Severe food allergy and anaphylaxis: Treatment, risk assessment and risk reduction


All authors’ degrees, affiliations and conflict of interest statements can be found online at http://dx.doi.org/10.7196/SAMJ.9201

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An anaphylactic reaction may be fatal if not recognised and managed appropriately with rapid treatment. Key steps in the management of anaphylaxis include eliminating additional exposure to the allergen, basic life-support measures and prompt intramuscular administration of adrenaline 0.01 mg/kg (maximum 0.5 mL). Adjunctive measures include nebulised bronchodilators for lower-airway obstruction, nebulised adrenaline for stridor, antihistamines and corticosteroids. Patients with an anaphylactic reaction should be admitted to a medical facility so that possible biphasic reactions may be observed and risk-reduction strategies initiated or reviewed after recovery from the acute episode.

Factors associated with increased risk of severe reactions include co-existing asthma (and poor asthma control), previous severe reactions, delayed administration of adrenaline, adolescents and young adults, reaction to trace amounts of foods, use of non-selective β-blockers and patients who live far from medical care.

Risk-reduction measures include providing education with regard to food allergy and a written emergency treatment plan on allergen avoidance, early symptom recognition and appropriate emergency treatment. Risk assessment allows stratification with provision of injectable adrenaline (preferably via an auto-injector) if necessary. Patients with ambulatory adrenaline should be provided with written instructions regarding the indications for and method of administration of this drug and trained in its administration. Patients and their caregivers should be instructed about how to avoid foods to which the former are allergic and provided with alternatives. Permission must be given to inform all relevant caregivers of the diagnosis of food allergy. The patient must always wear a MedicAlert necklace or bracelet and be encouraged to join an appropriate patient support organisation.

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The initial pharmacological management of anaphylaxis is given in Table 1.

### Co-factors for reactions
A number of co-factors may augment or amplify the severity of allergic reactions.\[12\] Given their importance in eliciting anaphylaxis, these co-factors need to be included in diagnostic measures and management. They include the following:

- **Physical exercise.** Food-dependent exercise-induced anaphylaxis may occur if exercise and consumption of a certain food occur within 4 hours of each other. The implicated food is usually well tolerated when the patient does not exercise.
- **Medication** includes non-steroidal anti-inflammatory drugs, such as aspirin, ibuprofen and opiates.\[13\]
- **Alcohol.**\[14\]
- **Fever and infectious diseases.**\[15\]
- **High-pollen season.** In oral allergy syndrome, symptoms may be heightened during pollen season.

Although an anaphylactic reaction seems to be triggered by a sole allergen in most cases, exposure to a single allergen is sometimes not enough to trigger an episode. Concomitant exposure to a combination of allergens, infections, physical exercise, psychological stress, alcohol and/or concomitant medication are necessary to provoke a reaction, i.e. summation anaphylaxis.

### Risk factors associated with the severity of allergic reactions to foods
The severity of allergic reactions to food allergens is multifactorial and variable. The severity of any reaction cannot be accurately predicted by the degree of the severity of any previous reaction, or by the size of the wheal of a skin-prick test or level of specific IgE.

Factors associated with increased risk, as shown in epidemiological studies,\[16-24\] include co-existing asthma (and poor asthma control), previous severe reactions, delayed administration of adrenaline, adolescents and young adults, reaction to trace amounts of foods, use of non-selective β-blockers and patients in remote areas far from medical care. Self-injectable adrenaline is under-used, even when available, and incorrect administration may also be an important factor, particularly when administered by needle and syringe rather than by an auto-injector.\[4\]

### Risk reduction\[25\]
The following factors should be considered in reducing the risk of an allergic reaction:

- Education with regard to food allergy and provision of a written emergency treatment plan on allergen avoidance, early symptom recognition and appropriate emergency treatment.
- Risk assessment and stratification with provision of injectable adrenaline (preferably via an auto-injector) if necessary. Training and provision of written instructions with regard to the indications for and method of administration of adrenaline.
- Follow-up with a primary care physician. Primary caregivers, nurses and doctors should be adequately trained and receive education to identify and treat allergic reactions to food early.
- Referral to an allergist if first presentation or unknown cause. More complicated food allergic patients should be referred to medical professionals competent in the diagnosis and management of food allergy.
- Management of patients with severe, complex or multiple food allergies by a multidisciplinary team, including dieticians and medical professionals.
- Early allergy testing in patients with food allergy symptoms. Interpretation of food allergy tests by a practitioner skilled in food allergy and with access to food challenge testing for cases of inconclusive results.
- Patients and caregivers should be educated about foods that should be avoided and available alternatives.
- Patients should be instructed to read labels. Clear guidelines should be set for labelling foodstuffs, including products that should be clearly linked to the name of an allergen to avoid confusion.
- Permission should be obtained to communicate the diagnosis of food allergy to all relevant caregivers, including schoolteachers. The patient must always wear a MedicAlert necklace or bracelet.
- Patients should be encouraged to join an appropriate patient support organisation.

### Table 1. Initial pharmacological management of anaphylaxis\[16\]

<table>
<thead>
<tr>
<th>First-line treatment</th>
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<tbody>
<tr>
<td>Adrenaline IM, 1:1 000 solution</td>
<td></td>
</tr>
<tr>
<td>Adrenaline dose might need to be repeated every 5 - 15 minutes</td>
<td></td>
</tr>
<tr>
<td>Via needle and syringe: adrenaline (undiluted 1:1 000 concentration) IM, 0.01 mg/kg per dose (equivalent to 0.01 mL/kg); maximum 0.5 mg/dose in the anterolateral thigh</td>
<td></td>
</tr>
<tr>
<td>Auto-injectors</td>
<td></td>
</tr>
<tr>
<td>Weight 8 - 25 kg: 0.15 mg IM in the anterolateral thigh[20,21]</td>
<td></td>
</tr>
<tr>
<td>Weight &gt;25 kg: 0.3 mg IM in the anterolateral thigh[20,21]</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2. Indications for the prescription of self-injectable adrenaline devices in the community\[25\]

<table>
<thead>
<tr>
<th>Absolute indications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous anaphylactic reaction to a food, insect sting, latex or unavoidable aeroallergen</td>
<td></td>
</tr>
<tr>
<td>Co-existent unstable or moderate-to-severe persistent asthma and food allergy</td>
<td></td>
</tr>
<tr>
<td>Idiopathic anaphylaxis</td>
<td></td>
</tr>
<tr>
<td>Food-dependent exercise-induced anaphylaxis</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relative indications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild-to-moderate peanut/and or tree nut allergy in patients ≥5 years of age</td>
<td></td>
</tr>
<tr>
<td>Food allergy in a teenager or young adult</td>
<td></td>
</tr>
<tr>
<td>Far from a medical facility</td>
<td></td>
</tr>
<tr>
<td>Reactions to small amounts of food, such as air-borne food allergens or contact via skin only</td>
<td></td>
</tr>
</tbody>
</table>
Indications for the prescription of self-injectable adrenaline devices in the community are given in Table 2.

Food allergy education

Strict avoidance of allergens
- Strict avoidance of allergens is the cornerstone of allergy management, although it is not curative and leaves patients at risk for accidental exposure.
- Only foods to which the patient is allergic should be avoided.
- Patients should receive education about label reading and medical terminology related to the identification of allergens.
- Patients should receive instruction with regard to cross-reactive allergens.
- It is advisable to involve a dietician in formulating a nutritionally adequate, allergen-free diet, especially in cases of multiple food allergies.
- Information on how to minimize cross-contact of foods with an allergen during meal preparation and serving can help to prevent accidental ingestion and reactions.
- Education on high-risk accidental ingestion, especially of foods prepared away from home (e.g. eating out, visiting friends’ homes, or attending parties).

Early recognition of allergic reactions and anaphylaxis

- A written emergency plan should be given to the patient; their caregivers should be notified about the food allergy and given a copy of the plan. Plans are available at http://www.allergyusa.org.
- The emergency plan should contain an image clearly differentiating between mild reactions and reactions requiring the use of adrenaline.
- Antihistamines are used for the management of non-severe allergic reactions.
- When only antihistamines are used for the treatment of acute allergic reactions, patients should be monitored should they develop more severe symptoms.
- As soon as a patient has an anaphylactic reaction, they should be placed in the supine position with lower extremities elevated; they should not stand up and move as this has been reported to increase the risk of severe anaphylaxis or sudden death.
- Adrenaline should be administered for all reactions that exceed the threshold in the action plan. If the patient or caregiver is considering adrenaline should not stand up and move as this has been reported to increase the risk of severe anaphylaxis or sudden death.
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Provision of an emergency kit, including self-injectable adrenaline and intravenous antihistamine

- Adrenaline is the mainstay of treating anaphylaxis.
- Giving adrenaline via an auto-injector is preferable to administering it via a needle and syringe.

Provision of instructions on when to go to a medical facility
- Patients should be informed when to go to a medical facility if they are experiencing symptoms of an anaphylactic reaction.
- For patients with a history of severe allergic reactions, adrenaline should be administered at the onset of mild symptoms; then they should proceed to an emergency facility.
- Patients experiencing an anaphylactic episode should be observed in a medical facility for at least 12-24 hours because of the risk of biphasic reactions.

Educate patients about long-term ongoing management

- Long-term management must include at least an annual medical review to assess accidental ingestion, reactions, or both, nutritional adequacy of their diet, approaches to allergen avoidance and need for retesting for resolution of food allergy.
- At each visit, risk assessment for asthma, re-education about early recognition and emergency treatment plans should be reviewed.

References