Anaphylaxis: Immediate Management in the Community

Anaphylaxis is likely if a person exposed to an allergen develops systemic changes which affect the skin, respiration and circulation, and which usually progress over several minutes

Remove exposure to allergen (e.g., discontinue administration of drugs/therapeutic agent)

↓

Assess skin, airway, breathing and circulation

↓

Rash, stridor, wheeze, respiratory distress, hypotension or clinical signs of shock?[1]

↓

Get help
Call an ambulance[2]

↓

Lie patient flat with legs raised (unless vomiting or respiratory distress increases)[3]

↓

Give Epinephrine 1:1,000 (1mg/mL) IM immediately into the middle third of anterolateral thigh (use 25mm needle) [4]

Aged less than 6 months	*0.1mL (100 micrograms)*
Aged 6 months-5 years	*0.15mL (150 micrograms)*
Aged 6-12 years	*0.3mL (300 micrograms)*
Aged over 12 years	*0.5mL (500 micrograms)*

For those over 100kg use 38-40mm needle

↓

Up to 3 doses may be given at 5 minute intervals
Remember urgency of hospital transfer
Alternate legs for multiple doses

1. Give CPR/BLS if necessary.
2. Ambulance will be equipped with oxygen and fluids
3. If respiratory distress present, place in semi recumbent position
4. The anterolateral thigh is preferred to injection into the deltoid muscle or subcutaneously

NOTE: **There are no contraindications to epinephrine.** Immediate administration of adequate doses of epinephrine will decrease patient mortality and morbidity. All patients with signs of a systemic reaction, especially hypotension, airway swelling or difficulty breathing, should receive immediate intramuscular (IM) epinephrine in the anterolateral thigh.

Auto injectors are not recommended for the administration of epinephrine in anemergency situation because they may not allow IM delivery of an age appropriate dose.

Suggested Anaphylaxis Kit

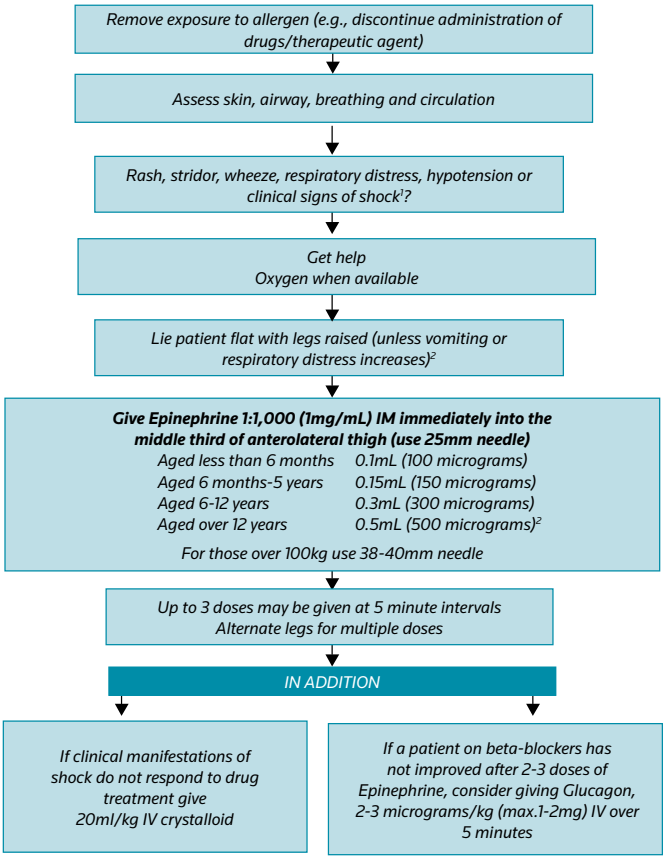
The availability of protocols, equipment and drugs necessary for management of anaphylaxis should be checked before each vaccination session

- Copy of "Anaphylaxis: Immediate Management in the Community" from Immunisation Guidelines for Ireland
- 3 x 1 ml ampoules of epinephrine (1:1000, 1mg/ml)
- 3 x 1 ml syringes
- Needles (3 x 16mm, 3 x 25 mm, 3 x 38-40mm)
- 1 pocket mask
- Sphygmomanometer (optional)
- Stethoscope (optional)
- Pen and paper to record time of administration of epinephrine.

The kits should be kept closed to ensure the drugs are not exposed to light and stored at room temperature. The kits require regular checking to replace drugs before their expiry date.

Auto injectors are not recommended for the administration of epinephrine in an emergency situation because they may not allow IM delivery of an age appropriate dose.

Anaphylaxis: Management by First Medical Responders (in GP surgery or hospital)



[1.] Give CPR/ALS if necessary. If severe hypotension, consider **slow** IV Epinephrine 1:10,000 solution, dose 10 microgram/kg, maximum dose 500 micrograms, over several minutes. **This is hazardous and is recommended only in a hospital setting under supervision by an intensivist**. ***Note the different strength for IV use.***

[2.] IM into middle third of anterolateral thigh.

NOTE: **There are no contraindications to epinephrine.** Immediate administration of adequate doses of epinephrine will decrease patient mortality and morbidity. All patients with signs of a systemic reaction, especially hypotension, airway swelling or difficulty breathing, should receive immediate intramuscular (IM) epinephrine in the anterolateral thigh.

Antihistamines or corticosteroids have no role in treating the respiratory or cardiovascular manifestations of anaphylaxis. An antihistamine may alleviate the cutaneous manifestations. A non-sedating oral antihistamine is preferred to chlorphenamine, which may sedate and which may cause hypotension when given IV.

Corticosteroids (preferably given orally) may be indicated if an acute asthma attack may hace contributed to the severity of the anaphylaxis.

ANAPHYLAXIS

Anaphylaxis is highly likely when either of the following two criteria[1, 2, 3] is fulfilled:

1. Acute onset of an illness (minutes to several hours) with involvement of the skin and/or mucosal tissue (e.g., generalised urticaria, pruritus or flushing, swollen lips-tongue-uvula)

and at least one of the following

a. Airway/Breathing: Respiratory compromise (e.g., dyspnoea, wheeze-bronchospasm, stridor, reduced peak expiratory flow, hypoxaemia)

b. Circulation: Reduced blood pressure (BP) or associated symptoms of end-organ dysfunction (e.g., hypotonia (collapse) syncope, incontinence)

c. Other: Severe gastrointestinal symptoms (e.g., severe crampy abdominal pain, repetitive vomiting), especially after exposure to non-food allergens.

or

2. Onset within minutes to several hours of hypotension* or bronchospasm or laryngeal involvement** after exposure to a known or probable allergen even in the absence of skin involvement.

* Infants and children under 10 years: systolic BP less than 70 plus (twice age in years) mm Hg

Children aged 10 years and older and adults: systolic BP less than 90mm Hg

**Symptoms including stridor, vocal changes, painful swallowing

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[1]Adapted from Cardona et al (2020). World Allergy Organization Journal. World allergy organization anaphylaxis guidance 2020
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7607509/pdf/main.pdf

[2]For fuller definition see https://brightoncollaboration.us/wp-content/uploads/2021/03/SPEAC_D2.5.2.1_Anaphylaxis-Case-Definition-Companion-Guide_V1.0-12070-1.pdf

[3] Joshi D et al (2014). An algorithm developed using the Brighton Collaboration case definitions is more efficient for determining diagnostic certainty.
http://dx.doi.org/10.1016/j.vaccine.2014.04.070.

Anaphylaxis is an acute, potentially fatal, multiorgan system reaction caused by the release of chemical mediators from mast cells and basophils. This results in capillary leakage, mucosal oedema and ultimately shock and asphyxia. It is caused by foreign protein antigens such as food, drugs, vaccines and bee stings.The US Vaccine Safety Datalink studied the rate of anaphylaxis following vaccination, using the Brighton case definition. This showed a rate of 1.31 (95% Confidence Interval, 0.90-1.84) per million vaccine doses. Most episodes begin within 30 minutes of vaccination.

It can vary in severity and rate of progression with manifestations over a few minutes or may be delayed for hours, adding to diagnostic difficulty. Shorter intervals to onset generally indicate more severe reactions. Fatal outcome is extremely rare. It usually results from delayed administration of epinephrine and from severe respiratory and/or cardiovascular complications. Other risk factors for fatal anaphylaxis include previous cardiovascular morbidity, older age, beta-lactam antibiotics, radiocontrast injections, and upright posture.

Vaccine recipients should be observed for at least 15 minutes after vaccination. If this is not practicable, vaccine recipients should wait in the vicinity for 15 minutes.

If there is a specific concern about a possible vaccine allergy e.g., previous anaphylaxis to a vaccine component or mastocytosis, vaccine recipients should be observed for 30 minutes.

Epinephrine is the most important drug for the treatment of anaphylaxis. Epinephrine maintains blood pressure, restores adequate tissue oxygenation and causes bronchodilation. Epinephrine works best when given early after the onset of anaphylaxis symptoms. Delayed administration is associated with protracted reactions, hypotension and fatal outcome.

Most patients respond to a single dose of IM epinephrine, particularly if it is given promptly after the onset of symptoms. When additional doses are required, typically only one or rarely two further doses are needed (e.g., in those with severe anaphylaxis). A second dose is necessary in up to 36% of cases.

Biphasic or late phase reactions, in which patients have a recurrence of symptoms and signs several hours after the initial episode, have been described in up to 20% of cases. They often occur after symptoms of anaphylaxis have resolved, can be more difficult to treat than the initial episode, and may require intubation. Patients should therefore be observed in hospital for at least 12 hours after severe episodes of anaphylaxis.

Fatal outcome is extremely rare. Death usually results from delayed administration of epinephrine and from severe respiratory and/or cardiovascular complications. Other risk factors for fatal anaphylaxis include previous cardiovascular morbidity, older age, beta-lactam antibiotics, radiocontrast injections, and upright posture.

Anaphylaxis must be distinguished from fainting (vasovagal episode), anxiety, breath-holding episodes and idiopathic urticaria or angioedema, which are more common.

Table 1 shows features which may assist differentiating fainting from anaphylaxis.

Table 1: Differentiating Vasovagal episode and Anaphylaxis

		Vasovagal episode	Anaphylaxis
Onset		Immediate	Usually within 5 minutes, but can be delayed for hours
Symptoms/signs	**Skin**	Generalised pallor; cold, clammy skin	Itch, generalised erythema, urticaria or angioedema (localised swelling of face, mouth, etc.)
	Respiratory	Normal or shallow, not laboured	Cough, wheeze, stridor, tachypnoea, recession, cyanosis
	Cardiovascular	Bradycardia but strong carotid pulse Hypotension corrected when lying	Tachycardia, weak/absent pulse. Sustained hypotension unless specific treatment
	Neurological	Light-headed, possible loss of consciousness, improves on lying down	Severe anxiety and distress. Loss of consciousness

Those experiencing **anxiety** may appear fearful, pale and sweaty, and complain of light-headedness, dizziness and numbness or tingling of their hands or feet. Hyperventilation is usually present.

During a **breath-holding episode** the child is suddenly silent and may be agitated. Facial flushing or pallor can occur as breath-holding continues. Some episodes end with resumption of crying, but others can be followed by a brief period of unconsciousness during which breathing resumes.

Urticaria or angioedema may appear at or away from the injection site but are not always caused by an allergic reaction and may disappear without additional treatment.

If any other symptoms occur, even if considered mild (sneezing, nasal congestion, coughing, etc.), Epinephrine should be given. There is little risk to the use of Epinephrine, especially in children, whereas delay in its administration in anaphylaxis may result in death. The features of anaphylaxis include obstructive swelling of the upper airway, marked bronchospasm and hypotension.

Beta blockers may interfere with the action of Epinephrine or with the compensatory mechanisms which occur in anaphylaxis.

If a patient on beta-blockers has not improved after 2-3 doses of Epinephrine, consider giving Glucagon, 2-3 micrograms/ kg (max. 1-2mgs) IV over 5 minutes, IV salbutamol, and/or IV atropine. These should only be used in hospital, preferably under the supervision of an intensivist.

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PREFACE

It has been a pleasure to act as Chair of the National Immunisation Advisory Committee of the Royal College of Physicians of Ireland (NIAC). The Committee is an altruistic, scientific and energetic group of people. Members are nominated from the RCPI, its Faculties, the RCSI, the ICGP, the IMB, the HPSC, the NIO, the HSE, the DOH, the National Virus Reference Laboratory, with a co-opted member from An Bord Altranais and the Northern Ireland Department of Health and an observer from the Institute of Obstetricians and Gynaecologists. A member of the NIAC is an observer at the Joint Committee for Vaccination and Immunisation (UK) and on the management board of the European Centre for Disease Control (ECDC).

Immunisation is a work in constant progress, with ongoing changes to the content and schedule of immunisation and availability of new vaccines. The NIAC members have met with the Minister of Health, Dr Reilly and with the Chief Medical Officer, Dr Tony Holohan, to whom the committee provides advice and recommendations in regard to vaccination.

The committee is greatly indebted to the HPSC for disease prevalence data and immunisation uptake data. In addition we are very appreciative of the National Centre for Pharmacoeconomics for providing sound and scientific health technology assessments of several vaccines. Health Technology Assessments will be required on all new forthcoming vaccines. We wish to acknowledge the informed input from Dr Mary Healy of Texas Children's Hospital into the decision to recommend pertussis vaccine for pregnant women.

While vaccine uptakes, particularly of MMR, have progressively improved, with acceptance rates of 92% at 24 months, there remain some concerns about uptake rates in the second year of life and among adolescents. The HPV vaccine campaign, however, saw uptake rates of over 80% among targeted girls. The NIAC is of the view that the RCPI and RCSI need to be more proactive in persuading all health care workers to receive Hepatitis B vaccine, annual influenza vaccine and other appropriate vaccines.

I must sincerely thank three hardworking and efficient Honorary Medical Secretaries, who have served NIAC well, Dr Jennifer Martin, Dr Cillian de

Gascun, and Dr Cilian O'Maoldomhnaigh and our longstanding and attentive College secretary/organiser/ administrator, Ms Karen Doyle. The Committee greatly appreciates, acknowledges and commends the remarkable and productive work of the writing group (too numerous to individually name) of the 2013 edition of "Immunisation Guidelines for Ireland" and would particularly like to thank the diligent proof readers, Dr Helena Murray and Ms Stephanie Mulcair.

These guidelines are intended for doctors, practice nurses, general nurses, pharmacists, paramedicals, those involved in travel health and all involved in the promotion and implementation of Ireland's immunisation programmes.

All chapters have been revised and updated, and a new chapter on immunocompromised added. The major innovation for 2013 is the Guidelines will now only be available online at www.rcpi.ie and www.immunisation.ie. The changes to the 2013 edition are itemised in the following pages. NIAC welcomes constructive comments on the "Guidelines" content.

I would also like to commend the National Immunisation Office on their excellent document "Driving Change in Immunisation 2005-2011".

Immunisation remains the single best preventive intervention medical intervention to reduce mortality and morbidity from vaccine preventable diseases.a doctor or nurse can make on behalf of children. NIAC looks forward to the future elimination of measles and further reduction of meningococcal disease and to the challenges posed by the evaluation and addition of new vaccines.

Denis Gill
Chair
NIAC

The 2013 Edition

All the Chapters in the 2013 edition have been rewritten and arranged in a standard format and the numbering of Chapters has changed.

Major changes made since the 2008 edition:

- **Anaphylaxis**
  The doses of Epinephrine have been simplified.

- **Chapter 2 General Immunisation Procedures**
  The section on immunisation of the immunocompromised removed.
  Catch up schedules revised.
  A new table on optimal and minimal intervals between vaccines added.
  Contraindications and Precautions revised.
  A section on Vaccination and anaesthesia or surgery added.

- **Chapter 3 Immunisation of Immunocompromised Persons**
  This is a new chapter, with detailed information on conditions associated with immunouppression and recommended vaccine schedules.

- **Chapter 5 Immunisations and Health Information for Travel**
  This chapter has been expanded and updated.
  New information added that although evidence now shows that yellow fever vaccine gives life-long protection, some countries still require an international certificate of 10 yearly vaccination.

- **Chapter 10 Human Papillomavirus**
  A recommendation added that quadrivalent vaccine should be considered for men who have sex with men up to 26 years of age and for women and men who are HIV infected or post haematopoietic stem cell transplant.

- **Chapter 15 Pertussis**
  Informaton about the recommendation for Tdap vaccination between 27-36 weeks gestation during each pregnancy has been added.

- **Chapter 16 Pneumococcal infection**
  Indications for pneumococcal conjugate vaccine expanded to include those in at the risk groups aged 18 years and older.

- **Chapter 18 Rotavirus**
  A recommendation to add rotavirus vaccine to the primary childhood immunisation programme has been added.

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