Clinical Guideline

ANAPHYLAXIS IN CHILDREN

SETTING          Bristol Royal Hospital for Children
FOR STAFF        Medical and nursing staff
PATIENTS         Paediatric patients (< 16 years)

GUIDANCE

Anaphylaxis is a severe hypersensitivity reaction characterised by life-threatening airway and/or breathing and/or circulation problems usually associated with skin and mucosal changes.

Key points in the history that may point towards a severe reaction include: previous severe reaction, history of increasingly severe reactions, history of asthma and treatment with beta-blockers

Anaphylaxis is likely when the following criteria are met:

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

The following supports a 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
- There can also be gastrointestinal symptoms (e.g. vomiting, diarrhea, abdominal pain and incontinence)

Frequency of organ system involvement:

In children respiratory signs are most common (95%) followed by dermatological signs (80%) and then gastrointestinal features (20-45%). Cardiovascular impairment is rare in children with food induced anaphylaxis (<2%) but more likely with anaphylactic reactions caused by intravenous drugs or insect stings.

Most reactions occur within 30 minutes of exposure to a trigger

Causes of anaphylaxis:

1. Food (56%)
2. Insect stings (5%)
3. Drugs (5%)
4. Idiopathic (20-30%)
**MANAGEMENT**

**Call for help**  
Remove allergen  
High flow oxygen  
Intramuscular (IM) Adrenaline

- Intubation  
- Surgical airway

**Airway**

- Complete obstruction
- Partial obstruction/stridor

**Breathing**

- Apnoea
- Wheeze

**Circulation**

- No pulse
- Shock

**Advanced life support**

**Reassess ABC**
<table>
<thead>
<tr>
<th>DRUGS</th>
<th>&lt; 6 months</th>
<th>6 months – 5 years</th>
<th>6 –11 years</th>
<th>12 years and up</th>
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<tbody>
<tr>
<td>Intramuscular adrenaline (in hospital)</td>
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<tr>
<td>10 microgram/kg</td>
<td>0.1 ml/kg of 1:10000 (infants or young children) OR 0.01 ml/kg of 1:1000 (older children)</td>
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<tr>
<td>IM adrenaline (pre-hospital and auto-injector)</td>
<td>150 micrograms (0.15 ml of 1:1000)</td>
<td>300 micrograms (0.3 ml of 1:1000)</td>
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<tr>
<td>Nebulised adrenaline</td>
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<tr>
<td>400 micrograms/kg</td>
<td>0.4 ml/kg of 1:1000 up to a maximum of 5 mls (dilute to 5 mls with 0.9% saline if necessary)</td>
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<tr>
<td>IV adrenaline (1:10,000)</td>
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<tr>
<td>Titrate 1 microgram/kg</td>
<td>1microgram/kg of intravenous adrenaline should be given over 1 minute; Dilute 0.1ml/kg 1:10,000 in 0.9% sodium chloride to a volume of 10ml, giving a solution of 1microgram/kg/ml</td>
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<tr>
<td>Crystalloid (e.g. 0.9% sodium chloride)</td>
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<td>20 ml/kg</td>
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<tr>
<td>Hydrocortisone (IM or slow IV)</td>
<td>25 mg</td>
<td>50 mg</td>
<td>100 mg</td>
<td>200 mg</td>
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<tr>
<td>Chlorphenamine (IM or slow IV)</td>
<td>250 microgram/kg (max dose 2.5mg)</td>
<td>2.5 mg</td>
<td>5 mg</td>
<td>10 mg</td>
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</table>

An intravenous infusion should only be considered in cases of anaphylaxis resistant to repeated doses of intramuscular adrenaline and after referral to PICU

Commence the adrenaline infusion at 1 microgram/kg/min and titrate to effect (range: 0.1 – 1.5 microgram/kg/minute)

Peripheral intravenous adrenaline infusion:

0.3mg/kg (3ml/kg of 1 in 10,000 adrenaline) made up to 500 mls with 0.9% sodium chloride and run at 100ml/hour is 1microgram/kg/min

CHILDREN TAKING BETA BLOCKERS

Patients taking beta-blockers may be resistant to treatment with adrenaline. However, intramuscular or intravenous adrenaline should always be administered as first line treatment but if this proves ineffective then intravenous glucagon should be administered because it has inotropic and chronotropic effects that are not mediated through beta-blockers.

The paediatric dose of glucagon is 20-30 micrograms/kg (maximum 1 milligram) given as a slow intravenous bolus over 5 minutes. This may be followed by an infusion of 5-15 microgram/minute titrated to effect (i.e. not weight based).

Glucagon is incompatible with fluids containing calcium and should be used immediately after preparation as there is a risk of precipitation. Side effects of intravenous glucagon administration include vomiting, hypokalaemia and hypocalcaemia.
INVESTIGATION

Anaphylaxis is a clinical diagnosis and intramuscular adrenaline should be administered as soon as it is recognised.

Mast cell tryptase does not reliably rise in childhood anaphylaxis particularly when food proteins have been the trigger. Therefore measurement of mast cell tryptase is not routinely recommended unless the cause is thought to be venom-related, drug related or idiopathic

- 1st sample as soon as possible after the emergency treatment has started
- 2nd sample ideally within 1 – 2 hours from the onset of symptoms

DOCUMENTATION, DISCHARGE AND FOLLOW-UP

1. Carefully document all of the clinical features
2. Record the time of onset of the reaction
3. Record the circumstances immediately before onset of symptoms to help identify the possible trigger
4. Admit for a minimum of 6 hours
5. Ensure review by the allergy team prior to discharge
6. Prescribe enough prednisalone (1-2 mg/kg, max 40 mg) to complete a 3 day course of steroids
7. Prescribe antihistamine to be taken regularly for 3 days
   - Under 2 years old - Cetirizine 2mg twice daily
   - 2-5 years old - Cetirizine 5mg once daily or 2.5mg twice daily
   - Over 6 years old – Cetirizine 10mg once daily or 5mg twice daily
8. Prior to discharge ensure that the family have:
   - Information about anaphylaxis, including the signs and symptoms of an anaphylactic reaction
   - Advice about how to avoid the suspected trigger (if known)
   - Anaphylaxis training and action plan
   - A demonstration of the correct use of the adrenaline injector (e.g. EpiPen, Emerade or JEXT) and when to use it
   - Information about the risk of biphasic reactions
   - Referral to allergy clinic
   - Information about patient support groups such as the Anaphylaxis Campaign and Allergy UK

Adrenaline auto-injector doses doses:

The Children’s allergy team generally recommend prescribing EpiPens as there has been extensive local training (e.g. nurseries and schools) provided using these devices.

<table>
<thead>
<tr>
<th>Weight</th>
<th>Adrenaline Dose</th>
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<tbody>
<tr>
<td>≤25 kg</td>
<td>150 micrograms</td>
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<tr>
<td>&gt;25 kg</td>
<td>300 micrograms</td>
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<tr>
<td>&gt;60 kg</td>
<td>Consider the need for a 500 microgram dose – Emerade is the only auto-injector device that currently offers this option</td>
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</table>
## REFERENCES

1. Advanced Paediatric Life Support (Sixth Edition)
2. NICE clinical guideline CG134 (Anaphylaxis: assessment and referral after emergency treatment)

## RELATED DOCUMENTS AND PAGES

None

## AUTHORISING BODY

CED Governance

## SAFETY

None

## QUERIES AND CONTACT

Children’s ED, ext. 28666