Guideline for the management of **Suspected Anaphylaxis in Children (under 16 years)**

Trust ref: B18/2019

Contents

1. Introduction and who the guideline applies to

This document sets out the guidelines for the management of anaphylaxis in children based on the NICE guidelines, Resuscitation guidelines and European Association of Allergy & Clinical Immunology (EAACI) guidelines.
Usually anaphylaxis will be diagnosed and managed within the Emergency Department at LRI or Childrens Short Stay Unit (CSSU). However, occasionally patients develop anaphylaxis as an inpatient and this could occur in any ward area

within UHL. This guideline applies to all Children within LRI with suspected anaphylaxis and to all Healthcare Professionals who are responsible for the clinical management and / or care of these patients.

1.1 Key Points

1. If in doubt, treat for anaphylaxis. An IM dose of adrenaline is safer than untreated anaphylaxis.
2. The first line treatment for anaphylaxis is **IM adrenaline** NOT salbutamol and antihistamines.
3. Anaphylaxis is potentially life-threatening, maintain an ABC approach, call for senior help early and reassess regularly.

Anaphylaxis can be difficult to diagnose but there is good evidence that the early recognition and treatment of anaphylaxis has a better outcome. It is expected that all registered staff working in the Children's Emergency Department (ED), CSSU and Children's wards have a responsibility to understand the management of anaphylaxis and up-date their knowledge. They will be supported by the children's allergy team.
All clinical staff working in any location within UHL would be expected to seek senior advice if they were presented with a patient with anaphylaxis and they did not feel adequately trained to manage the clinical case.

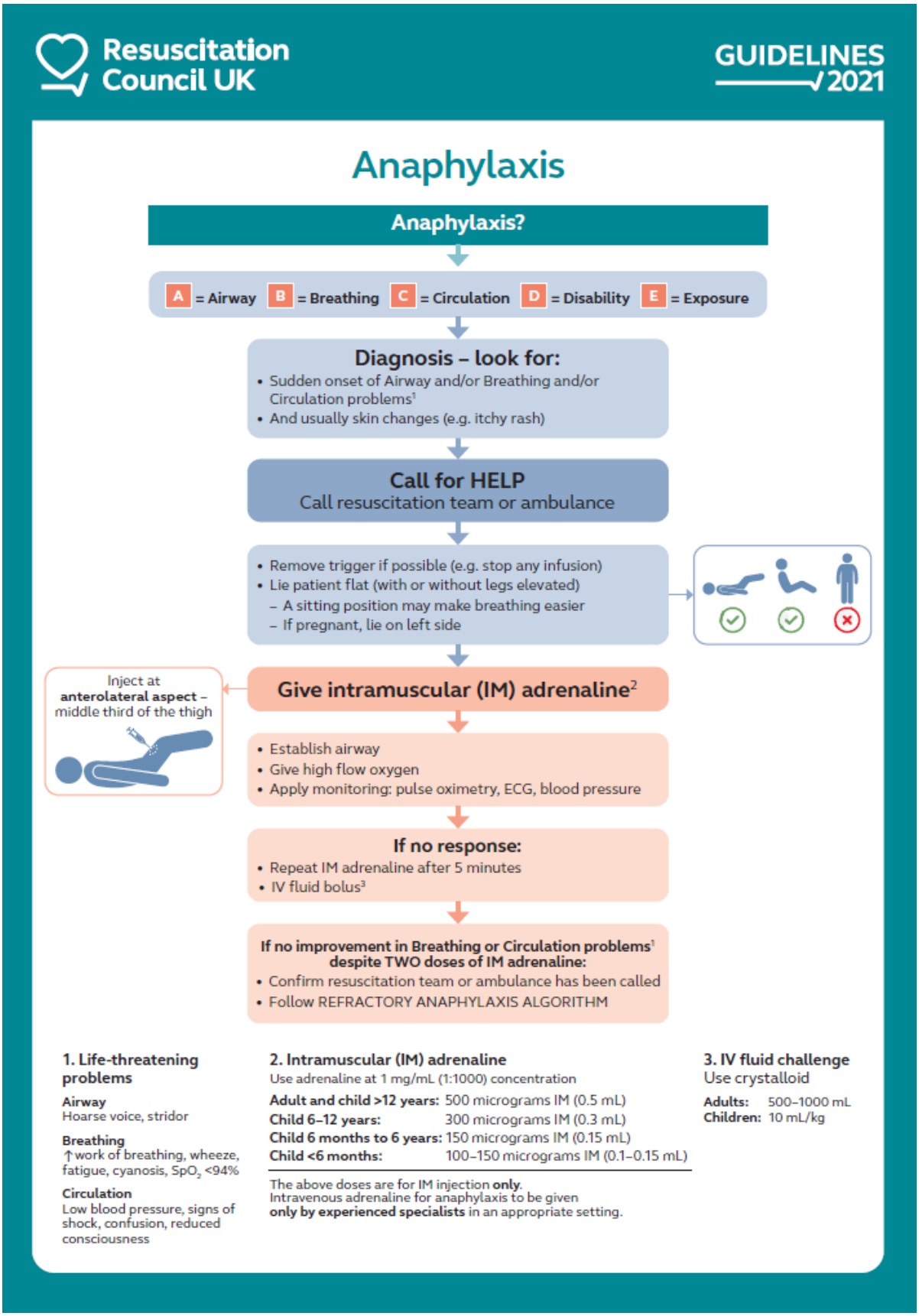
1.2 Related documents:

Basic Life Support or Choking UHL Childrens Hospital Guideline ref: C2/2016
Food and Drug Challenge UHL Childrens Nursing Guideline ref: C10/2010
Latex Allergy in Patients and Staff UHL Policy ref: B29/2005

2. Anaphylaxis - Definition

Anaphylaxis is a severe, life-threatening, systemic hypersensitivity reaction. It is characterised by rapidly developing, life-threatening problems involving the airway (pharyngeal or laryngeal oedema) and/or breathing (bronchospasm and/or tachypnoea) and/or circulation (hypotension and/or tachycardia). In most cases, there are associated skin and mucosal changes.

Initial treatment of Anaphylaxis Algorithm 1



Refractory Anaphylaxis Algorithm 2

2.1 Establishing a Diagnosis

Anaphylaxis is characterised by:

- Sudden onset and rapid progression of symptoms.
- **A**irway and/or **B**reathing and/or **C**irculation problems.
- Usually, skin and/or mucosal changes (flushing, urticaria, angioedema)

The diagnosis is supported if a patient has been exposed to an allergen known to affect them. However, in up to 30% of cases there may be no obvious trigger.

Remember:

- Skin or mucosal changes ***alone*** are not a sign of anaphylaxis.
- **Skin and mucosal changes can be subtle or absent in 10-20% of reactions** (e.g. some patients present initially with only bronchospasm or hypotension)

Gastrointestinal symptoms (e.g. nausea, abdominal pain, vomiting) in the absence of **A**irway and/or **B**reathing and/or **C**irculation problems do not usually indicate anaphylaxis. Abdominal pain and vomiting can be symptoms of anaphylaxis due to an insect sting or bite.

Remember anaphylaxis lies along a spectrum of severity in terms of allergic symptoms.

If in doubt treat anaphylaxis with IM adrenaline and seek help.

2.2 Differential Diagnosis

Following an ABCDE approach will help with treating the differential diagnoses.

In all of the circumstances below, IM adrenaline is unlikely to cause harm and might be clinically useful

Life-threatening conditions:

- Sometimes anaphylaxis can present with symptoms and signs that are very similar to life-threatening asthma-this is most common in children
- Hypotension is a late sign in children
- Seek expert help early if there are any doubts about the diagnosis and treatment

Other conditions which can mimic anaphylaxis (but do not respond to adrenaline)

- Inducible laryngeal obstruction (ILO, formerly known as vocal cord dysfunction)
- ACE inhibitor induced angioedema

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

- Faint (vasovagal episode)
- Panic attack
- Breath-holding episode in a child
- Spontaneous (non-allergic) urticaria or angioedema

2.3 Treatment of anaphylaxis

Please refer to algorithm 1 above (page 3).

Use an ABCDE approach to recognise and treat anaphylaxis. Treat life-threatening problems as you find them.

- **Patient positioning**

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

- Fatality can occur within minutes if a patient stands, walks or sits up suddenly. Patients must NOT walk or stand during acute reactions. Use caution when transferring children who have been stabilised.
- Patients with Airway and Breathing problems may prefer to be in a semi-recumbent position, as this will make breathing easier.
- Lying flat, with or without leg elevation, is helpful for patients with low blood pressure (Circulation problem)

a. Remove the trigger if possible

- Stop any drug suspected of causing anaphylaxis (e.g. drug infusion, blood products)
- Remove the stinger after a bee sting
- Do not try to make a child vomit
- Do not delay definitive treatment if removing the trigger is not feasible.

b. Adrenaline

Universally recommended as drug of choice in treatment of anaphylaxis

Potent catecholamine with α and β- adrenergic action; also acts as bronchodilator.

Table 1: Adrenaline dosage and administration recommendations:

Use IM adrenaline 1mg/ml [1:1000] adrenaline		
Age	**Dose**	**Volume**
Child>12yrs	**500 micrograms IM**	**(0.5ml of 1mg/ml adrenaline)**
6-12 years (or small child >12 years/pre pubertal	**300 micrograms IM**	**(0.3ml)**
6 months – 6 years	**150 micrograms IM**	**(0.15ml)**
<6 months	**100-150 micrograms**	**(0.1 to 0.15ml)**

Adrenaline is located in the resus trolleys. Allergy 'Grab boxes' are available in the Emergency Department and can be utilised in that department.

- Use a blue 23 gauge needle which is 25mm.
- In large children over 12 years old, a longer needle may be needed (green 21 gauge 38mm).
- In small infants an orange 25 gauge 16mm needle can be used.

Please use adrenaline auto-injector if you feel giving it by syringe and needle will delay adrenaline administration. If subsequent doses needed use syringe and needle.

Repeat the IM adrenaline dose after 5 minutes if there is no improvement in the patient's condition. Some guidelines recommend that further doses are given in the contralateral thigh.

If further doses of adrenaline are needed use an adrenaline ampoule by syringe and needle.

If there is no improvement in breathing or circulation problems despite 2 doses of IM adrenaline using a needle and syringe (or 1 dose of adrenaline via adrenaline auto-injector followed by 2 doses of IM adrenaline using a needle and syringe), follow the algorithm 2 for refractory anaphylaxis.

IM injection into vastus lateralis muscle (mid lateral thigh) is more effective than IM injection into deltoid muscle, or subcutaneous injection. Be careful with auto-injector triggers, they are very sensitive.

Continue to repeat IM adrenaline every 5 minutes while life-threatening respiratory or cardiovascular features persist until an IV infusion can be started as per refractory anaphylaxis (see below)

Table 2: Peripheral IV adrenaline infusion for refractory anaphylaxis

Peripheral IV adrenaline infusion for refractory anaphylaxis

Preparation

- **Continuous monitoring and observation are mandatory:**
  - ECG, pulse oximetry, non-invasive BP at least every 5 minutes
- Mix 1mg (1ml of 1mg/ml [1:1000] adrenaline in 100ml 0.9% sodium chloride and connect using an infusion pump via a dedicated line.
  - **Do not "piggy back" on to another line** unless using an anti-reflux valve.
- Do not infuse on the same side as a BP cuff, as BP measurements will interfere with the infusion and risk extravastion injury.

Initiation and adjustment

- **In children and adults start at 0.5 -1.0ml/kg/h** depending on severity:
  - Moderate severity 0.5 ml/kg/h (~0.1 micrograms/kg/min)
  - Severe (hypotensive or hypoxic) 1ml/kg/h
- **Titrate** up or down according to response, aiming for the lowest effective rate
  - Steady state is reached 5-10 min after a change in infusion rate.
  - Monitor infusion site regularly to ensure patency of cannula
- **Tachycardia, tremor, pallor with a normal or raised BP** may indicate excessive adrenaline treatment: reduce the infusion rate (or stop infusion if severe)
- If refractory to adrenaline infusion, seek urgent further expert help. Patients will require central venous access for prolonged infusion.

WEANING

- **As symptoms improve , reduce the infusion**, aiming for 50% of the starting rate.
- One hour after resolution of all symptoms and signs, reduce the infusion rate progressively over 30 minutes and then stop; monitor closely for recurrance and restart if necessary.

c. Oxygen (give as soon as available)

Initially give the highest concentration of oxygen possible, using a mask with an oxygen reservoir. As soon as is feasible, adjust the inspired oxygen concentration to achieve an oxygen saturation of 94-98% (in patients at risk of hypercapnic respiratory failure, consider a target of 88-92%)

d. Intravenous fluids

In the presence of hypotension/shock, or poor response to an initial dose of adrenaline:

Secure IV access and give a rapid IV fluid bolus (10ml/kg) and monitor the response. Use non-glucose-containing crystalloids such as 0.9% sodium chloride or Hartmann's. Give further fluid as necessary. A large amount of fluid may be required. Use non-glucose-containing crystalloids (e.g. Hartmann's or Plasma-Lyte rather than 0.9% sodium chloride to reduce the risk of hyperchloraemia).
Give fluids via the IO route if IV access is delayed.

e. Antihistamines

Antihistamines are not recommended as part of the initial emergency treatment for anaphylaxis. They have no role in treating respiratory or cardiovascular symptoms of anaphylaxis.

Antihistamines can be used to treat skin symptoms that often occur as part of allergic reactions including anaphylaxis. Their use must not delay treatment of respiratory or cardiovascular symptoms of anaphylaxis.

Non-sedating oral antihistamines (e.g. Cetirizine) should be used in preference to Chlorphenamine which can cause sedation. If oral route is not possible, Chlorphenamine can be given by IM and IV injection. Please note it can cause hypotension when given by rapid IV bolus.

Table 3: Recommended doses for oral cetirizine for an allergic reaction (as recommended by Resuscitation Council UK May 2021)

Age	Dose of oral cetirizine
< 2 years	250 micrograms/kg
2 – 6 years	5 mg
6 – 11 years	10 mg
12+ years	10 – 20 mg
Adults	10 – 20 mg

f. Steroids

The routine use of corticosteroids to treat anaphylaxis is not advised.

Consider giving steroids after initial resuscitation for refractory reactions or ongoing asthma/shock. Steroids must not be given preferentially to adrenaline.

g. Other Drugs

Bronchodilators

Individuals presenting with asthma in the context of possible exposure to a known allergen (so that anaphylaxis is a differential diagnosis) should receive treatment with IM adrenaline. In addition, to IM adrenaline bronchodilators (salbutamol and/or ipratropium) can be used. Bronchodilators should not be used as an alternative to a further parenteral treatment with adrenaline.

Nebulised Adrenaline

Nebulised adrenaline may be effective as an adjunct to treat upper airways obstruction caused by laryngeal oedema, but only after treatment with IM (or IV) adrenaline and NOT as an alternative.

Recommended doses are 5ml of 1mg/ml (1:1000) adrenaline

2.4 Investigations in Children with suspected anaphylaxis

Mast cell tryptase should be measured in all patients with suspected anaphylaxis where the diagnosis is uncertain.

The time of onset of anaphylaxis is the time when symptoms were first noticed. It is important that this time is recorded accurately.

a. Minimum: one sample, ideally within 2hrs and no later than 4 hrs after onset of symptoms
b. Ideally: take 3 samples
    1. An initial sample as soon as feasible
    2. A second sample 1-2hrs (but no later than 4hrs) after onset of symptoms
    3. A third sample at least 24hrs after complete resolution, or in convalescence (for example, at a follow up allergy clinic)

2.5 Assessment after the suspected anaphylactic reaction

Document the acute clinical features of the suspected anaphylactic reaction (rapidly developing, life-threatening problems involving the airway and/or breathing and/or circulation and, in most cases, associated skin and mucosal changes).

Record the time of onset of the reaction.

Record the circumstances immediately before the onset of symptoms to help to identify the possible trigger.

Common causes of anaphylaxis in children (in order of frequency):

1. Food
2. Drugs
3. Wasp and Bee Venom
4. Latex
5. Allergen immunotherapy
6. Exercise: Food-specific exercise, post-prandial (non-food specific)
7. Vaccinations
8. Idiopathic

2.6 Biphasic Reaction

After complete recovery of anaphylaxis, a recurrence of symptoms can occur within 72 hours with no further exposure to the allergen. It is managed in the same way as anaphylaxis. However, most commonly this occurs within 8-10 hours. **Therefore it is important to explain this to the patient and carers, although stress that this is uncommon.**

2.7 Disposition and follow-up

Children who have had emergency treatment for suspected anaphylaxis should be admitted to the Children's Short Stay Unit (CSSU) under the care of emergency department or paediatric medical team. **Please discuss all cases with the allergy consultant on-call.** Occasionally children will need to be admitted to the children's ward under the care of the paediatric medical team.

- Remember to re-supply children who have used their adrenaline auto-injector.

Table 4: Discharge criteria

Consider fast-track discharge (after 2 hours observation from resolution of anaphylaxis) if:	**Minimum 6 hours observation after resolution of symptoms recommended if:**	**Observation for at least 12 hours following resolution of symptoms if any one of the following:**
Good response (within 5-10 minutes) to a single dose of adrenaline given within 30 minutes of onset of reaction **And** Complete resolution of symptoms **And** The patient already has unused adrenaline auto-injectors and has been trained how to use them **And** There is adequate supervision following discharge	2 doses of IM adrenaline needed to treat reaction* **Or** Previous biphasic reaction	• Severe reaction requiring >2 doses of adrenaline. • Patient has severe asthma or reaction involved severe respiratory compromise. • Possibility of continuing absorption of allergen e.g. slow release medications. • Patient presents late at night, or may not be able to respond to deterioration. • Patients in areas where access to emergency care is difficult.
In all cases, discharge must comply with https://www.nice.org.uk/guidance/cg134		

*It may be reasonable for some patients to be discharged after 2 hours despite needing two doses of IM adrenaline, e.g. following a supervised allergy challenge in a specialist setting.

2.8 Discharge checklist

1. Please contact the Allergy consultant on-call by telephone after emergency treatment for suspected anaphylaxis to discuss a management plan. This should be followed by an email to childrensallergy@uhl-tr.nhs.uk. Please state patient details and description of event so that a follow up appointment can be made. In addition please inform the GP that this has occurred.

2. Record allergy on NerveCentre, in the child's health records and hospital notes.

3. Offer patient (or, as appropriate, their parent and/or carer) an appropriate adrenaline auto-injector as an interim measure before the specialist allergy service appointment (unless it is not recommended by the Allergy Consultant)

4. Provide a written emergency action plan, which includes information about anaphylaxis and the signs and symptoms of an allergic reaction. All brands of adrenaline auto-injector trainers (Jext / EpiPen) and written emergency action plans are available in allergy box in Children's ED and CSSU. Example emergency plans are attached to this guideline but can be accessed via the anaphylaxis box (preferred option) or BSACI website https://www.bsaci.org/about/download-paediatric-allergy-action-plans. Please give the patient a dummy adrenaline device and **train them how to use it**.

5. Please prescribe the following:

    - Adrenaline auto-injector (specify which device - Jext / EpiPen): Please prescribe at least 2. One for school/nursery and one for elsewhere.

Generally the allergy team prescribe Jext or EpiPen

- 6 months-6yrs: 0.15mg adrenaline dose (EpiPen Junior or Jext 150)
- >6yr: 0.3mg adrenaline dose (EpiPen or Jext 300)
- >12yrs: 0.3mg adrenaline dose or 0.5mg dose (EpiPen or Jext 300)
- Antihistamine: Non-sedating antihistamine to have as part of written emergency action plan. Cetirizine should be used as the antihistamine of choice.

6. Provide information of the risk of a biphasic reaction and advice about avoiding suspected trigger (if known).

7. Provide anaphylaxis information leaflet.

3. Education and Training

None

4. Supporting References

NICE Clinical Guideline 2011- updated August 2020 (CG134) – Anaphylaxis: assessment to confirm an anaphylactic episode and the decision to refer after emergency treatment for a suspected anaphylactic episode.
https://www.nice.org.uk/guidance/cg134

Resuscitation Council (UK) 2021. Emergency treatment of anaphylactic reactions: Guidelines for healthcare providers. https://www.resus.org.uk/library/additional-guidance/guidance-anaphylaxis/emergency-treatment

EAACI (European Academy of Allergy and Clinical Immunology) – Food Allergy and Anaphylaxis Guidelines 2014.

5. Key Words

Adrenaline, Allergy, Anaphylaxis, Angioedema Auto injector, Urticaria

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The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.
As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

Contact and review details	
Guideline Lead (Name and Title) G. Stiefel - Paediatric Allergy Consultant G. Lewis – Consultant in Paediatric Emergency Medicine	**Executive Lead** **Chief Medical officer**
Details of Changes made during review: V5 Discharge injector prescribing updated Updated contact list for allergy consultant on-call	

Appendix 1: Allergy Advice

ALLERGY ON-CALL

Children's Allergy Consultant telephone
On-call for **any** allergy advice
and **all** allergy referrals

7 days a week
08h00 to 24h00

On-call telephone number

07960871147

Dr David Luyt
Dr Gary Stiefel
Dr Briony Stone
Dr Maria Raptaki

Please discuss with allergy consultant for all referrals followed by email (If out of above hours just email)
childrensallergy@uhl-tr.nhs.uk

ADRENALINE AUTOINJECTOR TRAINING
Also available (where possible) during working week (Monday – Friday 9 – 5)

Appendix 2 : Sample Emergency Action Plans

bsaci improving allergy care through education, training and research — ALLERGY ACTION PLAN

RCPCH Royal College of Paediatrics and Child Health — Anaphylaxis Campaign — AllergyUK

This child has the following allergies:

Name: .....

DOB: .....

Photo

Mild/moderate reaction:

- Swollen lips, face or eyes
- Itchy/tingling mouth
- Hives or itchy skin rash
- Abdominal pain or vomiting
- Sudden change in behaviour

Action to take:

- Stay with the child, call for help if necessary
- Locate adrenaline autoinjector(s)
- **Give antihistamine:**

..... **(If vomited, can repeat dose)**

- Phone parent/emergency contact

Watch for signs of ANAPHYLAXIS

(life-threatening allergic reaction)

Anaphylaxis may occur without skin symptoms: ALWAYS consider anaphylaxis in someone with known food allergy who has **SUDDEN BREATHING DIFFICULTY**

A AIRWAY	B BREATHING	C CONSCIOUSNESS
• Persistent cough	• Difficult or noisy breathing	• Persistent dizziness
• Hoarse voice	• Wheeze or persistent cough	• Pale or floppy
• Difficulty swallowing		• Suddenly sleepy
• Swollen tongue		• Collapse/unconscious

IF ANY ONE (OR MORE) OF THESE SIGNS ABOVE ARE PRESENT:

1. **Lie child flat with legs raised** (if breathing is difficult, allow child to sit)

2. **Use Adrenaline autoinjector without delay** (eg. Jext®) (Dose: . 0.3 . mg)
3. **Dial 999** for ambulance and say ANAPHYLAXIS ("ANA-FIL-AX-IS")

***** IF IN DOUBT, GIVE ADRENALINE *****

AFTER GIVING ADRENALINE:

1. Stay with child until ambulance arrives, **do NOT stand child up**
2. Commence CPR if there are no signs of life
3. Phone parent/emergency contact
4. If no improvement **after 5 minutes, give a further adrenaline dose** using a second autoinjectable device, if available.

You can dial 999 from any phone, even if there is no credit left on a mobile. Medical observation in hospital is recommended after anaphylaxis.

Emergency contact details:

1) Name: .....

.....

2) Name: .....

.....

Parental consent: I hereby authorise school staff to administer the medicines listed on this plan, including a 'spare' back-up adrenaline autoinjector (AAI) if available, in accordance with Department of Health Guidance on the use of AAIs in schools.

Signed: .....

Print name: .....

Date: .....

For more information about managing anaphylaxis in schools and "spare" back-up adrenaline autoinjectors, visit: sparepensinschools.uk

How to give Jext®

1. Form fist around Jext® and PULL OFF YELLOW SAFETY CAP
2. PLACE BLACK END against outer thigh (with or without clothing)
3. PUSH DOWN HARD until a click is heard or felt and hold in place for 10 seconds
4. REMOVE Jext®. Massage injection site for 10 seconds

Additional instructions:

If wheezy, GIVE ADRENALINE FIRST, then asthma reliever (blue puffer) via spacer

This is a medical document that can only be completed by the child's healthcare professional. It must not be altered without their permission. This document provides medical authorisation for schools to administer a 'spare' back-up adrenaline autoinjector if needed, as permitted by the Human Medicines (Amendment) Regulations 2017. During travel, adrenaline auto-injector devices must be carried in hand-luggage or on the person, and **NOT** in the luggage hold. **This action plan and authorisation to travel with emergency medications has been prepared by:**

Sign & print name: .....

Hospital/Clinic: *Leicster Children's Allergy Service*

0116 258 6694 **Date:** .....

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RCPCH Royal College of Paediatrics and Child Health — Anaphylaxis Campaign — AllergyUK

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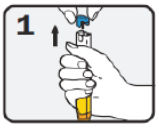
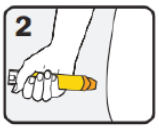
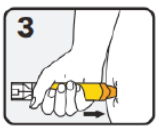
How to give EpiPen®



PULL OFF BLUE SAFETY CAP and grasp EpiPen. Remember: "blue to sky, orange to the thigh"



Hold leg still and PLACE ORANGE END against mid-outer thigh "with or without clothing"



PUSH DOWN HARD until a click is heard or felt and hold in place for **3 seconds**. Remove EpiPen.

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