CLINICAL GUIDELINE FOR THE TREATMENT OF ANAPHYLAXIS IN ADULTS AND CHILDREN

Summary.

Anaphylactic reaction?

Airway, Breathing, Circulation, Disability, Exposure

Diagnosis - look for:
- Acute onset of illness
- Life-threatening Airway and/or Breathing and/or Circulation problems
- And usually skin changes

Call for help
- Lie patient flat
- Raise patient’s legs

Adrenaline

When skills and equipment available:
- Establish airway
- High flow oxygen
- IV fluid challenge
- Chlorphenamine
- Hydrocortisone

Monitor:
- Pulse oximetry
- ECG
- Blood pressure

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1 Life-threatening problems:
Airway: swelling, hoarseness, stridor
Breathing: rapid breathing, wheeze, fatigue, cyanosis, SpO₂ < 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 micrograms IM (0.5 mL)
- Child more than 12 years: 500 micrograms IM (0.5 mL)
- Child 6-12 years: 300 micrograms IM (0.3 mL)
- Child less than 6 years: 150 micrograms IM (0.15 mL)

Adrenaline IV to be given only by experienced specialists
Titrated: Adults 50 micrograms, Children 1 microgram/kg

3 IV fluid challenge:
- Adult: 500 – 1000 mL
- Child: crystalloid 20 mL/kg

Stop IV colloid if this might be the cause of anaphylaxis

4 Chlorphenamine
(IM or slow IV)
- Adult or child more than 12 years: 10 mg
- Child 6-12 years: 5 mg
- Child 6 months to 6 years: 2.5 mg
- Child less than 6 months: 250 micrograms/kg

5 Hydrocortisone
(IM or slow IV)
- Adult: 200 mg
- Child: 100 mg, 50 mg, 25 mg
CLINICAL GUIDELINE FOR THE TREATMENT OF ANAPHYLAXIS IN ADULTS AND CHILDREN

1. Aim/Purpose of this Guideline

This aim of this guideline is to inform physicians, nurses and other healthcare staff of the up to date management of patients with anaphylaxis.

2. The Guidance

The incidence of anaphylactic reactions in the UK is rising. There is sometimes confusion about the diagnosis, treatment, investigation and follow up of patients who have experienced an anaphylactic reaction. The guidance presented here is based upon the guideline “Emergency Treatment of Anaphylaxis” published by the Resuscitation Council (UK) (annotated July 2012) and the NICE guidance CG134: Anaphylaxis (2011).

The guidance presented here covers the emergency management of both adults and children with anaphylaxis. There is a separately published RCHT “Clinical Guideline for the Management of Anaphylaxis in Infants and Children under 16 years of age” which is consistent with this guideline and may be used instead of it or in conjunction with it.

Patients with suspected anaphylaxis during anaesthesia should be managed according to The Association of Anaesthetists of Great Britain and Ireland guidance (www.aagbi.org) which can be found on display in laminated form in every anaesthetic room.

For the purposes of this guideline, anaphylaxis is broadly defined as: “a severe, life-threatening, generalised or systemic hypersensitivity reaction”.

Recognition and Treatment of Anaphylaxis

The onset of anaphylaxis is usually quite rapid, typically within minutes. Its clinical course is unpredictable, with a huge variability in severity and clinical features - this can lead to diagnostic difficulty.

Key Points:

- The treatment of anaphylactic reactions should be based on general life support principles.
- The Airway, Breathing, Circulation, Disability, Exposure (ABCDE) approach should be adopted in order to recognise, prioritise and treat problems.
- There is an emphasis on calling for help at an early stage.
- The greatest threat to life should be treated first.
- Initial treatment should not be delayed by a lack of patient history or a definitive diagnosis.
Recognition:
Anaphylaxis is likely when the following 3 criteria are met:
1. Sudden onset and rapid progression of symptoms.
2. Life-threatening Airway and/or Breathing and/or Circulation problems (see table below).
3. Skin and/or mucosal changes (flushing, urticaria, angioedema) – see below and note that in some cases of anaphylaxis there are no obvious skin changes, or that skin changes occur after life-threatening ‘A,B,C’ changes.

The following supports the diagnosis:
- Exposure to a known allergen for the patient or common trigger (e.g. food, drugs or venom)

Clinical evidence of life-threatening Airway, Breathing and Circulation problems

<table>
<thead>
<tr>
<th>Airway Problems</th>
<th>Breathing Problems</th>
<th>Circulatory Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Airway swelling (laryngeal/pharyngeal oedema). The patient has difficulty breathing and swallowing, with the feeling that his/her throat is “closing up”</td>
<td>- Shortness of breath: increased respiratory rate</td>
<td>- Signs of shock: pale, clammy, tachycardia</td>
</tr>
<tr>
<td></td>
<td>- Hoarse voice</td>
<td>- Dizziness or collapse</td>
</tr>
<tr>
<td></td>
<td>- Stridor</td>
<td>- Increased pulse rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Low blood pressure</td>
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<tr>
<td></td>
<td></td>
<td>- Decreased conscious level / loss of consciousness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Myocardial ischaemia and ECG changes (even with normal coronary arteries)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Cardiac arrest</td>
</tr>
</tbody>
</table>

Gastrointestinal features
Gastrointestinal symptoms (e.g. vomiting, abdominal pain, incontinence) can be prominent, but are not specific.

Skin and/or mucosal changes
These should be assessed as part of “Exposure” when using the ABCDE approach:
- When occurring alone, they do not indicate an anaphylactic reaction. Most patients who have skin changes caused by allergy do not go onto develop an anaphylactic reaction.
- They are often the first feature and are present in over 80% of anaphylactic reactions. However, there is a huge variability in skin/mucosal changes and they can be subtle or dramatic.
- There may be erythema – a patchy, or generalised, red rash.
- There may be urticaria (hives, nettle rash, weals or welts) which can appear anywhere on the body. These are usually itchy.
- Angioedema is similar to urticaria but involves swelling of deeper tissues: commonly the eyelids and lips, and sometimes in the mouth and throat.
Differential Diagnosis:

Following the “ABCDE approach” should help identify alternative diagnoses to anaphylaxis in a patient.

Other life-threatening conditions:
- Sometimes an anaphylactic reaction can present with symptoms and signs that are similar to life-threatening asthma – this is more common in children.
- A low blood pressure with a petechial or purpuric rash can be signs of septic shock.

Other non-life-threatening conditions:
- Faint (vasovagal episode).
- Panic attack.
- Breath-holding episode in child.
- Idiopathic (non-allergic) urticaria or angioedema.
- Scombroid fish poisoning.

Treatment of a patient who is not in cardiac arrest

The treatment guideline is summarised in the Resuscitation Council (UK) algorithm (page 1). The basic principles of treatment are the same in all age groups.

Patients should expect the following treatment as a minimum:
- Recognition they are seriously unwell.
- An early call for help.
- Assessment and treatment based on the “ABCDE” approach.
- Patient monitoring (pulse, blood pressure, ECG, pulse oximetry).
- Adrenaline therapy if indicated.
- Investigation and follow up by an allergy specialist.

Patient Positioning
- The patient may prefer to sit up if this will make breathing easier.
- Lying flat with/without leg elevation is helpful for patients with a low blood pressure. If patients feel “faint” it is important not to stand them up.
- Patients who are breathing and unconscious should be placed on their side (recovery position).
- Heavily pregnant patients should be placed on their left side to prevent caval compression.

Remove the Trigger
- Stop the administration of any drug suspected of causing an anaphylactic reaction.
- In the case of a bee sting, remove the stinger. Early removal is more important than the method of removal.
- Patients should not be made to vomit after suspected food-induced anaphylaxis.
Adrenaline

- Adrenaline is the most important drug for the treatment of an anaphylactic reaction.
- Adrenaline works best when given soon after the onset of the reaction so treatment should not be delayed if indicated. In paediatric patients, it may be quickest to administer adrenaline by using the patient’s own Epipen in the appropriate doses.
- **Intramuscular (IM) adrenaline** is suitable for most individuals who need adrenaline. Adverse effects are extremely rare with the correct doses. The best site for an IM injection is the anterolateral aspect of the middle third of the thigh. The needle used needs to be long enough to ensure that the adrenaline is injected into muscle.
- The following **doses** should be given:

<table>
<thead>
<tr>
<th>Adrenaline IM dose- Adults</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5mg IM (= 500 micrograms = 0.5mL of 1:1000) adrenaline</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adrenaline IM dose – Children</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 12 years</td>
<td>500 micrograms IM (0.5mL of 1:1000) same as adult dose</td>
<td></td>
</tr>
<tr>
<td></td>
<td>300 micrograms (0.3 mL of 1:1000) if small or prepubertal</td>
<td></td>
</tr>
<tr>
<td>&gt;6-12 years</td>
<td>300 micrograms IM (0.3 mL of 1:1000)</td>
<td></td>
</tr>
<tr>
<td>&gt; 6 months – 6 years</td>
<td>150 micrograms IM (0.15mL of 1:1000)</td>
<td></td>
</tr>
<tr>
<td>&lt; 6 months</td>
<td>150 micrograms IM (0.15mL of 1:1000)</td>
<td></td>
</tr>
</tbody>
</table>

- Use monitoring to help to assess the response to adrenaline.
- Repeat the IM adrenaline dose if there is no improvement in the patient’s condition. Further doses can be given at about 5 minute intervals according to the patient’s response.

**Intravenous (IV) Adrenaline (for specialist use only)**

- There is a much greater risk of causing **harmful side effects** by inappropriate dosage or misdiagnosis of anaphylaxis when using IV adrenaline.
- IV adrenaline should only be administered by those experienced in the use and titration of vasopressors in their normal clinical practice (e.g. anaesthetists, emergency physicians, intensive care doctors).
- Many healthcare providers will have given IV adrenaline as part of the resuscitation of a patient in cardiac arrest. This does not provide them with sufficient experience to use IV adrenaline in anaphylaxis - in patients with spontaneous circulation; IV adrenaline can cause life-threatening hypertension, tachycardia, arrhythmias and myocardial ischaemia.
Oxygen

- Initially, the highest possible concentration of oxygen should be given by using a mask with an oxygen reservoir and an oxygen flow rate of greater than 10 litres per minute.
- If the patient is intubated, the lungs should be ventilated with high concentration oxygen.

Fluids

- Large volumes of fluid may leak from the patient’s circulation during an anaphylactic reaction. There may be signs of shock, vasodilatation and a low blood pressure.
- It is important to ensure there is intravenous access and to infuse IV fluids immediately. An appropriate rapid intravenous fluid challenge is 20mL/kg in a child or 500-1000mLs in an adult.
- The response should be monitored and further fluids given as necessary.
- There is no evidence to support the use of IV colloids over crystalloids.
- If IV access cannot be established, then the intra-osseous route can be used, but only by healthcare workers who are trained to do so.

Antihistamines

- These are the second line treatment in anaphylaxis.
- Used alone, they are unlikely to be life-saving in a true anaphylactic reaction.
- Chlorphenamine should be used and injected slowly either intravenously or intramuscularly.
- The dose of Chlorphenamine depends on age:
  - >12 years and adults: 10 mg IM or IV
  - >6-12 years: 5 mg IM or IV
  - 6 months – 6 years: 2.5 mg IM or IV
  - < 6 months: 250 micrograms/kg IM or IV

Steroids

- Corticosteroids may help to prevent biphasic reactions or shorten protracted reactions.
- Hydrocortisone should be injected intravenously or intramuscularly.
- Patient monitoring needs to be continued to look for induced hypotension.
- The dose of hydrocortisone depends on age:
  - >12 years and adults: 200 mg IM or IV
  - >6-12 years: 100mg IM or IV
  - 6 months – 6 years: 50 mg IM or IV
  - <6 months: 25 mg IM or IV

Anaphylaxis drug kits

All of the cardiac arrest trolleys at RCHT contain an anaphylaxis drug kit. These contain the following drugs:

- Adrenaline (1:1000)
- Hydrocortisone
- Chlorphenamine
Cardiopulmonary Arrest following an anaphylactic reaction

- Cardiopulmonary Resuscitation (CPR) should be started immediately and treatment should follow current Advanced Life Support (ALS) guidelines.
- Remove the trigger.
- Doses of adrenaline should follow those recommended in the ALS guidelines.
- The intramuscular route for adrenaline is not recommended after cardiac arrest has occurred.

Investigations - Mast cell tryptase

- Mast cell tryptase is the specific test to help confirm the clinical diagnosis of an anaphylactic reaction, particularly in adults. In children, it is only useful for idiopathic anaphylaxis, or suspected drug/venom-induced anaphylaxis.
- It is a useful test as a follow up of suspected anaphylactic reactions, but does not help in the initial recognition and treatment. It is important that waiting for the levels does not delay treatment.
- The concentration peak of mast cell tryptase occurs 1-2 hours after the onset of symptoms and levels will be back to normal by 6-8 hours. Therefore, timing of the blood tests is crucial.
- Ideally, three samples should be taken and sent to Haematology (in a buff top tube):
  1. Initial sample when feasible after resuscitation has started.
  2. Second sample at 1-2 hours after start of symptoms.
  3. Third sample at 24 hours or at follow up (e.g. allergy clinic) to provide a baseline tryptase level for the patient.
- It is important that the samples reach the laboratory as soon as possible after being taken, as they are separated and frozen immediately on receipt in the laboratory.
- The request accompanying each sample should clearly record the time of sampling and whether it was the first, second or a subsequent sample.

Discharge from hospital

- Patients who have a suspected anaphylactic reaction should be treated and then observed for at least 6 hours in a clinical area with facilities for treating life-threatening “ABC” problems.
- They should then be reviewed by a senior physician/paediatrician and a decision made about further treatment/observation.

Before discharge from hospital, all patients must be:

- Reviewed by a senior clinician.
- Given clear instructions to return to hospital if symptoms return.
- Considered for anti-histamines and oral steroid therapy (e.g. 40mg prednisolone once daily for an adult) for up to 3 days. This is helpful for the treatment of urticaria and may decrease the chance of a further reaction.
- Considered for an adrenaline auto-injector, or given a replacement. An auto-injector (“Epipen” or “Emerade”) is not normally appropriate for patients who suffer anaphylactic reactions to drugs (as these can be avoided), but is likely to be appropriate for patients who have idiopathic reactions or reactions to stings or food.
- Have a follow up plan, including contact with the patient’s general practitioner.
- Given patient education about avoiding and treating future episodes.
Note that all children (aged <16 years) who have experienced anaphylaxis should be admitted to the Paediatric Observation Unit. They should be followed up in the appropriate RCHT allergy clinic.

Record Keeping
It is important that the event is properly documented in order to help confirm the diagnosis of anaphylaxis and identify the most likely trigger. It is important the following is clearly documented in the patient’s notes:

- Description of the reaction with circumstances and timings to help identify potential triggers (including the time of onset of the reaction).
- Initial “ABCDE” assessment.
- List of administered treatments.
- Copies of relevant patient records: these may include ambulance records, emergency department records, observation charts, and anaesthetic/surgical charts.
- Results of investigations already completed. Timings of mast tryptase samples.

Reporting of Reactions
- Adverse drug reactions that include anaphylactic reaction should be reported to the Medicines and Healthcare products Regulatory Agency (MHRA) using the yellow card scheme (www.MHRA.gov.uk)
- The British National Formulary (BNF) includes copies of the Yellow Card at the back of each edition.
- All fatal anaphylaxis cases need to be reported as a serious incident and discussed with the coroner.

3. Monitoring compliance and effectiveness

<table>
<thead>
<tr>
<th>Element to be monitored</th>
<th>Critical incidents and concerns/non-compliance relating to patients treated for anaphylaxis will be discussed as part of governance at the Resuscitation Committee.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>Jonathan Wyatt Chairman Resuscitation Committee</td>
</tr>
<tr>
<td>Tool</td>
<td>Datix &amp; Cardiac Arrest/Peri-arrest Audit</td>
</tr>
<tr>
<td>Frequency</td>
<td>Reviewed at quarterly Resuscitation Committee meetings</td>
</tr>
<tr>
<td>Reporting arrangements</td>
<td>Reviewed at quarterly Resuscitation Committee meetings</td>
</tr>
<tr>
<td>Acting on recommendations and Lead(s)</td>
<td>Responsibility for this will be taken by Resuscitation Committee at their regular meetings.</td>
</tr>
<tr>
<td>Change in practice and lessons to be shared</td>
<td>Review of occurrences of non-compliance with this guideline will be used to feed back to relevant clinicians and departments. Required changes to practice that are identified will be actioned by department leads. A lead member of the team will be identified to take each change forward where appropriate. Any divisional concerns will be raised through the Clinical Audit &amp; Outcomes Group which the Resuscitation Committee reports to.</td>
</tr>
</tbody>
</table>
4. **Equality and Diversity**
   4.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement.

   **4.2. Equality Impact Assessment**
   The Initial Equality Impact Assessment Screening Form is at Appendix 2.
## Appendix 1. Governance Information

<table>
<thead>
<tr>
<th>Document Title</th>
<th>CLINICAL GUIDELINE FOR THE TREATMENT OF ANAPHYLAXIS IN ADULTS AND CHILDREN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Issued/Approved:</td>
<td>7 July 2014</td>
</tr>
<tr>
<td>Date Valid From:</td>
<td>1 Oct 2017</td>
</tr>
<tr>
<td>Date Valid To:</td>
<td>20 Feb 2021</td>
</tr>
<tr>
<td>Directorate / Department responsible (author/owner):</td>
<td>Jonathan Wyatt, Chairman, Resuscitation Committee, RCHT</td>
</tr>
<tr>
<td>Contact details:</td>
<td>01872-252452</td>
</tr>
<tr>
<td>Brief summary of contents</td>
<td>A guideline to help health professionals to recognise and treat patients presenting with anaphylaxis.</td>
</tr>
<tr>
<td>Suggested Keywords:</td>
<td>Anaphylaxis; resuscitation; adrenaline</td>
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<tr>
<td>Target Audience</td>
<td>RCHT ✓ PCH CFT KCCG</td>
</tr>
<tr>
<td>Executive Director responsible for Policy:</td>
<td>Medical director</td>
</tr>
<tr>
<td>Date revised:</td>
<td>1 Oct 2017</td>
</tr>
<tr>
<td>This document replaces (exact title of previous version):</td>
<td>Clinical guideline for the treatment of anaphylaxis in adults and children</td>
</tr>
<tr>
<td>Approval route (names of committees)/consultation:</td>
<td>Resuscitation Committee RCHT ALS instructors Consultants in Medicine Directorate</td>
</tr>
<tr>
<td>Divisional Manager confirming approval processes</td>
<td>Vicky Peverelle</td>
</tr>
<tr>
<td>Name and Post Title of additional signatories</td>
<td>Not Required</td>
</tr>
<tr>
<td>Signature of Executive Director giving approval</td>
<td>{Original Copy Signed}</td>
</tr>
<tr>
<td>Publication Location (refer to Policy on Policies – Approvals and Ratification):</td>
<td>Internet &amp; Intranet ✓ Intranet Only</td>
</tr>
<tr>
<td>Document Library Folder/Sub Folder</td>
<td>Clinical / Critical Care and Resuscitation</td>
</tr>
</tbody>
</table>
** Links to key external standards | Resuscitation Council (UK), NICE CG134  
** Related Documents: | None  
** Training Need Identified? | No – training is covered within existing ILS/ALS courses

### Version Control Table

<table>
<thead>
<tr>
<th>Date</th>
<th>Version No</th>
<th>Summary of Changes</th>
<th>Changes Made by (Name and Job Title)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24/3/2014</td>
<td>V1.0</td>
<td>Initial Issue</td>
<td></td>
</tr>
<tr>
<td>26/6/2014</td>
<td>V1.1</td>
<td>Minor changes and amendments.</td>
<td>J. Wyatt, ED cons</td>
</tr>
<tr>
<td>1/10/2017</td>
<td>V1.2</td>
<td>Minor changes to comply with Trust’s current guidelines template. Plus addition of new higher dose auto injector (Emerade).</td>
<td>J. Wyatt, ED Cons</td>
</tr>
</tbody>
</table>

**All or part of this document can be released under the Freedom of Information Act 2000**

**This document is to be retained for 10 years from the date of expiry.**

**This document is only valid on the day of printing**

**Controlled Document**

This document has been created following the Royal Cornwall Hospitals NHS Trust Policy on Document Production. It should not be altered in any way without the express permission of the author or their Line Manager.
Appendix 2. Initial Equality Impact Assessment Form

<table>
<thead>
<tr>
<th>Name of the guidelines (hereafter referred to as policy)</th>
<th>Clinical Guideline for the Treatment of Anaphylaxis in Adults and Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directorate and service area:</td>
<td>Existing</td>
</tr>
<tr>
<td>Royal Cornwall Hospital</td>
<td></td>
</tr>
<tr>
<td>Name of individual completing assessment:</td>
<td>Telephone: 01872 252452</td>
</tr>
<tr>
<td>Jonathan Wyatt – Chairman Resuscitation Committee</td>
<td></td>
</tr>
</tbody>
</table>

1. Policy Aim*
   Who is the strategy / policy / proposal / service function aimed at?

   The aim of this guideline is to inform physicians, nurses and other healthcare staff of the up to date management of patients with anaphylaxis.

2. Policy Objectives*

   As above

3. Policy – intended Outcomes*

   As above

4. *How will you measure the outcome?

   See section 3

5. Who is intended to benefit from the policy?

   All patients

6a) Is consultation required with the workforce, equality groups, local interest groups etc. around this policy?

   NO

   b) If yes, have these *groups been consulted?

   C). Please list any groups who have been consulted about this procedure.

7. The Impact

   Please complete the following table.

Are there concerns that the policy could have differential impact on:

<table>
<thead>
<tr>
<th>Equality Strands</th>
<th>Yes</th>
<th>No</th>
<th>Rationale for Assessment / Existing Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


| Sex (male, female, transgender / gender reassignment) | ✓ |
| Race / Ethnic communities /groups | ✓ |
| Disability - learning disability, physical disability, sensory impairment and mental health problems | ✓ |
| Religion / other beliefs | ✓ |
| Marriage and civil partnership | ✓ |
| Pregnancy and maternity | ✓ |
| Sexual Orientation, Bisexual, Gay, heterosexual, Lesbian | ✓ |

You will need to continue to a full Equality Impact Assessment if the following have been highlighted:

- You have ticked “Yes” in any column above and
- No consultation or evidence of there being consultation- this excludes any policies which have been identified as not requiring consultation. or
- Major service redesign or development

8. Please indicate if a full equality analysis is recommended. Yes No ✓

9. If you are not recommending a Full Impact assessment please explain why.

Signature of policy developer / lead manager / director

Date of completion and submission

Names and signatures of members carrying out the Screening Assessment

1. Jonathan Wyatt
2.

Keep one copy and send a copy to the Human Rights, Equality and Inclusion Lead, c/o Royal Cornwall Hospitals NHS Trust, Human Resources Department, Knowledge Spa, Truro, Cornwall, TR1 3HD

A summary of the results will be published on the Trust’s web site.

Signed __________________

Date __________________