

Anaphylaxis

Key messages for health professionals

health

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Anaphylaxis is a severe and sudden allergic reaction that can cause death. It is a medical emergency requiring immediate treatment, as well as ongoing management to minimise risk. Allergic reactions to food, medications and venom are increasing. This document aims to provide health professionals with a summary of current knowledge regarding anaphylaxis, to assist with identification, prevention and management.

What are the clinical features of anaphylaxis?

Anaphylaxis is characterised by involvement of the respiratory and/or cardiovascular system, often combined with skin and/or gastrointestinal features.¹ It can occur any time from minutes to two hours after exposure to an allergen, although most reactions occur within 30 minutes.² Children tend to present more commonly with respiratory and cutaneous symptoms, and there may be a history of atopy (particularly in those with food anaphylaxis).³ Adults more often present with cardiovascular and cutaneous symptoms.⁴

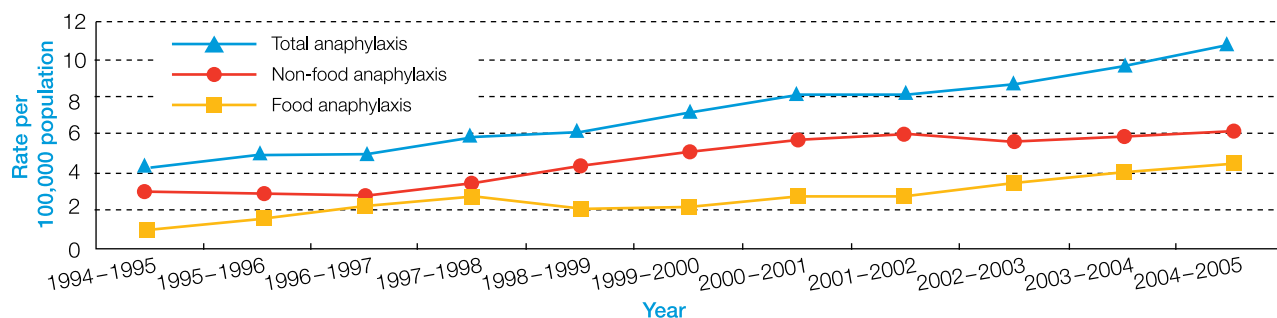
The diagnosis of anaphylaxis can sometimes be difficult, particularly in the absence of skin features or a known allergen. Anaphylaxis should be considered as a possible cause for any acute respiratory distress, bronchospasm, hypotension and/or cardiac arrest.⁴

Table 1: Common features of anaphylaxis

Respiratory/Airway	Cardiovascular	Skin	Gastrointestinal
Stridor/wheeze	Tachycardia/bradycardia	Urticaria (hives, wheals)	Nausea
Difficulty swallowing	Collapse/loss of consciousness	Angioedema	Vomiting
Persistent cough	Hypotension	Flushing	Abdominal pain
Dyspnea	Pale and floppy (infants)	Generalised itch	Diarrhoea
Hoarse voice			
Throat/chest tightness			



Figure 1: Time trends in anaphylaxis admissions in Australia, 1994–2005



Adapted from: Liew, W.K., Williamson, E., Tang, M.L. Anaphylaxis fatalities and admissions in Australia. *J Allergy Clin Immunol*, 2009. 123(2): p. 434–42. Note: Non-food anaphylaxis includes medication-induced, probable medication-induced, insect venom induced, of undetermined cause and relating to a medical or surgical procedure.

How common is anaphylaxis?

Presentations and hospital admissions for all causes of anaphylaxis are increasing. In 2004–05 there were over 10 anaphylaxis admissions per 100,000 population, representing a rate 2.5 times that of 1994 levels (figure 1).⁵

However, deaths from anaphylaxis are uncommon. Between 1997 and 2005 there were 112 deaths due to anaphylaxis in Australia, equating to a rate of about 0.64 deaths per million people per year.⁵ The majority of deaths occurred in adults (figure 2).

What causes anaphylaxis?

The most common causes of anaphylaxis can be grouped into three main categories:

- medication
- food
- insect venom.

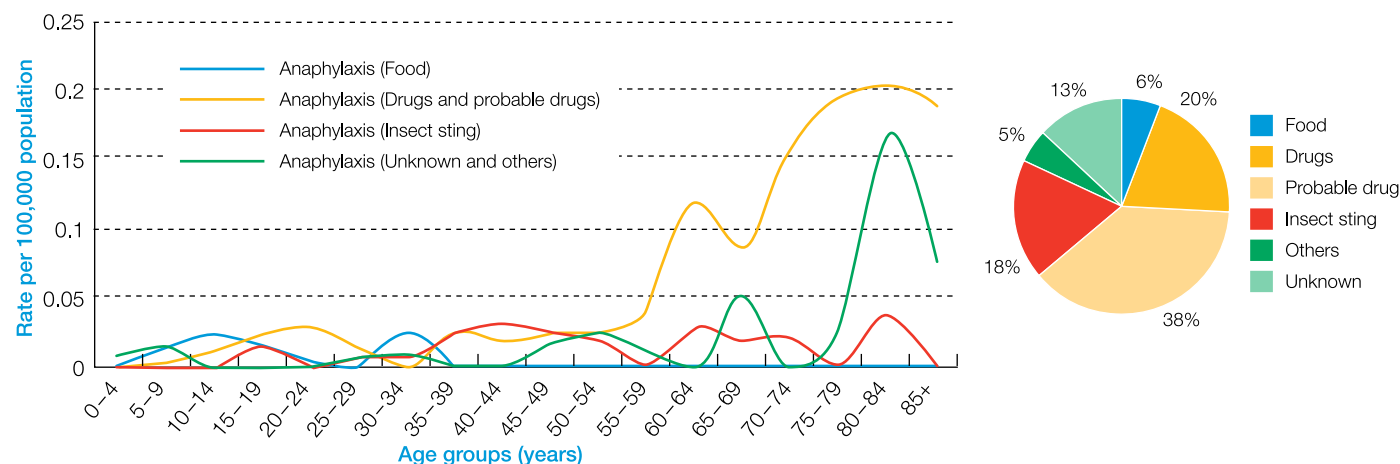
Medication

Medications are the most common cause of anaphylaxis hospital admissions in older adults (figure 3). The medications most frequently implicated are antibiotics (especially penicillins), non-steroidal anti-inflammatory drugs (NSAIDs), opiates and anaesthetic agents.⁶ Confirmed, or probable, medication-related anaphylaxis contributes to 57 per cent of all deaths due to anaphylaxis, the majority occurring in adults 55–85 years of age (figure 2).⁵

Food

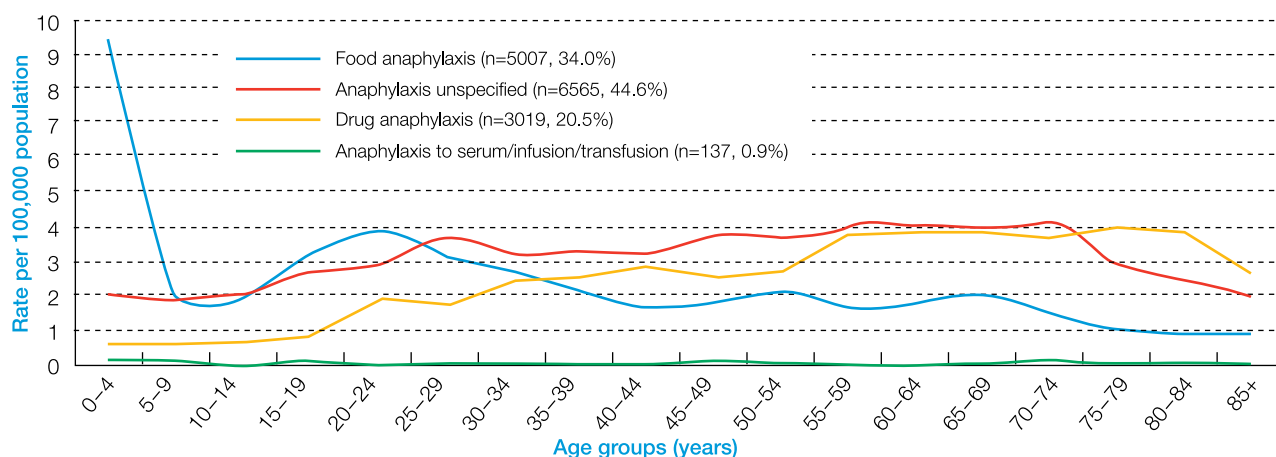
In children, food allergy is the most common cause of anaphylaxis, being the trigger in over 80 per cent of paediatric anaphylaxis presentations.³ The most common causative foods are peanuts, tree nuts, hen's eggs, cow's milk, wheat, shellfish, fish, and seeds (for example, sesame).⁷ The risk of anaphylaxis is highest with nut allergy.^{3, 7}

Figure 2: Causes of anaphylaxis fatalities in Australia, 1997–2005 (n=112)



Source Figures 2 and 3: Liew, W.K., Williamson, E., Tang, M.L. Anaphylaxis fatalities and admissions in Australia. *J Allergy Clin Immunol*, 2009. 123(2): p. 434–42

Figure 3: Causes of anaphylaxis admissions by age group, Australia 1994–2005



Hospital admissions for food anaphylaxis occur most commonly in those 0–4 years (figure 3), however fatalities peak in the 15–30 year age group.⁵ Food allergies overall caused only six per cent of all deaths due to anaphylaxis in Australia between 1997 and 2005 (figure 2).⁵

Insect venom

The venom of stinging insects such as bees, wasps and jack jumper (hopper) ants can cause anaphylaxis. Venom was associated with 18 per cent of deaths due to anaphylaxis in Australia between 1997 and 2005. The majority of these occurred in men over 35 years of age (figure 2).⁵

Role of co-factors

The presence of specific factors can also increase the likelihood of anaphylaxis when exposure to an allergen occurs. Such ‘co-factors’ include alcohol, recent exercise, inter-current infection and medication use (beta blockers, Angiotensin Converting Enzyme (ACE) inhibitors).^{4, 8} Furthermore, co-morbid conditions such as asthma, chronic obstructive pulmonary disease and cardiovascular disease are associated with an increased risk of severe or fatal anaphylaxis.^{7, 9}

Who is most at risk of anaphylaxis?

Predicting those who will develop anaphylaxis can be difficult. However, those with the following may be at increased risk:

- a history of anaphylaxis
- multiple allergies to medications
- allergies to peanuts, tree nuts and/or shellfish
- a history of asthma, particularly poorly-controlled, and other atopic conditions.¹⁰

One should also consider the potential for anaphylaxis in those starting a new medication.

There are currently no tests that can identify those at increased risk for anaphylaxis. In particular, the level of allergen specific IgE or size of the skin prick test (SPT) reaction, while suggesting the likelihood of clinical allergy, do **not** predict increased risk of anaphylaxis.⁹ This is a common misconception.

How is anaphylaxis managed?

Acute management

Adrenaline is the first line treatment for anaphylaxis (refer to table 2).

Table 2: Emergency management of anaphylaxis

1	Stop exposure to causative agent (if possible), assess reaction severity and treat accordingly
	<ul style="list-style-type: none"> • Call for assistance • Give adrenaline IM (lateral thigh) 0.01 mg/kg (maximum dose 0.5 mg) • Lie patient flat (elevate legs if tolerated) • Set up IV access • Give high flow oxygen + airway/ventilation support if needed <p>If hypotensive, also:</p> <ul style="list-style-type: none"> • Set up additional wide-bore IV access (that is, 14G or 16G in adults) for normal saline infusion • Give IV normal saline bolus 20 mL/kg stat
2	If there is inadequate response, an immediate life-threatening situation or deterioration:
	<p>Repeat IM adrenaline injection every 3–5 min, as needed,</p> <p>or</p> <p>Start an IV adrenaline infusion, as per hospital guidelines/protocol*</p>

* IV adrenaline usually requires intensive care expertise for administration
Adapted from: Brown, S.G., Mullins, R.J. and Gold, M.S. *Anaphylaxis: diagnosis and management*. Med J Aust, 2006. **185**(5): p. 283–9.

Long-term management

Long-term management and risk minimisation for anaphylaxis has a number of components, many of which can be provided by general practitioners:

1. Referral to an allergy specialist

All patients with suspected anaphylaxis should be referred to a medical specialist (allergist/clinical immunologist) for investigation and provision of a comprehensive management plan.¹

2. Identification of the trigger(s) of anaphylaxis

After anaphylaxis has occurred, accurate identification of the allergen enables allergen avoidance and guides appropriate management. Careful history taking is needed to try to determine the likely allergen, including history of recent medication use, food intake and/or potential for insect stings. Following this, skin prick testing (SPT) and blood allergen specific IgE and blood IgE testing (enzyme immunoassay, for example, Phadia ImmunoCAP, Immulite AlaTOP) can be helpful.¹¹ These tests must only be performed by qualified practitioners using standardised methods and interpretation criteria and, for SPT, appropriate safety precautions.

3. Avoidance of trigger(s)

Education and planning for **avoidance of allergens and co-factors** is very important. Allergen-specific strategies include:

- Medications
 - clear documentation of drug allergies in healthcare records
 - wrist band alerts when admitted to hospital
 - education for patients when commencing new medications known to carry a particular risk of anaphylaxis.
- Food
 - patient education regarding the common sources of accidental exposure (see www.allergy.org.au)
 - asking if prepared foods contain the allergen, reading food labels carefully
 - for adolescents and adults, 'cautious touch-testing' where prepared food is touched to the external lip before eating – tingling, burning or swelling can alert the person to a possible allergy¹⁰
 - considering consultation with a dietician.
- Insect stings
 - wearing shoes and long pants/sleeves when outdoors
 - wearing gloves when gardening
 - avoiding implicated insects where possible.

4. Assessment of need for an adrenaline autoinjector

An allergist/clinical immunologist should evaluate the need for the initial prescription of an **adrenaline autoinjector** (EpiPen® or Anapen®), with careful education for patients and carers about appropriate use. An adrenaline autoinjector is recommended where there is a history of anaphylaxis if the patient is considered to be at continuing risk, or in other individuals considered to be at high risk of developing anaphylaxis (eg peanut/tree nut allergy in a patient with regular asthma). Prescribing guidelines can be found at www.allergy.org.au

5. Provision of an Emergency Action Plan for Anaphylaxis

Written emergency action plans for anaphylaxis contain instructions on symptom recognition and management, including use of adrenaline autoinjectors. A copy should be given to patients and parents/carers, with accompanying verbal education about anaphylaxis recognition and management. Instructions may be provided about wearing a MedicAlert bracelet and use of medications such as an asthma reliever. Action plans, specific to the type of adrenaline autoinjector prescribed, are available at www.allergy.org.au

6. Regular follow up

Annual review with a regular family doctor is important to:

- monitor allergic symptoms
- ensure optimum risk minimisation
- update the autoinjector prescription and emergency action plan.
- educate and enhance confidence in correctly recognising and managing anaphylaxis.

As part of risk minimisation, it is very important to ensure that co-morbid conditions such as asthma, chronic obstructive pulmonary disease and cardiovascular disease are optimally managed.⁷

In addition, follow up with an allergy specialist may be indicated. The allergist may recommend additional allergy treatments or alter management plans to suit changing circumstances or changing risk of exposure to allergens.

Other management strategies

Allergen-specific immunotherapy involves administration of increasing doses of allergen over time to enable clinical and immunological tolerance.¹¹ This therapy is indicated in some cases of insect venom anaphylaxis, as well as some cases of asthma and severe allergic rhinitis.¹¹ Desensitisation therapy is also utilised for some medication allergies.¹² Allergen-specific immunotherapy is not currently available for food anaphylaxis. An allergy specialist should be consulted to discuss indications for allergen specific immunotherapy.

A note about isolated angioedema

Angioedema is a self-limited, localised subcutaneous or submucosal swelling. Angioedema may be associated with allergic/anaphylactic reactions (mast-cell mediated) or may occur in isolation (bradykinin mediated), without other features of an allergic reaction. Isolated angioedema can be an adverse effect of medications. For example, up to 0.7 per cent of patients taking ACE inhibitors may experience angioedema.⁶ Management consists of cessation of the causative medication. While uncommon, isolated angioedema of the larynx, upper airway or tongue requires immediate emergency attention. Angioedema that is not associated with administration of ACE inhibitors and is not due to allergic reactions to food, insect stings or medication is rarely dangerous.

Summary of key points

- Presentations and hospital admissions for anaphylaxis are increasing.
- Death from anaphylaxis is rare.
- Overall, the most common causes of anaphylaxis are medication, food and insect venom. Medications are a common cause of anaphylaxis in older adults, particularly antibiotics, NSAIDs, anaesthetic drugs and opiates. Food allergy is the most common cause of anaphylaxis in children, but rarely results in death.
- Anaphylaxis is a medical emergency requiring immediate medical treatment with adrenaline.
- Long-term management is important to minimise ongoing risk. This includes referral to an allergy specialist, identification of the trigger, allergen avoidance, prescription of an adrenaline autoinjector, provision of a written emergency action plan and regular education and follow up.

Important links

- www.allergy.org.au
- www.allergyfacts.org.au

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