

Food Allergy Clinical Update

This Clinical Update complements ASCIA food allergy e-training for health professionals. The main purpose of this document is to provide an evidence-based, 'quick reference guide' to assist health professionals in the management of patients with IgE and non-IgE mediated food allergy.

Contents

	Page
1. Adverse food reactions - definitions	2
1.1 Overview	2
1.2 Food allergy	
1.2.1 IgE mediated food allergy	2
1.2.2 Non-IgE mediated food allergy	3
1.2.3 Mixed IgE and non-IgE mediated food allergy	3
1.3 Food intolerance	3
2. Diagnosis of food allergy	4
3. Nutrition assessment of food allergic individuals	4
4. Management of food allergy	5
4.1 Role of GP/paediatrician after an initial food allergic reaction/anaphylaxis	5
4.2 Role of GP/paediatrician for patients with known severe food allergy (anaphylaxis) risk	5
4.3 Breastfeeding and infant formulas	6
4.4 Complementary foods/introducing solids	9
4.5 Education	10
Appendices	
A. Diagnosis and emergency treatment of food allergy	13
B. Food labels and food allergy	15
C. Non-IgE mediated and mixed IgE/non-IgE mediated conditions associated with food allergy	16
D. Further information about food allergy for health professionals and patients	22
E. References	23

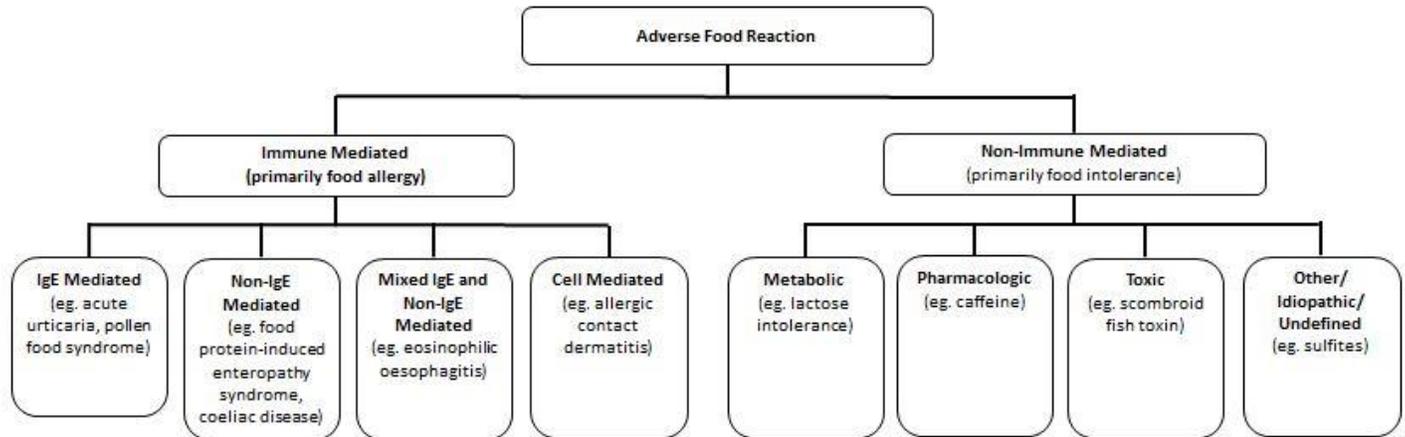
Acknowledgement:

ASCIA received an educational grant from the WA Department of Health to develop this Clinical Update.

1. Adverse food reactions - definitions

1.1 Overview

The term Adverse Food Reaction relates to any reproducible reaction to a food. Types of adverse food reactions can be classified as follows:



Source: Adapted from Boyce et al. JACI, 2010.

1.2 Food allergy

A food allergy is an abnormal immune-mediated reaction to ingested food, resulting in clinical symptoms. Food allergies can be classified by their immune mechanism:

- IgE mediated,
- Non-IgE mediated,
- Mixed IgE and non-IgE mediated.

1.2.1 IgE mediated food allergy:

- Reactions occur when allergens bind to Immunoglobulin E (IgE) antibodies bound to mast cells, resulting in the release of histamine and other inflammatory mediators.
- Symptoms are usually of rapid onset (<30 minutes in children, usually <2 hours in adults).
- Diagnostic tests (e.g. skin prick and blood tests) are usually positive.
- Signs of mild or moderate allergic reactions:
 - Swelling of lips, face, eyes.
 - Hives or welts.
 - Tingling mouth.
 - Abdominal pain, vomiting.
 - Eczema or rashes.
- Anaphylaxis is a severe allergic reaction which is defined by any one of the following signs:
 - Difficult/noisy breathing.
 - Swelling of tongue.
 - Swelling/tightness in throat.
 - Difficulty talking and/or hoarse voice.
 - Wheeze or persistent cough.
 - Persistent dizziness or collapse.
 - Pale and floppy (young children).
- Common food allergens in children include cow's milk, egg, peanut, tree nut, wheat, soy, sesame, fish and shellfish. While over 90% of food allergic reactions in Australia are caused by these foods, any food may cause an allergic reaction.

- Children with peanut, tree nut, sesame, fish and shellfish allergy usually do not outgrow these allergies. However, cow's milk, egg, soy and wheat allergy commonly resolve, with 85% of young children in population based studies outgrowing their allergy to cow's milk or egg by age 3-5 years.
- In adults, the most common food triggers are those of peanut, tree nuts, sesame seed and seafood.

NOTE: Mild or moderate allergic reactions may not always precede anaphylaxis⁸.

1.2.2 Non-IgE mediated food allergy:

- Reactions occur when the ingested food protein causes an immune response resulting in delayed inflammation, normally in the skin or gastrointestinal tract.
- Symptoms usually occur 2-24 hours after ingestion of the food protein.
- Diagnostic tests are usually negative.
- Symptoms include delayed eczema; delayed vomiting and diarrhoea; loose, frequent bowel actions; blood or mucus in stools; irritability and unsettledness in infants². Specific conditions include food protein-induced enterocolitis syndrome (FPIES), proctocolitis and food protein induced enteropathy.
- Refer to Appendix D for further details on syndromes and causative foods.

1.2.3 Mixed IgE and non-IgE mediated food allergy

- Symptoms are caused by one or both mechanisms described above.
- Conditions include eosinophilic oesophagitis and eczema.
- Refer to Appendix D for further information.

1.3 Food intolerance

Food allergy needs to be distinguished from other types of adverse food reactions such as food intolerance which can be:

- Metabolic in origin, due to an enzyme deficiency, such as lactose intolerance;
- Pharmacological reactions to food components, such as caffeine, monosodium glutamate (MSG) and other naturally occurring food chemicals (salicylates, amines);
- Toxic reactions, for example scombroid fish toxin; or
- Reactions where the mechanism is uncertain, such as reactions to sulfite preservatives.

Food allergy and food intolerance are often confused because symptoms of food intolerance may resemble food allergy symptoms. The following points should be noted:

- Food intolerance does not involve the immune system and does not result from IgE mediated reactions, nor does it cause anaphylaxis.
- The exact mechanism by which some food intolerances occur is not always clear.
- There is no reliable skin or blood test to diagnose food intolerance.
- Diagnosis of food allergy and risk of anaphylaxis should always be medically confirmed.
- In some patients dietary elimination and challenge may assist diagnosis.

The primary focus of this document is the nutritional management of IgE mediated, non-IgE mediated and mixed IgE/non-IgE mediated food allergy.

2. Diagnosis of food allergy

IgE mediated food allergy is diagnosed through a detailed medical history in conjunction with skin testing or serum specific IgE testing performed by specialists qualified in interpreting the results. Refer to Appendix A for detail on diagnostic tests for allergy.

Diagnosis of non-IgE mediated food allergy requires dietary elimination +/- oral food allergen challenge. Exclusion diets to investigate suspected food allergy should **only** be undertaken with the support and supervision of a medical practitioner and dietitian.

Highly restricted diets may adversely affect nutritional status and interfere with diagnostic procedures such as coeliac disease testing. Inappropriate diets in young children may precipitate feeding disorders, which are common amongst children with food allergies. Therefore, referral to a dietitian may be appropriate.

Some individuals with egg and cow's milk allergy may be able to tolerate extensively heated egg (such as egg in cakes) or cow's milk products (such as baked commercial biscuits containing cow's milk powder) in their diet without having any allergic reaction. However, the decision to introduce such foods into the diet of a cow's milk or egg allergic individual and should only be done so in consultation with a clinical immunology/allergy specialist.

Where extensively heat treated egg and cow's milk products are clinically tolerated and incorporated into the diet of children known to be allergic to egg and/or cow's milk, they should not be removed without consultation with a clinical immunology/allergy specialist.

There are currently a few studies which suggest that regular ingestion of these extensively heated products might assist with outgrowing the egg or cow's milk allergy. However, the evidence is not yet conclusive, and this should not be the major reason to introduce these products into the diet of children with known egg and cow's milk allergy at this time.

At times, oral food allergen challenges are undertaken to prove or disprove the presence of food allergy. Oral food allergen challenges can be used to determine:

- The significance of a positive food allergy test when a clinical reaction has never occurred or the food has never been ingested;
- Whether food allergy has resolved; or
- The presence of a food allergy when allergy tests are negative but the individual reports clinical symptoms and suspects food is involved (non IgE mediated allergy).

The location of challenge will be based on risk assessment by a clinical allergy/immunology specialist, taking into account the risk of reactivity; potential severity; other factors such as comorbidity (e.g. asthma); and location of residence. For example, high risk challenges (where anaphylaxis may occur) are normally carried out in well-equipped hospital units able to deal with anaphylaxis.

Standardised protocols for conducting oral food allergen challenges have been developed by ASCIA.

Refer to Appendix A for further information on the diagnosis and emergency treatment of food allergic reactions.

3. Nutrition assessment of food allergic individuals

The role of the dietitian in IgE mediated food allergy is to assist the clinical immunology/allergy specialist with:

- Diagnosis (detailed diet history) and dietary assessment.
- Assessment and monitoring of nutritional status.
- Education of patient/parent/guardian.

Whilst it is not the dietitian's role to diagnose food allergy, dietitians can assist clinical immunology/allergy specialists with identifying allergic triggers by:

- Obtaining detailed diet history.
- Providing dietetic support for oral food allergen challenges (e.g. blinded food challenges, disguising the allergen), used to confirm an allergy, or determine if allergy has resolved.
- Supervising restricted diets and providing nutritional support to minimise the risk of nutritional compromise.

Assessing growth is important for a number of reasons including:

- Indicates adequacy of macronutrients in diet.
- Children with food allergy may have impaired growth compared to non-allergic children.
- Poor growth can be a result of undiagnosed food allergy (especially non IgE mediated food allergy). All cases of suspected poor growth should be assessed by a paediatrician for medical causes.
- Cow's milk, wheat or multiple food allergies have the greatest impact on nutrition and growth, therefore it is important to monitor growth and nutritional intake of children with these allergies until 2-3 years of age or until growth and intake has stabilised and the family is able to self manage appropriately.
- Children with food allergies have better nutritional intake with dietary support.

4. Management of food allergy

4.1 Role of the GP/paediatrician after an INITIAL food allergic reaction/anaphylaxis

- Provide specialist referral with relevant clinical history.
- Prescribe initial adrenaline autoinjector and educate patient on how to use it.
- Provide ASCIA Action Plan (including ASCIA Travel Plan).
- Educate patient/carers in recognition/management of reactions.
- Advise on appropriate allergen avoidance measures.
- For anaphylaxis, teach patient how to use adrenaline autoinjector using trainer device.
- Demonstration has been associated with a 5-fold increase in ability to use the device.
- Training must be brand specific as EpiPen and Anapen have different methods of administration.
- Educate patient on carrying and storage of adrenaline autoinjector.
- For patients with asthma, review and optimise asthma management.
- Refer to a dietitian with experience in food allergy for nutrition assessment and education/dietary management, especially for young children with allergy to cow's milk, wheat or multiple food allergy.
- Provide education materials.

4.2 Role of the GP/paediatrician for patients with known severe food allergy (anaphylaxis) risk

- Provide updated referral for specialist review when required.
- Check autoinjector expiry and renew prescription if required.
- In children, check that autoinjector dose is appropriate for weight/age.
- Review patient/carer knowledge of autoinjector use using a trainer device.
- Review documentation:
- Update ASCIA Action Plan and ASCIA Travel Plan.
- Provide ASCIA Travel Plan.
- Review appropriate allergen avoidance measures.
- Review and optimise asthma management.
- Refer to a dietitian with experience in food allergy for nutrition assessment and education/dietary management, especially for young children with allergy to cow's milk, wheat or multiple food allergy
- Provide education materials.

4.3 Breastfeeding and infant formulas

Breastfeeding and food allergy

- Breast milk is the first choice for all infants including those with food allergy.
- Anaphylaxis in exclusively breastfed infants from maternal allergen ingestion is very rare.
- Complete maternal exclusion of food allergens is not usually required.
- Maternal dietary proteins are transferable into breast milk and can *sometimes* provoke non-dangerous allergic reactions in a breastfed infant.
- Mothers should be encouraged to continue breastfeeding if their infant has anaphylaxis.

Possible indicators of IgE mediated food allergy in a breastfed infant include:

- Frequent and severe vomiting;
- Severe and unresponsive eczema;
- Generalised cutaneous symptoms (e.g. urticaria, eczema).

Possible indicators of non-IgE mediated food allergy in a breastfed infant include:

- Ongoing diarrhoea (with or without blood loss, with or without mucus present);
- Failure to thrive;
- Extreme irritability and feeding difficulties.

Maternal dietary exclusion during breastfeeding

Maternal dietary exclusion is **not** usually recommended to prevent **anaphylaxis** in infancy; such reactions almost always require the child to ingest the food orally.

Short term maternal dietary exclusion is **sometimes** recommended on a trial basis some allergic conditions (under the direction of the clinical immunology/allergy specialist) to determine whether symptoms of eczema, irritability or gastrointestinal upset improve.

It is important to:

- Ensure adequate nutrition of mothers during dietary exclusion (e.g. nutritional advice, meal planning, nutrient supplements, referral to an Accredited Practising Dietitian). The quality of breastmilk is affected by maternal nutrition.
- Assess whether the dietary exclusion is effective in improving the infant's symptoms. If no improvement the mother should return to a normal diet.
- If resolution of symptoms in the infant occurs with maternal dietary exclusion, the suspected food protein should be reintroduced into the mother's diet to confirm the allergy. It is important to liaise with the immunologist/allergist/medical practitioner before conducting this type of challenge.

When is specialised infant formula recommended for food allergy?

- For infants with confirmed cow's milk allergy and soy allergy when breastfeeding is not possible or supplementary feeding is required.
- When allergic symptoms in the breastfed infant persist after trialing maternal dietary exclusion of cow's milk protein (dairy) and soy protein (mothers may express to maintain milk supply whilst specialised formula is trialed).

Feeding options for infants with confirmed cow's milk allergy

Extensively hydrolysed formulas (eHF) and amino acid formulas (AAF) have modified proteins to reduce allergenicity. The proteins in these formulas have been broken down to amino acids level:

- eHF contains 85% amino acids and some cow's milk protein. It is tolerated by 90% of infants with cow's milk allergy.
- AAF contains 100% amino acids.

The following table outlines the formula options for infants with **confirmed** cow's milk allergy (CMA):

Feeding option	Uses	Availability
Breast milk	<ul style="list-style-type: none"> All infants 	
Soy formula	<ul style="list-style-type: none"> Confirmed CMA (not anaphylaxis) > 6 m.o. (not soy allergic) 	Without prescription
Extensively hydrolysed formula (eHF)	<ul style="list-style-type: none"> Confirmed CMA (not anaphylaxis) < 6 m.o. Confirmed CMA (not anaphylaxis) > 6 m.o. if soy formula not tolerated 	Without prescription or with PBS or Pharmac prescription
Amino acid formula (AAF)	<ul style="list-style-type: none"> Confirmed CMA (anaphylaxis) SMA where soy and eHF not tolerated 	Without prescription or with PBS or Pharmac prescription

Introducing eHF or AAF

- eHF and AAF formulas are not very palatable.
- These formulas can be more difficult to introduce in older infants.
- It is important to monitor the infant closely until they are taking adequate amounts.
- To improve palatability and acceptance of the formula:
 - Mix formula with expressed breast milk, increasing concentration of formula over a few days until the child is taking the formula on its own.
 - Add 1% golden syrup or 2 drops vanilla essence if refusing specialised formula (gradually reduce amount of flavouring agent 2-3 days after formula acceptance).
 - For older infants and children:
 - Chill the formula.
 - Serve in a covered cup.
 - Use a straw.
 - Incorporate into foods.
- Medical practitioners may prescribe eHF or AAF whilst the infant is still being breastfed if the infant satisfies the PBAC criteria.
- This can assist with acceptance of the formula should the mother stop breastfeeding or the infant require complementary feeding¹⁵.

Milk options NOT recommended for infants with confirmed cow's milk allergy

Most individuals (over 90%) with cow's milk allergy will react to other mammalian milks.

Infant formulas that are NOT recommended in cow's milk allergic infants:

- Cow's milk based including anti-reflux and lactose free cow's milk based;
- Partially hydrolysed (pHF) cow's milk based (labelled as hypoallergenic or HA);
- Goat's milk based formula.
- Soy infant formula if the child is less than 6 months of age.

Soy formula is not currently recommended in children less than the age of 6 months by ASCIA which differs from the 2013 PBAC recommendations which make no age distinction. ASCIA will review recommendations after the release of the next Cochrane Review regarding infant formulas.

Other preparations that are NOT recommended due to allergenicity or suboptimal nutritional profile:

- A2 cow's milk;
- Rice drink;
- Oat drink;
- Soy drink;
- Almond or other nut drinks;
- Other mammalian milks (goat, sheep, camel);
- Home-made cereal/soy/nut drinks.

Milk options after 1 year of age for cow's milk allergy

Dietary review by an Accredited Practising Dietitian (APD) is recommended at this stage to consider the most appropriate option to ensure nutritional adequacy of the overall diet.

Continue breastfeeding	<ul style="list-style-type: none">• Breastfeeding can be continued into the second year of life.• Alternative milk beverages such as soy, oat, rice or nut drinks can be introduced in cooking and as a drink whilst breastfeeding.
Specialised infant formula (eHF or AAF)	<ul style="list-style-type: none">• For those children with allergies to both cow's milk and soy, it is preferable to continue with specialised formula until age 2 as the nutrient profile is better for growth than cereal or nut based drinks.• Consider whether the calcium content of the specialised formula is adequate for the second year of life.• Amino acid formula is available in preparations for over one year of age. Diet history and assessment at one year of age will determine whether a change to >1 year preparation is necessary. Preparations for over 1 year are higher in calories and may interfere with solids intake.
Soy drink	<ul style="list-style-type: none">• Children on soy infant formula can be changed to a calcium fortified soy drink after 12 months of age.<ul style="list-style-type: none">- Use calcium fortified (120mg/100mL).- Select one with 2-3.5% fat content, protein content around 3g/100ml.- Some soy drinks may contain other allergens (e.g. chickpea, wheat).
Oat, rice and nut drinks	<ul style="list-style-type: none">• These drinks are low in fat and protein and should only be used in young children with dietetic supervision.• Use calcium fortified versions when available (120mg Ca/100mL).• Some rice and oat drinks may contain other allergens (e.g. chickpea).

Ensuring adequate calcium intake

Calcium supplements are more effective when taken:

- In split doses (calcium is best absorbed in doses less than 500mg).
- Separately from iron or iron rich meals.

Considerations when choosing a calcium supplement

The amount of **elemental** calcium (calcium available for absorption) is important:

Calcium Carbonate:

- Inexpensive and contains the most elemental calcium per tablet.
- Needs gastric acid for absorption so best taken with meals.
- Not absorbed well by patients taking proton pump inhibitors or H2 blockers for gastric reflux.

Calcium Citrate:

- Best absorbed supplemental form of calcium but contains less elemental calcium.
- Can be taken any time of day.
-

Calcium Gluconate and Calcium Lactate:

- These types of calcium pills contain low content of elemental calcium.
- May need to take a large amount of tablets to meet the calcium requirement.

A range of calcium supplements are available for children. Calcium supplements given to children should be based on doses appropriate for their age.

Calcium supplement doses

- Calcium should be supplemented to bridge the deficit in calcium intake, where the intake of calcium fortified milk substitute is low.
- Referral to a dietitian is recommended to calculate the level of calcium supplementation required.
- The following table indicates the Recommended Dietary Intake of calcium for various ages, supplementation above the RDI is not recommended unless specifically prescribed by a medical practitioner.
- Refer to ASCIA patient education resource for CMA for further information on food sources of calcium.
- The Upper Limit for all ages is 2500mg.

Age	Calcium RDI
1-3 yrs	500 mg
4-8 yrs	700 mg
9-11 yr	1000 mg
12-18 yrs	1300 mg
Men 19- 70 yr	1000 mg
Men > 70	1300 mg
Women 19-50	1000 mg
Women > 50	1300 mg

Ref: NHMRC Nutrient Reference Values.

4.4 Complementary foods (introducing solids)**Key recommendations**

- When your infant is ready, at around 6 months, but not before 4 months, start to introduce a variety of solid foods, starting with iron rich foods, while continuing breastfeeding.
- All infants should be given allergenic solid foods including peanut butter, cooked egg and dairy and wheat products in the first year of life. This includes infants at high risk of allergy.
- Hydrolysed (partially and extensively) infant formula are not recommended for prevention of allergic disease.

Maternal diet and breastfeeding

- ASCIA recommends a healthy balanced diet, rich in fibre, vegetables and fruit. This provides many health benefits to the mother and infant during pregnancy and breastfeeding.
- Exclusion of any particular foods (including foods considered to be highly allergenic) from the maternal diet during pregnancy or breastfeeding is not recommended, as this has not been shown to prevent allergies.
- Up to 3 serves of oily fish per week may be beneficial, as there is some evidence that omega-3 fatty acids (found in oily fish) during pregnancy and breastfeeding may help prevent eczema in early life.
- Whilst there is moderate evidence that probiotics during pregnancy and breastfeeding may help prevent eczema in early life, recommendations about probiotic supplements cannot currently be made because the optimal species and dose of probiotics that might have an effect is unclear. More research is required in this area before clear and specific recommendations can be made.

Breastfeeding and infant formula

- Breastfeeding is recommended for at least 6 months and for as long as mother and infant wish to continue. There is no consistent evidence that breastfeeding is effective for the prevention of allergic disease. However, breastfeeding is recommended for the many benefits it provides to mother and infant.
- Breastfeeding during the period that solid foods are first introduced to infants from around 6 months may help reduce the risk of the infant developing allergies, although evidence for this is low.

- If breastfeeding is not possible, a standard cow's milk based formula can be given. There is no evidence that soy or goat's milk formula reduce the risk of allergic disease when used in preference to standard cow's milk based formula.
- Based on a recently published review of studies, there is no consistent convincing evidence to support a protective role for partially hydrolysed formulas (usually labelled 'HA' or Hypoallergenic) or extensively hydrolysed formulas for the **prevention** of eczema, food allergy, asthma or allergic rhinitis in infants or children.
- Regular cow's, goat's milk (or other mammal derived milks), soy milk, nut and cereal beverages are *not recommended* for infants as the main source of milk before 12 months of age.

Introduce solid foods from around 6 months, but not before 4 months, when your infant is developmentally ready whilst continuing to breastfeed

- Foods should not be introduced before 4 months.
- Infants differ in the age that they are developmentally ready for solid foods.
- Signs that your infant may be developmentally ready to start solids include: being able to sit relatively unaided, loss of the tongue-thrust reflex that pushes food back out, and trying to reach out and grab food.
- ASCIA recommends the introduction of solid foods around 6 months, but not before 4 months, and preferably whilst breastfeeding. There is some evidence this is protective against the development of allergic disease.
- When your infant is ready, introduce foods according to what the family usually eats, regardless of whether the food is considered to be a common food allergen. There is some evidence that the introduction of common allergenic foods (including cooked eggs as raw egg is not recommended, peanuts, nuts, wheat, fish) should not be delayed. However further evidence is required to clarify optimal timing for each food.
- You may choose to introduce one new food at a time so that if a reaction occurs, the problem food can be more easily identified. If a food is tolerated, continue to give this as a part of a varied diet.
- If possible, continue to breastfeed whilst you introduce foods to your infant. There is some limited evidence that this may reduce the risk of allergies developing, and there are many other health benefits of continued breast feeding.
- Cow's milk or soy milk (or their products, such as cheese and yoghurt) can be used in cooking or with other foods if dairy products/soy are tolerated.
- There is good evidence that for infants with severe eczema and/or egg allergy, that regular peanut intake before 12 months of age can reduce the risk of developing peanut allergy. If your child already has an egg allergy or other food allergies or severe eczema, you should discuss how to do this with your doctor.
- There is moderate evidence that introducing cooked egg (raw egg is not recommended) into an infant's diet before 8 months of age, where there is a family history of allergy, can reduce the risk of developing egg allergy.
- When introducing foods that other family members are allergic to, it is important to follow risk minimisation strategies to prevent cross contamination of allergens, for those who are allergic to the foods.
- It is important to understand that the facial skin in babies is very sensitive and that many foods (including citrus, tomatoes, berries, other fruit and vegemite) can irritate the skin and cause redness on contact – this is not food allergy. Smearing food on the skin will not help to identify possible food allergies.
- **Some infants will develop food allergies. If there is any allergic reaction to any food, that food should be stopped and you should seek advice from a doctor with experience in food allergy.** If an adverse food reaction occurs:
 - The suspected food should be avoided until the infant is reviewed by their medical practitioner.
 - Continue to introduce other new foods.
 - Referral to a clinical immunology/allergy specialist may be necessary.

It is important to understand that the facial skin in babies is very sensitive and that many foods (including citrus, tomatoes, berries, other fruit and vegemite) can irritate the skin and cause redness on contact – this is not food allergy. Smearing food on the skin will not help to identify possible food allergies.

4.5 Education

Food selection and preparation

It is important to teach parents/guardians/patients about appropriate meal selection and preparation. Dietitians have an important role in educating patients/parents/guardians about:

- Allergen avoidance;
- Appropriate food/ingredient substitutes;
- How to achieve a balanced diet;
- Encouraging normal eating behaviour.

Education should be in context with other issues for parents/guardians:

- Stress;
- Perception of risk of anaphylaxis and poor outcome: is it realistic;
- Busy life, juggling responsibilities of family, work, extended family;
- Parents with limited knowledge of cooking from scratch without pre-prepared products;
- Cultural and language issues;
- Fatigue from sleep deprivation from feeding/caring for an often unsettled infant;
- Post Natal Depression;
- Other siblings.

For children and young adults with food allergy, age appropriate education is essential for allergen avoidance.

Children and young adults need to know:

- How to identify known allergens (e.g. show photos of food allergens).
- How to declare their food allergy – “tell and ask”.
- To be assertive and question food offered by others.
- To not share or swap food and utensils (unless washed).
- Risk minimisation strategies (e.g. hand washing before and after eating to prevent cross contamination).
- How to read and understand product labels (including alternate words for food allergen).
- If they are not sure if the food is safe they should not eat it.
- If they have been prescribed an adrenaline autoinjector and they do not have it easily accessible, they should not eat.

Adolescents and young adults have the highest rate of food-induced fatal anaphylaxis, most commonly when eating outside the home. The reasons are unclear but poor education and risk-taking behaviour may contribute.

Educate about potential sources of cross contamination of food allergens:

- Processing such as cross contamination of allergens can occur on shared manufacturing lines, in the process of transporting, storing or packaging of ingredients.
- Point of purchase such as food sold in bulk containers and distributed using shared trowels, delicatessen items.
- Food preparation such as using shared equipment such as knives, slicing equipment and cutting boards or shared frying pans without washing in between use.
- Food service such as food buffet, juice bars.

Food labels and food allergy

Patients/parents need education about selection of appropriate foods. Supermarket shelves can often be overwhelming for the newly diagnosed individual or parent of an allergic child when shopping for appropriate foods, therefore it is important to teach patients how to read food labels.

Food allergic patients need to know:

- What information is mandatory on food labels,
- What information is voluntary on food labels,

- How to identify allergens on the label, and
- When to use caution and seek further information.

Food allergic patients should always check:

- Labels every time they purchase a product (even if previously considered safe) as ingredients and/or manufacturing processes may change.
- Ingredient lists and precautionary allergen statements.

Food allergic individuals may need to contact manufacturers for additional information regarding the risk of cross contamination from food allergens.

Imported foods may pose a higher risk for the allergic individual, as the standards of food labelling may not comply with Australian and New Zealand standards. Nonetheless, unlabeled foods pose a much higher risk of accidental exposure.

Refer to Appendix B for further information relating to the FSANZ Food Standards Code and food allergens on food labels.

Refer to the ASCIA dietary avoidance information sheets for patient information:

www.allergy.org.au/patients/food-allergy/ascia-dietary-avoidance-for-food-allergy

Travelling with food allergy

Patients/parents should be educated about how to be prepared when travelling with food allergy including:

- Checking travel insurance.
- Checking airline policies in advance, particularly for international travel.
- Prepare and carry ASCIA Action Plan for Anaphylaxis and ASCIA Travel Plan (these can be completed by general practitioners).
- Informing airlines and travel attendants.
- Other strategies:
 - Carry own food.
 - Wipe down tray tables.
 - Food exclusion zones - some airlines have food exclusion zones as part of their management policy.

Appendix A: Diagnosis and emergency treatment of food allergy

Allergy testing

Allergy tests are not stand-alone diagnostic tools.

Diagnosis of allergy is based on a combination of:

- Clinical history.
- Tests to identify IgE sensitisation to an allergen. These should be undertaken and interpreted by a clinical immunology/allergy specialist:
 - Skin Prick Testing (SPT). This detects the presence of allergen-reactive IgE bound to skin mast cells. A positive SPT is defined as a wheal size greater than 3mm compared to the negative control. SPT results must be performed by trained medical professionals and interpreted by a clinical immunology/allergy specialist.
 - Serum allergen specific IgE (ssIgE) - a blood test formerly known as RAST. This measures allergen-reactive IgE in the blood.
- Medically supervised oral food allergen challenge (as required).

Patch testing is not used to confirm IgE mediated food allergy.

It is important to note that many people with positive allergy tests do not have clinical allergy and suspected allergy should always be confirmed by a clinical immunology/allergy specialist.

Allergy testing can tell us:

- If the patient is sensitised to an allergen.
- The likelihood of reacting after a food challenge (for certain foods).
- If a patient is not sensitised to an allergen and therefore, that an IgE mediated reaction is unlikely.

Allergy testing cannot tell us:

- The severity of a reaction if a sensitised patient is exposed to the allergen.
- If the patient's symptoms are caused by the allergen.

Misconceptions about allergy testing:

- A positive test result is diagnostic of a food allergy.
- A negative test result excludes food allergy.
- The SPT wheal size correlates with the severity and/or duration of an allergy.

Unproven and inappropriate methods that claim to test for allergy or intolerances:

- Include IgG testing to foods, cytotoxic food testing, kinesiology, Vega testing, electrodermal testing, pulse testing, reflexology and hair analysis.
- Are not scientifically validated and may lead to unnecessary, costly and (in the case of some changes in diet) dangerous avoidance strategies.
- Are not Medicare rebated in Australia.
- Are not recommended by ASCIA or any allergy society worldwide.

Further information is available from the ASCIA website:

www.allergy.org.au/health-professionals/hp-information/asthma-and-allergy/unorthodox-testing-and-treatment

Co-reactivity

Co-reactivity means clinically allergic to proteins in unrelated foods

For example, in individuals allergic to:

- Cow's milk protein: 10% are also allergic to soy. This is particularly relevant when choosing an alternative infant formula or cow's milk substitute.
- Egg: 30% also have peanut or tree nut allergy.

In certain patients allergy testing for co-reactive foods may provide useful information on co-existing allergy.

Cross-reactivity

Cross-reactivity means clinically allergic to similar proteins present in related foods

For example, in individuals allergic to:

- Cow's milk: ~90% will be allergic to goat's milk;
- Cashew: most will be allergic to pistachio;
- Fish: ~75% will be allergic to other fish;
- Prawn: most will be allergic to other crustaceans (e.g. crab, lobster);
- Peanut: ~5% are allergic to another legume (e.g. soy);
- Pollen Food Syndrome (oral allergy syndrome): allergic to similar proteins in pollen and some fruit/vegetables.

Understanding potential cross-reactivity may assist in assessment and management.

Treatment of food allergic reactions

Action for mild or moderate allergic reactions

- Remove allergen if possible or obvious but it may be unknown that the food has been ingested.
- Non-sedating antihistamines may be useful for cutaneous symptoms (e.g. hives).
- Locate adrenaline autoinjector (if available).

Watch for signs of progression to anaphylaxis.

Action for anaphylaxis

- Lay patient flat. Do not allow them to stand or walk. If breathing is difficult, allow them to sit.
- Give ADRENALINE AUTOINJECTOR into the outer mid-thigh without delay:
 - 0.15 mg adrenaline autoinjectors should be given to children 10-20kg (aged ~1-5 years).
 - 0.30 mg adrenaline autoinjectors should be given to adults and children > 20kg (aged over ~5 years).
 - Repeat every 5 minutes as needed if unresponsive.
- Phone ambulance to transport patient to hospital if not already in a hospital setting.

If in doubt, give the adrenaline autoinjector.

All individuals at risk of anaphylaxis should:

- Know what to do in an emergency.
- Have an ASCIA Action Plan for anaphylaxis completed by their medical practitioner.
- Carry an adrenaline autoinjector and know how to use it.

If the patient is not confident in how to manage their allergy and/or risk of anaphylaxis, suggest a follow-up appointment with their medical practitioner.

Appendix B: Food labels and food allergy

FSANZ Food Standards Code

- Food Standards Code 1.2.3 includes mandatory labelling of common allergens included as an ingredient, part of compound ingredient, food additive or processing aid.
- Mandatory allergens include:
 - Peanut
 - Tree nuts
 - Cow's milk
 - Egg
 - Soy
 - Fish
 - Shellfish
 - Sesame
 - Gluten (must state grain source)
- Despite this regulation, some labels may not comply and therefore it is still important to educate about the various names for the allergens.
- An ingredient can be listed under a variety of names and not all are obvious, so it is important to provide patients with detailed lists of ingredient names. Wallet cards for the common allergens are available from Allergy & Anaphylaxis Australia.
- For the variety of names used for common food allergens, visit the ASCIA website for Dietary Avoidance Information Sheets: www.allergy.org.au/patients/food-allergy/ascia-dietary-avoidance-for-food-allergy and the Allergy & Anaphylaxis Australia website: www.allergyfacts.org.au

Ingredients derived from common allergens

- Ingredients derived from common allergens may be refined by removing the protein content, making them non-allergenic. Examples include:
 - Glucose derived from wheat.
 - Lecithin derived from soy or egg.Further examples can be found in the ASCIA Dietary Avoidance Information Sheets available from the ASCIA website: www.allergy.org.au/patients/food-allergy/ascia-dietary-avoidance-for-food-allergy

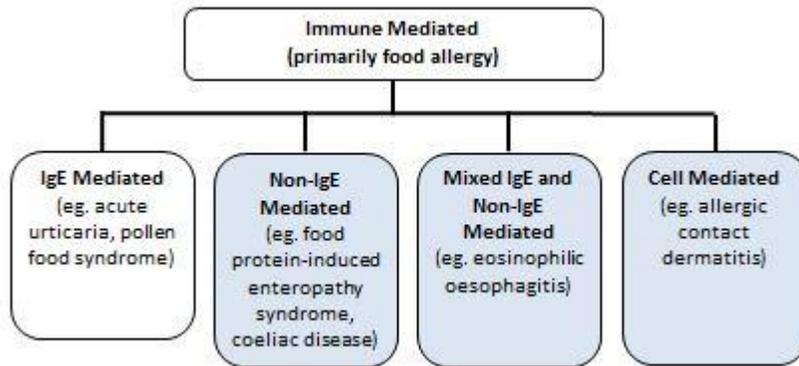
'Free from' labelled products

- Some products are manufactured specifically to replace an allergen (e.g. non-dairy substitute) or exclude an allergen (e.g. dairy free cake mix).
- These products can be very popular and useful.
- However, some products may require the addition of an allergenic ingredient in the preparation of the product (e.g. Nut free, wheat free, egg free, dairy free cake mix – instructions may include 'add egg').
- Therefore, it is important to teach consumers to **read the ingredient list** and cooking/preparation instructions, not just the 'free from' message.

Precautionary Allergen Statements (PAS)

- The intention of PAS is to convey risk of unintentional allergen inclusion due to cross contamination and possibly to protect the manufacturers³⁰. Examples include:
 - 'May contain traces of nuts'.
 - 'Allergy information: baked in a facility that uses dairy'.
 - 'Manufactured in a facility that also processes peanuts'.
- PAS are voluntary, unregulated and included at the discretion of the food manufacturer³⁰.
- PAS therefore may not always be present on a food label, even though there may be a risk of cross contamination.
- In Australia 95% of snack food products include PAS and there are 30 different types of PAS³¹.
- VITAL is a voluntary program that provides a process and criteria to determine if precautionary labeling is required. For more information, visit www.allergenbureau.net/vital/

Appendix C: Non-IgE mediated and mixed IgE/non-IgE mediated conditions associated with food allergy



Source: Adapted from Boyce et al. JACI, 2010.

Conditions associated with food allergy:

- Pollen Food Syndrome (oral allergy syndrome).
- Food allergy and eczema (atopic dermatitis)
- Gastrointestinal syndromes.

These conditions:

- Are mostly non-IgE or mixed IgE mediated.
- Often have negative SPT and serum specific IgE tests.
- Often require identification of causative foods by exclusion and re-challenge.
- Have symptoms that are delayed and often dose dependent.

Oral allergy syndrome (OAS)

- Pollen-Food-Syndrome or OAS, occurs mainly in adolescents and adults with allergic rhinitis (hay fever) who are sensitised to particular inhalant allergens such as pollen, particularly birch pollen;
- Affects 10% of those with allergic rhinitis (significant regional variation);
- Mediated by cross-reactive IgE responses to allergens present in pollen and other plants;
- Presents with itchy mouth/throat with eating uncooked fresh fruits, vegetables, spices, sometimes nuts, latex;
- Progression to anaphylaxis is rare.

Dietary management

- Avoidance of the offending foods in their raw, uncooked form (except peanuts and tree nuts as roasted nuts can cause OAS);
- Most patients will tolerate the food if well cooked and those who can tolerate the foods cooked should not avoid them in their cooked form;
- Cooking, baking or briefly microwaving raw fruits and vegetables is usually sufficient to alter the allergen to make them tolerable;
- Implicated nuts usually cause symptoms regardless of cooking and therefore should be avoided;
- Those unable to consume multiple fruits/vegetables may require nutritional advice and supplements.

Food allergy and eczema

- Eczema is a common skin condition in infants and children which can severely impact on growth, development and family life.
- Early onset (< 3 months of age) and moderate-severe disease make food allergy more likely.

- Food allergy and eczema may occur in the same individual but may not be related.
- Dairy, egg, peanuts, tree nuts, soy and wheat are most commonly associated with eczema but any food can be causal.
- Food is rarely associated with eczema in adults.
- Patients should be referred to a clinical immunology/allergy specialist for management by a specialist team including nurses and dietitians.
- Regardless of whether food allergy is causal the application of topical creams is an important part of eczema management.
- Emollients form a protective film over the skin to keep moisture in and irritants out.
- In addition to emollients skin care also involves baths, topical steroids and wet wraps and sometimes antihistamines and antibiotics.

Mechanisms and management

- The mechanism for food allergy causing eczema is delayed T-cell (maybe we say non IgE or mixed or nothing at all) more so that an immediate IgE-mediated reaction.
- Immediate eczema flares are more common in infants and children with peanut allergy.
- Infants and children should be referred to a specialist allergy / immunology clinic for assessment by a multidisciplinary team.
- Management involves: Skin prick tests for specific allergens.
- Temporary elimination of foods testing positive until skin is clear, followed by challenge with one food at a time.
- Optimal skin treatment with baths, emollients, wet wraps in addition to topical steroids +/- antibiotics as required is also common.
- A detailed diet history and nutritional assessment is indicated to identify nutritional risk and/or growth failure
- Many patients with eczema present with restricted dietary intake with dairy being the most common excluded food.
- In many cases the role of the dietitian will be to re-introduce foods which when excluded have not resulted in clinical improvement.

Overview of gastrointestinal syndromes associated with food allergy

Syndrome	Age	Symptoms	Causal foods	Treatment
Food protein-induced enteropathy	Early infancy	Protracted diarrhoea, vomiting, abdominal distension, failure to thrive, oedema	Usually cow's milk, soy or wheat	Dietary manipulation with hypoallergenic infant formula
Food protein-induced proctocolitis	First weeks – months of life	Isolated bloody stools, otherwise well and thriving	Cow's milk, soy drink, breastfed (50%)	Dietary manipulation with hypoallergenic infant formula
Food protein-induced enterocolitis (FPIES)	Young infants	Protracted diarrhoea, projectile vomiting, hypovolaemic shock	Cow's milk, soy drink, rice, beef, poultry, grains (does not occur in exclusively breastfed infants)	Dietary manipulation with hypoallergenic infant formula
Eosinophilic oesophagitis	Any age (early infancy more diet responsive)	Gastroesophageal reflux, postprandial nausea, vomiting, food impaction, diarrhoea, abdominal pain	Most commonly cow's milk, soy, wheat, egg and sometimes meat and grains	Dietary manipulation (usually 8 foods), swallowed or inhaled corticosteroids

Source: Adapted from KJ Allen and P Martin, J Clin Gastro 2010.

Eosinophilic oesophagitis (EoE)

- EoE is a mixed IgE and non-IgE mediated condition;
- EoE involves inflammation with eosinophils (“allergy white cells”) in the oesophagus;
- Most patients are atopic (~60%);
- 10% of patients have a family history of EoE;
- Delayed diagnosis is common;
- Male adults and children more commonly have EoE than females;
- Resolution is rare;
- Diagnosis – gastroenterology review, endoscopy and biopsy confirmation;
- Symptoms of esophageal dysfunction - there is age variation in symptoms;
- Management options – dilation of strictures; medication (anti-reflux medications, swallowed asthma steroids); dietary manipulation.

Rationale for dietary manipulation

- Amino acid formula diets result in resolution in around 95% of children, but are difficult to use in older children and adults as they usually require nasogastric feeding due to the poor palatability of the formula;
- Studies eliminating foods based on the results of skin prick testing and food patch testing report 70% success rates;
- However, there is a lack of consensus on the type of dietary manipulation that should be used in the treatment of EoE;
- The types of dietary manipulation include:
 - 6 food elimination diet.
 - Directed diets.
 - Amino acid based diets.
- If undertaking dietary manipulation, this should be supervised by a specialised dietitian working closely with the allergy specialist and/or gastroenterologist to ensure provision of an adequate and appropriate diet;
- The medical specialist is responsible for the decision on which dietary manipulation is to be followed, the dietitian provides support for the patient and family to achieve nutritional adequacy;
- Dietary manipulation may assist both adults and children;
- Allergy testing does not reliably predict implicated foods or who will improve;
- Mechanism – IgE mediated and delayed inflammation;
- Most common triggers – milk, soy, egg, wheat, nuts, seafood; chicken and red meat are less common triggers.

Six (6) food elimination diet

- Usually only milk, soy, egg, wheat, peanuts, tree nuts, fish and shellfish are removed;
- Sometimes referred to as 6 food elimination diet if fish and shellfish are grouped together and peanuts and tree nuts are grouped together;
- Additional foods may be eliminated if allergy testing positive or history indicates;
- Main advantage is simplicity resulting in increased compliance;
- Dietitians assist by providing advice on food substitutes and nutritional supplementation if required;
- Repeat endoscopy/biopsy conducted after 6-8 weeks to assess the benefit of the dietary manipulation.
- If improvement seen (symptoms, repeat biopsy), allow diet liberalisation, introducing one new food every 5-7 days;
- Withdraw the food if symptoms return;
- The gastroenterologist will determine the frequency of repeat biopsies;
- If no improvement with dietary manipulation, diet is less likely to be an underlying cause.
- Further research regarding the best dietary approach is required.

Directed diets

- Directed diets remove foods based on the history of trigger foods and allergy testing;
- Food/s are removed from the diet for 6-8 weeks;
- Dietitians assist by providing advice on food substitutes and nutritional supplementation if required;
- Repeat endoscopy/biopsy conducted after 6-8 weeks to assess the benefit of the dietary manipulation;
- If improvement seen (symptoms, repeat biopsy) allow diet liberalisation introducing one new food every 2-4 days;
- Withdraw the food if symptoms return;
- The gastroenterologist will determine the frequency of repeat biopsies;
- If no improvement, diet is not an underlying cause.

Amino acid based diet

- The amino acid based diet is impractical in adults and most older children and is not commonly used in Australia and New Zealand;
- It is based on formula containing free amino acids, corn syrup solids, medium-chain triglycerides for 6-8 weeks (eHF is not appropriate);
- Patients are also allowed water, one fruit and fruit juice;
- Tube feeding may be required in older patients;
- If improvement seen (symptoms, repeat biopsy) allow diet liberalisation introducing one new food every 5-7 days;
- Withdraw the food if symptoms return;
- The gastroenterologist will determine the frequency of repeat biopsies;
- If there is no improvement, diet is not an underlying cause.

Food protein-induced enteropathy

Overview

- Age: < 3 years, usually in early infancy;
- Symptoms: vomiting, diarrhoea, poor growth, malabsorption, poor nutrition, abdominal distention, may have anaemia;
- Onset: 1-3 days after exposure to offending food;
- Major triggers: milk and soy most common, also wheat and egg;
- Exposure route: via breast milk or infant diet (formula or solids).

Management

- If breastfeeding - continue breastfeeding with maternal dietary elimination of major triggers (specialist will advise);
- If formula fed:
 - Eliminate food and/or formula from infant's diet (usually cow's milk and soy)
 - eHF usually tolerated;
 - Use AAF if no improvement seen or poor growth.
- Improvement usually seen within 3-7 days (occasionally 1-4 weeks);
- If child improves, challenge by introducing one food per week to confirm the causative food. Symptoms usually appear within 3 days;
- Modified diet thereafter;
- Breastfeeding mothers may need support from a dietitian;
- Most cases resolve by 1-2 years. Reassess and challenge around 12 months of age, and 6-12 months thereafter under specialist advice (usually home challenge).

Food protein-induced enterocolitis syndrome (FPIES)

Overview

- Age: Most commonly present at 4-6 months during introduction of foods/formula; most resolve by 3-4 years of age.
- Symptoms: Severe vomiting, some children develop lethargy, pallor, diarrhoea, hypothermia and/or hypovolaemia;
- Onset: Usually within 2-4 hours after exposure; diarrhoea may take 4-8 hours;
- Major triggers: Rice, cow's milk and soy are the most common causes ; also eggs, oats legumes, chicken and seafood; any food can trigger FPIES;
- Approximately 60% react to first exposure to food;
- Post reaction, up to 50-70% of children have an elevated neutrophil and/or platelet count;
- Very rarely occurs in exclusively breastfed infants;
- Specific IgE and skin prick tests are usually negative;
- Severe cases require hospital challenge to prove resolution.

Management

- If breastfeeding, continue and eliminate offending food/s from infant diet; do not need to eliminate offending foods from the maternal diet (unless evidence of acute FPIES following a breastfeed; this is very rare);
- If cow's milk/soy induced FPIES, eHF usually tolerated;
 - If FPIES reaction to eHF occurs, then use AAF
 - Approximately 20-50% of children with cow's milk FPIES may cross react and have soy FPIES.

Introduction of solids

- Most children with FPIES in Australia have FPIES to single triggering food.
- If FPIES occurring to more than one food, then referral to a paediatric clinical immunology/allergy specialist is recommended to guide safe introduction of foods.
- Some parents may be reluctant to introduce solid food after a severe FPIES reaction and need guidance to introduce solid foods.
- Similar foods may need to be avoided after an FPIES reaction.

In general, the following guidelines can be applied to the introduction and avoidance of additional new foods into the diet of infants with FPIES:

Food to which infant has had FPIES reaction	Avoid these foods unless advised by treating allergy specialist
Cow's milk	Soy
Rice	Oats (other grains, such as wheat, rye, barely are usually safe)
Chicken	All poultry
Fish	All fish (unless tolerating other fish species) It is not clear whether children with fish FPIES are at risk of having shellfish FPIES
Fruits/Vegetables	Discuss with your doctor which other fruits and vegetables can be introduced

Currently there have been no studies to determine whether delaying the introduction of certain foods results in a reduced risk of developing FPIES to that food.

It is important to note:

- Feeding difficulties are common in children with FPIES, particularly with delayed diagnosis.
- Uncommon cases of adult-onset FPIES are most commonly triggered by seafood.

Food protein-induced proctocolitis (FPIP)

Overview

- Age: < 3 months;
- Symptoms: bloody stools, usually otherwise well. Overall prevalence is unknown but FPIP is a common cause of rectal bleeding in infants;
- Onset: predominantly occurs in breastfed infants; sometimes on formula;
- Major triggers: milk and soy, less commonly egg and corn.

Management

- If breastfeeding:^{5,45}
 - Cow's milk should be removed from the maternal diet first under the supervision of a Dietitian to ensure complete avoidance and nutritional adequacy for breastfeeding.
 - Most cases resolve with elimination of cow's milk within 48-72 hours, but can take up to 2 weeks.
 - If there is no resolution, soy should be removed followed by egg. More extensive maternal diet manipulation only with specialist advice.
 - Once symptoms have resolved, then challenge with the eliminated foods via maternal diet once stable, to confirm the causative food.
 - Some cases will not resolve with maternal dietary elimination and will need eHF or, if no improvement, AAF.
- If formula fed, eHF usually tolerated; eliminate food from infant diet:
 - Improvement usually seen 3-7 days (occasionally 2 weeks).
 - Use AAF if no improvement seen.

Resolution:

- Resolution occurs in 50% by age 6 months, 95% by age 9 months,
- General consensus is to reintroduce the offending food at 12 months of age, but based on resolution figures can be tried after it has been eliminated for 6 months. This can be done via the maternal or infant's diet.
- For Infants who presented with more severe symptoms, such as bloody diarrhoea, the food should be introduced gradually over 3-5 days.

Formula options for gastrointestinal syndromes associated with food allergy

When cow's milk and soy are triggers:

	Breastfeeding and maternal dietary exclusion	Formula options
Food protein-induced enteropathy	<ul style="list-style-type: none"> • Continue breastfeeding if possible • Maternal dietary exclusion of suspect food/s 	<ul style="list-style-type: none"> • eHF • Use AAF if eHF not tolerated
Food protein-induced proctocolitis	<ul style="list-style-type: none"> • Continue breastfeeding if possible • Maternal dietary exclusion of suspect food/s 	<ul style="list-style-type: none"> • eHF • Use AAF if eHF not tolerated
FPIES	<ul style="list-style-type: none"> • Continue breastfeeding if possible • Maternal dietary exclusion not recommended without specialist advice 	<ul style="list-style-type: none"> • eHF • Use AAF if eHF not tolerated
EoE	<ul style="list-style-type: none"> • Continue breastfeeding if possible • Maternal dietary exclusion not recommended without specialist advice 	<ul style="list-style-type: none"> • AAF

Ref: Allen. J Paediatr Child Health, 2009. Kemp et al, Med J Aust, 2008.

Appendix D: Further information about food allergy for health professionals and patients

Australasian Society of Clinical Immunology and Allergy (ASCIA)

ASCIA is the peak professional body of clinical immunology and allergy specialists in Australia and New Zealand.

www.allergy.org.au

ASCIA e-training for health professionals

www.allergy.org.au/health-professionals/health-professionals-e-training

- Food allergy, anaphylaxis, allergic rhinitis and immunotherapy

ASCIA health professionals webpage

www.allergy.org.au/health-professionals

- Includes links to ASCIA Clinical Updates for health professionals, position papers and guidelines.

ASCIA anaphylaxis resources webpage

www.allergy.org.au/health-professionals/anaphylaxis-resources includes links to:

- ASCIA Action Plans, Travel Plans, FAQ, Guidelines, Information for parents and other anaphylaxis related resources.
- ASCIA anaphylaxis e-training for schools and childcare.
- ASCIA anaphylaxis e-training for the community.

ASCIA patients and consumer webpage

www.allergy.org.au/patients

- Includes links to more than 60 topics including ASCIA infant feeding advice. Most of these documents include allergen minimisation and avoidance strategies.
- ASCIA dietary avoidance information sheets
www.allergy.org.au/patients/food-allergy/ascia-dietary-avoidance-for-food-allergy

Food labelling

- Food Standards Australia & NZ
www.foodstandards.gov.au
- VITAL labelling information
www.allergenbureau.net

Patient support organisations

- Allergy & Anaphylaxis Australia - Provides patient resources and phone assistance throughout Australia.
www.allergyfacts.org.au
- Allergy New Zealand - Provides patient resources and phone assistance throughout New Zealand.
www.allergy.org.nz

Adrenaline autoinjector supplier websites

- EpiClub - Provides EpiPen expiry date reminder for patients.
www.epiclub.com.au

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