

**BET 2: DO PARENTS OF CHILDREN WITH
ALLERGIC REACTIONS KNOW HOW TO
USE ADRENALINE AUTOINJECTORS
APPROPRIATELY?**

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ABSTRACT

A short-cut review was carried out to establish whether the parents of children with

Table 2 Relevant papers

Author, date and country	Patient group	Study type (level of evidence)	Outcomes	Key results	Study weaknesses
Gold and Sainsbury, 2000, Australia	68 Parents of children with a history of anaphylaxis and an AAI attending paediatric allergy service at tertiary centre in Adelaide	Single centre, cross-sectional retrospective, structured telephone questionnaire survey	Knowledge of anaphylaxis symptoms—scored out of 11 Knowledge on how to use AAI (4-step technique) Decision to use AAI in necessary situations	16% of parents able to name between 9 and 11 symptoms of anaphylaxis, those who have seen 2 or more serious reactions were more successful than those who had seen 1 or none (12% vs 26%) 16% of parents were able to recall all 4 steps of AAI technique 5% could not recall any steps 45 Anaphylactic reactions had occurred, but only 14 parents used AAI (31%)	No objective testing of AAI ability. No data on non-responders
Sicherer <i>et al</i> , 2000, USA	101 Consecutively referred food-allergic patients (95 parents and 6 patients over the age of 12 years)	Single centre, cross-sectional descriptive study	Having AAI device on them at all times Ability to use AAI (following 6 or 9-step technique depending on device) Factors associated with correct use	86% Stated they had the device on them at all times; however, only 71% had it on them in clinic, of which 10% were expired 32% of participants were able to correctly use an AAI Membership to a lay organisation, ($p=0.007$) and owning a device for >2.5 years ($p=0.0003$) were associated with improved ability Having been prescribed the device by an allergist conferred greater (but not significant $p=0.006$) ability	Only includes food-allergic children
Blyth and Sundrum, 2002, UK	Parents of 25 children enrolled via contact with schools that identified pupils with AAI	Cross-sectional survey including questionnaire and structured interview	Ability successfully to inject training device using 6-step technique	6 (24%) Parents were able to complete all 6 steps	Small sample. Children only enrolled via school nurses. No information on non-responders. No analysis to determine who had trained the parents who were successful
Kim <i>et al</i> , 2005, USA	165 Parents of children with food allergy and AAI from local food allergy support groups and private paediatric clinics	Single centre, cross-sectional descriptive questionnaire study, with a visual analogue scale for 'perceived comfort' 0 cm=very uncomfortable to 10 cm=very comfortable	Knowledge of key steps for AAI use Comfort using AAI on child Decision to use AAI during severe reaction	Administration questions answered correctly by 90% of parents Mean distance of 6.6 cm. 75 patients felt 'very uncomfortable' using AAI on child. 51% Concerned about recognising the signs, 40% feared hurting their child, 36% though they would forget the technique in an emergency situation. Increased comfort levels were associated with previous use of AAI ($p=0.009$) and earlier AAI training ($p=0.005$) 70 (42%) of children had experienced serious reaction, only 14 (8%) of parents administered adrenaline	Selection bias due to the locations chosen for enrolment, majority of responders were white mothers with degrees, no African American or Hispanic parents included. No objective testing of ability
Arkwright and Farragher, 2006, UK	122 Parents of consecutive children prescribed AAI attending allergy clinic. 56 AAI prescribed by GP, 35 prescribed by non allergy specialists, 31 prescribed by allergists	Single centre, prospective and direct study—case notes of children review, once they attended a follow-up appointment their AAI technique was reviewed	Parents' ability to administer successful injection using 5-step technique on dummy device	47% of parents were able to use the device	

Continued

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Author, date and country	Patient group	Study type (level of evidence)	Outcomes	Key results	Study weaknesses
			Effect of prescriber and training techniques on correct use	Those who had received device from allergy clinic were significantly better than those who had received device from GP, $p < 0.01$ Those who had received a demonstration of the device were significantly better than those who had received only written information, $p = 0.003$	
			Other factors associated with correct use	Parents associated with lay organisations were significantly better than those who were not, $p = 0.001$	
			Decision to use AAI during severe reaction	No parents had used the device, despite 26 severe cases being reported	
Huang, 2007, USA	224 Parents of children with a history of anaphylaxis. Parents were retrained after initial attempt and reassessed at next appointment	Single centre cross-sectional study	Ability to use AAI trainer using 9-step technique	First visit, 22% completed all 9 steps. Second visit, 68%. Third visit, 94%	
Diwakar <i>et al</i> , 2010, UK	74 Patients who carried an AAI and attended tertiary centre allergy clinic over a 2-month period. Split into three groups (1) AAI training provided by allergist ($n = 30$); (2) AAI training provided by non-allergists ($n = 24$); (3) AAI provided with no training ($n = 20$)	Single centre cross-sectional questionnaire based survey for prospective clinical audit	Knowledge on AAI technique (maximum score of 7)	Significant difference in knowledge between specialist trained and untrained patients (5.97 vs 5.05, $p = 0.007$). Knowledge difference between those non-specialist trained and those with no training was not significant, $p = 0.075$	Small sample size. No explanation of method for knowledge and confidence scores. No objective testing of ability
			Confidence in using AAI (maximum score 2)	Significant difference in knowledge between specialist trained and untrained patients (1.5 vs 0.75, $p = 0.001$) Confidence difference between non-specialist trained and those with no training was close to significant, $p = 0.06$	
Hellstrom <i>et al</i> , 2010, Sweden	5 Children who had recently been prescribed an AAI over a 5-month period Children were initially taught how to use the device, given time to practice and then self-injected with a active device	Single centre cross-sectional study	Ability to use AAI device correctly on themselves Anxiety difference before and after AAI use using anxiety questionnaire	All 15 children were able to administer adrenaline correctly Seven children reported anxiety before the injection, falling to 1 after the injection	Small sample size. Did not use a validated anxiety questionnaire
Segal <i>et al</i> , 2012, Israel	141 Children (or parents for those <12 years) returning for follow-up after AAI training at diagnostic visit	Single centre cross-sectional study	Ability to use AAI using 5-step/10-point technique. Ability to use AAI increases after training	5.6% of participants achieved 10 points, 19% of participants scored 0 points Mean score had improved from 4.71 to 6.73 ($p < 0.001$) after AAI training. Time from diagnostic visit to 1st follow-up had no effect on total score	Only training provided by allergist was consider. No non-specialist group
Topal <i>et al</i> , 2013, Turkey	64 Patients with history of allergic reaction who had been prescribed an AAI (50 caregivers and 14 children >12 years old). Assessment took place at least 1 year post initial training	Single centre cross-sectional descriptive study	Able to perform 6 steps for a successful injection on training device Factors associated with appropriate use	39.4% of participants were able to complete all 6 steps Ability was strongly associated with belief it was necessary ($p = 0.04$), attending follow-ups ($p = 0.01$) and history of severe reaction ($p = 0.01$). Inverse relationship between ability to use device and time elapsed since last visit ($p = 0.002$) or last teaching session ($p = 0.01$)	Author assumes teaching was given to all patients along with technique reviews at follow-up. No comparison made between the teaching from allergists and non-allergists
			Decision to use AAI in an allergic reaction	7 Children had anaphylactic reactions since receiving AAI, of which 5 had them with them, although only 1 chose to use it	

AAI, adrenaline autoinjector; GP, general practitioner.

anaphylaxis are proficient in the use of autoinjectors. Seven hundred and three papers were found of which nine presented the best evidence to answer the clinical question. The author, date and country of publication, patient group studied, study type, relevant outcomes, results and study weaknesses of these best papers are shown in table 2. The clinical bottom line is that competence varies widely and that further efforts are required to train and monitor training outcomes.

THREE-PART QUESTION

(In parents of children with history of anaphylaxis) is there (evidence for the effective use of adrenaline autoinjectors) during (anaphylactic emergencies)?

CLINICAL SCENARIO

A 10-year-old child is to be discharged from the paediatric emergency department after presenting in anaphylactic shock. In accordance with National Institute for Health and Clinical Excellence guidelines you prescribe an adrenaline autoinjector (AAI) and teach him and his mother the six-step technique for use using a training device. They both seem happy but you wonder if they will still remember the technique in the future or in an emergency situation?

SEARCH STRATEGY

Medline 1946 to June Week 1 2013
EMBASE 1980 to 2013 Week 26
CINAHL Plus

((exp patient/) OR (exp parent/) OR (exp caregiver/) OR (parent\$.mp) OR (carer.mp)) AND ((exp Patient Education as Topic/) OR (exp health education/) OR (exp teaching/) OR (educat\$.mp) OR (teach\$.mp) OR (instruct\$.mp)) AND ((exp epinephrine/) OR (exp self, administration/) OR (exp injections, intramuscular/) OR (adrenalin\$.mp) OR (autoinjector.mp) OR (auto-injector.mp) OR (epipen.mp) OR (auvi-q.mp) OR (JEXT.mp) OR (IM.mp) OR (intramuscular\$.mp)) Limits—Human, English Language, Children 0–18 years.

CINAHL-MESH term (epinephrine) AND MESH term (patient education).

SEARCH OUTCOME

A total of 703 papers was discovered, nine of which were relevant.

COMMENT(S)

Seven of the papers used objective testing of patients' (those above the age of

12 years) or parents' AAI technique, with mean scores ranging from 39.4% (50) to only 5.6% (56). The authors adopted a variety of scoring systems; Segal *et al* used a 10-point method, different to all other studies and may explain why the results were lower than other similar studies. Two studies used questionnaire methods to assess patients' ability—using either open-ended questions in which patients described the technique or true/false questions. Kim *et al* chose the latter and saw significantly higher rates of ability in patients than all other studies—90% of patients correctly answered the six true/false questions relating to AAI technique. It is not surprising that participants were better in this method of analysis compared to a difficult objective test, in which mistakes such as holding the device the wrong way round or forgetting to press for the 'click' can be easily done. It is recommended that specialists provide AAI training; three of the studies considered how specialist training affects ability. Arkwright and Farragher and Diwakar *et al* found a significant difference between those who had been trained by allergists and those who had no training. ($p < 0.01$ and $p = 0.007$, respectively). Diwakar *et al* also noted there was no difference in knowledge or confidence for those who had been trained by non-specialists and those who had received no training, suggesting it is only training by allergists that is truly effective. There was a number of external factors that were strongly associated with improved AAI technique, Arkwright and Farragher and Sicherer *et al* both determined that membership of a lay organisation was significant, suggesting motivated families who sought advice and education beyond that provided by their doctors were more likely to use AAI correctly. Only two of the studies considered the benefit of additional training; both showed encouraging results. Low levels of AAI use is a multifactorial problem of which poor education is one only part; four studies asked patients or parents who had appropriate ability how often they had used their AAI, and despite a number of serious reactions warranting adrenaline they were rarely used. Kim *et al* and Hellstrom *et al* relate this to a 'fear of the unknown'. These fears need to be addressed to ensure parents'/patients' comfort levels are improved, Hellstrom *et al* even suggest using active AAI devices in controlled settings to reduce anxiety and improve AAI use.

Clinical bottom line

Ideally allergists should provide AAI technique training; both children and parents should be trained, using a training device. This education should be seen as a process, which needs to be reviewed and repeated at each appointment or contact with health services.

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