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.

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

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

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.

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.

1.3 Related documents: UHL Children’s Hospital Basic Life Support C2/2016
UHL Food & Drug Challenge Children’s Nursing guideline C10/2010
UHL Policy for the management of actual or suspected latex allergy 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 with tachypnoea) and/or circulation (hypotension and/or tachycardia). In most cases, there are associated skin and mucosal changes.
Algorithm 1: Emergency Treatment of Anaphylaxis in Children

Suspected Anaphylaxis

CALL FOR HELP
Remove allergen (e.g. Bee sting) if present
High Flow Oxygen via facemask
DO NOT WAIT FOR IV ACCESS
Administer Adrenaline IM (mid lateral thigh)
Lie flat if safe to do so with knees up

Intubation or Surgical Airway
Complete Obstruction
Assess Airway
No Problem
Partial Obstruction/Stridor
Repeat Adrenaline IM if no response after 5-10 minutes
Give Nebulised Adrenaline; repeat every 10 mins as required
Hydrocortisone IV

Bag ventilation via mask or ET tube
Apnoea
Assess Breathing
No Problem
Wheeze
Repeat Adrenaline IM if no response after 5-10 mins
Nebulised Salbutamol
Hydrocortisone IV
Consider IV Salbutamol

Paediatric Arrest Call 2222
Repeat Adrenaline IM if no response
Hydrocortisone

Paediatric Arrest Call 2222
Basic and Advanced Life Support algorithms
No Pulse
Assess Circulation
No Problem
Shock
Repeat as required

Regularly Reassess ABC until STABLE

Uncertain Diagnosis?
Consider taking blood for Mast Cell Tryptase
DO NOT DELAY EMERGENCY TREATMENT

 WHEN STABLE Admit under Paediatric Medical Team
Consider: Antihistamine PO/IM, Steroid PO, Adrenaline Auto-injector resupply (See full Guideline below)
<table>
<thead>
<tr>
<th>Drugs in Anaphylaxis</th>
<th>Dosage by Age</th>
<th>&lt; 6 months</th>
<th>6 months – 6 years</th>
<th>6 – 12 years</th>
<th>&gt; 12 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adrenaline IM – Autoinjector</td>
<td>150 micrograms</td>
<td></td>
<td>300 micrograms</td>
<td></td>
<td>500 micrograms</td>
</tr>
<tr>
<td>IM ADRENALINE SHOULD BE ADMINISTERED IN MID LATERAL THIGH MUSCLE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adrenaline IM – In-hospital(^1)</td>
<td>10 micrograms/kg</td>
<td></td>
<td>(0.01)ml/kg of 1:1000 Adrenaline (^1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adrenaline IV*</td>
<td>EXPERIENCED SPECIALISTS ONLY – see advice below*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adrenaline (Nebulised)</td>
<td>0.5ml/kg of 1:1000 (Max 5ml)</td>
<td>(0.5)mg/kg of 1:1000 (Max 5ml)</td>
<td>(0.5)mg/kg of 1:1000 (Max 5ml)</td>
<td>(0.5)mg/kg of 1:1000 (Max 5ml)</td>
<td></td>
</tr>
<tr>
<td>(Dilute to minimum of 4ml with 0.9% Saline for ease of administration)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid Bolus IV</td>
<td>20mls/kg 0.9% Saline</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrocortisone (IM or slow IV)</td>
<td>25mg</td>
<td>50mg</td>
<td>100mg</td>
<td>200mg</td>
<td></td>
</tr>
<tr>
<td>Salbutamol (Nebulised)</td>
<td>2.5mg</td>
<td>2.5mg</td>
<td>5mg</td>
<td>5mg</td>
<td></td>
</tr>
<tr>
<td>Chlorphenamine (IM or slow IV)</td>
<td>250micrograms/kg (max 2.5mg)</td>
<td>2.5mg</td>
<td>5mg</td>
<td>10mg</td>
<td></td>
</tr>
<tr>
<td>Chlorphenamine (PO)</td>
<td>1mg</td>
<td>1mg</td>
<td>2mg</td>
<td>4mg</td>
<td></td>
</tr>
<tr>
<td>&lt;1 year</td>
<td>1-2 years</td>
<td>2-5 years</td>
<td>&gt; 6 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cetirizine PO (preferred antihistamine)</td>
<td>0.25mg/kg</td>
<td>2.5mg</td>
<td>5mg</td>
<td>10mg</td>
<td></td>
</tr>
</tbody>
</table>

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
2.1 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:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Acute onset of an illness (minutes to several hours) with involvement</td>
<td>AND AT LEAST ONE OF THE FOLLOWING:</td>
</tr>
<tr>
<td>of the skin, mucosal tissues, or both (e.g., generalised urticaria, itching or flushing, swollen lips – tongue – uvula)</td>
<td>A) Respiratory compromise (e.g., dyspnoea, wheeze-bronchospasm, stridor, reduced PEF, hypoxemia)</td>
</tr>
<tr>
<td></td>
<td>B) Reduced blood pressure or associated symptoms of end-organ dysfunction (e.g., hypotonia (collapse), syncope, incontinence)</td>
</tr>
<tr>
<td>2. Two or more of the following that occur rapidly after exposure to a</td>
<td></td>
</tr>
<tr>
<td>likely allergen for that patient (minutes to several hours)</td>
<td>A) Involvement of the skin-mucosal tissue (e.g., generalised urticaria, itching or flushing, swollen lips – tongue – uvula)</td>
</tr>
<tr>
<td></td>
<td>B) Respiratory compromise (e.g., dyspnoea, wheeze-bronchospasm, stridor, reduced PEF, hypoxemia)</td>
</tr>
<tr>
<td></td>
<td>C) Reduced blood pressure or associated symptoms of end-organ dysfunction (e.g., hypotonia (collapse), syncope, incontinence)</td>
</tr>
<tr>
<td></td>
<td>D) Persistent gastrointestinal symptoms (e.g., crampy abdominal pain, vomiting)</td>
</tr>
<tr>
<td>3. Reduced blood pressure after exposure to a known allergen for that</td>
<td>A) Infants and children: low systolic blood pressure (age - specific) or greater than 30% decrease in blood pressure</td>
</tr>
<tr>
<td>patient (minutes to several hours)</td>
<td>B) Adolescents: systolic blood pressure of less than 90 mm Hg or greater than 30% decrease from that person’s baseline</td>
</tr>
</tbody>
</table>

PEF: Peak expiry flow

Or other trigger, for example, immunological but IgE-independent, or non-immunological (direct) mast cell activation

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, generalised urticaria (only one body organ system affected) might be the only manifestation of anaphylaxis

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 x 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 / minute at age 1 – 2 years: from 80 – 120 beats / minute at age 3 years; and from 70 – 115 beats per minute after age 3 years.

Infants are 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 (70-80%)
- 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.

2.2 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:

<table>
<thead>
<tr>
<th>Oral antihistamines</th>
<th>IM antihistamine (Chlorpheniramine)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;6 years: Cetirizine 10 mg (10 ml)</td>
<td>&gt;12 years: 10 mg (1 ml)</td>
</tr>
<tr>
<td>2-5 years: Cetirizine 5 mg (5 ml)</td>
<td>6-12 years: 5 mg (0.5 ml)</td>
</tr>
<tr>
<td>1-2 years: Cetirizine 2.5mg</td>
<td>6mo-6 years: 2.5 mg (0.25 ml)</td>
</tr>
<tr>
<td>&lt;1 year Cetirizine 0.25mg/Kg</td>
<td>&lt;6mo: 250mcg/kg (max 2.5mg)</td>
</tr>
</tbody>
</table>

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.
2.3 **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.

2.4 **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

**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.**
2.5 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.

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.**

2.6 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. Offer patients (or, as appropriate, their parent and/or carer) an appropriate adrenaline autoinjector as an interim measure before the specialist allergy service appointment (unless it is not recommended by the Allergy Consultant)

3. Provide a written emergency action plan, which includes information about anaphylaxis and the signs and symptoms of an allergic reaction. All brands of adrenaline autoinjector trainers (Jext / EpiPen /Emerade) 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](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.**

4. Please prescribe the following:
   - Adrenaline autoinjector (specify which device - Jext / EpiPen / Emerade): Please prescribe 2. One for school/nursery and one for elsewhere.
   - 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”.
   - Corticosteroids: oral prednisolone 1mg/kg once daily (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).

6. Provide anaphylaxis information leaflet.
3. **Education and Training**
   None

4. **Monitoring Compliance**
   None at present

<table>
<thead>
<tr>
<th>What will be measured to monitor compliance</th>
<th>How will compliance be monitored</th>
<th>Monitoring Lead</th>
<th>Frequency</th>
<th>Reporting arrangements</th>
</tr>
</thead>
</table>

5. **Supporting References**

   NICE Clinical Guideline 2011 (CG134) – Anaphylaxis: assessment to confirm an anaphylactic episode and the decision to refer after emergency treatment for a suspected anaphylactic episode.


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

6. **Key Words**

   Adrenaline, Allergy, Anaphylaxis, Angioedema Auto injector, Urticaria

   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.

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**CONTACT AND REVIEW DETAILS**

<table>
<thead>
<tr>
<th>Guideline Lead (Name and Title)</th>
<th>Executive Lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>G. Lewis – Consultant in Paediatric Emergency Medicine</td>
<td>Chief Medical officer</td>
</tr>
<tr>
<td>G. Stievel - Paediatric Allergy Consultant</td>
<td></td>
</tr>
<tr>
<td>D. Luyt – Paediatric Consultant</td>
<td></td>
</tr>
</tbody>
</table>

**Details of Changes made during review:**

2.1 common symptoms Urticaria and angioedema percentage changed from (90%) to (70-80%)

2.5 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.

Please contact the Allergy consultant on-call by telephone after emergency treatment for suspected anaphylaxis to discuss a management plan.

2.6 Addition of auto injector Emerade

2.6 added 6 Provide anaphylaxis information leaflet
Appendix 1: Allergy Advice

ALLERGY ADVICE

Call the Children’s Allergy Service if you require **any** Paediatric allergy advice **7 days a week** between **08h00 and 24h00**.

Consultant on call number

07960871147

Dr David Luyt
Dr Gary Stiefel
Dr Konstantinos Kakleas

ADENALINE AUTOINJECTOR TRAINING
Also available (where possible) during working week (Monday-Friday 9-5)
Appendix 2: Emergency Action Plans

**Allergy Action Plan**

**THIS CHILD HAS THE FOLLOWING ALLERGIES:**

**Name:**
**DOB:**

**Emergency contact details:**
1. 
2. 

**PARENTAL CONSENT:** I hereby authorise school staff to administer the medicines listed on this plan, including a backup adrenaline autoinjector (AAI) if available, in accordance with Department of Health Guidance on the use of AAI in schools.

Signed: ____________________________

(Print Name) ____________________________ Date: ____________________________

**How to give EpiPen®**

1. Form fist around EpiPen® and PULL OFF BLUE SAFETY CAP
2. SWING AND PUSH GRANDE TP against outer thigh (with or without clothing) until a click is heard
3. HOLD FIRMLY in place for 10 seconds
4. REMOVE EpiPen® Massage Injection site for 10 seconds

© The British Society for Allergy & Clinical Immunology, 2017

**Mild-moderate allergic reaction:**
- Swollen lips, face or eyes
- Itchy / tingling mouth
- Hives or itchy skin rash
- Abdominal pain or vomiting
- Sudden change in behaviour

**ACTION:**
- Stay with the child, call for help if necessary
- Locate adrenaline autoinjector(s)
- Give antihistamine: CETIRIZINE 10mg
- Phone parent/emergency contact: (if vomited, can repeat dose)

**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**

**AIRWAY:** Persistent cough, hoarse voice, difficulty swallowing, swollen tongue

**BREATHING:** Difficult or noisy breathing, wheeze or persistent cough

**CONSCIOUSNESS:** Persistent dizziness / pale or floppy, suddenly sleepy, collapse, unconscious

If ANY ONE (or more) of these signs are present:

1. *Lie child flat:* (if breathing is difficult, allow child to sit)
2. **Use Adrenaline autoinjector** (e.g. EpiPen) **without delay**
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 2nd adrenaline dose using a second autoinjector 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.

**Additional Instructions:**

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 ‘backup’ adrenaline autoinjector if needed, as permitted by the Human Medicines (Amendment) Regulations 2019.

This plan has been prepared by:

**SIGN & PRINT NAME:** ____________________________

**Hospital/Clinic:** ____________________________

**Date:** ____________________________

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Suspected Anaphylaxis in Children under 16 years
Latest version approved by Policy and Guideline Committee on 12 April 2019 | Trust Ref: B18/2019 (formerly C34/2015)
Next Review: April 2022

NB: Paper copies of this document may not be most recent version. The definitive version is held in the Policy and Guideline Library.
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