For and against

Are the dangers of childhood food allergy exaggerated?

The numbers of deaths from food allergy are small and not all are preventable. Allan Colver believes that the increasing prescription of emergency prophylaxis to children fuels anxiety rather than saving lives, but Jonathan Hourihane argues that there are no data to show that prescription of autoinjectors increases anxiety and their provision, as part of an integrated care plan, is justified

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BMJ 2006;333:494–8

YES The natural course and epidemiology of food allergy are not the same in children and adults, and the associated dangers may also differ. Many statements on food allergy in children have been derived from adult populations or studies in which children and adults were not analysed separately. However, studies of children suggest that the dangers are overstated; this leads to unnecessary alarm for many families and schools and also to medical advice and management that may be disproportionate to the risk.

In this article I shall use the phrase food allergy to mean an abnormal or exaggerated immunological response to specific food proteins that may or may not be mediated by IgE, and which is manifest by objectively reproducible symptoms or signs.[1] I will not use the term anaphylaxis because it is sometimes used to mean any IgE mediated allergic reaction, ranging from mild to severe, whereas others use it to mean only a severe allergic reaction with evidence of hypotension or upper or lower airway obstruction. This wide variation may explain why a study in the United States estimated that 15% of the population had experienced anaphylaxis.[w1]

Exaggerated perception of risk

The public seems to have an exaggerated perception of the risks of food allergy, probably spurred on by the media. Recent headlines in national newspapers in the United Kingdom include: "One bite and he dies," "School unable to supervise boy with killer allergy," and "Worry over nut allergy knocks out school conkers." Food allergy is often thought to be more dangerous and frightening than, say, pneumonia, asthma, or diabetes, probably because of the rapid onset of symptoms and the notion that severe reactions and deaths from food allergy can be prevented. In reality, the number of deaths is small (table), and only some are preventable.[2 3]

Deaths each year in children under 16 in United Kingdom

No of deaths	Cause	Years
1	Food allergy[2]	1990-2000
25	Asthma[w8]	1999
206*	Unexpected, sudden, non-violent deaths that were unexplained or caused by medical conditions not recognised before death[w9]	1984-94
275	Accidents[w10]	2004
310	Sudden infant death syndrome[w11]	2004

*Proportional correction; paper reports ages 1-20.

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What is the risk?

Childhood food allergy is being diagnosed more often, the number of children with adrenaline (epinephrine) autoinjectors has greatly increased, and many children, parents, and teachers are anxious.[4 5] These changes may reflect an increase in the underlying prevalence of food allergy, but this is not certain. A recent Danish study of an unselected population found discrepancies between the prevalence of allergy as reported by parents (15%) and the prevalence of food allergy on oral challenge, which was 2.3% in children younger than 3 years and 1% in older children.[6] These data confirmed earlier studies in Sweden and Iceland.[7] But even if prevalence has risen, the incidence of severe reactions, including death, may not have increased. Surely such information needs to be known before dangers can be assessed?

Eight children younger than 16 years died from food allergy between 1990 and 2000 in the UK—that is, one death per 16 million children each year.[2] If we assume that 5% of children have food allergy, then this is one death per 830 000 children with food allergy each year. Milk caused four of the deaths and no child younger than 13 died from eating peanuts. Two of the children died despite receiving adrenaline before admission to hospital, and a further child, with a mild food reaction, died from an overdose of adrenaline. Similar rates are reported in Sweden, with only six deaths between 1993 and 2003 (T Foucard, personal communication, March 2006).[8] [w2] No other large epidemiological studies of children exist, so we do not know how incidence varies between countries. A letter reported a higher incidence in Canada—11 deaths between 1986 and 2000 in a child population one fifth that of the UK.[9]

Extra references w1-w11 are on bmj.com

In the UK, 229 children were admitted to hospital for food allergy between 1998 and 2000.[10] This number is unlikely to be an underestimate because it is supported by another study of UK children that used different methods.[w3] Fifty eight of the 229 children had severe reactions—that is, at least one of the following applied:

- More than one dose of nebulised bronchodilator needed
- Fluid bolus of at least 20 ml/kg needed
- More than one dose of adrenaline needed (by any route)
- Inotropic support needed
- Experienced cardiorespiratory arrest.

Only six of the 58 children might have benefited from autoinjectors because the others already had an autoinjector, did not need adrenaline, received adrenaline within 10 minutes from ambulance workers or primary care staff, or were having their first attack.

Factors that increase risk

If we knew which children with food allergy were most at risk of a severe or fatal reaction, anxiety could be allayed in the others. We have no evidence that the following predict severity:

- Type of allergen
- Amount of allergen
- Severity of previous reaction(s)
- Severity of reaction after a low dose oral challenge
- Multiple allergies
- Size of skin prick reaction
- Total IgE values
- Allergen specific IgE values.

However, asthma is consistently associated with more severe reactions.[11] In a childhood study, all but one of nine children with fatal or near fatal reactions had associated asthma, and in an adult study all but one of the 32 patients who died had associated asthma. Thus, absence of asthma should reassure parents and doctors.[2 w4] Food allergy in asthmatic children is a risk factor for severe asthmatic attacks, as shown by a case-control study in which children who needed ventilation for asthma were compared with less ill children admitted to hospital with asthma.[w5]

Getting the diagnosis right

A diagnosis of food allergy creates much anxiety for all who care for the child.[5] It is important to establish a correct diagnosis, and later to assess whether the child has grown out of their allergy. It is unwise to work on the principle: "If in doubt, it is safer to assume food allergy is present."

Neither skin prick tests nor allergen specific IgE tests can determine whether a child is allergic, although very large weals or very high allergen specific IgE concentrations have been suggested to predict allergy.[12 13] It is common to encounter children who are definitely allergic to one allergen, but whose parents think their child should avoid many other allergens on the basis of skin or IgE testing. In a community survey, half of children positive to peanuts on skin prick testing or with raised peanut specific IgE (or both) could eat them without ill effect.[14]

Food allergy is usually diagnosed by means of an oral challenge.[15] The challenge is usually double blind in research studies, but for clinical use it can be open. It should always be conducted in hospital in a controlled setting, and in some circumstances such challenges are inadvisable.[16] However, if precautions are in place the procedure is safe. Reactions occur in all children who are clinically allergic, and 1-10% of these children require adrenaline, but reactions are not life threatening.[17 w6]

Most children grow out of allergy to milk and eggs. Recent studies show that reactivity to other food allergens, including tree nuts and peanuts, may also be outgrown.[18 19 w7] Children, especially those with adrenaline autoinjectors, should be reviewed periodically with a view to an oral rechallenge.[15] Research is ongoing to determine whether skin prick testing or allergen specific IgE concentrations can assist such monitoring.[1]

Appropriate medical advice and management

Once the diagnosis is certain, the following sensible measures should be taken[1]:

- Parents, children, and teachers should be given full information
- The allergen should be avoided if possible
- Optimal asthma management should be ensured
- Medical assistance should be sought quickly if a child starts an allergic reaction
- An adrenaline autoinjector could be provided if the child lives in (or is taking a trip to) an area which emergency services cannot reach within about 30 minutes.

Arguments can be made for and against general provision of autoinjectors. The main argument in its favour is that reactions are best treated within a few minutes (some say at the stage of early rash or tingling) rather than after waiting for an ambulance or seeking medical assistance.[1] I think this claim is unfounded but accept that evidence is hard to obtain because of the small number of fatal reactions. Because having to carry adrenaline is a nuisance and the risk of a serious reaction is small, the burden of proof should be with those who propose the general use of autoinjectors.

Parents of a child who has recently had a life threatening allergic reaction to food will understandably be anxious, and an autoinjector may reduce their anxiety. When food allergy is diagnosed after a less severe reaction, the advice and approach of the doctor are crucial and may either allay or increase anxiety. Parents with autoinjectors feel the responsibility greatly, and they think they must always be on their guard. Parents should be told how and when to give adrenaline, but one survey found that only half of families questioned had unexpired adrenaline on hand and only one third could use the autoinjector properly.[20] Even when adrenaline was available, only one third of parents used it when needed.[21] Perhaps parents forget about the autoinjector or find it stressful to use, especially several years after being given instruction. Many would rather call emergency services and discuss the appropriate treatment with them.

One study found that children with peanut allergy report more fear of adverse health events, feel more

Summary points

- The incidence of severe food allergy reactions in children is small and not increasing
- The risk of death is very small
- Many effective and simple measures are available to reduce risk
- Many children grow out of food allergy, and clinical reactivity should be reassessed periodically
- It is unclear what proportion of children with food allergy should be prescribed an adrenaline autoinjector
- Autoinjectors generate anxiety in children and carers, and they should be prescribed only when a diagnosis of food allergy has been confidently established, usually by oral challenge

threatened by potential hazards, restrict their physical activity more, and are more worried about being away from home than children with diabetes.[22] The study could not tell whether prescription of an autoinjector improved or reduced overall quality of life, but the authors said that "it is essential that education is geared to decreasing unjustified levels of anxiety." This could start with doctors recognising that the risk of a serious event is extremely small, and that liberal prescription of autoinjectors can cause anxiety and may not prevent death.

Even if autoinjectors could prevent all deaths, the cost of giving injectors (which have a shelf life of 15 months) to all UK children with food allergy (for both home and school) is estimated at £20m (€29m; $37m) per life saved.[4] This is in addition to the psychosocial cost of the anxiety.

Although the number of deaths is small, we should aim to prevent all deaths. This is not possible with our present knowledge; in striving to prevent all deaths, strategies should balance psychosocial and financial costs against general advice for all children with food allergy and more intense regimens for a few.

Contributors and sources: AC is a consultant paediatrician, professor of community child health, and chair of the British Paediatric Surveillance Unit. He has conducted research at population level on health surveillance of preschool children, screening, immunisation, and epidemiology of cerebral palsy. In 2001, he completed a UK study of severe food allergy in children and continues to review the emerging literature on food allergy and to scrutinise the views and articles cited by people whose interpretation of the results of his UK study were different from his own.

Competing interests: None declared.

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(Accepted 25 May 2006)

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NO The acquisition, preparation, and consumption of food are fundamental and unavoidable parts of life. Retrospective and prospective case series show time and again that food allergy can be fatal for some people, at a time and place they cannot predict or avoid (fig 1).[1–3] Food allergy is the most common cause of anaphylaxis outside a hospital setting.[2] Population based studies show that up to 6% of preschool children have had allergic reactions to foods and 2% of adults may be affected by IgE mediated allergies.[4] Food allergy is at least as common as epilepsy. In the United Kingdom, the government says that organ specific specialties have adequate resources to provide allergy care,[5–7] but we would not be having this debate if this approach worked well. The UK is the only developed country that uses this system of service provision for allergy.

Allergic reactions to food are easy to treat, but the treatment is not always successful.[2] The uncertainty of predicting future risk (or safety) is unsettling for families of children with allergy and doctors who deal with such families. It is hard to live with the uncertainty about the timing and outcome of allergic reactions.[8 9] Much of the anxiety relates to the lack

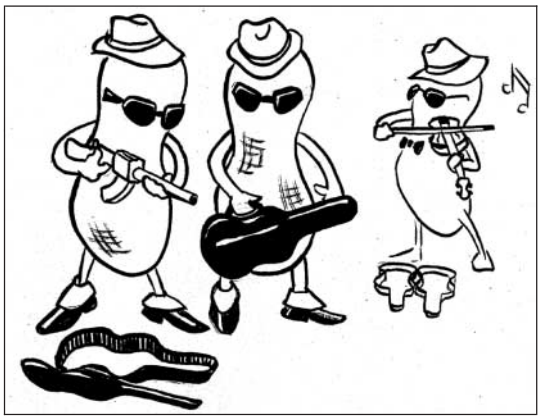

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Fig 1 Food allergy can strike unpredictably

of confidence that families have in their family doctors, who may not be very knowledgeable about allergies, or in nursery and school staff who may encounter the child while he or she is having an allergic reaction.[10] It is my view that we need more medical training in allergy to meet the need that clearly exists for support of families and their primary care doctors.[5]

What foods cause allergy?

Any food that contains protein can cause allergy, but the list of foods that cause serious allergic reactions in children is remarkably short—only eight foods or food groups account for more than 90% of immediate allergic reactions (box).[4] Many of these foods are staples that are difficult to avoid.[11 12] Strategies of avoidance and appropriate family and medical responses need to be in place.

Is food allergy dangerous?

Food allergy kills people. If we accept this fact then we must look at the uncertainty surrounding food allergy that led to the charge of exaggeration. An allergic reaction itself is a traumatic experience—whether mild, moderate, or severe—and should be avoided. No biological markers are available to predict who will or will not have anaphylaxis in the future, so even experts cannot accurately predict a person's future risk. The "who, when, and where" of a future severe or fatal reaction are impossible to prove. This is an area of profound medical uncertainty.[13]

The prediction of who is and who is not at risk of a severe food allergic reaction is more of an assessment than a decision, and this assessment should focus on the role of asthma and a history of having previous severe reactions.[1] However, a prospective study of reported deaths due to allergy in the UK showed that only 20% of people who died of food allergic reactions had had a severe reaction in the past.[2 3] None the less, patients who have had severe reactions in the past are more likely to have severe reactions in the future. Expert assessment and integrated management plans can minimise but not eliminate such risk.[14 15] Data on severe allergic reactions in children who survived in the UK have been criticised by national and international experts in the field owing to the designs

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Fig 2 A young boy having a moderately severe allergic reaction, with angio-oedema, urticaria, and obvious anxiety

of the studies and over-restrictive case definitions which led to a significant underestimate of the incidence of severe allergic reactions to food in children.[16–18]

Food allergy is dangerous in the wrong hands

People with allergy have the right to have their condition recognised and dealt with appropriately. Non-expert management can lead to unjustified exclusion diets, to justified diets being kept in place too long, to inappropriate social exclusion, and to malnutrition.[19]

Although there are worries that the provision of autoinjectors may increase anxiety, I know of no evidence to support this notion. My experience is precisely the opposite, and this view is supported by the literature.[10 15] However, food allergy does cause anxiety (fig 2), and the doctor's approach to the problem may increase this anxiety. Even a mild allergic reaction may reduce a patient or parent's self confidence in dealing

Foods that cause more than 90% of IgE mediated allergic reactions in children

- Milk
- Eggs
- Peanuts
- Tree nuts and seeds
- Fish
- Shellfish
- Soya
- Wheat

Recommended websites

National

Anaphylaxis Campaign (www.anaphylaxis.org.uk)

British Society of Allergy and Clinical Immunology (www.bsaci.org)

International

European Academy of Allergology and Clinical Immunology (www.eaaci.org)

Food Allergy and Anaphylaxis Network (www.faan.org)

American Academy of Allergy Asthma and Immunology (www.aaaai.org)

with allergy, whereas successful management willincrease the patient and their family's perception of control and reduce anxiety. Anxiety can be minimised by expert review and support. We just don't have enough experts.

Proper management in allergy clinics means that most patients never have to use adrenaline kits, but it is wrong to say that the kits are not needed.[14 15 20] The prescription of such kits without training and support (for instance in primary care before review at an allergy clinic) is probably also "dangerous" and may cause distress. The argument about with whom the "burden of proof" lies betrays a fundamental misunderstanding of the management of allergy risk. Nobody is advocating "more general use" of adrenaline. What is advocated is increased availability of adrenaline kits for people who might need to use them.

The management of anaphylaxis is more than management of the event itself.[8] It involves integrated and collaborative interaction with families to empower them and facilitate normal social activities, which will hopefully engender normal social development in the children.

Summary

Food allergy is here to stay. The disease is a killer (though rarely); it can erode or inhibit normal formative experiences in childhood, and it impairs a child's quality of life. The hazard of allergen exposure is considerable even if the risk of such exposure is low. Allergy is rarely viewed without prejudice in local health economies in the UK, despite its low cost and its place at the interface of community and hospital services. Let's get allergy services out of the academic centres and into the community, which is where food allergy is really "dangerous."

Thanks to Yvonne d'Art and Hazel Gowland for helpful comments.

Contributors and sources: JOBH has been a paediatric allergist for the past 12 years, with research interests in the areas of peanut allergy and anaphylaxis. This article was discussed with a general practitioner, senior members of the anaphylaxis campaign, and researchers active in the field. JOBH is guarantor.

Competing interests: JOBH has provided medical opinion to commercial concerns and litigants about food allergy and has acted as an expert witness. He has been paid for his opinions to be used in promotional material about adrenaline autoinjectors. He has been funded by producers of hypoallergenic infant formulas and allergen immunotherapies, and he has received hospitality from and been paid to speak at educational meetings sponsored by such companies. He is a medical adviser to the anaphylaxis campaign and was formerly a member of council of the British Society for Allergy and Clinical Immunology, which continues to lobby for improved allergy services in the NHS.

Summary points

Food allergy is common—2% of adults and up to 6% of preschool children are affected

Deaths are rare but other reactions are almost inevitable over time

No tests are available to predict clinical severity

Management consists of empowering patients and providing rescue drugs

Delay in use of these drugs is associated with a worse outcome in severe reactions

These drugs are rarely needed by patients who attend recognised allergy clinics but cannot be withheld because of the medical uncertainty surrounding allergy

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(Accepted 28 July 2006)

doi 10.1136/bmj.38931.581505.801