# ANAPHYLAXIS

## Advanced Life Support

ERC GUIDELINES 2015 EDITION

# ANAPHYLAXIS

## 8.1. Definition

**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.

There are a number of national guidelines available all over Europe. The European Academy of Allergy and Clinical Immunology's (EAACI) Taskforce on Anaphylaxis defined clinical criteria for diagnosing anaphylaxis in 2014 (For more details see *http://www.eaaci.org/resources/scientific-output/guidelines*).

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## 8.2. Aetiology

Anaphylaxis usually involves the release of inflammatory mediators from mast cells or basophils triggered by an allergen interacting with cell-bound immunoglobulin E (IgE). Non-IgE-mediated or non-immune release of mediators can also occur. Histamine and other inflammatory mediator release are responsible for the vasodilatation, oedema and increased capillary permeability.

Anaphylaxis can be triggered by any of a very broad range of triggers with food, drugs, stinging insects, and latex the most commonly identified triggers. Food is the commonest trigger in children and drugs the commonest in adults. Virtually any food or drug can be implicated, but certain foods (nuts) and drugs (muscle relaxants, antibiotics, nonsteroidal anti-inflammatory drugs and aspirin) cause most reactions. A significant number of cases of anaphylaxis are idiopathic.

The risk of death is increased in those with pre-existing asthma, particularly if the asthma is poorly controlled or in those asthmatics who fail to use, or delay treatment with, adrenaline.

When anaphylaxis is fatal, death usually occurs very soon after contact with the trigger. Fatal food reactions cause respiratory arrest typically after 30-35 min; insect stings cause collapse from shock after 10-15 min; and deaths caused by intravenous medication occurred most commonly within 5 min. Death rarely occurred more than six hours after contact with the trigger.

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**Anaphylaxis is likely when all of the following three criteria are met:**

- sudden onset and rapid progression of symptoms
- life-threatening **A**irway and/or **B**reathing and/or **C**irculation 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 anaphylaxis.
- 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).

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## 8.3.2. Life-threatening Airway, Breathing and Circulation problems:

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 noise caused by upper airway obstruction.

**Breathing problems:**

- shortness of breath - increased respiratory rate
- wheeze
- patient becoming tired
- confusion caused by hypoxia
- cyanosis - this is usually a late sign
- respiratory arrest.

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**Circulation problems:**

- signs of shock - pale, clammy
- tachycardia
- hypotension - feeling faint, 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.

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

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## 8.3.3. 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.

Although skin changes can be worrying or distressing for patients and those treating them, skin changes without life-threatening airway, breathing or circulation problems do not signify anaphylaxis.

**Figure 12.5**
Anaphylaxis algorithm

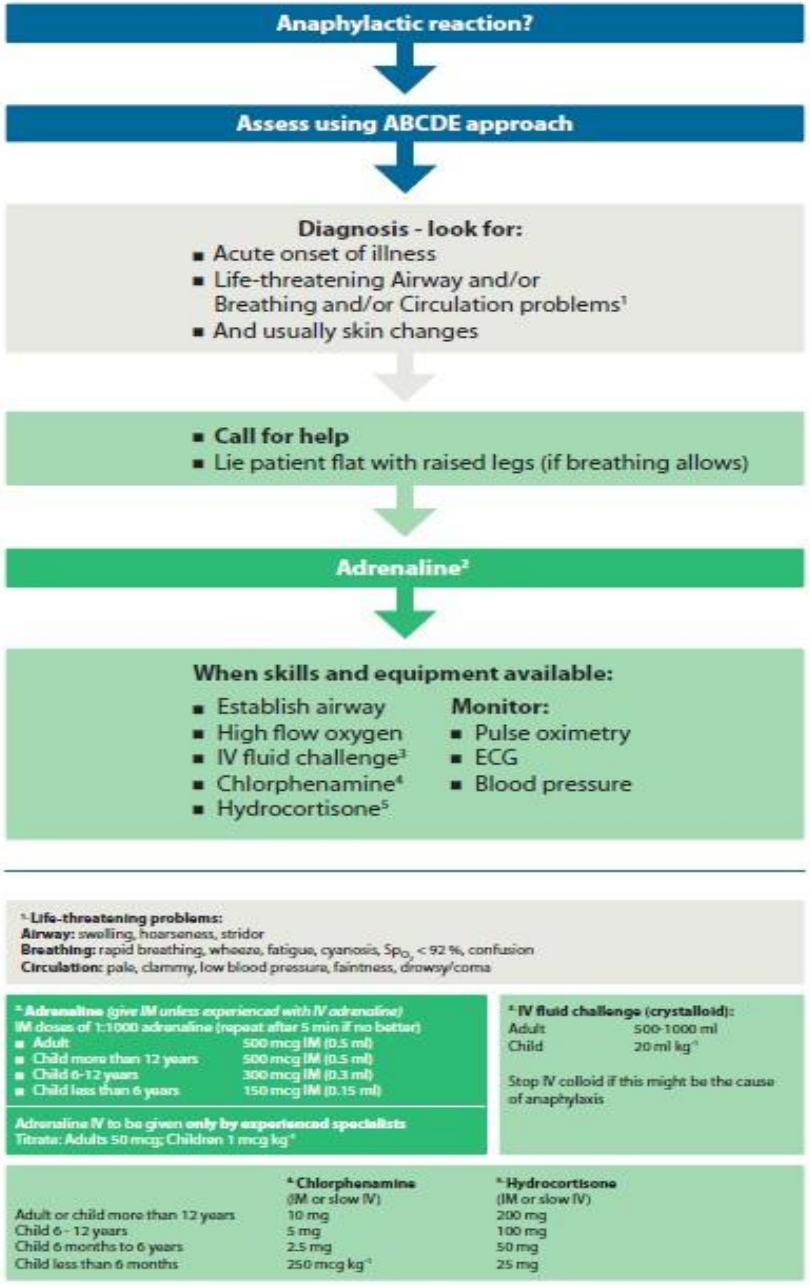

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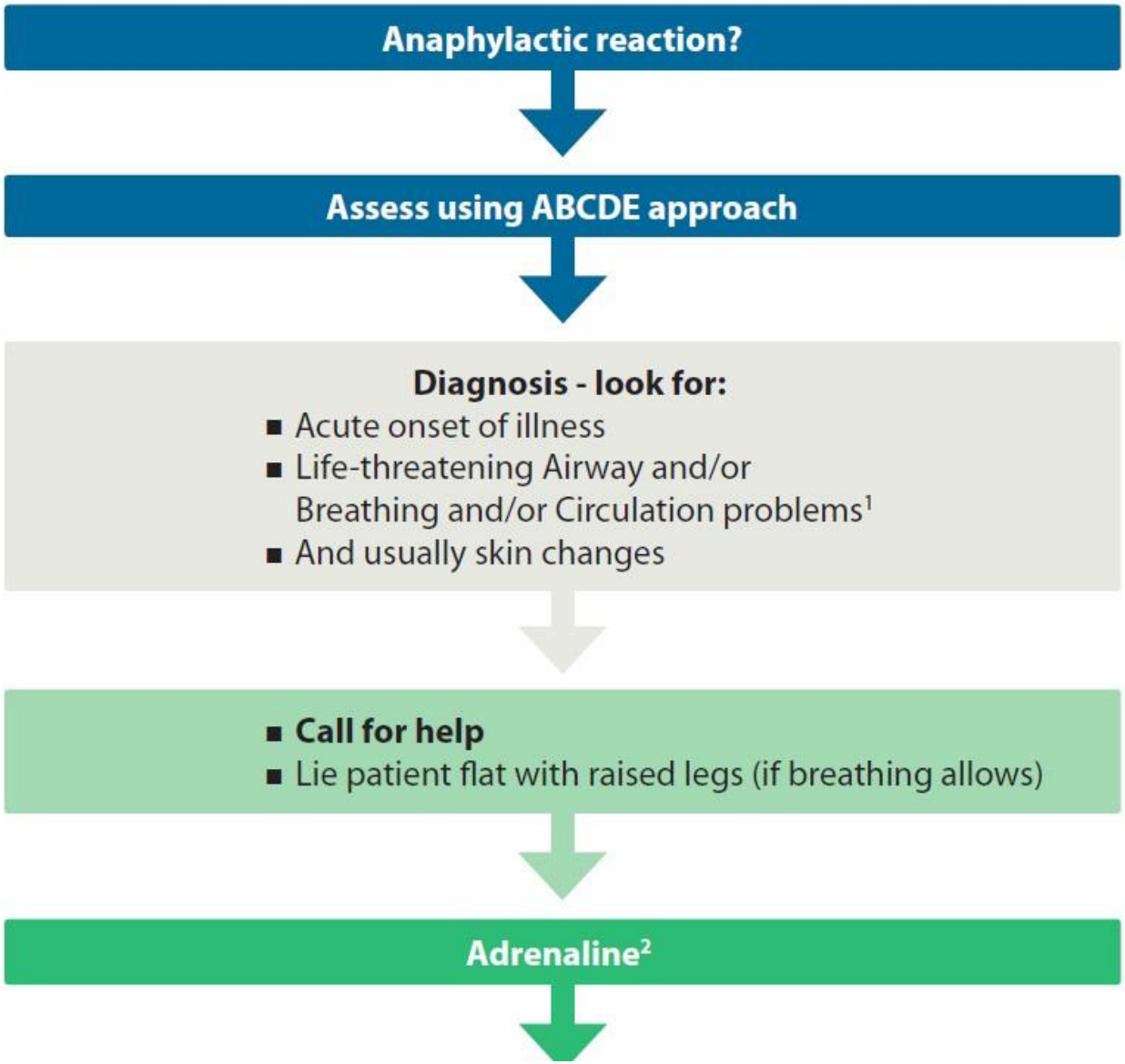
**Figure 12.5**
Anaphylaxis algorithm



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**Adrenaline[2]**

**When skills and equipment available:**

- Establish airway
- High flow oxygen
- IV fluid challenge[3]
- Chlorphenamine[4]
- Hydrocortisone[5]

**Monitor:**

- Pulse oximetry
- ECG
- Blood pressure

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[1] **Life-threatening problems:**
**Airway:** swelling, hoarseness, stridor
**Breathing:** rapid breathing, wheeze, fatigue, cyanosis, $Sp_{O_2}$ < 92 %, confusion
**Circulation:** pale, clammy, low blood pressure, faintness, drowsy/coma

[2] **Adrenaline** *(give IM unless experienced with IV adrenaline)*
IM doses of 1:1000 adrenaline (repeat after 5 min if no better)

| | |
|---|---|
| Adult | 500 mcg IM (0.5 ml) |
| Child more than 12 years | 500 mcg IM (0.5 ml) |
| Child 6-12 years | 300 mcg IM (0.3 ml) |
| Child less than 6 years | 150 mcg IM (0.15 ml) |

Adrenaline IV to be given **only by experienced specialists**
Titrate: Adults 50 mcg; Children 1 mcg $kg^{-1}$

[3] **IV fluid challenge (crystalloid):**

| | |
|---|---|
| Adult | 500-1000 ml |
| Child | 20 ml $kg^{-1}$ |

Stop IV colloid if this might be the cause of anaphylaxis

| | [4] **Chlorphenamine** (IM or slow IV) | [5] **Hydrocortisone** (IM or slow IV) |
|---|---|---|
| Adult or child more than 12 years | 10 mg | 200 mg |
| Child 6 - 12 years | 5 mg | 100 mg |
| Child 6 months to 6 years | 2.5 mg | 50 mg |
| Child less than 6 months | 250 mcg $kg^{-1}$ | 25 mg |

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## 8.6. Investigations

The specific test to help confirm a diagnosis of an anaphylactic reaction is measurement of mast cell tryptase. In anaphylaxis, mast cell degranulation leads to markedly increased blood tryptase concentrations.

### 8.6.1. Mast cell tryptase sample timing

The time of onset of the anaphylactic reaction is the time when symptoms were first noticed.

a) Minimum: one sample at 1-2 h after the start of symptoms.

b) Ideally: Three timed samples:

1) Initial sample as soon as feasible after resuscitation has started - do not delay resuscitation to take sample.

2) Second sample at 1-2 h after the start of symptoms.

3) Third sample either at 24 h or in convalescence. This provides baseline tryptase levels - some individuals have an elevated baseline level.

c) Use a serum or clotted blood ('liver function test' bottle) sample.

d) Record the timing of each sample accurately on the sample bottle and request form.

e) Consult your local laboratory if you have any queries.

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## 8.6.2. Discharge and follow-up

Patients who have had a suspected anaphylactic reaction should be treated and then observed for at least 6 h in a clinical area with facilities for treating life-threatening ABC problems. Patients with a good response to initial treatment should be warned of the possibility of an early recurrence of symptoms and in some circumstances should be kept under observation for up to 24 h (e.g. individuals with severe asthma or with a severe asthmatic component, patients presenting in the evening or at night, patients in areas where access to emergency care is difficult, previous history of biphasic reactions, possibility of continuing absorption of allergen).

The exact incidence of biphasic reactions is unknown. There is no reliable way of predicting who will have a biphasic reaction. It is therefore important that decisions about discharge are made for each patient by an experienced clinician.

Before discharge from hospital all patients with anaphylaxia must be:

- Given clear instructions to return to hospital if symptoms return.
- Considered for an adrenaline auto-injector, or given a replacement and ensured that appropriate training has been given.
- Have a plan for follow-up, including contact with the patient's general practitioner.
- Referred to an allergy specialist to identify the cause, and thereby reduce the risk of future reactions and prepare the patient to manage future episodes themselves.