-threatening reactions caused by insect stings, medications, latex rubber or exercise are uncommon in children (39, 40).

Although anaphylactic reactions are rare, a significant proportion of school-age children are at risk. It is not possible to identify with certainty in which individuals with relatively common conditions such as food allergies, these occur. A recent survey of 100 Scottish schools revealed 61% had at least one child at risk of anaphylaxis, defined by previous use of or provision of injectable adrenaline (13). Up to 24% of children with history of anaphylaxis have their first episode on school grounds (9); food allergens may be present in nearly all situations in schools such as lessons, science projects, mealtimes, playtimes and celebrations. Therefore, all schools should be prepared by training, regardless if they currently have pupils with a history of anaphylaxis (9).

Challenges for the school

Schools are currently poorly prepared. Information about allergies is often not communicated to the school, leaving the child exposed to avoidable risk (9). Where management plans are provided by allergists, they are often not implemented by the school especially during extraordinary activities such as school holidays/excursions (13). Emergency medication is often not made available, and teachers are poorly trained (41). Ideally, training should be provided by existing community or school nurses networks (where available), who themselves should be trained to deliver the training package to schools. This model takes advantage of the efficiency of the hub and spoke training models and ensures high quality and consistency of training. In some countries, these facilities are not available, and there is a need for political initiatives. Alternative training programmes need to be developed and resources should be directed towards achieving this goal.

Treatment of the acute episode in school

Intramuscular (IM) adrenaline is the initial treatment of choice for anaphylaxis (10, 42). This should be given by an adrenaline autoinjector into the vastus lateralis muscle of the thigh. A teacher or school nurse will necessarily perform and supervise initiation of treatment for anaphylaxis occurring at school. Suitably trained individuals must be present in schools as delay in administration of IM adrenaline is associated with death from anaphylaxis. School staff should be indemnified against prosecution for causing harm although administering emergency medication. For older (> 10 years) children who have received suitable training, they may administer the injection themselves after parental consent. Oral antihistamines should also be administered, and the child should be brought into a position of comfort (lay the patient down, if there are respiratory symptoms they should sit up and bronchodilators given, if available). The child

should be monitored and arrangements should be made to transport him/her to the nearest hospital emergency department, irrespective of treatment administered or apparent return to normal health (beware of biphasic reactions). The child should not be sent home.

Action points for the school

1. When a child at risk of anaphylaxis is newly identified by the allergy clinic, the school should receive written notification through the parents or doctor.
2. A written emergency treatment plan produced by the allergist (and agreed with the family doctor) should be adopted by the school.
3. Individually labelled emergency kits should be provided for schools, containing the emergency treatment plan, intramuscular adrenaline autoinjectors and oral antihistamines.
4. School staff should be aware of the location of emergency kits, and the expiration dates of medication should be checked regularly. Temporary or replacement staff should be alerted to allergic children and be made aware of measures to protect them.
5. Appropriately trained school staff should administer all emergency medication to young children. Older students should be allowed to self-medicate when they have reached sufficient maturity and after appropriate training.
6. School training should include all staff members and cover allergen avoidance, recognition and treatment of anaphylaxis.
7. All protective measures should continue during extracurricular activities such as school trips and holidays.
8. School staff should be retrained annually, to take account of changes in staff, students and protocols.
9. If a severe reaction occurs within the school, the headmaster should take responsibility to direct an investigation into what went wrong so that future mistakes can be prevented.
10. School staff should be indemnified against prosecution for the consequences of administering emergency medication.

Emergency medication recommendations for school

School staff should be prepared to treat an acute asthma attack or allergic reaction promptly, with the appropriate medication. This is facilitated by a physician-guided allergy management plan for each allergic student. The treatment of acute asthma requires inhaled beta-2-agonists. Other allergic symptoms rely on oral H1-antihistamines and corticosteroids. H1-antihistamines are indicated for the treatment of mild allergic symptoms, such as urticaria, angio-oedema, and rhinoconjunctivitis. A long-acting nonsedating antihistamine (e.g. cetirizine, loratadine or similar) should be used to prevent drowsiness at school. Short-acting inhaled beta-2-agonists should always be used to treat asthma symptoms; however, it should be stressed to school staff not to rely on inhaled beta-2-agonists only for more severe symptoms, or to delay the use of injected adrenaline in cases of anaphylaxis. Children with any severe allergic reaction, whether or not they have received intramuscular adrenaline must be transported to the local emergency department and observed for at least 6 h.

Legal aspects

There is currently no European legislation dealing specifically with the allergic child at school. National legislation alone therefore governs the management of children's health at school, and this varies considerably across Europe. A central issue is the conflict that exists between the teachers' legal responsibilities and liabilities in administering medication at school and the child's need for care and privacy.

Under current regulations, teachers have no specific duties in terms of child health protection as this responsibility lies entirely with the school/health care system. Their lack of responsibility is because of their lack of medical training. Teachers, therefore, do not have any particular liability above and beyond that of anyone who happens to be present when a child needs care.

However, given the high prevalence of allergy amongst school-age children and the need to deal with acute episodes at school more attention is now being paid to this issue. Indeed, according to an European Union (EU) Briefing Paper, 'Legal Framework of New Governance and Modern Policy in Education throughout Europe', many governments are now creating mechanisms for schools to become more accountable to parents and to government via the increased use of quality assurance mechanisms. In some cases running alongside this increased accountability, greater responsibility is delegated to each school and the school governors, often in the form of more financial control. This also means that the school and sometimes the school governors have to take greater legal responsibility for the management of their school, the quality of teaching, and the safety and well-being of their students.

It is important to point out that one of the purposes of the Legal Framework is to improve child health care at school via the more consistent promotion of quality and standards provided in every country. Two main models were identified. The continental European model appears to rely very much on central monitoring while the UK model is established, to a greater degree, on school autonomy and school liability.

We can therefore determine two concurrent liable parties in terms of school health care: one is the head teacher, who has the duty to call in the competent authorities (over structural and childcare issues) and the other is the Public Health Service, which has the more general medical duty to look after the psychophysical well-being of each student. There are several differences between legal systems within and outside the EU. In the United States, recently, the Food Allergy and Anaphylaxis Management Act was voted on by House on April 8, 2008, to provide schools with uniform guidance on how to create appropriate management and emergency plans for children in the allergy field. In addition, this act is soon to be enacted at a Federal level.

In Australia, the states Victoria and Tasmania have implemented legislation for managing allergies at school. In Victoria, from 2009, all teachers are required to be trained in allergy management. This model requires, by law, the completion, at enrolment, of a form regarding the child's health needs, the training of all teachers with a health professional

and parents, and mandatory notification to the school by parents of any relevant changes. If the child's health problem can be managed with procedures that do not require the intervention of a fully trained health care professional, the school allows the presence of all instruments and qualified personnel needed to provide the required medical care. Ontario, Canada, has had a similar legislation since 2005.

It is desirable that EU bodies consider this issue a priority in the near future to promote a harmonized approach across Europe.

Conclusions

One of four school-age children in Europe lives with allergic disease. There is a broad spectrum of severity with some children at risk of severe asthma or anaphylaxis which on rare occasions may cause death, whilst others present with chronic allergic diseases and experience reduced quality of life and impaired school performance. All children with allergic diseases may experience acute exacerbations at school. Recognition of the allergic child is the first step in management. Schools should enquire about a diagnosis of allergy at the registration of any new child. There should be protocols in place to ensure rapid access to emergency medical care. The school may hold treatment protocols and allergy medication for emergency use, where allowed by national laws.

An education network involving families, health care and education providers is crucial in ensuring that children are identified, the school staff alerted and trained, and specific allergy management plans initiated. This should be achieved through the empowerment of key stakeholders and supported by continuing education of all school staff.

Appropriate legislation should be introduced to make safe the school environment for the allergic child as well as safeguarding educational workers. The implementation of these recommendations across diverse models of health care in Europe would ultimately protect and nurture all children with allergy whilst at school.

Addendum

Experts Group: Baiardini I, Bousquet J, Grimshaw K, Kalayci O, Warner JO. Patient's Organization Representa-

tives: Reading D (Anaphylaxis UK), Podestà M (Food Allergy Italia), Timmermans F (Anaphylaxis the Netherlands). European Reference Group: Calvert M (Senior School Nurse, UK), De Swert L (Belgium), Du Bois A (the Netherlands), Halken S (Denmark), Hourihane J (Ireland), Pohunek P (Czech Republic), Salapatras M (Greece) and EFA Representative, Springer E (Poland), Szeffalusi Z (Austria), Vodusek V (Slovenia), Wasseberg J – Eigenmann P (Switzerland).

Acknowledgments

We are most grateful to Representatives from countries (or National Societies) who provided suggestions and comments at the Task Force workshop held on Saturday February 14th 2009.

Austin M. (Anaphylaxis, UK), Calvert M. (Senior School Nurse, UK), De Swert L. (Belgium), Du Bois A. (the Netherlands), Halken S. (Denmark), Hourihane J. (Ireland), Pohunek P. (Czech Republic), Salapatras M. (Greece), Springer E. (Poland), Szeffalusi Z. (Austria), Vodusek V. (Slovenia), Wasseberg J. (Switzerland).

The authors thank Mr. Jeremy Kemp for secretarial assistance.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Plan particulier de mise en sûreté face aux risques majeurs.

Appendix S2. Managing life threatening food allergies in schools.

Appendix S3. European Union briefing paper: 'Legal Framework of New Governance and Modern Policy in Education throughout Europe'.

Please note: Wiley-Blackwell are not responsible for the content or functionality of any supporting materials supplied by the authors. Any queries (other than missing material) should be directed to the corresponding author for the article.

References

- Almqvist C, Larsson PH, Egmar AC, Hedren M, Malmberg P, Wickman M. School as a risk environment for children allergic to cats and a site for transfer of cat allergen to homes. *J Allergy Clin Immunol* 1999;**103**: 1012–1017.
- Berge M, Munir AK, Dreborg S. Concentrations of cat (Fel d 1), dog (Can f 1) and mite allergens in the clothing and school environment of Swedish schoolchildren with and without pets at home. *Pediatr Allergy Immunol* 1998;**9**:25–30.
- Munir AK, Einarsson R, Schou C, Dreborg SK. Allergens in school dust. I. The amount of the major cat (Fel d 1) and dog (Can f 1) allergens in dust from Swedish schools is high enough to probably cause perennial symptoms in most children with asthma who are sensitised to cat and dog. *J Allergy Clin Immunol* 1993;**91**:1067–1074.
- Norbäck D, Torgen M, Edling C. Volatile organic compounds, respirable dust, and personal factors related to prevalence and incidence of sick building syndrome in primary schools. *Br J Ind Med* 1990;**47**:733–741.
- Norbäck D, Wälinder R, Wieslander G, Smedje G, Erwall C, Venge P. Indoor air pollutants in schools: nasal patency and biomarkers in nasal lavage. *Allergy* 2000;**55**:163–170.
- Smedje G, Norback D. Incidence of asthma diagnosis and self-reported allergy in relation to the school environment – a four-year follow-up study in schoolchildren. *Int J Tuberc Lung Dis* 2001;**5**:1059–1066.

7. Smedje G, Norbäck D, Edling C. Asthma among secondary schoolchildren in relation to the school environment. *Clin Exp Allergy* 1997;**27**:1270–1278.
8. Einarsson R, Munir AKM, Dreborg SKG. Allergens in school dust: II. Major mite allergens in dust from Swedish schools. *J Allergy Clin Immunol* 1995;**95**:1049–1053.
9. McIntyre CL, Sheetz AH, Carroll CR, Young MC. Administration of epinephrine for life-threatening allergic reactions in school settings. *Pediatrics* 2005;**116**:1134–1140.
10. Muraro A, Roberts G, Clark A, Eigenmann P, Halken S, Lack G et al. The management of anaphylaxis in childhood: position paper of the European academy of allergology and clinical immunology. *Allergy* 2007;**62**:857–871.
11. Walker S, Khan-Wasti S, Fletcher M, Cullinan P, Harris J, Sheikh A. Seasonal allergic rhinitis is associated with a detrimental effect on examination performance in United Kingdom teenagers: case-control study. *J Allergy Clin Immunol* 2007;**120**:381–387.
12. Avery NJ, King RM, Knight S, Hourihane JO'B. Assessment of quality of life in children with peanut allergy. *Pediatr Allergy Immunol* 2003;**14**:378–382.
13. Rankin KE, Sheikh A. Serious shortcomings in the management of children with anaphylaxis in Scottish schools. *PLoS Med* 2006;**3**:e326.
14. Asher MI, Montefort S, Björkstén B, Lai CK, Strachan DP, Weiland SK et al. Worldwide time trends in the prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and eczema in childhood: ISAAC Phases One and Three repeat multicountry cross-sectional surveys. *Lancet* 2006;**368**:733–743.
15. Bohlke K, Davis RL, DeStefano F, Marcy SM, Braun MM, Thompson RS. Epidemiology of anaphylaxis among children and adolescents enrolled in a health maintenance organization. *J Allergy Clin Immunol* 2004;**113**:536–542.
16. Gupta R, Sheikh A, Strachan DP, Anderson HR. Time trends in allergic disorders in the UK. *Thorax* 2007;**62**:91–96.
17. Gupta R, Sheikh A, Strachan DP, Anderson HR. Burden of allergic disease in the UK: secondary analyses of national databases. *Clin Exp Allergy* 2004;**34**:520–526.
18. Eigenmann PA, Zamora SA. An internet-based survey on the circumstances of food-induced reactions following the diagnosis of IgE-mediated food allergy. *Allergy* 2002;**57**:449–453.
19. Mehl A, Wahn U, Niggemann B. Anaphylactic reactions in children – a questionnaire-based survey in Germany. *Allergy* 2005;**60**:1440–1445.
20. Ewan PW, Clark AT. Efficacy of a management plan based on severity assessment in longitudinal and case-controlled studies of 747 children with nut allergy: proposal for good practice. *Clin Exp Allergy* 2005;**35**:751–756.
21. Roberts G, Patel N, Levi-Schaffer F, Habibi P, Lack G. Food allergy as a risk factor for life-threatening asthma in childhood: a case-controlled study. *J Allergy Clin Immunol* 2003;**112**:168–174.
22. Austin JB, Selvaraj S, Russell G. Childhood asthma in the Highlands of Scotland – morbidity and school absence. *Scott Med J* 2004;**49**:18–21.
23. Hill RA, Standen PJ, Tattersfield AE. Asthma, wheezing and school absence in primary schools. *Arch Dis Child* 1989;**64**:246–251.
24. Parcel GS, Gilman SC, Nader PR, Bunce H. A comparison of absentee rates of elementary school children with asthma and non-asthmatic schoolmates. *Pediatrics* 1979;**64**:878–881.
25. Shah S, Gibson PG, Wachinger S. Recognition and crisis management of asthma in schools. *J Paediatr Child Health* 1994;**30**:312–315.
26. Lenney W, Wells NEJ, O'Neill BA. The burden of paediatric asthma. *Eur Respir Rev* 1994;**4**:49–62.
27. Sawyer SM. Asthma friendly schools: the importance of school policy for children with asthma. *J Paediatr Child Health* 2006;**42**:483–485.
28. Davis A, Savage Brown A, Edelstein J, Tager IB. Identification and education of adolescents with asthma in an urban school district: results from a large-scale asthma intervention. *J Urban Health* 2008;**85**:361–374.
29. Bruzzese JM, Unikel L, Gallagher R, Evans D, Colland V. Feasibility and impact of a school-based intervention for families of urban adolescents with asthma: results from a randomized pilot trial. *Fam Process* 2008;**47**:95–113.
30. McCann DC, McWhirter J, Coleman H, Calvert M, Warner JO. A controlled trial of a school-based intervention to improve asthma management. *Eur Respir J* 2006;**27**:921–928.
31. Darsow U, Lubbe J, Taieb A, Seidenari S, Wollenberg A, Calza AM et al. Position paper on diagnosis and treatment of atopic dermatitis. *J Eur Acad Dermatol Venereol* 2005;**19**:286–295.
32. Lewis-Jones S. Quality of life and childhood atopic dermatitis: the misery of living with childhood eczema. *Int J Clin Pract* 2006;**60**:984–992.
33. Juniper EF, Guyatt GH. Development and testing of a new measure of health status for clinical trials in rhinoconjunctivitis. *Clin Exp Allergy* 1990;**21**:77–83.
34. Blaiss MS. Cognitive, social, and economic costs of allergic rhinitis. *Allergy Asthma Proc* 2000;**21**:7–13.
35. Bock SA, Munoz-Furlong A, Sampson HA. Fatalities due to anaphylactic reactions to foods. *J Allergy Clin Immunol* 2001;**107**:1091–1193.
36. Novembre E, Cianferoni A, Bernardini R, Mugnaini L, Caffarelli C, Cavagni G et al. Anaphylaxis in children: clinical and allergologic features. *Pediatrics* 1998;**101**:8–16.
37. Munoz-Furlong BA. Food allergy in schools: concerns for allergists, pediatricians, parents and school staff. *Ann Allergy Asthma Immunol* 2004;**93**:S47–S50.
38. Lucas JS, Grimshaw KE, Collins K, Warner JO, Hourihane JO. Kiwi fruit is a significant allergen and is associated with differing patterns of reactivity in children and adults. *Clin Exp Allergy* 2004;**34**:1115–1121.
39. Bonifazi F, Jutel M, Bilo M, Birnbaum J, Muller U, the EAACI Interest Group on Insect Venom Hypersensitivity. Prevention and treatment of hymenoptera venom allergy: guidelines for clinical practice. *Allergy* 2005;**60**:1459–1470.
40. Golden DB, Kagey-Sobotka A, Norman P, Hamilton R, Lichtenstein L. Outcomes of allergy to insect stings in children, with and without venom immunotherapy. *N Engl J Med* 2004;**351**:668–674.
41. Watura J. Nut allergy in schoolchildren: a survey of schools in the Severn NHS Trust. *Arch Dis Child* 2002;**86**:240–244.
42. Simons FER, Sheikh A. Evidence-based management of anaphylaxis. *Allergy* 2007;**62**:827–829.