



CLINICAL GUIDELINE

Recognition and Management of Anaphylaxis

A guideline is intended to assist healthcare professionals in the choice of disease-specific treatments.

Clinical judgement should be exercised on the applicability of any guideline, influenced by individual patient characteristics. Clinicians should be mindful of the potential for harmful polypharmacy and increased susceptibility to adverse drug reactions in patients with multiple morbidities or frailty.

If, after discussion with the patient or carer, there are good reasons for not following a guideline, it is good practice to record these and communicate them to others involved in the care of the patient.

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Important Note:

The Intranet version of this document is the only version that is maintained. Any printed copies should therefore be viewed as 'Uncontrolled' and as such, may not necessarily contain the latest updates and amendments.

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1. Introduction and Definition:

Anaphylaxis is an extreme form of allergic sensitivity that involves an abnormal antigen-antibody response to a drug or other substance introduced into the body. The incidence of anaphylactic reactions is increasing₁

The following definition is offered by the Resuscitation Council (UK)₁

'Anaphylaxis is a severe, life-threatening, generalised or systemic hypersensitivity reaction'

This is characterised by rapidly developing life-threatening airway and/or breathing and/or circulation problems usually associated with skin and mucosal changes.

2. Scope

This guidance is applicable to all areas of the NHS GGC Mental Health Service. Irrespective of where a situation arises, the need to improve patient outcome by the early administration of intramuscular Adrenaline immediately following diagnosis, drives the associated practice. As nurses are invariably involved in the administration of newly prescribed drugs and they have a statutory duty to provide care, then they are considered the 'first line' of response in the provision of the initial treatment. A prescription is **not** required to administer IM Adrenaline in Anaphylaxis. The treatment Algorithm on page 13 is guided by the fact that additional interventions are provided 'where equipment and skills' are available but Adrenaline must be available/accessible in all settings, including Adult, Older People, Learning Disabilities, Addictions, Child and Adolescent both community and all inpatient/ residential services.

3. Background

Anaphylactic reactions can vary in severity and progress. Extremely rarely the manifestations may be delayed for a few hours. This is an important element for the administration of drugs, particularly parenteral drugs, within a patient's home. Written advice must be provided for the patient and carer describing potential 'delayed' reactions and the necessary actions to take. In inpatient settings, nurses must be aware of the fact that there may be a delayed reaction and monitor the patient accordingly.

All those who are suspected of having had an anaphylactic reaction should be referred to a specialist in allergy. Intravenous adrenaline must only be used in certain specialist settings and only by those skilled and experienced in its use, this does not include routine Mental Health settings. Individuals who are at high risk of an anaphylactic reaction should carry an adrenaline auto-injector and receive training and support in its use.

Individuals who are involved in resuscitation regularly are more likely to have advanced resuscitation skills than those who are not. This guideline does not expect individuals to obtain intravenous access in an emergency if this is not part of their usual role. Rather, individuals should use skills that they know and use regularly. This will make it more likely that these skills are used effectively on the rare occasions when they are needed to treat an anaphylactic reaction. Any extra skills specifically for the treatment of a patient with an anaphylactic reaction should be reasonably easy to learn, remember and implement (e.g., intramuscular (IM) injection of adrenaline).

Treatment of an anaphylactic reaction should be based on general life support principles:

- Use the Airway, Breathing, Circulation, Disability, Exposure (ABCDE*) approach to recognise and treat problems.
- Call for help early (2222 for main hospital services or 999 for Resource Centres, community settings – including a patient's home, LD residential settings and satellite units such as Birdston Nursing Home)

- Treat the greatest threat to life first.
- Initial treatments should not be delayed by the lack of a complete history or definite diagnosis.

Patients having an anaphylactic reaction in any setting should expect the following as a minimum:

- Recognition that they are seriously unwell.
- An early call for help.
- Initial assessment and treatments based on an ABCDE* approach.
- Adrenaline therapy if indicated.
- Investigation and follow-up by an allergy specialist.

Within community mental health teams/services the availability and use of Adrenaline IM is highly recommended. There is a professional and organisation duty to ensure that rapid access to the definitive treatment for this life threatening emergency should be available. This is particularly relevant if a patient has a history of anaphylaxis (typically patient should have own auto injector which is only used if no service Adrenaline accessible), severe asthma and/or food allergies/allergy history. Adrenaline 1 in 1000, with needles/syringes should be available within Resource Centres/community facilities to facilitate administration in such circumstances.

*See Appendix 1 for more information about the ABCDE approach.

4. Triggers

Anaphylaxis can be triggered by any of an extensive range of triggers, but those most commonly identified include food, drugs and venom². The relative importance of these varies considerably with age, with food being particularly important in children and medicinal products being much more common triggers in older people³. Of foods, nuts are the most common cause; muscle relaxants, antibiotics, NSAIDs and aspirin are the most commonly implicated drugs (Table 1). It is important to note that, in many cases, no cause can be identified.

Trigger	Total	Broken down:
Stings	47	29 wasp, 4 bee, 14 unknown
Nuts	32	10 peanut, 6 walnut, 2 almond, 2 brazil, 1 hazel, 11 mixed or unknown
Food	13	5 milk, 2 chickpea, 2 crustacean, 1 banana, 1 snail
Food (possible)	17	5 during meal, 3 milk, 3 nut, 1 each – fish, yeast, sherbet, nectarine, grape, strawberry
Antibiotics	27	11 penicillin, 2 cephalosporin, 2 Amphotericin, 1 Ciprofloxacin, 1 Vancomycin
Anaesthetic drugs	39	19 Suxamethonium, 7 Vecuronium, 6 Atracurium, 7 at induction
Other drugs	24	6 NSAID, 3 ACEI, 5 gelatins, 2 protamine, 2 vitamin K, 1 each – etoposide, acetazolamide, pethidine, local anaesthetic, diamorphine, streptokinase
Contrast media	11	9 iodinated, 1 technetium, 1 fluorescein
Other	3	1 latex, 1 hair dye, 1 hydatid

Table 1. Suspected triggers for fatal anaphylactic reactions in the UK between 1992-2001₃ NSAID – Non steroidal anti-inflammatory drug
ACEI – Angiotensin Converting Enzyme Inhibitor

4.1 Mortality

The overall prognosis of anaphylaxis is good, with a case fatality ratio of less than 1% reported in most population-based studies 4-6. Risk of death is, however, increased in those with pre-existing asthma, particularly if the asthma is poorly controlled 7. There are approximately 20 anaphylaxis deaths reported each year in the UK, although this may be a substantial underestimate.

4.2 Risk of recurrence

The risk of an individual suffering recurrent anaphylactic reaction appears to be quite substantial, being estimated at approximately 1 in 12 per year⁸.

4.3 Trends over time

There is very limited data on trends in anaphylaxis internationally, but data indicate a dramatic increase in the rate of hospital admissions for anaphylaxis, increasing from 0.5 to 3.6 admissions per 100,000 between 1990 and 2004: an increase of 700%^{9, 10}.

When anaphylaxis is fatal, death usually occurs very soon after contact with the trigger. From a case-series, fatal food reactions cause respiratory arrest typically after 30–35 minutes; insect stings cause collapse from shock after 10–15 minutes; and deaths caused by intravenous medication occur most commonly within five minutes

5. Recognising and diagnosing anaphylaxis

A diagnosis of anaphylactic reaction is likely if a patient who is exposed to a trigger (allergen) develops a sudden illness (usually within minutes of exposure) with rapidly progressing skin changes and life-threatening airway and/or breathing and/or circulation problems. The reaction is usually unexpected.

The lack of any consistent clinical manifestation and a range of possible presentations cause diagnostic difficulty in practice. Many patients with a genuine anaphylactic reaction are not given the correct treatment¹². Patients, particularly children, have been given injections of adrenaline inappropriately for allergic reactions just involving the skin, or for Vasovagal reactions or panic attacks¹³.

A single set of criteria will not identify all anaphylactic reactions. There is a range of signs and symptoms, none of which are entirely specific for an anaphylactic reaction; however, certain combinations of signs make the diagnosis of an anaphylactic reaction more likely¹⁴. When recognising and treating any acutely ill patient, a rational ABCDE approach must be followed and life-threatening problems treated as they are recognised (see Appendix 1)

5.1 Anaphylaxis is likely when all of the following 3 criteria are met

- Sudden onset and rapid progression of symptoms
- Life-threatening Airway and/or Breathing and/or Circulation problems
- Skin and/or mucosal changes (flushing, urticaria, angioedema)

The following supports the diagnosis:

- Exposure to a known allergen for the patient

Remember:

- 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 (some patients can have only a decrease in blood pressure, i.e., a Circulation problem)
- There can also be gastrointestinal symptoms (e.g. vomiting, abdominal pain, incontinence)

Confusion arises because some patients have systemic allergic reactions that are less severe. For example, generalised urticaria, angioedema, and rhinitis would not be described as an anaphylactic reaction, because the life-threatening features — an airway problem, respiratory difficulty (breathing problem) and hypotension (circulation problem) — are not present.

5.2 Sudden onset and rapid progression of symptoms

- The patient will feel and look unwell.
- Most reactions occur over several minutes. Rarely, reactions may be slower in onset.
- The time of onset of an anaphylactic reaction depends on the type of trigger.

An intravenous trigger will cause a more rapid onset of reaction than stings which, in turn, tend to cause a more rapid onset than orally ingested triggers e.g. food

- The patient is anxious and can experience a “sense of impending doom”.

5.3 Life-threatening Airway and/or Breathing and/or Circulation problems

Patients can have either an A or B or C problem or any combination. Use the ABCDE approach to recognise these.

Airway problems:

- Airway swelling, e.g., throat and tongue swelling (pharyngeal/laryngeal oedema). The patient has difficulty in breathing and swallowing and feels that the throat is closing up.
- Hoarse voice.
- Stridor – this is a high-pitched inspiratory (on inhaling) noise caused by upper airway obstruction.

Breathing problems:

- Shortness of breath – increased respiratory rate, more than 20 breaths per minute (adult).
- Wheeze.
- Patient becoming tired.
- Confusion caused by hypoxia (lack of circulating oxygen).
- Cyanosis (appears blue) – this is usually a late sign.
- Respiratory arrest.

There is a range of presentation from anaphylaxis, through anaphylaxis with predominantly asthmatic features, to a pure acute asthma attack with no other features of anaphylaxis. Life-threatening asthma with no features of anaphylaxis can be triggered by food allergy. Anaphylaxis can also present as a primary respiratory arrest.

Circulation problems:

- Signs of shock – pale, clammy.
- Increased pulse rate (tachycardia).
- Low blood pressure (hypotension) – feeling faint (dizziness), collapse.
- Decreased conscious level or loss of consciousness.
- Anaphylaxis can cause myocardial ischaemia and electrocardiograph (ECG) changes even in individuals with normal coronary arteries.

Cardiac arrest.

Circulation problems (often referred to as anaphylactic shock) can be caused by direct myocardial depression, vasodilation and capillary leak, and loss of fluid from the circulation. Bradycardia (a slow pulse) is usually a late feature, often preceding cardiac arrest.

The circulatory effects do not respond, or respond only transiently, to simple measures such as lying the patient down and raising the legs. Patients with anaphylaxis can deteriorate if made to sit up or stand up.

The above Airway, Breathing and Circulation problems can all alter the patient's neurological status (Disability problems) because of decreased brain perfusion. There may be confusion, agitation and loss of consciousness.

Patients can also have gastro-intestinal symptoms (abdominal pain, incontinence, vomiting).

5.4 Skin and/or mucosal changes

These should be assessed as part of the Exposure when using the

ABCDE approach.

- They are often the first feature and present in over 80% of anaphylactic reactions.
- They can be subtle or dramatic.
- There may be just skin, just mucosal, or both skin and mucosal changes.
- There may be erythema – a patchy, or generalised, red rash.
- There may be urticaria (also called hives, nettle rash, weals or welts), which can appear anywhere on the body. The weals may be pale, pink or red, and may look like nettle stings. They can be different shapes and sizes, and are often surrounded by a red flare. They are usually itchy.
- Angioedema is similar to urticaria but involves swelling of deeper tissues, most commonly in the eyelids and lips, and sometimes in the mouth and throat.

Skin changes without life-threatening airway, breathing or circulation problems do not signify an anaphylactic reaction. Most patients who have skin changes caused by allergy do not go on to develop an anaphylactic reaction.

5.5 Differential diagnosis

Life-threatening conditions:

- Sometimes an anaphylactic reaction can present with symptoms and signs that are very similar to life-threatening asthma – this is commonest in children.
- A low blood pressure (or normal in children) with a petechial or purpuric rash can be a sign of septic shock.
- Seek help early if there are any doubts about the diagnosis and treatment.
- Following an ABCDE approach will help with treating the differential diagnoses.

Non life-threatening conditions (these usually respond to simple measures):

- Faint (vasovagal episode).
- Panic attack.
- Breath-holding episode in child.

Idiopathic (non-allergic) Urticaria or Angioedema.

There can be confusion between an anaphylactic reaction and a panic attack. Victims of previous anaphylaxis may be particularly prone to panic attacks if they think they have been re-exposed to the allergen that caused a previous problem. The sense of impending doom and breathlessness leading to hyperventilation are symptoms that resemble anaphylaxis in some ways. While there is no hypotension, pallor, wheeze, or urticarial rash or swelling, there may sometimes be flushing or blotchy skin associated with anxiety adding to the diagnostic difficulty. Diagnostic difficulty may also occur with vasovagal attacks after immunisation procedures, but the absence of rash, breathing difficulties, and swelling are useful distinguishing features, as is the slow pulse of a vasovagal attack compared with the rapid pulse of a severe anaphylactic episode. Fainting will usually respond to lying the patient down and raising the legs.

As the diagnosis of anaphylaxis is not always obvious, all those who treat anaphylaxis must have a systematic approach to the sick patient. In general, the clinical signs of critical illness are similar whatever the underlying process because they reflect failing respiratory, cardiovascular, and neurological systems, i.e. ABCDE problems. Use an ABCDE approach to recognise and treat an anaphylactic reaction. Treat life-threatening problems as you find them. The basic principles of treatment are the same for all age groups.

6. The specific treatment of an anaphylactic reaction depends on:

- a. Location.
- b. Training and skills of rescuers.
- c. Number of responders.
- d. Equipment and drugs available.

a) Location

Treating a patient with anaphylaxis in the community will not be the same as in an acute hospital or a psychiatric hospital. Out of hospital (community settings) and for psychiatric hospitals, an ambulance must be called early and the patient transported to an emergency department. Within some psychiatric hospitals adjunctive drugs/ equipment are available e.g. Chlorphenamine, oxygen etc. For community facilities the minimum expected is Adrenaline administration IM and basic life support (CPR) if required.

b) Training of rescuers

All clinical staff should be able to call for help and initiate treatment in a patient with an anaphylactic reaction. Rescuers must use the skills for which they are trained. Clinical staff who give parenteral medications should have initial training inclusive of ILS (Immediate Life Support) and regular updates in dealing with anaphylactic reactions/ life threatening illness. The Health Protection Agency recommends that staff who give immunisations should have annual updates¹⁵.

c) Number of responders

The single responder must always ensure that help is coming. If there are several rescuers, several actions can be undertaken simultaneously.

d) Equipment and drugs available

Resuscitation equipment and drugs to help with the rapid resuscitation of a patient with an anaphylactic reaction must be immediately available in all clinical settings. Clinical staff should be familiar with the equipment and drugs they have available and must check them regularly. Within community the minimum expected is IM Adrenaline and a pocket mask for mouth to mask breathing if required.

All patients who have had an anaphylactic reaction should be continuously monitored (e.g., by Ward staff, ambulance crew, in the emergency department etc.). Minimal monitoring within inpatient settings includes pulse oximetry, non-invasive blood pressure and 3-lead ECG. Monitoring must be supervised by an individual who is skilled at interpreting and responding to any changes.

6.1 Patients having an anaphylactic reaction in any setting

Patients should expect the following as a minimum:

- Recognition that they are seriously unwell.
 - An early call for help.
 - Initial assessment and treatments based on an ABCDE approach.
 - Adrenaline therapy if indicated.
 - Investigation and follow-up by an allergy specialist.

6.2 Patient positioning

All patients should be placed in a comfortable position. The following factors should be considered:

- Patients with Airway and Breathing problems may prefer to sit up as this will make breathing easier.
- Lying flat with or without leg elevation is helpful for patients with a low blood pressure (Circulation problem). If the patient feels faint, do not sit or stand them up - this can cause cardiac arrest.
- Patients who are breathing and unconscious should be placed on their side (recovery position).
- Pregnant patients should lie on their left side to prevent caval compression.

6.3 Remove the trigger if possible

Removing the trigger for an anaphylactic reaction is not always possible.

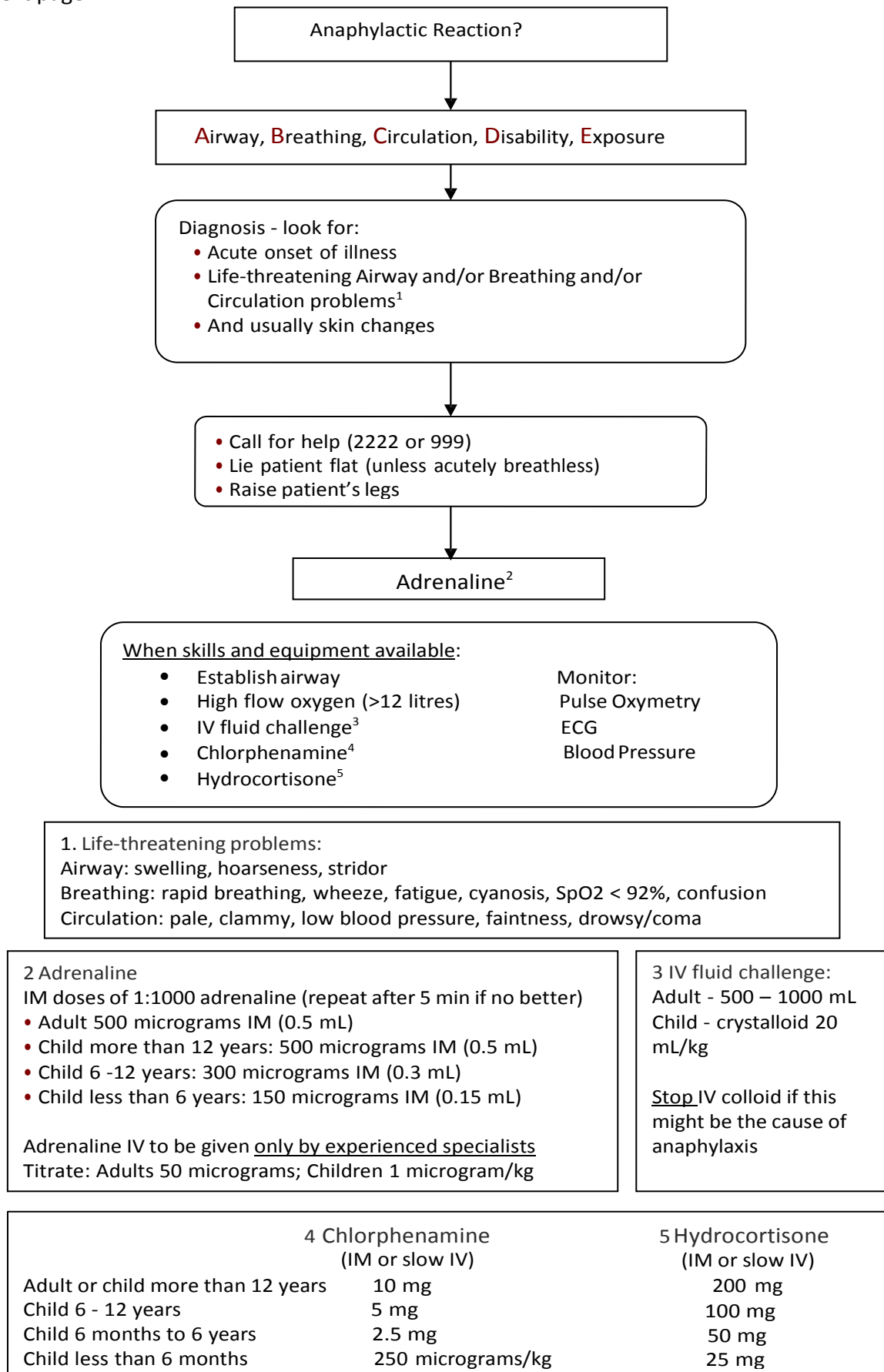
- Stop any drug suspected of causing an anaphylactic reaction (e.g., stop intravenous infusion of a gelatin solution or antibiotic).
- Remove the stinger after a bee sting. Early removal is more important than the method of removal.
- After food-induced anaphylaxis, attempts to make the patient vomit are not recommended.
- Do not delay definitive treatment if removing the trigger is not feasible.

6.4 Cardio-respiratory arrest following an anaphylactic reaction

Start cardiopulmonary resuscitation (CPR) immediately and follow current guidelines. Rescuers should ensure that help is on its way as early advanced life support (ALS) is essential. Use doses of adrenaline recommended in the ALS guidelines. The intramuscular route for adrenaline is not recommended after cardiac arrest has occurred.

6.5 Anaphylaxis algorithm

The key steps for the treatment of an anaphylactic reaction are shown in the algorithm on the next page.



7. Adrenaline (Epinephrine)

Adrenaline is the most important drug for the treatment of an anaphylactic reaction¹⁶. Adverse effects are extremely rare with correct doses injected intramuscularly (IM).

Difficulties can arise if the clinical picture is evolving when the patient is first assessed. Adrenaline should be given to all patients with life-threatening features of Anaphylaxis. If these features are absent but there are other features of a systemic allergic reaction, the patient needs careful observation and symptomatic treatment using the ABCDE approach. Adrenaline must be readily available in clinical areas where an anaphylactic reaction could occur.

7.1 Intramuscular (IM) Adrenaline

The intramuscular (IM) route is the best for most individuals who have to give adrenaline to treat an anaphylactic reaction. Monitor the patient as soon as possible (pulse, blood pressure, ECG, pulse oximetry). This will help monitor the response to adrenaline. The IM route has several benefits:

- There is a greater margin of safety.
- It does not require intravenous access.
- The IM route is easier to learn.

7.2 Choice of needle and technique for intramuscular (IM) injection

The best site for IM injection is the anterolateral aspect of the middle third of the thigh¹⁷. The needle used for injection needs to be sufficiently long to ensure that the adrenaline is injected into muscle.

The following guidance is based on the recommendations for intramuscular injections for vaccination (Immunisation against infectious disease. Department of Health UK, 2006). For IM injections, the needle needs to be long enough to ensure that the drug is injected into the muscle. A 25mm needle is best and is suitable for all ages. In some adults, a longer length (38 mm) may be needed.

Standard UK needle gauges and lengths		
Brown	26G	10 mm
Orange	25G	16 mm or 25 mm
Blue	23G	25 mm
Green	21G	38 mm

Give IM injections with the needle at a 90° angle to the skin. The skin should be stretched, not bunched.

7.3 Adrenaline IM dose

For adults the dose of IM Adrenaline delivered should be:

0.5 mg IM (= 500 micrograms = 0.5 mL of 1:1000) adrenaline

For children the dose of IM Adrenaline should be:

The scientific basis for the recommended doses is weak. The recommended doses are based on what is considered to be safe and practical to draw up and inject in an emergency. (The equivalent volume of 1:1000 adrenaline is shown in brackets)

- > 12 years: 500 micrograms IM (0.5 mL) i.e. same as adult dose 300 micrograms (0.3 mL) if child is small or prepubertal
- > 6 – 12 years: 300 micrograms IM (0.3 mL)
- > 6 months – 6 years: 150 micrograms IM (0.15 mL)
- < 6 months: 150 micrograms IM (0.15 mL)

Repeat the IM adrenaline dose at 5 minute intervals, if there is no improvement in the patient's

condition.

NB: Intravenous Adrenaline would only be used by experienced health care professionals in resuscitation practices during a cardiorespiratory arrest.

7.4 Adrenaline in special populations

Previous Resuscitation Council (UK) guidelines recommended adrenaline dose adjustments in certain circumstances (e.g., in patients taking tricyclic antidepressants, the previous recommendation was to give half the dose). This is now considered unhelpful for such caveats in the setting of an acute anaphylactic reaction. There is large inter-individual variability in the response to adrenaline. In clinical practice, it is important to monitor the response; start with a safe dose and give further doses if a greater response is needed, i.e. titrate the dose according to effect.

Adrenaline can fail to reverse the clinical manifestation of an anaphylactic reaction, especially when its use is delayed or in patients treated with beta-blockers. The decision to prescribe a beta-blocker to a patient at increased risk of an anaphylactic reaction should be made only after assessment by an allergist and cardiologist.

7.5 Adrenaline auto-injectors

Auto-injectors are often given to patients at risk of anaphylaxis for their own use. Currently, there are only two doses of adrenaline auto-injector commonly available: 0.15 and 0.3 mg. The more appropriate dose for an auto-injector should be prescribed for individual patients by allergy specialists. Healthcare professionals should be familiar with the use of the most commonly available auto-injector devices. The dose recommendations for adrenaline in this guideline are intended for healthcare providers treating an anaphylactic reaction, using a needle and syringe to 'draw up' the dose from an ampoule.

If an adrenaline auto-injector is the only available adrenaline preparation when treating anaphylaxis, healthcare providers should use it.

7.6 Oxygen (give as soon as available)

Initially, give the highest concentration of oxygen possible using a mask with an oxygen reservoir. Ensure high flow oxygen (greater than 10 litres min⁻¹) to prevent collapse of the reservoir during inspiration. If the patient's trachea is intubated, ventilate the lungs with high concentration oxygen using a self-inflating bag.

7.7 IV Fluids (give as soon as available)

The delivery of intravenous fluids would be considered on some mental health inpatient settings where equipment and skills are available. Large volumes of fluid may leak from the patient's circulation during an anaphylactic reaction. There will also be vasodilation, a low blood pressure and signs of shock.

If there is intravenous access, infuse intravenous fluids immediately. Give a rapid IV fluid challenge (500- 1000 mL in an adult) and monitor the response; give further doses as necessary. Consider colloid infusion as a potential cause in a patient receiving a colloid at the time of onset of an anaphylactic reaction and stop the infusion. 0.9% saline is a suitable fluid for initial resuscitation. Do not delay the administration of IM adrenaline whilst attempting intravenous access.

7.8 Antihistamines (after initial resuscitation)

Antihistamines are a second line treatment for an anaphylactic reaction. The evidence to support their use is weak, but there are logical reasons for them. Antihistamines (H1-antihistamine) may help counter histamine-mediated vaso-dilation and bronchoconstriction. They may not help in reactions depending in part on other mediators but they have the virtue of safety. Used alone, they are unlikely to be lifesaving in a true anaphylactic reaction. Inject Chlorphenamine slowly intravenously or intramuscularly.

The dose of Chlorphenamine depends on age:

- >12 years and adults: 10 mg IM or IV slowly
- >6 – 12 years: 5 mg IM or IV slowly
- >6 months – 6 years: 2.5 mg IM or IV slowly
- <6 months: 250 micrograms/kg IM or IV slowly

7.9 Steroids (give after initial resuscitation)

Corticosteroids may help prevent or shorten protracted reactions. In asthma, early corticosteroid treatment is beneficial in adults and children. There is little evidence on which to base the optimum dose of hydrocortisone in anaphylaxis. In hospital patients with asthma, higher doses of hydrocortisone do not seem to be better than smaller doses.

Inject hydrocortisone slowly intravenously or intramuscularly, taking care to avoid inducing further hypotension.

The dose of hydrocortisone for adults and children depends on age:

- >12 years and adults: 200 mg IM or IV slowly
- >6 – 12 years: 100 mg IM or IV slowly
- >6 months – 6 years: 50 mg IM or IV slowly
- <6 months: 25 mg IM or IV slowly

8. Transfer of Care, Follow up and Confirming Diagnosis

It is vital that mental health patients are followed up within acute care settings even if a positive response has been achieved with treatment within a mental health location. This will confirm the diagnosis, inform future risk status and facilitate follow up by an allergy specialist.

Before discharge from hospital (acute) all patients must be:

- Reviewed by a senior clinician (physician).
- Given clear instructions to return to hospital if symptoms return.
- Considered for anti-histamines and oral steroid therapy for up to 3 days. This is helpful for treatment of urticaria and may decrease the chance of further reaction.
- Considered for an adrenaline auto-injector (see below), or given a replacement.
- Have a plan for follow-up, including contact with the patient's RMO and general practitioner.

8.1 Record keeping

To help confirm the diagnosis of anaphylaxis and identify the most likely trigger, it is useful for the medical emergency team, ambulance service and allergy clinic to have:

- A description of the reaction with circumstances and timings to help identify potential triggers.
- A list of administered treatments.
- Copies of relevant patient records, e.g., ambulance charts, emergency department records, observation charts, anaesthetic charts.

- Results of any investigations already completed.

8.2 Reporting of reaction

Adverse drug reactions that include an anaphylactic reaction should be reported to the Medicines and Healthcare products Regulatory Agency (MHRA) using the yellow card scheme (www.mhra.gov.uk). The British National Formulary (BNF) includes copies of the Yellow Card at the back of each edition. This mandatory reporting is in addition to the normal organisational requirements such as Datex, incident reporting and briefing note systems.

8.3 Specialist referral

All patients presenting with anaphylaxis should be referred to an allergy clinic to identify the cause, and thereby reduce the risk of future reactions and prepare the patient to manage future episodes themselves. There is a list of specialist clinics on the British Society for Allergy and Clinical Immunology (BSACI) website.

8.4 Patient education

Refer patients at risk of an anaphylactic reaction to an appropriate allergy clinic. Patients need to know the allergen responsible and how to avoid it. If the allergen is a food, they need to know what products are likely to contain it, and all the names that can be used to describe it. They also need information to know how to avoid situations that could expose them to the allergen.

Patients need to be able to recognise the early symptoms of anaphylaxis, so that they can summon help quickly and prepare to use their emergency medication. Patients at risk are should carry their adrenaline auto-injector with them at all times. Patients and those close to them (i.e., close family, friends, and carers) should receive information/ training in using the auto-injector and should practise regularly using a suitable training device, so that they will know what to do in an emergency.

Patients must always seek urgent medical assistance when experiencing anaphylaxis and after using an adrenaline auto-injector. Information about managing severe allergies can be obtained from their allergy specialist, general practitioner, other healthcare professional or the Anaphylaxis Campaign. Although there are no randomised clinical trials, there is evidence that individualised action plans for self- management should decrease the risk of recurrence.

Specific guidance and training is available for schools with children at risk of allergic reactions (www.allergyinschools.org.uk).

All those at high risk of an anaphylactic reaction should consider wearing some device, such as a bracelet (e.g., Medic Alert), that provides information about their history of anaphylactic reaction.

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The ABCDE Approach to Assessing the Acutely (physically) Ill Patient

Modified from Immediate Life Support manual 2015 (Resuscitation Council (UK)).

Underlying principles

The approach to all critically ill patients, including those who are having an anaphylactic reaction, is the same. The underlying principles are:

1. Use an Airway, Breathing, Circulation, Disability, and Exposure (the ABCDE) approach to continuously assess and treat the patient.
2. Do a complete initial assessment and re-assess regularly.
3. Treat life-threatening problems before moving to the next part of assessment.
4. Assess the effects of treatment.
5. Call for help early (e.g., calling for an ambulance or resuscitation team).
6. Use all members of the team or helpers. This will enable interventions, e.g., calling for help, assessment, attaching monitoring equipment, and intravenous access, to be undertaken simultaneously.
7. Communicate effectively.
8. The aim of the initial treatments is to keep the patient alive, and achieve some clinical improvement. This will buy time for further treatment and expert help.
9. Remember - it can take a few minutes for treatments to work.
10. The ABCDE approach can be used irrespective of your training and experience in clinical assessment or treatment. The detail of your assessment and what treatments you give will depend on your clinical knowledge and skills. If you recognise a problem or are unsure, call for help.

First steps:

1. Ensure personal safety.
2. First look at the patient in general to see if the patient 'looks unwell'.
3. If the patient is awake ask, "How are you?" If the patient appears unconscious, shake him and ask, "Are you all right?" If he responds normally, he has a patent airway, is breathing and has brain perfusion. If he speaks only in short sentences, he may have breathing problems. Failure of the patient to respond is a marker of critical illness.
4. Monitor the vital signs early. If available, attach a pulse oximeter, ECG monitor, and non-invasive blood pressure monitor to all critically ill patients, as soon as possible.
5. If trained to do so, insert an intravenous cannula as soon as possible. Take bloods for investigation.

Airway (A)

Airway obstruction is an emergency. Get expert help immediately.

1. Look for the signs of airway obstruction:
 - Complete or severe airway obstruction causes paradoxical chest and abdominal movements ('see-saw' respirations) and the use of the accessory muscles of respiration. Central cyanosis is a late sign of airway obstruction. In complete airway obstruction, there are no breath sounds at the mouth or nose. In partial obstruction, air entry is diminished and often noisy.
2. Treat airway obstruction as an emergency:

In most cases where airway obstruction is caused by lack of pharyngeal tone or the

tongue falling to the back of the throat, e.g., loss of consciousness because of hypotension, only simple methods of airway clearance are needed (e.g., airway opening manoeuvres, suction, insertion of an oropharyngeal or nasopharyngeal airway).

- Anaphylaxis can cause airway swelling (pharyngeal or laryngeal oedema). Overcoming this obstruction may be very difficult and early tracheal intubation is often required. This requires expert help and urgent transfer to the nearest A&E is priority.

3. Give oxygen at high concentration:

- Give high concentration oxygen using a mask with an oxygen reservoir. Ensure high flow oxygen (usually greater than 10 litres min⁻¹) to prevent collapse of the reservoir during inspiration.
- In the absence of arterial blood gas values, use pulse oximetry to guide oxygen therapy. Aim for an oxygen saturation of 94-98%. In the sickest patients this is not always possible, so you may have to accept lower values, i.e., 90-92% oxygen saturation on a pulse oximeter.

Breathing (B)

1. During the immediate assessment of breathing, it is vital to diagnose and treat immediately life-threatening conditions, e.g., acute severe bronchospasm. Look, listen and feel for the general signs of respiratory distress: sweating, central cyanosis, use of the accessory muscles of respiration and abdominal breathing.
2. Count the respiratory rate. The normal adult rate is 12 - 20 breaths min⁻¹. A high, or increasing, respiratory rate is a marker of illness and a warning that the patient may deteriorate suddenly.

The normal respiratory rate varies by age (approximate):

<1 year	30-40 min ⁻¹
>1 to 2 years	26-34 min ⁻¹
>2 to 5 years	24-30 min ⁻¹
>5 to 12 years	20-24 min ⁻¹
>12 years	12-20 min ⁻¹

Assess the depth of each breath, the pattern (rhythm) of respiration and whether chest expansion is equal and normal on both sides.

3. Record the inspired oxygen concentration (%) given to the patient and the SpO₂ reading of the pulse oximeter. A normal SpO₂ in a patient receiving oxygen does not necessarily indicate adequate ventilation: the pulse oximeter detects oxygenation, not hypercapnia (high CO₂).
4. Listen to the patient's breath sounds a short distance from his face. Rattling airway noises indicate airway secretions, usually because the patient cannot cough or take a deep breath. Stridor or wheeze suggests partial, but important, airway obstruction. Listen to the chest with a stethoscope if you are trained to do so. The specific treatment of breathing disorders depends upon the cause. Bronchospasm causing wheeze is common in anaphylaxis. All critically ill patients should be given oxygen.
5. Initially give the highest possible concentration of inspired oxygen using a mask with an oxygen reservoir. Ensure high flow oxygen (usually greater than 10 litres min⁻¹) to prevent collapse of the reservoir during inspiration. As soon as a pulse oximeter is available, titrate the oxygen to aim/ maintain an oxygen saturation of 94-98%.
6. If the patient's depth or rate of breathing is inadequate or the patient has stopped breathing, use a pocket mask or a two person bag-mask ventilation while calling urgently for expert help. In an anaphylactic reaction, upper airway obstruction or bronchospasm may make bag mask ventilation difficult or impossible.

Circulation (C)

In almost all medical emergencies, including an anaphylactic reaction, consider hypovolaemia as the likeliest cause of shock until proved otherwise. In anaphylaxis the shock is usually caused by vasodilation and fluid leaking from capillary blood vessels. Unless there are obvious signs of a cardiac cause (e.g., chest pain, heart failure), give intravenous fluid to any patient with low blood pressure and a high heart rate. Remember that breathing problems, which should have been treated earlier on in the breathing assessment, can also compromise a patient's circulatory state.

1. Look at the colour of the hands and digits: are they blue, pink, pale or mottled?
2. Assess the limb temperature by feeling the patient's hands: are they cool or warm?
3. Measure the capillary refill time. Apply cutaneous pressure for five seconds on a fingertip held at heart level with enough pressure to cause blanching. Time how long it takes for the skin to return to the colour of the surrounding skin after releasing the pressure. The normal refill time is less than two seconds. A prolonged time suggests poor peripheral perfusion. Other factors (e.g., cold surroundings, poor lighting, and old age) can prolong the time.
4. Assess the state of the veins: they may be under-filled or collapsed when hypovolaemia is present.
5. Count the patient's pulse rate.
Normal heart rate by age (approximate)

Newborn to 3 months	140 min ⁻¹
>3 months to 2 years	130 min ⁻¹
>2 to 10 years	80 min ⁻¹
>10 years	75 min ⁻¹
Adults	60-100 min ⁻¹
6. Palpate peripheral and central pulses, assessing for presence, rate, quality, regularity and equality. Barely palpable central pulses suggest a poor cardiac output.
7. Measure the patient's blood pressure. Even in shock, the blood pressure may be normal, because compensatory mechanisms increase peripheral resistance in response to reduced cardiac output. In anaphylaxis, vasodilation is common and the blood pressure may fall precipitously very early on. A low diastolic blood pressure suggests arterial vasodilation (as in anaphylaxis or sepsis). A narrowed pulse pressure (difference between systolic and diastolic pressures) suggests arterial vasoconstriction (cardiogenic shock or hypovolaemia).
8. Listen to the heart with a stethoscope, if you are trained to do so.
9. Look for other signs of a poor cardiac output, such as reduced conscious level.
10. The treatment of cardiovascular collapse depends on the cause, but should be directed at fluid replacement and restoration of tissue perfusion. Seek out signs of conditions that are immediately life-threatening, e.g., massive or continuing bleeding, or anaphylactic reaction, and treat them urgently.
11. A simple measure to improve the patient's circulation is to lie the person flat and raise the legs. This must be done with care as it may worsen any breathing problems.
12. In pregnant patients use a left lateral tilt of at least 15 degrees to avoid caval compression; after 20 weeks' gestation the pregnant woman's uterus can press down on the inferior vena cava and impede venous return to the heart.
13. Insert one or more large-bore intravenous cannulae if trained to do so. Use short,

wide - bore cannulae, because they enable the highest flow.

14. Give a rapid fluid challenge: Adults - 500 mL of warmed crystalloid solution (e.g., 0.9% saline) in 5- 10 minutes if the patient is normotensive or one litre if the patient is hypotensive. Use smaller volumes (e.g., 250 mL) for adult patients with known cardiac failure and use closer monitoring (listen to the chest for crepitations after each bolus).
15. Reassess the pulse rate and BP regularly (every 5 min), aiming for the patient's normal BP. If this is unknown, in adults aim for a systolic BP greater than 100 mmHg.

0 to1 month	50-60 mmHg
>1 to12 months	70 mmHg
>1 to 10 years	70 + (age in years x 2) mmHg
>10 years	90 mmHg

16. If the patient does not improve, repeat the fluid challenge.
17. If there are symptoms and signs of cardiac failure (shortness of breath, increased heart rate, raised JVP, a third heart sound, and inspiratory crackles in the lungs on auscultation), decrease or stop the fluid infusion.

Disability (D)

Common causes of unconsciousness include profound hypoxia, hypercapnia, cerebral hypoperfusion due to hypotension, or the recent administration of sedative or analgesic drugs.

1. Review and treat the ABCs: exclude hypoxia and hypotension.
2. Examine the pupils (size, equality, and reaction to light).
3. Assess the patient's conscious level rapidly using the AVPU method: Alert, responds to Vocal stimuli, responds to Painful stimuli, or Unresponsive to all stimuli. Alternatively use the Glasgow Coma Scale.
4. Measure the blood glucose, using a glucose meter or stick method, to exclude hypoglycaemia. If below 3 mmol l-1, give 50 mL of 10% glucose solution intravenously.
5. Nurse unconscious patients in the lateral position if their airway is not protected.

Exposure (E)

To examine the patient properly, full exposure of the body is necessary. Skin and mucosal changes after anaphylaxis can be subtle. Minimise heat loss. Respect the patient's dignity.

Additional information

1. Take a full clinical history from the patient, relatives or friends, and other staff.
2. Review the patient's notes and charts
 - a. Study both absolute and trended values of vital signs.
 - b. Check that important routine medications are prescribed and being given.
3. Review the results of recent laboratory or radiological investigations.
4. Consider what level of care is required by the patient, e.g., transport to nearest A&E facility.
5. Make complete entries in the patient's notes of your findings, assessment and treatment. Record the patient's response to therapy.
6. Consider definitive treatment of the patient's underlying condition.