Anaphylaxis

This pathway is for the diagnosis and management of adults and children with anaphylaxis.

COVID-19 note

In light of the current COVID-19 pandemic, if considering using nebulised treatments, consider alternatives as aerosol-generating procedures increase risk of COVID-19 infection to treating staff. If nebulisers are used, use contact and airborne precautions and clean the room thoroughly afterwards. See Thoracic Society of Australia and New Zealand (TSANZ) – Peak Respiratory Bodies Recommend the Use of Spacers rather than Nebulisers During the SARS CoV-2 Pandemic.

Last updated: 6 May 2020

Clinical editor's note

28 May 2020 – A limited number of funded EpiPens are available for children < 18 years who meet specific criteria, through the Allergy NZ FundaPen initiative.

Assessment

1. Suspect anaphylaxis if:
   - sudden onset and rapid progression of symptoms.
   - Shock, bronchospasm, laryngeal oedema
   - life-threatening airway, breathing, or circulation problems.

Circulation

- Reduced blood pressure (in adults, usually systolic BP < 80 mmHG)
- Collapse
- Syncope
- Pale, clammy
- Tachycardia

Breathing

- Dyspnoea
- Wheeze or bronchospasm
- Hypoxaemia
- Confusion

Airway

- Stridor

        - Significant tongue or upper airway swelling (angioedema)
        - Hoarse voice
        - Patient feels as though their "throat is closing up"
    - Abdominal cramps or pain, vomiting, diarrhoea.
    - Skin and mucosal changes i.e., pruritus, urticaria, flushing, angio-oedema.

Angio-oedema

- Angio-oedema is usually a benign allergic condition, which may become life threatening if there is swelling of the larynx, upper airway, or tongue causing airway obstruction.
- See also Angio-oedema.

Skin and mucosa

- Skin or mucosal changes alone are not a sign of an anaphylactic reaction.
- Skin and mucosal changes can be subtle or absent in up to 20% of reactions.

    - suspected or confirmed exposure to allergen.

2. Exclude other diagnoses e.g., vasovagal episode, severe asthma, panic attack, heart failure, hereditary angio-oedema, scombroid fish poisoning.

3. Differentiate anaphylaxis from a mild-to-moderate allergic reaction. Skin, oral, or gastrointestinal symptoms are:

Oral or gastrointestinal symptoms

- Tingling mouth
- Crampy abdominal pain
- Vomiting

Skin symptoms

- Generalised pruritus
- Erythema, urticaria
- Angio-oedema e.g., swelling of the face, eyes, or lips

    - often present in anaphylaxis, but are not essential for the diagnosis.
    - due to mild-to-moderate allergic reaction if not triggered by insect sting or parenterally administered medication, and without respiratory or circulatory involvement.

Management

Use adrenaline as first-line drug

The most important drug for anaphylaxis is intramuscular (IM) adrenaline followed by intravenous (IV) fluids. Antihistamines and steroids should be considered second-line treatments and can be given orally.[1]

Acute management

1. If acute anaphylaxis is diagnosed, start treatment immediately as below and, if primary options for acute care (POAC) observation and management are not appropriate, arrange an urgent ambulance for hospital admission. State anaphylaxis is the emergency, and request Emergency Department assessment.

2. Start emergency treatment with intramuscular adrenaline or adrenaline auto-injector. Where possible, give high flow oxygen. Monitor pulse, blood pressure, pulse oximetry, ECG. Record the dose and time of all medications.

Adrenaline auto-injector

Dose of adrenaline auto-injector for the emergency treatment of anaphylaxis	
Weight	**Adrenaline auto-injector**
10 to 20 kg	150 micrograms/0.3 mL EpiPen Jr (green-labelled device)
20 kg or more	300 micrograms/0.3 mL Epi Pen (yellow-labelled device)

Emergency treatment with intramuscular adrenaline

- Give intramuscular (IM) adrenaline immediately (acts within 1 to 2 minutes), usually given in the mid-anterolateral thigh.
- Determine the correct dose:

Intramuscular adrenaline dose for anaphylaxis

Age range	Dose	Volume of adrenaline 1 in 1000 (1 mg/mL)
Infant < 6 months	10 micrograms/kg	0.01 mL/kg
6 months to 6 years	150 micrograms/kg	0.15 mL/kg

6 years to 12 years	300 micrograms/kg	0.3 mL/kg
12 years to 18 years	500* micrograms/kg	0.5* mL/kg

*use 300 micrograms (0.3 mL) if small or prepubertal child

See also NZ Formulary – Anaphylaxis

- If anaphylaxis is after immunisation, where possible, administer in a non-injected limb.
- Repeat every 5 to 10 minutes if ongoing respiratory or cardiovascular compromise.
- Self-injecting adrenaline devices EpiPen, are available in two doses:
  - EpiPen with 0.3 mg adrenaline, for adults or children over 20 kg
  - EpiPen Junior, used for infants and children between 7.5 kg and 20 kg.
- Adrenaline is given by intramuscular injection. This gives a more rapid increase in plasma and tissue concentrations than a subcutaneous injection.
- The buttocks are not recommended as an injection site.
- Transient side-effects of adrenaline include anxiety, fear, restlessness, headaches, dizziness, palpitations, tremor. Only rarely does it cause ventricular arrhythmias, angina, myocardial infarction (MI), pulmonary oedema, sudden increase in blood pressure, intracranial haemorrhage.
- IV route should only be used if the patient has failed to respond to repeated IM adrenaline.
- To avoid the inadvertent use of 1:1000 adrenaline IV, consider labelling boxes of 1:1000 adrenaline "for IM or nebulised use only".

3. If there is concern about circulation or shock, **gain IV access**, and give IV fluid bolus:
   - Adult, 500 to 1000 mL of normal saline
   - Child, 20 mL/kg

If response is slow to the first dose of adrenaline, consider larger volume. Monitor closely in case of fluid overload in the elderly, and in those with cardiovascular or renal disease.

4. **Consider second-line medications**:
   - **Antihistamines** – Can be given for symptom relief of urticaria, angio-oedema or itch e.g., cetirizine or loratadine.

Loratadine

Adult dose – 20 mg daily for 3 days. See NZ Formulary – Loratadine.

Child dose – see NZ Formulary for Children: Loratadine.

Cetirizine

Adult dose – 20 mg daily for 3 days. See NZ Formulary – Cetirizine hydrochloride

Child dose – see NZ Formulary for Children: Cetirizine hydrochloride

- Steroids – Usually oral prednisone (2 mg per kg) maximum of 40 mg for three days.

Steroids

- Evidence is lacking for the use of IV steroids in the emergency management of anaphylaxis.
- Main benefit may be to prevent or shorten protracted reaction, and they are useful in bronchospasm.[2]

- Bronchodilators for persistent bronchospasm.

Bronchodilator use

In light of the current COVID-19 pandemic, if considering using nebulised treatments, consider alternatives as aerosol generating procedures increase the risk of COVID-19 infection to treating staff. If nebulisers are used, use contact and airborne precautions, and clean the room thoroughly afterwards.

See NZ Formulary – Anaphylaxis

See NZ Formulary for Children – Anaphylaxis

5. Arrange at least 4 hours of monitoring as recurrence or biphasic reactions can occur. Consider management and observations under POAC where appropriate.

Biphasic reactions

- A minority of patients experience biphasic reactions, with recurrence of symptoms 6 to 24 hours after the original attack.
- Most patients will be discharged on a short course of oral antihistamines and steroids.

6. Consider taking blood to check tryptase level.

Tryptase

- Measuring tryptase may be useful, particularly if there is uncertainty about the diagnosis of anaphylaxis.
- Released by activated mast cells.

- Levels peak 1 to 2 hours after anaphylaxis onset and return to normal in 6 to 8 hours.
- For optimum results, take a minimum of 2 samples, one within 30 minutes of the reaction, and another 6 hours later. Take a further sample at 3 hours, if possible.
- Some patients with anaphylaxis will have normal tryptase levels, but an abnormal level is useful if there is doubt about the diagnosis.
- See also LabPLUS – Tryptase.

Prevention and follow-up

1. Check that an adrenaline auto-injector (AAI), e.g. EpiPen, has been prescribed where appropriate and demonstrate correct use.

When to prescribe Epipen

Self-administered adrenaline should be considered when the trigger for anaphylaxis is unknown or repeat exposure is not avoidable (e.g., food and venom, but not drug-induced anaphylaxis).

Auto-injectable devices

- EpiPens can be purchased from pharmacies without a prescription for between $150 and $200, or at a cheaper price from online pharmacies, so advise the patient to shop around.
- A limited number of funded EpiPens are available for children < 18 years who meet specific criteria, through the Allergy NZ FundaPen initiative.
- ACC may contribute to the replacement cost of an adrenaline auto-injectable if:
  - it has been used for acute management of anaphylaxis to a known trigger e.g., venom, food.
  - the device was recommended by a general practitioner, and the patient produces the original dispensary receipt. If the device was obtained from an online pharmacy, they can reissue the receipt if needed.
- ACC will not pay for adrenaline auto-injectors.
- For further information, see Allergy NZ – Anaphylaxis.
- Always educate on the use of EpiPen.
- Needles, syringes, and ampoules of adrenaline are cheaper, but may be difficult for patients to administer accurately.
- For drug-related anaphylaxis, notify the NZ Pharmacovigilance Centre.

2. If anaphylaxis occurs shortly after a drug is given:

- notify the NZ Pharmacovigilance Centre.
- record the reaction in the patient's file.
- advise patient to avoid all medications in the same class, and warn about potentially cross-reactive medications e.g., cephalosporins in the case of penicillin allergy.

3. Give the patient:
   - the Australasian Society of Clinical Immunology and Allergy (ASCIA) – Anaphylaxis Action Plan. For children, ensure a copy goes to childcare, preschool, or school.
   - confirmation of the trigger.

Confirmation of trigger

- For confirmation of the trigger,

request paediatric or immunology assessment.

Immunology assessment

- In Auckland DHB, request non-acute immunology assessment
- In Counties Manukau Health and Waitematā DHB, request non-acute general medicine assessment.

- As skin testing, particularly for venom or drug allergy, may be falsely negative in the 4 weeks after a significant allergic reaction, testing may need to be postponed, but do not postpone referral.

   - education and written advice about:

- specific food allergens.
- bee or wasp stings, as desensitisation may be available. See ASCIA – Allergic Reactions to Bites and Stings.

4. Suggest a MedicAlert bracelet to patients with a history of anaphylaxis.
5. Arrange follow-up for all patients with anaphylaxis. If the patient is:
   - an adult in Auckland DHB, request a non-acute immunology assessment, or
   - an adult in Counties Manukau Health or Waitematā DHB, request non-acute general medicine assessment.
   - a child aged < 15 years, request non-acute paediatric assessment.

Request

- If acute anaphylaxis request Emergency Department assessment, if not managing in-practice under POAC.
- If adult with anaphylaxis:
  - in Auckland DHB, arrange follow-up non-acute immunology assessment.
  - in Counties Manukau Health or Waitematā DHB, arrange follow-up non-acute general medicine assessment.
- If child < 15 years with anaphylaxis, request follow-up non-acute paediatric assessment.
- If drug-induced anaphylaxis, notify the NZ Pharmacovigilance Centre.

Information

Clinical Resources

Education

BMJ Learning:

- The Royal New Zealand College of General Practitioners Modules [requires registration]
- Anaphylaxis: A Guide to Management

Further information

- Australasian Society of Clinical Immunology and Allergy (ASCIA) – Anaphylaxis Resources
- New Zealand Pharmacovigilance Centre – Centre for Adverse Reactions Monitoring (CARM)
- NZ Resuscitation Council – Guidelines

Patient Information

- Australasian Society of Clinical Immunology and Allergy (ASCIA):
  - Anaphylaxis Resources
  - Patients, Consumers, Carers
- Health Navigator – Anaphylaxis
- Starship Child Health – Patient Information About Purchasing an Adrenaline Auto-injector.