Food Allergy in children

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Declarations

• Educational sponsorship
  – ALK Albello – Epipen
  – Meda Pharmaceuticals – JEXT
  – Allergy Therapeutics
• Research and scientific advisory
  – Danone Nutricia
  – Public Health England
• Teaching faculty
  – Allergy MSc University of Southampton

Learning objectives
Food allergy in children and young people
Implementing NICE guidance
February 2011
NICE clinical guideline 116
NICE Recommendations

The recommendations cover the six following key areas:

• Assessment and allergy-focused clinical history
• Diagnosis of IgE-mediated food allergy
• Diagnosis of non-IgE-mediated food allergy
• Providing information and support
• Referral to secondary or specialist care
• Alternative diagnostic tools

When to suspect food allergy

• Immediate reaction to food
• Non response to standard therapy in
  – Atopic dermatitis
  – Gastro-oesophageal reflux disease (GORD)
  – Constipation
  – Chronic gut symptoms

Case - 1

• 8 month old girl
• First serving of scrambled egg
• Immediate hives around mouth
• Vomits
• Becomes lethargic and rash becomes more generalised
• -> 999 observed in A&E settled and discharged
Case - 2

- 6 year old boy
- Eats Chinese take away with cashew nuts
- Next day awakes with swollen face and eyes, hives
- Takes three days to settle down

Allergy focused history

- History of reaction
- Personal history of allergic disease
  - Asthma eczema hay fever other food allergy
- Family history of allergic disease
  - Immediate family only

The anatomy of an allergic reaction
Spot the difference

**Food allergy**
- EATS Hx
- Atopic

**Urticaria**
- Unrelated to exposure
- Physical triggers
- Lasts for days
- Photos
- Non atopic

**Anaphylaxis**
- Dizziness, weakness, syncope, seizures
- Eye
  - Pruritus, conjunctival injection, lacrimation
- Nose
  - Pruritus, congestion, sneezing, clear rhinorrhea
- Upper airway
  - Hoarseness, stridor, oropharyngeal or laryngeal edema, cough, complete obstruction
- Cardiovascular
  - Tachycardia, hypotension, arrhythmias, cardiac arrest
- Lower airways
  - Chest tightness, dyspnea, tachypnea, use of accessory muscles, cyanosis, bronchospasm, respiratory arrest
- Skin
  - Sensation of warmth, flushing, erythema, general pruritus, urticaria, angioedema
- Gastrointestinal
  - Nausea/vomiting, cramping abdominal pain, diarrhea (often bloody)
Case 3

- 4 month old boy exclusively breast fed
- First bottle of formula
- Immediate localised hives and vomiting
- Parent try same next day with similar results
Case 4

- 3 month old girl breast fed
- Unsettled, cries and arches when laid flat
- Vomits 3-4 x day - at least half feed volume
- Poor sleep
- Explosive loose stool
- Generalised eczema seems to be getting worse
- Thriving

Types of food allergy

Allergen exposure

- Current food avoidance
- Suspected allergen
- Prior exposures
- 95 % of paediatric food allergy is on first known exposure
- Sx with fresh fruit and veg suggests oral allergy syndrome
Infant exposure to cows milk

Infant Formula

Human milk

Exposure

<table>
<thead>
<tr>
<th>Non-IgE</th>
<th>IgE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eating</td>
<td>Eating</td>
</tr>
<tr>
<td>Through breast milk</td>
<td>Skin contact</td>
</tr>
<tr>
<td></td>
<td>Rarely inhaled as food aerosols</td>
</tr>
</tbody>
</table>

Residual epitopes in formulas

- Normal
- Partially hydrolysed
- Cows Milk in breast
- Extensively hydrolysed
- Amino acids
Common food allergens (EU)

<table>
<thead>
<tr>
<th>Non IgE</th>
<th>IgE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>Milk, egg, peanut, tree nuts</td>
</tr>
<tr>
<td>Soy</td>
<td>Wheat and fish</td>
</tr>
<tr>
<td>Rarely egg and wheat</td>
<td>Other EU label allergens</td>
</tr>
</tbody>
</table>

Non EU label allergens – kiwi lentil chickpea

Rare allergens occur as part of picture of multiple allergic sensitisation and not in isolation

Causality

- Speed of onset of symptoms
- Reproducibility
- Consumption of food before or after event?
- Exposure to cross reactive allergens?
Timing

<table>
<thead>
<tr>
<th>Non-IgE</th>
<th>IgE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vomiting with minutes to several hours</td>
<td>Immediate</td>
</tr>
<tr>
<td>Eczematous skin flare in hours</td>
<td>Within 30 minutes</td>
</tr>
<tr>
<td>Symptoms can be insidious and relationship to food may only be clear on exclusion diet for 2-4 weeks</td>
<td>Within 2 hours rare</td>
</tr>
<tr>
<td>Biphasic reaction are later but associated with immediate symptoms that then clear</td>
<td></td>
</tr>
<tr>
<td>Symptoms have gone within 12 hours</td>
<td></td>
</tr>
</tbody>
</table>

The secret bottle is NOT sensitising

Rapid progression of IgE mediated symptoms

- Tingling and swelling at site of face
- Itchy rash
- Tightening of the chest
- Difficulty in breathing
Symptoms

<table>
<thead>
<tr>
<th>Non IgE</th>
<th>IgE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confined to skin and gut</td>
<td>Start where allergen contact occurred –</td>
</tr>
<tr>
<td></td>
<td>normally mouth itch</td>
</tr>
<tr>
<td>Eczema</td>
<td>Multisystem disease mucosa, gut, skin,</td>
</tr>
<tr>
<td></td>
<td>respiratory, neurological, cardiovascular</td>
</tr>
<tr>
<td></td>
<td>if severe</td>
</tr>
<tr>
<td>Gut dysmotility</td>
<td></td>
</tr>
<tr>
<td>FTT and oedema is rare</td>
<td></td>
</tr>
</tbody>
</table>

Summary

Allergen Exposure ➔ Timing ➔ Symptoms ➔ Reproducibility

Diagnosis of IgE mediated food allergy
Diagnosis of IgE-mediated food allergy (1)

- If IgE-mediated food allergy is suspected,
  - offer a skin prick test
  - and/or blood tests called specific IgE (RAST)
- Skin prick tests should only be undertaken where there are facilities to deal with an anaphylactic reaction

Allergy Diagnostics: Pros and cons

**Skin Prick testing**
- Same day results
- Requires skilled staff
- Small risk of reaction
- Need skilled interpretation
- Less expensive

**Specific IgE**
- Delayed results
- Skilled Laboratory
- Blood test in a child
- Need skilled interpretation
- More Expensive
Alternative diagnostic tools

- Do not use these in diagnosis:
  - Vega test
  - applied kinesiology
  - hair analysis
  - serum-specific IgG (York Labs)

Providing information and support

- The primary principle is food allergen avoidance
- Patient and family education is key
Providing information and support

– Offer information that is age-appropriate
– Offer information that is relevant to the type of allergy
– If a food elimination diet is advised, information given should take into account socioeconomic, cultural and religious issues
– Consider referral to a registered dietician
– Offer information about the support available and details of how to contact support groups

Dietary advice in food allergy

• Avoidance
  – Prevent further reactions
• Prevention
  – Early introduction of highly allergenic foods
• Treatment
  – Use of cake for treatment of egg allergy
  – DON’T advise small amounts of peanut in peanut allergy!

An Ounce of Prevention is Worth a Pound of Cure
  - Benjamin Franklin -
Primary prevention strategies for atopic disease

- Skin barrier protection
  - Reduced bathing
  - Emollients
- Pregnancy and lactation
  - Inclusive maternal diet
  - Hydrolysed formula
- Infant feeding
  - Early introduction dairy protein, egg, peanut
  - LEAP study
  - EAT study

Referral to secondary or specialist care

Specialist children's allergy clinic

Secondary and tertiary care

1. A dietician
2. General paediatrics
3. A paediatrician with an interest in allergy
4. A paediatric allergist in a regional centre
Referral

• Suspected IgE mediated food allergy
  – For diagnosis information and support
• Suspected non IgE who will continue on a dairy free diet
  – Paediatric dietician to manage the condition

3 Ps for secondary care referral

• Prudence
• Perplexed
• Parents

3 Ps for secondary care referral

• Prudence
  – acute systemic reactions
  – severe delayed reactions
  – IgE-mediated food allergy and asthma
  – faltering growth in combination with one or more of the gastrointestinal symptoms
• Perplexed
• Parents
3 Ps for secondary care referral

• Prudence
• Perplexed
  – strong clinical suspicion of IgE-mediated food allergy
  – not responded to a single-allergen elimination diet
  – Allergy test results are negative
• Parents

3 Ps for secondary care referral

• Prudence
• Perplexed
• Parents
  – significant eczema where multiple or cross-reactive food allergies are suspected by the parent
  – persisting parental suspicion of food allergy

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**Emollient as primary prevention for eczema**

- High risk infants with strong FH of atopy

![Proportion of with eczema at 6 months](image)

Control: 43, RR 0.50, P 0.017
Emollient: 22

*Simpson et al 2014 JACI*

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**Eczema is risk factor food allergy**

![Peanut skit by SCORAD scores](image)

*Du Toit et al JACI 2013;131:135-43*
Results of the LEAP study

- Proportion of PNA
  - Avoidance: 17.2%
  - Early introduction: 3.2%
- High risk infants
- Eczema
- Egg allergy

The EAT study

- Proportion of Food allergy in EAT study
  - Overall ITT: 7.1%
  - Per protocol: 2.4%
  - Per protocol: 2.5%
  - Early introduction: 0%
  - Per protocol: 1.4%
- Gen popln
- Breastfed
- FA at 36 months

Who is at high risk of atopy?

- Family history of atopy
  - 40-60% risk of eczema in child
- Severe eczema in infancy
  - Increases risk of food allergy up to 75%
- Sibling with peanut allergy
  - 7-11 fold risk of peanut allergy in child
Unanswered questions

• How do we apply this knowledge in primary care?
• What is the role of allergy testing to guide therapy?
• How does it affect the atopic march?

Assessment:
An allergy-focused clinical history

If food allergy is suspected, a healthcare professional should take an allergy-focused clinical history, and physically examine the child based on the findings.\[1.1.3\]

Referral to secondary or specialist care

Based on the allergy-focused clinical history, consider referral to secondary or specialist care if
FLG is key to skin barrier integrity
Peanut allergy: Effect of environmental peanut exposure in children with filaggrin loss-of-function mutations

\[ \text{OR} 3.2; 95\% \text{ CI} \{1.1–9.8\}; P=0.05 \]

Causal relationship between filaggrin and FA

FLG LOF mutation \rightarrow Eczema \rightarrow Allergic sensitisation to food \rightarrow Food allergy

Results of pathway analysis of FILAFFAL study of 10W cohort data

Venkataraman et al 2014 JACI