

## **Guidance for the Management of Egg Allergy in Children**

### Indication for use:

Children from birth -18 years presenting with symptoms of egg allergy

### Based on:

British Society for Allergy and Clinical Immunology guidelines for the management of egg allergy. Clinical & Experimental Allergy. 2010 Aug 1;40(8):1116-29.

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**Scope:**

This guidance is intended to support the management of children with egg allergy. It does not replace the need to refer some children with egg allergy to Allergy Clinic.

**Background:**

Egg allergy affects about 1-2% of children<sup>1</sup>. It most commonly presents during infancy following the first exposure to egg during weaning<sup>2</sup>. Most reactions are immediate (IgE mediated) reactions. Delayed reactions to egg can occur.

Well-cooked/baked egg (sponge cake baked at 180C for 20mins) is less allergenic than cooked egg (scrambled, boiled). Raw egg is the most allergenic. The egg white is more allergenic than the yolk. Ovalbumin is the most abundant egg white protein. It is heat labile and associated with reactions to lightly cooked and raw egg. Ovomuroid is heat stable and associated with reactions to all types of egg.

The majority of immediate reactions to egg are mild. Reactions often include an urticarial rash (80-90% of reactions) and gastrointestinal symptoms such as vomiting (10-44% of reactions)<sup>2</sup>. More severe reactions, involving the respiratory system, are less common. Sometimes young children develop floppiness and pallor.

Egg allergy can resolve and hence the management should include avoidance advice, emergency medication and consideration of when and how re-introduction may occur.

**Diagnosis:**

A diagnosis can usually be made from the clinical history. Allergy tests may support a diagnosis and help guide resolution. Changes in the size of the skin prick test wheal over time can indicate resolution of egg allergy<sup>2</sup>. Skin prick testing and egg specific IgE should only be used if there is a clinical suspicion of egg allergy. These are poor screening tools for egg allergy<sup>2</sup>. However, if a child has strongly positive skin prick tests and/or egg specific IgE and they have never eaten egg, a referral to Allergy clinic is needed.

Skin prick testing should be performed with egg reagent. The interpretation of skin prick testing to raw egg is not standardized.

If there is a typical history of a reaction to egg, a skin prick test wheal size of >3mm is diagnostic of likely egg allergy<sup>2</sup>.

There is a relationship between higher levels of egg specific IgE and egg allergy. There are no universally agreed values to diagnose egg allergy. Cut off values of >6-7kUA/L in children over 2 years and >2kUA/L in children under 2 years are indicative of egg allergy.

Egg components Ovalbumin (Gal d 2) and Ovomuroid (Gal d 1) can be measured. High levels of Ovomuroid ((Gal d 1) a heat-stable egg protein) specific IgE are associated with the persistence of egg allergy.

In younger children small skin prick test wheals and lower specific IgE values are more predictive of egg allergy than in older children. The size of a skin prick test wheal does not correspond to the severity of a reaction. For example, a small wheal does not guarantee a mild reaction and a large wheal does not predict anaphylaxis.

### **Resolution of Egg Allergy:**

Egg allergy resolves in the majority of children. Resolution is more likely in children who have only developed a rash after eating egg and who have smaller skin prick test wheals or lower specific IgE<sup>3</sup>. Persistence of egg allergy is more likely in children who have had multi-system reactions, other food allergy and atopic disease.

Resolution of egg allergy occurs in stages starting with tolerance to well-cooked/baked egg (cake) then lightly cooked egg (scrambled) finally followed by raw egg (mayonnaise). Tolerance to well-cooked/baked egg broadens the diet and makes egg avoidance less onerous. Studies have shown that up to 70% of patients with mild egg allergy will be able to tolerate well-cooked/baked egg<sup>4</sup>. Some studies have suggested that eating well-cooked/baked egg promotes tolerance to other forms of egg<sup>6</sup>, other studies have suggested that it does not make a difference<sup>7</sup>.

The rate at which egg allergy resolves is variable. Children grow out of allergy to well-cooked/baked egg twice as quickly as they outgrow allergy to lightly cooked egg<sup>1</sup>. Children who have had a mild reaction (rash only) after significant exposure (mouthfuls of scrambled egg) often tolerate baked egg at 2-3 years old and cooked egg at 3-4 years old<sup>2</sup>. Of all children with egg allergy approximately 1/3 will have resolved allergy to well-cooked/baked egg at 3 years and 2/3 at 6 years<sup>1</sup>. Resolution of allergy to egg may continue in teenagers<sup>1</sup>.

Re-introduction should be individualized. Re-introduction should not be attempted within 6 months of a reaction<sup>2</sup>. If there is a reaction at any stage the previously tolerated diet should be recommenced and further attempts at re-introduction considered after a further 6 months<sup>2</sup>.

Figure 1 (adapted from BSACI)<sup>2</sup>

1. Well-cooked egg	2. Lightly cooked egg	3. Raw egg
Cakes	Scrambled egg	Fresh mayonnaise
Biscuits	Boiled egg	Fresh mousse and shop-bought mousse which contains egg
Dried egg pasta	Fried egg	Fresh ice cream
Pancakes and Yorkshire pudding	Omelette	Sorbet
Egg in sausages, both vegetarian and meat varieties, and also in other processed meats such as burgers prepared meat dishes	Egg fried rice	Royal icing (both fresh and powdered icing sugar)
Well-cooked fresh egg pasta	Meringues	Home-made marzipan
Quorn	Some marshmallows	Raw egg in cake mix and other dishes awaiting cooking (children of all ages love to taste or lick the spoon!)
Sponges and sponge fingers	Lemon curd	Egg glaze on pastry
Chocolate bars which contain nougat or dried egg, e.g. Milky Way or Mars bar or Crème egg,	Quiche	Horseradish sauce
Some soft-centred chocolates	Poached egg	Tartar sauce
Chewitts	pancakes,	'Frico' edam cheese or other cheeses containing egg white, lysozyme
Egg in some gravy granules	Egg in batter	Mayonnaise
Dried egg noodles, cakes, some biscuits, waffles	Egg in breadcrumbs, e.g. on fish fingers and chicken nuggets	Salad cream
Commercial marzipan	Hollandaise sauce	
	Quiche and flans (fruity and savoury),	
	Egg custard and egg custard tarts	
	Crème caramel	
	Crème Brûlée	
	'Real' custard	
	Yorkshire pudding – some patients who can eat well-cooked egg can tolerate these, but it depends on how well-cooked they are and if they contain any 'sticky' batter inside	
	Tempura batter	

### **Management:**

All children with an egg allergy require avoidance advice, including advice about foods that may be continued (for example those foods currently tolerated, see below), provision of emergency medication and an Allergy Action Plan. Allergy Action Plans are available on the Trust intranet.

The exclusion of egg does not cause nutritional deficiencies therefore the majority of children with a single egg allergy do not require a referral to the dietitian. Children who are vegetarian may require advice about alternative sources of protein and iron. Egg protein in food may be referred to by unusual terms especially on imported foods. Examples are: egg lecithin, albumen, albumin, ovalbumin, globulin, ovoglobulin, livetin, ovomucin, vitellin and ovovitellin. Where the labelling is in Latin, the words for egg are OVUM or OVO. The proteins in eggs from other birds are very similar to those in hens' eggs and should be avoided too.

### **Mild/moderate immediate reaction:**

Symptoms may include erythema, urticarial rashes, angioedema, mild diarrhoea and vomiting, and a behavior change (such as becoming quiet or distressed). There is no cardio-respiratory involvement. Usually a moderate amount of egg has been consumed (a spoonful).

Advise avoidance of lightly cooked and raw egg. If well-cooked/baked egg is tolerated it should not be excluded from the diet. Supply anti-histamines for use in allergic reactions and provide an allergy action plan. Teach the family/carers to recognize and manage severe reactions. If there is a suspicion of other allergies, asthma or severe eczema then refer to Allergy clinic.

Allergy tests may be used initially to confirm the diagnosis and/or guide the introduction of well-cooked/baked egg. If well-cooked/baked egg is not already consumed, introduction of well-cooked/baked egg can be considered after 6-12 months. This is often when the child approaches 2 years old. Consider the introduction of well-cooked/baked egg annually if allergy tests predict resolution. After 6-12 months of tolerating well-cooked/baked egg, the introduction of lightly cooked egg can be considered. Children who tolerate well-cooked/baked egg may still react to lightly cooked egg<sup>1</sup>.

Allergy tests and other risk factors (see below) can be used to guide whether well-cooked/baked egg can be safely introduced at home or a hospital based food challenge is required. Patients can be discussed with or referred to the Allergy team.

### **Severe/potentially severe immediate reaction:**

There may be multi-system features such as cardio-respiratory involvement (anaphylaxis) or severe gastro-intestinal symptoms. A reaction to only a trace amount of egg or to well-cooked/baked egg indicates a potentially severe reaction may occur.

Advise avoidance of all egg unless there is a clear history of tolerance to well-cooked/baked egg. If well-cooked/baked egg is tolerated it should not be excluded from the diet. Supply anti-histamines and consider adrenaline for use in allergic reactions. Adrenaline is required for anaphylactic reactions and co-existent asthma (requiring regular use of an inhaled steroid). Provide an allergy action plan and teach the family/carers to recognize and manage severe reactions.

Refer to Allergy clinic. Egg introduction requires close management and hospital based food challenges are likely to be required.

### **Persistent egg allergy:**

Children with egg allergy that persists beyond usual resolution (6-7 years) should be referred to Allergy clinic. Periodical review may be required and attempts at re-introduction are likely to require hospital based food challenges.

**Delayed reaction:**

Consider delayed egg allergy in the differential diagnosis and assessment of factors contributing to eczema and gastro-intestinal symptoms. Egg may cause eczema to flare up and worsen the severity of eczema in some children. A trial of egg exclusion for 4-6 weeks is required to make the diagnosis. Egg may be re-introduced at home if there is no evidence of IgE sensitization. Well-cooked/baked egg should be re-introduced before lightly cooked egg. Beyond 3 months exclusion, allergy tests and formal advice about introduction should be considered.

**Egg never consumed:**

Some children will never have consumed egg because of suspicion of allergy. Egg may be detected in breast milk and some children will have reacted after maternal egg consumption. Egg may not have been introduced because of multiple food allergies or eczema. If there is a true likelihood of egg allergy, allergy tests should be performed prior to introducing egg and a referral to Allergy clinic can be made.

Occasionally children have never eaten egg but do not have an increased likelihood of egg allergy. Allergy test are not usually required however it is advisable to introduce well-cooked egg/baked egg prior to cooked egg.

**Introduction of egg:**

In a **home introduction** small amounts of egg are slowly introduced over a number of days. A home introduction can be advised by a doctor or dietitian. It is a structured method of introducing egg when the risk of a reaction is deemed to **be very low**. Sometimes it can help give parents the confidence to introduce baked egg at home.

For example:

- Day 1 – 3**    normal diet  
                  and    1 small crumb of fairy cake (1g)
- Day 4**        normal diet  
                  and    1 large crumb of fairy cake (3g)
- Day 5**        normal diet  
                  and    ¼ portion of fairy cake (7g)
- Day 6**        normal diet

and ½ portion of fairy cake (15g)

**Day 7** normal diet  
and 1 portion of fairy cake (30g)

**Day 8** normal diet  
and baked egg containing foods as part of a normal diet including cakes, biscuits, sausages, pancakes, yorkshire puddings

A **home food challenge** is occasionally advised by the doctors in Allergy clinic. This replicates a hospital based food challenge and is different from a home introduction. When a home food challenge is used there is **a potential risk of an allergy reaction.**

Any home introduction of egg (using a home introduction or a home food challenge) should only be considered if the following criteria are fulfilled:

- Mild reaction despite ingestion of a moderate volume of egg (a few mouthfuls of scrambled egg)

- No asthma

- Small SPT wheal (< 3mm)

- The previous reaction was >6m ago

If not fulfilled a hospital based food challenge is needed. Often children with ongoing egg allergy (and a SPT >3mm) will tolerate baked egg but need a hospital based food challenge. This could be considered if the skin prick wheal is getting smaller but other risk factors are present.

Hospital based food challenges should be always being considered in the following situations. There is a separate integrated care pathway for children undergoing a hospital based food challenge. Children meeting these criteria should be under the care of Allergy clinic.

- Previous severe reactions

- Reactions to only trace amounts of egg

- Children with asthma requiring a regular inhaled steroid

- Children with multiple and complex allergies

- Children who cannot safely follow advice for a home introduction

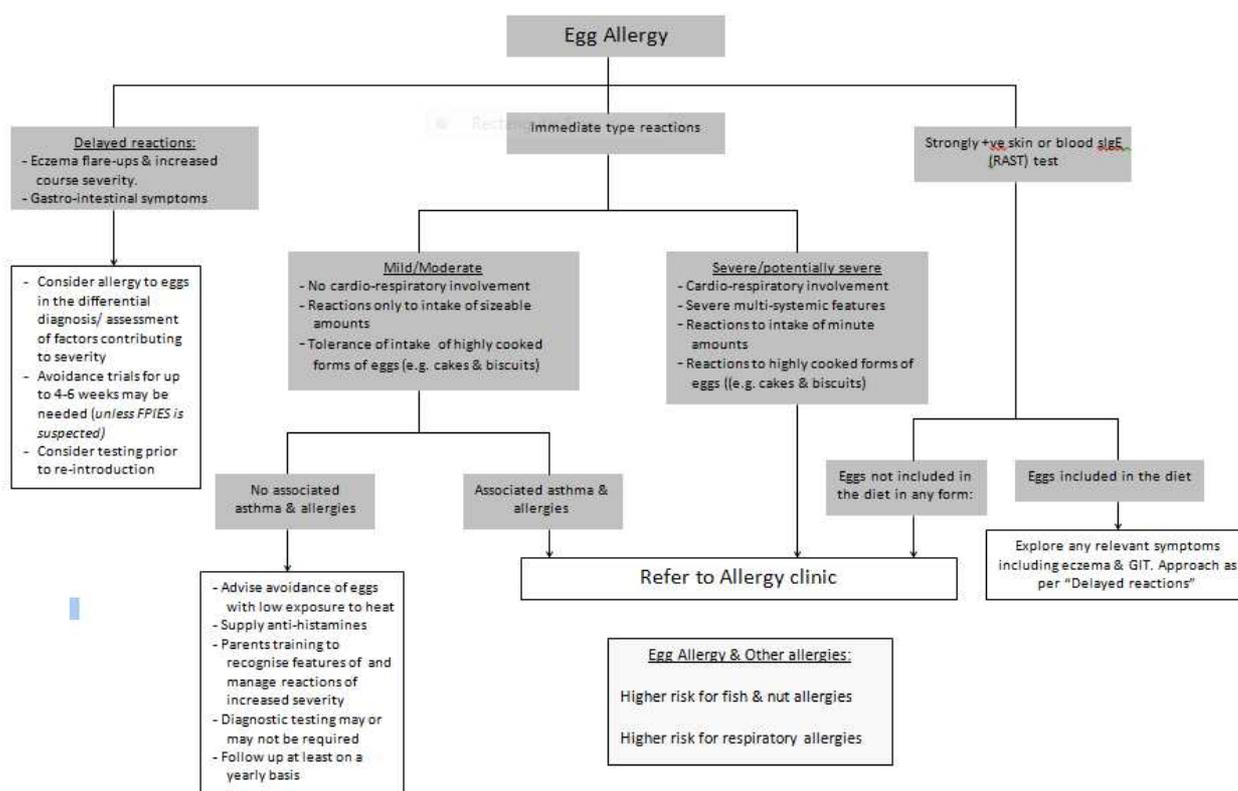
**Vaccinations:**

MMR: There are no contra-indications and MMR should be given in primary care

Influenza: The Joint Committee on Vaccination and Immunisation has advised that children with egg allergy can safely be vaccinated with Fluenz Tetra in any setting (including primary care and schools)<sup>5</sup>. This includes children with previous anaphylaxis to egg<sup>5</sup>. The only exception is for children who have previously had an anaphylaxis to egg so severe that they required ventilation on an intensive care unit as a result. Inactivated (injected) influenza vaccines that are egg free or have an ovalbumin content of < 0.12 µg/ml may be used safely in individuals with egg allergy, in primary care<sup>5</sup>. Further information can be found in DoH Green Book (updated 2017).

Yellow Fever: This is contraindicated in egg allergy. If essential discuss with the Allergy team.

**Overview of management and referral to Allergy clinic:**



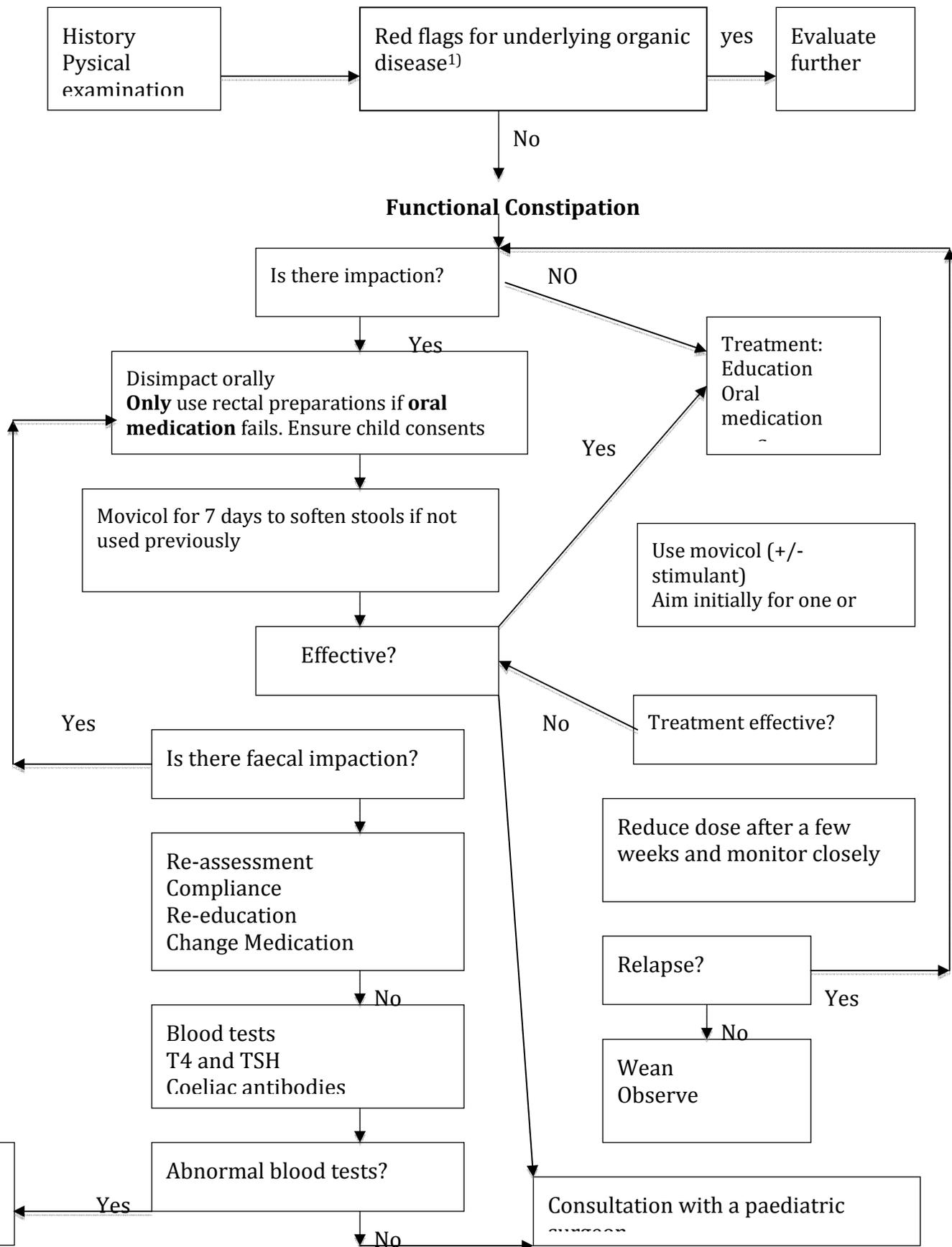
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**Constipation management (adapted from partners in Paediatrics and NICE CG99)**



How common is egg allergy in children and adults? Egg allergy affects about 1.3 % of all children and 0.2 % of all adults. What vaccine should I get if I am egg allergic, but I can eat lightly cooked eggs? Can egg protein in flu vaccine cause allergic reactions in persons with a history of egg allergy? Yes, allergic reactions can happen, but they occur very rarely with the flu vaccines available in the United States today. Occasional cases of anaphylaxis, a severe life-threatening reaction that involves multiple organ systems and can progress rapidly, in egg-allergic persons have been reported to the Vaccine Adverse Event Reporting System (VAERS) after administration of flu vaccine. Flu vaccines contain various components that may cause allergic reactions, including anaphylaxis.