

Self-administration of epinephrine in children: a survey of current prescription practice and recommendations for improvement

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SUMMARY

The prevalence of peanut allergy is increasing rapidly and many children are now prescribed self-injectable epinephrine as part of their management. We aimed to examine the current extent of self-injectable epinephrine dispensing to children in the Eastern Health and Social Services Board (EHSSB), Northern Ireland, including indications for prescription, investigations performed, information and training provided and actual usage. Dispensing records held by the EHSSB were examined for the period May to August 1998. All general practitioners prescribing 'Epipens' during this period were contacted and asked to identify the patient and provide contact details. Information was gathered using postal questionnaires sent to General Practitioners and parents. A total of 104 'Epipen' prescriptions were dispensed. Thirty-seven (36%) general practitioners responded to the initial questionnaire; of these 36 (35%) were suitable for analysis. Thirty-four parents were then contacted; 28 (82%) returned questionnaires were reviewed. The commonest indication for 'Epipen' prescription was peanut allergy (32 of 36 (89%) general practitioner responses; 25 of 28 (89%) parent responses). Twenty-six (72%) children had been seen by a specialist; all except one had either blood or skin tests. Six of the remaining eight children had no investigations. General practitioners reported 14 (39%) parents to have basic life support training, compared with six (21%) parents. Eighteen (64%) parents had been given written information regarding their child's allergy, nine (32%) had been referred to a dietician and seven (25%) children wore a medical warning bracelet. The Epipen had been used by three children; all three had multiple food allergies. This study has identified a great variability in the management of children with allergy including the need for specialist referral, further investigation, written allergy advice, referral to a dietician and formalised training in basic life support and administration of epinephrine. It suggests a lack of consensus amongst health care professionals as to the best practice in the management of potentially life threatening food allergy and indicates, at least, a need for better multidisciplinary communication.

INTRODUCTION

Food allergy is common in childhood, with a prevalence between 0.3% and 8%¹ and the suggestion that the incidence is increasing.² In particular, over the last 10 years the prevalence of peanut allergy has doubled, and it now affects approximately 1% of British preschool children.³ Once a child develops nut allergy it is usually lifelong,⁴ although recent reports have challenged this idea.⁵ In the majority of cases, the diagnosis has far reaching implications for the child, their family and carers.

To date there is no consensus on the best management for a child presenting with a history suggestive of peanut allergy.⁶ Guidelines produced by the Royal College of Physicians of

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London and the Royal College of Pathologists UK⁷ have recommended that Paediatricians should always be involved in the care of children with allergic disease. In individual cases there may be further consultation with or referral to an adult allergy specialist. In peanut allergy, children presenting with a clear-cut history of an acute reaction following the ingestion of peanuts may need no additional tests to confirm the diagnosis,⁸ but specialist referral is still important for education of the family and child. Children with a less conclusive history require further investigations.⁹ Skin-prick testing and allergen specific IgE are useful additional tests,¹⁰ but not diagnostically efficient in all cases. Therefore, a careful clinical history with judicious use and interpretation of these tests is required. In some cases it is necessary to proceed to open or double blind placebo controlled food challenge in order either to confirm or to exclude food allergy. Such investigations should only be undertaken by experienced personnel.

This study examined some aspects of the current management of allergy among children by a questionnaire survey of their general practitioners (GPs) and parents. We surveyed GPs in the Eastern Health and Social Services Board which commissions care services for approximately 680,000 people. In particular we looked at the extent of epinephrine prescription for home use, in the form of the 'Epipen Autoinjector'. The indications for prescribing the 'Epipen', information and training given to parents and follow-up data on actual usage were obtained.

METHODS

Eastern Health and Social Services Board dispensing records for a 4 month period from May 1998 to August 1998 were examined and GPs prescribing the 'Epipen' were identified. Prior to this date no computer code was available for 'Epipens', hence GPs could not be identified. These GPs were contacted by letter on two occasions and asked to identify the child receiving the 'Epipen', complete a short questionnaire on circumstances surrounding the prescription and either forward the parent questionnaire to the family or give permission for the parents to be approached and return contact information. Two GPs did not consent to their patient being approached and one parent did not wish to be sent a questionnaire.

• General Practitioner Questionnaires

GPs were questioned on the indication for the 'Epipen' prescription, either peanut or other specified allergies, who prescribed the 'Epipen' and how many were prescribed for each child. They were also asked to provide information on investigations performed (full blood count (FBC) and differential white cell count (DWCC), total IgE, RAST Specific IgE, skin prick testing and/or oral food challenge) and by whom, and what information was given to parents after the prescription of the Epipen (recognition of allergic reactions, when and how to use the 'Epipen', and basic life support (BLS)). Details of usage of the 'Epipen' were also requested. Finally, GPs were asked to record their perceptions on 'Epipen' prescription and allergies.

If contact information and consent to approach the parents was provided, they were contacted in writing and asked to complete and return a short questionnaire.

• Parent Questionnaires

Information obtained from parents included their perception of why the 'Epipen' was prescribed, who prescribed it, investigations undertaken, information and training given in the recognition of allergic reactions, when and how to use the 'Epipen' and BLS. Objective data included the number of 'Epipens' held by each child, where they were kept and use to date. Information on referral to dietician, contact with school, provision of written information and use of Medical Warning Bracelet was obtained.

RESULTS

A total of 104 'Epipen' prescriptions were dispensed by 104 GPs during the four months of the study. All GPs were contacted and a total of 37 (36%) responded to the questionnaire. Names and addresses of two children were not supplied and one parent did not consent, leaving 36 (35%) GP responses for analysis. Thirty-four parents were sent questionnaires, two were returned as wrong addresses, one had to be discarded as not applicable, and three were not returned by parents, leaving a total of 28 parent questionnaires. The age range of children involved in this study was two to 16 $\frac{1}{2}$ years, median age eight years (information available in 30 cases). There were 19 boys and 15 girls (information available in 34 cases). The commonest indication for 'Epipen' prescription from GP questionnaires was peanut allergy (32/36, 89%) either singly (25, 70%) or

with other allergies (7, 19%). Allergies other than peanut (egg protein allergy, anaphylaxis to rabbit fur and a reaction to antibiotics in a child with cystic fibrosis) accounted for three (8%), with no information returned in the final case. The commonest indication for 'Epipen' prescription from parent responses was peanut allergy (25/28, 89%) either singly (20, 71%) or with other allergies (five 8%). Allergies other than peanut (egg protein, rabbit fur and antibiotic reaction) accounted for the remaining three (11%).

In 23 children, where the GP stated that the indication for the 'Epipen' prescription was for peanut allergy alone, parents reported peanut plus other nut allergies.

General practitioners reported that 11 (31%) 'Epipens' were prescribed by a consultant paediatrician, eight (22%) by an unspecified hospital consultant eight (22%) by the GP, seven (19%) by a consultant immunologist and two (6%) by an unknown source.

General practitioners reported that a total of 26 (72%) children had at least one investigation performed, more commonly in children referred to a secondary specialist. Nine children (82%) prescribed an 'Epipen' by a consultant paediatrician, six (86%) prescribed by a consultant immunologist and seven (88%) prescribed by an undefined hospital consultant had at least one investigation performed, compared to three children (38%) prescribed an 'Epipen' by their GP. Six children (17%) had no investigations performed; five had 'Epipens' prescribed by their GP. Investigations performed were not documented in three cases. The commonest test ordered was allergen specific IgE (n=24/26 (92%) of children who had investigations performed) and five children were reported to have had oral food challenge. General Practitioners reported that 29 (81%) parents had received training in recognition of allergic reactions, 28 (78%) on when to use the 'Epipen' and 27 (75%) on how to use the 'Epipen'. Fourteen (39%) parents were

TABLE

General practitioner and parent responses and percentage concordance of responses

<i>Question asked</i>	<i>GP response</i>	<i>Parent response</i>	<i>% Concordance</i>
Number of respondents	36	28	28
Indication for prescription			82%
Peanut alone	25(69%)	20(71%)	
Peanut & other	7(19%)	5(18%)	
Other	3(8%)	3(11%)	
Prescriber			50%
Consultant paediatrician	11(31%)	5(18%)	
Hospital consultant	8(22%)	2(7%)	
General practitioner	8(22%)	17(61%)	
Consultant immunologist	7(19%)	4(14%)	
Unknown	2(6%)	0	
Investigations performed			89%
Yes	26 (72%)	22(79%)	
No	6 (17%)	6(21%)	
Unknown	4 (11%)	0	
Training received			
Recognition	29(81%)	20(71%)	57%
When	28(78%)	23(82%)	57%
How	27(75%)	23(82%)	54%
BILS	14 (39%)	6 (21%)	36%
Usage	3(8%)	3(11%)	100%

reported to have been taught BLS. Most parents reported receiving information on the recognition of allergic reactions ($n=20/28$, 71%), when to use the 'Epipen' ($n=23/28$, 82%) and how to use the 'Epipen' ($n=23$, 82%). Six parents (21%) said they had been trained in BLS.

In only two cases (of 28 where information was available) was there agreement between GP and parental responses on information and training (Table). The number of 'Epipens' owned by each child ranged from one to eight. Modal number was four. Pens were kept at home, in school and with grandparents. Eighteen (64%) parents said they have received written information about allergies, nine (32%) children had been referred to a dietician and seven (25%) wore a Medical Warning Bracelet. Twenty-two (85%) schools had been informed that the child used an 'Epipen'. Three (11% of 28) children prescribed an 'Epipen' had used it. These children all reported multiple allergies including peanut allergy, and all had been admitted to hospital on at least one occasion following the use of the 'Epipen'. General Practitioners were asked to record their perceptions on 'Epipen' prescription and allergies. Thirty (83% of those responding) GPs felt that the prescription was appropriate. In the cases where the 'Epipen' was known to be prescribed following hospital assessment, 21/26 (81%) felt that they had received adequate information from the hospital following the prescription of the 'Epipen'. Overall, four (11%) felt that there was over-prescription of 'Epipens' to children.

DISCUSSION

Food allergy is common in childhood with a current prevalence between 0.3% and 8%.¹ Increased public and parental awareness, with high profile media coverage of the potential life threatening complications make it likely that the demand for home treatment of anaphylaxis will continue to increase. This study not only highlights differing perceptions of parents and general practitioners as to why an 'Epipen' was prescribed, but also a variation in practice. This suggests poor communication between parents and the medical professionals. We appreciate that our study involves small numbers but feel that important lessons can be learnt from our results if misinformation and inappropriate management are to be avoided.

Once a child develops nut allergy it is usually lifelong, although recent reports have challenged

this idea.⁵ Unnecessary dietary restrictions and lifestyle adaptations can be minimized by accurate diagnosis. The prescription of epinephrine for home use has resource implications with each 'Epipen' costing just under £30, and ideally each child should have a minimum of four prescribed at the time of diagnosis. The shelf life is often well under a year, thus making frequent renewal an added consideration.

A clear history of an allergic reaction immediately following ingestion of peanuts should be adequate to make a definitive diagnosis of peanut allergy, but assessment by a specialist is recommended prior to the prescription of epinephrine for home use.⁷ In this study we found that one in three children were not seen by a hospital consultant. This may be acceptable if the GP involved has extensive experience in the management of allergy, but may indicate a lack of awareness of the need for referral. For children in whom the history is less certain, investigations are indicated. Both allergen specific IgE and skin prick testing have historically been limited by false positive and negative results but recent reports document the use of food specific IgE concentrations to diagnose symptomatic food allergy with 95% certainty.¹³ The gold standard test for children presenting with a suspected food allergy is double blind placebo controlled food challenge.^{14, 15} This test is not without risk and must only be performed by experienced staff in a centre with full resuscitation procedures. In this study GPs reported that 6 (17%) children had no investigations performed and of these 5 were not referred for assessment by a hospital consultant. The commonest test performed was allergen specific IgE ($n=24$ of 26 (92%) that were known to have investigations performed).

Not all reactions to peanuts are life-threatening, and oral antihistamines are adequate treatment for such reactions. However, epinephrine is the treatment of choice for life threatening anaphylaxis, but must be given at the first sign of a reaction.^{6, 16} Intramuscular injection is the preferred route of administration as it provides rapid peak concentrations in most children.¹⁷ Deficiencies in the actual carriage of prescribed epinephrine and its successful usage have been identified.¹⁸ In a study of 101 families previously prescribed epinephrine for food allergy only one third of patients/parents knew how to administer their epinephrine correctly.¹⁹ When epinephrine is indicated, it must be available at all times and

parents and all carers must be trained in the appropriate timing and safe use of the Epipen. Complications have been described following its use,^{11,12} albeit in the adult population. Despite this study having small numbers, a relatively high proportion (3/28 or 11%) reported using the Epipen. All three reported receiving instruction on the use of the Epipen but none on BLS. Again discrepancies were found between GP and parent responses.

Epinephrine administration is only one aspect of the management of food allergy. Indeed, the ready access to an Epipen may provide false reassurance and decrease vigilance in preventing exposure. Our study suggests that professionals fail to emphasize other aspects of management. Dietary avoidance is a key aspect of peanut allergy management and referral to a dietician should be made as peanuts and other nuts are frequent hidden ingredients in many foodstuffs. Medical Warning Bracelets allow easy identification of the medical condition and allow appropriate treatment to be given early. Comprehensive advice in drawing up a training package for an individual patient and carers is available and should be adhered to²⁰ and communicated to parents and carers.

On the basis of our study results we would recommend the following:

All children, suspected to have food allergy, should be referred for specialist assessment either by a suitably experienced paediatrician or Immunologist. Testing, when indicated, should involve the most appropriate and informative investigation. Review should be arranged to monitor effectiveness of avoidance, adequacy of treatment and continued sensitization.

If the diagnosis is confirmed, a multidisciplinary team approach should be adopted, and include

- Paediatrician +/- Immunologist
- Dietician
- General practitioner
- School Health Team

The child, their family and other carers should be instructed in the recognition and treatment of allergic reactions including training in basic life support. Regular review of 'Epipen' and BLS technique is advisable.

Written information on peanut allergy, individualized for each child, must be given to

parent and other carers, including schools if of school age.

Dietary advice on avoidance of nuts or other relevant food allergens.

A minimum of 4 'Epipens' in the household: two for home and two for school.

Each child must wear a Medical Warning Bracelet (Medic Alert, SOS) for easy identification of their medical condition.

CONCLUSION

This study has identified a lack of consensus in the management of anaphylaxis, including specialist referral, investigations, written allergy advice, referral to a dietician and formalised training in administration of epinephrine and basic life support. We recommend the development and dissemination of clear guidelines, improved communication between health professional and carers and continued evaluation of outcomes.

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