LRI Emergency Department

Guideline for the management of

Suspected Anaphylaxis in Children (under 16 years)

Staff relevant to:	**ED Medical and Nursing Staff**
ED senior team approval date:	**September 2015**
Version:	**2.8**
Revision due: **Trust Ref Number:**	**December 2018** **C34/2015**
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Algorithm 1: Emergency Treatment of Anaphylaxis in Children

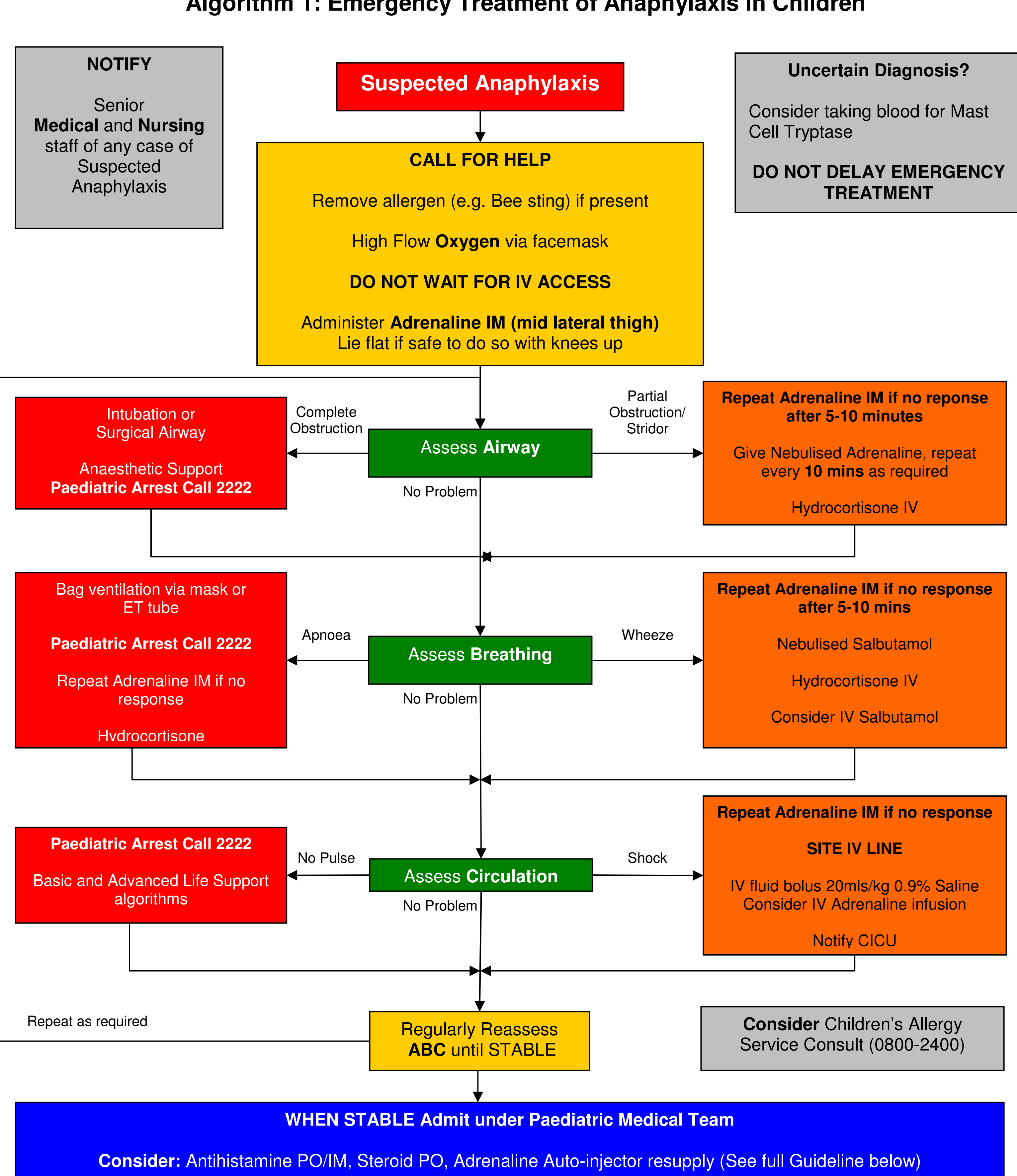
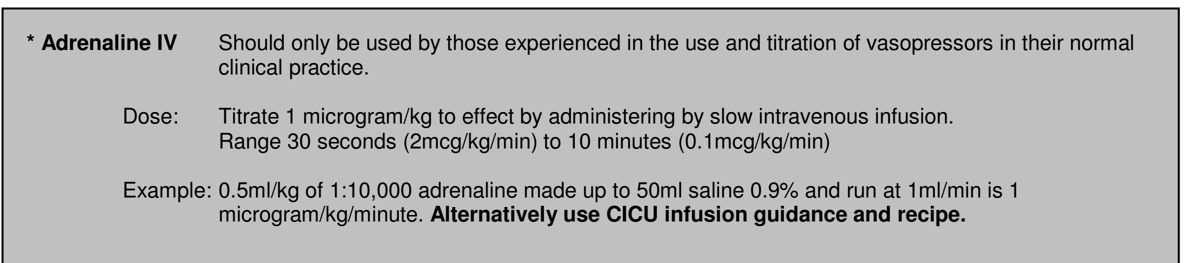


Table 1: Drugs in Anaphylaxis

Drugs in Anaphylaxis	Dosage by Age			
	< 6 months	6 months – 6 years	6 – 12 years	> 12 years
Adrenaline IM – Autoinjector	150 micrograms		300 micrograms	500 micrograms
IM ADRENALINE SHOULD BE ADMINISTERED IN MID LATERAL THIGH MUSCLE				
Adrenaline IM – In-hospital[1]	10 micrograms/kg *0.01ml/kg of 1:1000 Adrenaline[1]*			
Adrenaline IV*	EXPERIENCED SPECIALISTS ONLY – see advice below*			
Adrenaline (Nebulised)	0.5ml/kg of 1:1000 (Max 5ml) *(Dilute to minimum of 4ml with 0.9% Saline for ease of administration)*			
Fluid Bolus IV	20mls/kg 0.9% Saline			
Hydrocortisone (IM or slow IV)	25mg	50mg	100mg	200mg
Salbutamol (Nebulised)	2.5mg	2.5mg	5mg	5mg
Chlorphenamine (IM or slow IV)	250micrograms/kg (max 2.5mg)	2.5mg	5mg	10mg
Chlorphenamine (PO)	1mg	1mg	2mg	4mg
	<1 year	**1-2 years**	**2-5 years**	**> 6 years**
Cetirizine PO (preferred antihistamine)	0.25mg/kg	2.5mg	5mg	10mg

1. For smaller infants and young children (e.g. <10kg) consider 0.1 ml/kg of 1:10,000 Adrenaline IM. The strength of IM adrenaline is not intended to be prescriptive, 1:1,000 or 1:10,000 could be used depending on what is practicable. The problem with sticking solely to 1:1,000 is that when used in infants and small children, you are then required to draw up very small volumes.



*** Adrenaline IV** Should only be used by those experienced in the use and titration of vasopressors in their normal clinical practice.

Dose: Titrate 1 microgram/kg to effect by administering by slow intravenous infusion.
Range 30 seconds (2mcg/kg/min) to 10 minutes (0.1mcg/kg/min)

Example: 0.5ml/kg of 1:10,000 adrenaline made up to 50ml saline 0.9% and run at 1ml/min is 1 microgram/kg/minute. **Alternatively use CICU infusion guidance and recipe.**

Adapted from Emergency Treatment of Anaphylaxis, the Advanced Life Support Group 2010

1. Introduction

1.1 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.

1.2 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 life-threatening, maintain an ABC approach, call for senior help early and reassess regularly.

1.3 Anaphylaxis can be difficult to diagnose but there is good evidence that the early recognition and treatment of anaphylaxis has a better outcome.

2. Scope

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.

Usually anaphylaxis will be diagnosed and managed within the Emergency Department at LRI or Children's Assessment Unit (CAU). However, occasionally patients develop anaphylaxis as an inpatient and this could occur in any ward area within UHL.

2.1 Roles and Responsibilities

It is expected that all registered staff working in the Children's Emergency Department (ED), CAU and childrens 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.

3. 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 with tachypnoea) and/or circulation (hypotension and/or tachycardia). In most cases, there are associated skin and mucosal changes.

4. Establishing a Diagnosis

It is vital to establish an early diagnosis. This can be achieved by following the information in table 2 below:

Table 2: Anaphylaxis is highly likely when any one of the following three criteria is fulfilled:	
1	Acute onset of an illness (minutes to several hours) with involvement of the skin, mucosal tissue, or both (eg, generalized urticaria, itching or flushing, swollen lips-tongue-uvula) *AND AT LEAST ONE OF THE FOLLOWING:* A) Respiratory compromise (eg, dyspnea, wheeze-bronchospasm, stridor, reduced PEF, hypoxemia) B) Reduced blood pressure or associated symptoms of end-organ dysfunction (eg. hypotonia [collapse], syncope, incontinence)
2	Two or more of the following that occur rapidly after exposure to a *likely allergen*[a] for that patient (minutes to several hours) A) Involvement of the skin-mucosal tissue (eg, generalized urticaria, itch-flush, swollen lips-tongue-uvula) B) Respiratory compromise (eg, dyspnea, wheeze-bronchospasm, stridor, reduced PEF, hypoxemia) C) Reduced blood pressure or associated symptoms (eg, hypotonia [collapse], syncope, incontinence) D) Persistent gastrointestinal symptoms (eg, crampy abdominal pain, vomiting)
3	Reduced blood pressure after exposure to *known allergen*[b] for that patient (minutes to several hours) A) Infants and children: low systolic blood pressure (age-specific) or greater than 30% decrease in systolic blood pressure[c] B) Adolescents: systolic blood pressure of less than 90 mm Hg or greater than 30% decrease from that person's baseline
PEF: peak expiratory flow. [a] Or other trigger, for example, immunologic but IgE-independent, or non-immunologic (direct) mast cell activation. [b] For example, after an insect sting, reduced blood pressure might be the only manifestation of anaphylaxis; or, in a similar example, during allergen immunotherapy, after injection of a known allergen for that patient, generalized urticaria (only one body organ system affected) might be the only initial manifestation of anaphylaxis. [c] Low systolic blood pressure for children is defined as less than 70 mm Hg from 1 month to 1 year, less than (70 mm Hg +[2 × age]) from 1 to 10 years, and less than 90 mm Hg from 11 to 17 years. Normal heart rate ranges from 80-140 beats/min at age 1-2 years; from 80-120 beats/min at age 3 years; and from 70-115 beats/min after age 3 years. Infants are more likely to have respiratory compromise than hypotension or shock, and in this age group, shock is more likely to be manifest initially by tachycardia than by hypotension.	

Clinical signs and symptoms of anaphylaxis are highly variable, involve multiple organ systems and can range from mild cutaneous symptoms to a fatal reaction (See table 2). Successful treatment is dependent on prompt, early recognition of signs and symptoms.

Common Symptoms:

- Urticaria and angioedema (90%)
- Upper (swelling of the throat and tongue, dysphagia, drooling, stridor), and lower (dyspnoea and wheeze) respiratory symptoms (60-70%)
- Gastrointestinal (abdominal pain, nausea, vomiting and diarrhoea) (45%)
- Cardiovascular (hypotension) (49%)
- Neurological symptoms of headache, blurred vision and rarely seizures (5-25%)

Patients may experience sensation of impending doom, manifest in younger children as irritability or extreme fright.

5. Treatment of anaphylaxis

Please refer to algorithm 1 above titled "emergency treatment of anaphylaxis in children" and table 1 "drugs in anaphylaxis".

a. Adrenaline

Universally recommended as drug of choice in treatment of anaphylaxis
Potent catecholamine with α and β- adrenergic action; also acts as bronchodilator.

Dosage and administration recommendations:

> 10 micrograms/kg body weight (0.01ml/kg of adrenaline 1:1000) to a maximum of 0.5 ml (0.5mg) repeated after 5-10 minutes for 2 doses and then every 4 hours as needed.
>
> **PLEASE USE ADRENALINE AUTOINJECTOR IF AVAILABLE AS FIRST LINE.**
>
> 0.15mg dose for 7.5-25Kg (up to 6 years); 0.3mg dose if >25KG (6 -12 years) and 0.5mg above 12 years.

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

The use of subcutaneous or inhaled adrenaline in the treatment of anaphylaxis is not recommended. One caveat is **stridor from laryngeal oedema** where nebulized adrenaline (2-5ml, 1mg/ml) can be used in addition to IM adrenaline (EAACI guidelines)

If the patient has evidence of bronchoconstriction (i.e wheeze) then nebulise with Salbutamol. **THIS IS NOT A SUBSTITUTE FOR IM ADRENALINE**

b. Antihistamines

Used to prevent relapse, **NOT** appropriate **MONOTHERAPY** for the treatment of acute anaphylaxis as:

> Slow acting, even at maximal doses, and hence can't overcome explosive mediator
> release of anaphylaxis
>
> Do not prevent mediator release and do not have effect on other mediators released in
> anaphylaxis such as leukotrienes, prostaglandins, platelet-activating factor and others

Will mitigate dermal symptoms and may prevent relapse of symptoms.

Unlikely to be harmful and may be beneficial in stable patients after epinephrine and fluids

Dosages:

Oral antihistamines			IM antihistamine (Chlorpheniramine)	
>6 years:	Cetirizine	10 mg (10 ml)	>12 years:	10 mg (1 ml)
2-5 years:	Cetirizine	5 mg (5 ml)	6-12years:	5 mg (0.5 ml)
1-2 years:	Cetirizine	2.5mg	6mo-6 years:	2.5 mg (0.25 ml)
<1 year	Cetirizine	0.25mg/Kg	<6mo	250mcg/kg (max 2.5mg)

c. Corticosteroids

Like antihistamines, corticosteroids are considered ancillary to epinephrine, O2, and fluids.

Recommended on the basis of pharmacological properties and observed action in treatment of acute asthma. However may theoretically protect against biphasic response.

Both IV Antihistamines and IV corticosteroids are recommended by APLS for use soon after IM Adrenaline.

6. Investigations in Children with suspected anaphylaxis

There is no evidence for the use of mast cell tryptase in diagnosing anaphylaxis in children (NICE guidelines)

After a suspected anaphylactic reaction in children younger than 16 years, consider taking blood samples for mast cell tryptase testing as follows if the cause is thought to be venom-related, drug-related or idiopathic:

1. a sample as soon as possible after emergency treatment has started
2. a second sample ideally within 1–2 hours (but no later than 4 hours) from the onset of symptoms.

There is no role for mast cell tryptase measurement with respect to anaphylaxis related to food.

7. 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

8. 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 8-10hours.**Therefore it is important to explain this to the patient and carers.**

9. Disposition and follow-up

Children who have had emergency treatment for suspected anaphylaxis should be admitted to hospital under the care of a paediatric medical team. **If in any doubt, consult a senior.**

Patients who presented with respiratory compromise should be closely monitored for at least 6-8 hours and patients who presented with circulatory instability require close monitoring for 12-24 hours (EAACI guidelines).

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

10. Discharge Checklist

1. After emergency treatment for suspected anaphylaxis, offer people a referral to a specialist allergy service. Contact Children's Allergy Service for urgent advice if required. Arranging a follow up can be organised by sending 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. Offer patients (or, as appropriate, their parent and/or carer) an appropriate adrenaline injector as an interim measure before the specialist allergy service appointment.

3. Provide a written emergency action plan which includes information about anaphylaxis and the signs and symptoms of an allergic reaction. Both brands of adrenaline autoinjector trainers (Jext / EpiPen) and written emergency action plans are available in allergy box in Children's ED and CAU. Example emergency plans are attached to this guideline. Please give the patient a dummy adrenaline device and **train them how to use it.**

4. Please prescribe the following:

   a. Adrenaline autoinjector (specify which device - Jext / EpiPen): Please prescribe 2. One for school/nursery and one for elsewhere.

   b. Antihistamine: Non-sedating antihistamine for 48-72h and to have as part of written emergency action plan. Cetirizine should be used as the antihistamine of choice as per above table 1 titled "drugs for anaphylaxis".

   c. Corticosteroids: oral prednisolone 1mg/kg (rounded to nearest 5mg - max. 40mg) for 48-72h for biphasic response.

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

11. References

1. NICE Clinical Guideline 134 (CG134) – Anaphylaxis: assessment to confirm an anaphylactic episode and the decision to refer after emergency treatment for a suspected anaphylactic episode.

2. Resuscitation Council (UK) 2010. Emergency treatment of anaphylactic reactions. Guidelines for healthcare providers.

3. F Davies – Guidelines for treatment of anaphylaxis in children

4. D Luyt – Children's Hospital Medical Guideline: Anaphylaxis

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

Appendix 1: Allergy Emergencies and the Children's Allergy Service

The Children's Allergy Service are available for advice for ALL paediatric allergy emergencies

7 days a week between 08h00 and 24h00

Telephone numbers to call:

Dr Gary Stiefel	07947 355185	(weeks 1, 3 and 5)
Dr David Luyt	07540 811499	(weeks 2 and 4)

ADRENALINE AUTOINJECTOR TRAINING

Also available (where possible) during working week (Monday-Friday 9-5)

Appendix 2 : Emergency Action Plans

Allergy: Emergency Action Plan with ***Jext®***

KNOWN ALLERGIES:

Name:

Preferred Name:

Date of Birth:

Photo

Parent / Carer details:

1)
☎

2)
☎

Mild to Moderate Reaction:

- Swelling of lips, face, eyes
- Hives or itchy rash
- Itchy / tingling mouth / itchy throat
- Abdominal pain, vomiting

ACTION:

- Stay with the child
- Call for help if necessary
- Give antihistamine: CETIRIZINE
  If vomited, can give a further dose (circle)
- Contact parent / carer
- Locate Jext®

<2yrs	2.5mg	2.5ml
2-6yrs	5mg	5ml
6+yrs	10mg	10ml or 1 tablet

Watch for signs of ANAPHYLAXIS
(Severe allergic reaction):

- Difficult or noisy breathing
- Wheeze / persistent cough / hoarse voice
- Difficulty swallowing / tightness in throat
- Loss of consciousness or collapse
- Pale / floppy / suddenly sleepy
- If in doubt or rapidly deteriorating

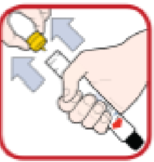
If ANY ONE of these signs are present:

- **Lie child flat.** If breathing is difficult, allow to sit
- **Give Jext®** (circle) **150 micrograms 300 micrograms**
- **Dial 999 for an ambulance* and say ANAPHYLAXIS ("ANA-FIL-AX-IS")**
- **Stay with the child**
- **If no improvement after 5-10 minutes, give a further Jext® dose (if prescribed)**
  (please check overleaf)

Additional instructions:
If asthmatic and concerns about breathing give 10 puffs of Salbutamol inhaler

*Medical observation in hospital for at least 6 hours is recommended after anaphylaxis (NICE Guidelines).

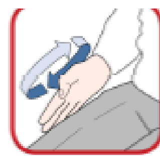
How to give Jext®



Step 1. Grasp the Jext® in your dominant hand as above. Pull off the yellow cap with the other hand.

Step 2. Place the black injector tip against outer thigh, holding the injector at a right angle to thigh.

Step 3. Push the black tip firmly into thigh until you hear a 'click', then keep it pushed in. Hold firmly in place for 10 seconds then remove.



Step 4. Massage the injection area for 10 seconds. Seek immediate medical help by dialling 999 for an ambulance.

For more information on Jext® and to register for the free expiry alert service, go to www.jext.co.uk.

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Please complete Report Form (appendix B3), giving clear account of events and fax it to 0116 225 3850

Allergy: Emergency Action Plan with ***EpiPen®***

KNOWN ALLERGIES:

Name:

Preferred Name:

Date of Birth:

Photo

Parent / Carer details:

1)
☎

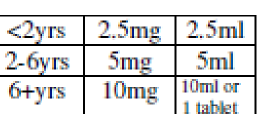
2)
☎

Mild to Moderate Reaction:

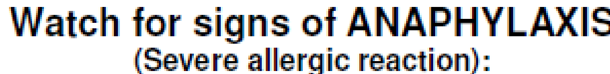
- Swelling of lips, face, eyes
- Hives or itchy rash
- Itchy / tingling mouth / itchy throat
- Abdominal pain, vomiting

ACTION:

- Stay with the child
- Call for help if necessary
- Give antihistamine: CETIRIZINE
  If vomited, can give a further dose (circle)
- Contact parent / carer
- Locate EpiPen®



<2yrs	2.5mg	2.5ml
2-6yrs	5mg	5ml
6+yrs	10mg	10ml or 1 tablet



Watch for signs of ANAPHYLAXIS
(Severe allergic reaction):

- Difficult or noisy breathing
- Wheeze / persistent cough / hoarse voice
- Difficulty swallowing / tightness in throat
- Loss of consciousness or collapse
- Pale / floppy / suddenly sleepy
- If in doubt or rapidly deteriorating

If ANY ONE of these signs are present:

- **Lie child flat.** If breathing is difficult, allow to sit
- **Give EpiPen®** (circle) **EpiPen® Jr EpiPen®**
- **Dial 999 for an ambulance* and say ANAPHYLAXIS ("ANA-FIL-AX-IS")**
- **Stay with the child**
- **If no improvement after 5-10 minutes, give a further EpiPen® dose** (if prescribed)

(please check overleaf)

Additional instructions:
If asthmatic and concerns about breathing give 10 puffs of Salbutamol inhaler

*Medical observation in hospital for at least 6 hours is recommended after anaphylaxis (NICE Guidelines).

Please complete Report Form (appendix B3), giving clear account of events and fax it to 0116 225 3850

How to give EpiPen®

Step 1. Lie down with your leg slightly elevated or sit up if breathing is difficult

Step 2. Grasp your EpiPen® in your dominant hand with the blue safety cap closest to your thumb and remove cap

Step 3. Hold the EpiPen® about 10cm away from your leg, swing and jab the orange tip into the outer thigh. Hold in place for 10 seconds. Remove EpiPen®.

Step 4. Massage the injection area for 10 seconds. You must dial 999 immediately, ask for an ambulance and state anaphylaxis.

Keep your Epipen® device at room temperature.
For more information on Epipen® and to register for the free expiry alert service, go to www.epipen.co.uk.

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