

Anaphylaxis

All vaccinators must be able to distinguish anaphylaxis from fainting, anxiety, breath holding spells and convulsions.

Anaphylaxis is a very rare, unexpected and occasionally fatal allergic reaction. Anaphylaxis develops over several minutes and usually involves multiple body systems. Unconsciousness is rarely the sole manifestation, and it only occurs as a late event in severe cases. A strong central pulse (eg, carotid) is maintained during a faint (vasovagal syncope), but not in anaphylaxis.

In general, the more severe the reaction, the more rapid the onset. Most life threatening adverse events begin within 10 minutes of vaccination. The intensity usually peaks at around one hour after onset.

Symptoms limited to only one system can occur, leading to delay in diagnosis. Biphasic reactions, where symptoms recur 8 to 12 hours after onset of the original attack and prolonged attacks lasting up to 48 hours, have been described. All patients with anaphylaxis should be hospitalised.

Signs of anaphylaxis

Anaphylaxis is a severe adverse event of rapid onset, characterised by circulatory collapse. In its less severe (and more common) form, the early signs are generalised erythema and urticaria with upper and/or lower respiratory tract obstruction. In more severe cases, limpness, pallor, loss of consciousness and hypotension become evident in addition to the early signs.

Vaccinators should be able to recognise all of the signs and symptoms of anaphylaxis given in Table 1.

Table 1: Signs and symptoms of anaphylaxis

Time scale	Signs and symptoms	Severity
Early warning signs (within a few minutes)	Dizziness, perineal burning, warmth, pruritis	Mild
	Flushing, urticaria, nasal congestion, sneezing, lacrimation, angioedema	Mild to moderate
	Hoarseness, nausea, vomiting, substernal pressure	Moderate to severe
	Laryngeal oedema, dyspnoea, abdominal pain	Moderate to severe
Late and life threatening symptoms	Bronchospasm, stridor, collapse, hypotension, dysrhythmias	Severe

There is no place for conservative management of anaphylaxis. Early administration of adrenaline is essential. (For more details see Table 2.8.)

Misdiagnosis of faints and other common causes of collapse as anaphylaxis can lead to inappropriate use of adrenaline. Vaccinators should be able to distinguish anaphylaxis from fainting (vasovagal syncope), anxiety and breath holding spells (see Table 2). However, infants and babies rarely faint. Sudden loss of consciousness, limpness, pallor and vomiting (signs of severe anaphylaxis in children) should be presumed to be an anaphylactic reaction.

In adults and older children, the most common adverse event is a syncopal episode (fainting), either immediately or soon after vaccination. During fainting the individual suddenly becomes pale, loses consciousness and if sitting or standing will slump to the ground. Recovery of consciousness occurs within a minute or two. Fainting is sometimes accompanied by brief clonic seizure activity, but this generally requires no specific treatment or investigation if it is a single isolated event.

Table 2: Distinguishing anaphylaxis from a faint (vasovagal reaction)

	Faint	Anaphylaxis
Onset	Usually at the time or soon after the injection	Usually a delay of 5–30 minutes after injection
System		
Skin	Pale, sweaty, cold and clammy	Red, raised and itchy rash; swollen eyes and face; generalised rash
Respiratory	Normal to deep breaths	Noisy breathing from airways obstruction (wheeze or stridor); respiratory arrest
Cardiovascular	Bradycardia; transient hypotension	Tachycardia; hypotension; dysrhythmias; circulatory arrest
Gastrointestinal	Nausea/vomiting	Abdominal cramps
Neurological	Transient loss of consciousness; good response once prone	Loss of consciousness; little response once prone

Distinguishing a hypotonic, hyporesponsive episode (HHE) from anaphylaxis

Hypotonic, hyporesponsive episode (HHE)⁵ is defined as 'an episode of acute diminution in sensory awareness or loss of consciousness accompanied by pallor or cyanosis and muscle hypotonicity'. Different studies have found an incidence varying between 3.5 and 291 per 100,000 immunisations. This wide variation probably reflects lack of an ideal case definition and difficult case recognition, as well as different vaccine formulations.

Collapse reactions, often called an HHE or shock like syndrome, are seen occasionally in infants and very young children following vaccination. Note that:

- onset is sudden, occurring within 48 hours of vaccination
- duration of the episode usually ranges from 1–30 minutes, but may last longer.

All of the following must be present:

- limpness or hypotonia
- reduced responsiveness or hyporesponsiveness
- pallor or cyanosis (no urticaria or angioedema).

The child recovers spontaneously but may remain drowsy for 24–48 hours. Any child who has an HHE should be referred to a paediatrician for review as soon as possible.

In contrast to HHE, an episode of anaphylaxis in infants or small children usually occurs shortly after vaccination, and respiratory (bronchospasm and laryngeal oedema), circulatory (hypotension and tachycardia) problems, and vomiting and diarrhoea will develop rapidly.

Adrenaline is not recommended for HHE as these children do not have respiratory and circulatory problems.

An HHE is no longer a contraindication to further doses of a pertussis vaccine, but rather a precaution (see also sections 6.6 and 6.7).

Avoidance of anaphylaxis

To help avoid anaphylaxis, before immunisation:

- ensure there are no contraindications to immunisation
- ask the vaccinee or parent/caregiver about known hypersensitivity
- ask the vaccinee or parent/caregiver about previous AEFIs
- if in doubt as to the advisability or otherwise of administering the vaccine, consult the vaccinee's general practitioner or a paediatrician.

Vaccinees should remain under observation for 20 minutes to ensure they

are observed if they experience an immediate adverse event and they can be appropriately treated.

Be prepared by:

- ensuring emergency procedures are known by all staff
- practising emergency procedures regularly
- having an emergency kit (see Table 3) and adrenaline in every room where vaccinations/medications are given
- checking emergency kits regularly
- not giving vaccines when working alone.

Table 3: Emergency equipment

Emergency kit

An emergency kit should contain:

- adrenaline* 1:1000 and dosage chart
- syringes: 1.0 mL (tuberculin not insulin, as the insulin needle is non-removable)
- needles: a range of needle lengths and gauges, including 23 or 25 G × 25 mm, 22 G × 38 mm
- a range of airways, including paediatric.

Other emergency equipment required

It is also necessary to have on hand:

- an oxygen cylinder
- an ambubag, oxygen tubing and a range of oxygen mask sizes (adult and paediatric)
- access to a telephone.

* The expiry date of the adrenaline and other medicines should be written on the outside of the emergency kit, and the kit should be checked monthly. Adrenaline is heat and light sensitive and should be stored appropriately. Adrenaline that has a brown tinge must be discarded.

Remember: events happen without warning. Appropriate emergency equipment must be immediately at hand whenever immunisations are given, and all vaccinators must be familiar with the practical steps necessary to save life following an anaphylactic reaction (see Tables 3 and 4).

The following drugs are used only under the direction of a medical practitioner:

- antihistamine injection
- hydrocortisone injection (available on Medical Practitioner Supply Order).

Table 4: Initial anaphylaxis response/management

- **CALL FOR HELP** – send for professional assistance (ambulance, doctor). Never leave the recipient alone.
- **ASSESS** – if unconscious, place in the recovery position and institute standard procedures for basic life support (airway, breathing, circulation). If cardiorespiratory arrest occurs, administer age appropriate CPR and life support measures.
- **ADMINISTER ADRENALINE** – dosage: 1:1000 (adrenaline 1:1000 = 0.01 mg per 0.01 mL).

Adrenaline dosage for 1:1000 formulation is 0.01 mL/kg up to a maximum of 0.5 mL.

If weight unknown use the following guidelines:

Infants less than 1 year: 0.05–0.10 mL

Infants less than 2 years: 0.10 mL

Children 2–4 years: 0.20 mL

Children 5–10 years: 0.30 mL

Adolescents over 11 years: 0.30–0.50 mL

Adults: 0.50 mL

Route: deep IM. Where possible administer in a non-injected limb.

You can expect to see some response to the adrenaline within 1–2 minutes. If necessary, adrenaline can be repeated at 5–15 minute intervals, to a maximum of three doses, while waiting for assistance. Use alternate sites/limbs for additional doses.

- **ADMINISTER OXYGEN** at high flow rates where there is respiratory distress, stridor or wheeze.
- **IF HYPOTENSIVE, ELEVATE LEGS.**
- **IF STRIDOR IS PRESENT, ELEVATE HEAD AND CHEST.**
- **RECORD VITAL SIGNS** every 5–10 minutes and document fully all symptoms and treatment given.
- **ADMIT TO HOSPITAL** – all cases of anaphylaxis should be admitted to hospital for observation. Rebound anaphylaxis can occur 12–24 hours after the initial episode.

Note: Only medical practitioners should administer IV adrenaline, and then only 1:10,000 dilution at a dose of 0.01 mg/kg and volume of 1:10,000 of 0.1 mL/kg.

Adrenaline

Intramuscular injection of 1:1000 adrenaline is the preferred treatment of anaphylaxis and it should be universally available when vaccinating. A tuberculin syringe should be used to improve the accuracy of measurement when drawing up small doses.

Adrenaline is the mainstay of the treatment of anaphylaxis. It stimulates the heart and reverses vasoconstriction and bronchospasm, and reduces oedema and urticaria, thus countering the anaphylaxis. However, adrenaline is a very potent agent, and if used in inappropriate doses can cause dysrhythmias, severe hypertension, left ventricular failure and tissue necrosis. Intravenous adrenaline should be administered by a medical practitioner with extreme caution, in small boluses, and under careful monitoring, and it is not appropriate as the first line of treatment of anaphylaxis (see the note in Table 3).

Ongoing management in hospital or by a medical practitioner

All patients who have experienced anaphylaxis should be admitted to hospital. The attending medical practitioner should accompany patients who are in an unstable or deteriorating condition, so that treatment can be continued during transfer.

Hydrocortisone and antihistamine may be used as adjunctive medication. Nebulised salbutamol is helpful for bronchospasm. Additional drugs that may be administered include:

- phenergan: 0.5 mg/kg orally or 0.25 mg intravenous, to inhibit delayed histamine reactions
- adrenaline: nebulised adrenaline for laryngeal oedema
- bronchodilators: salbutamol 5 mg nebulised, to help reverse bronchospasm
- corticosteroids: prednisone 2 mg/kg (up to 40 mg) orally, or hydrocortisone 4 mg/kg IV, to help resolve tissue swelling (for young children and infants prednisolone syrup 5 mg/mL may be more appropriate).

Observation for a period of up to 24 hours after stabilisation of the patient's condition is recommended due to the risk of late deterioration from delayed and biphasic reactions.

Report the reaction to CARM, PO Box 913, Dunedin, using the prepaid postcard HP3442, or via online reporting at <http://carm.otago.ac.nz>.