

## Adrenaline

Adrenaline is an important drug that is used in a number of emergency medical situations. It is the first line treatment for severe allergic reactions (anaphylaxis) and is available on prescription in a pre-loaded injection device (known as an adrenaline auto-injector or AAI).

The following Factsheet is written to give people who are at risk of severe allergic reactions basic knowledge on how adrenaline works, what injectors are available, who should be prescribed adrenaline, how many injectors should be carried, when to use adrenaline and other important pieces of information.

If you are prescribed adrenaline, it should be available **at all times** – with no exceptions. After an injection is given, someone should call the emergency services immediately as the person will need to be observed in case there is a secondary reaction (known as biphasic anaphylaxis) and further treatment may be needed.

Adrenaline is also known as epinephrine, which is its international name. They are the same drug.

This Factsheet is for general information only and you should always be guided by your GP or allergy specialist. Throughout you will see brief medical references given in brackets. More complete references are published towards the end.

### What is anaphylaxis?

Anaphylaxis (also known as an anaphylactic reaction) is a serious allergic reaction that is rapid in onset and on rare occasions causes death. There may often be a rash or swelling affecting the skin and sometimes vomiting and diarrhoea. However, the more serious and severe features of the reaction are caused by swelling and tightening of the airways causing difficulty in breathing and/or a sudden fall in the blood pressure leading to dizziness and even collapse.

### How does adrenaline work?

Adrenaline acts quickly to open up the airways, reduce their swelling and raise the blood pressure. To work effectively, it must be given as soon as possible if there are any signs of a severe allergic reaction. With early treatment those more severe symptoms are easier to reverse.

### What adrenaline injectors are available?

The adrenaline injectors prescribed in the UK at present are Emerade®, EpiPen® and Jext®. They are designed for self-use and that is why they are usually referred to as '**adrenaline auto-injectors**' or 'AAIs'.

- Emerade® is the most recent single-use adrenaline auto-injector to become available. It has a needle guard to protect against needle stick injury. Visit [www.emerade-bausch.co.uk](http://www.emerade-bausch.co.uk)

- EpiPen® has a spring-loaded concealed needle. The built-in needle protection keeps the needle covered during and after use. Visit [www.epipen.co.uk](http://www.epipen.co.uk)
- Jext® has a locking needle shield which engages after use, designed to protect against needle injury. Visit [www.jext.co.uk](http://www.jext.co.uk)

If you have been prescribed one of the adrenaline auto-injectors listed above, it is vital that you are shown how to use it. We believe it is the responsibility of the medical professional who prescribed it to you to ensure that you are given training and check you understand the information provided. In our view, you are entitled to ask for training and follow-up training at a later date.

Adrenaline auto-injectors have a use-by date. If you carry them, you should make sure you go to your doctor for a replacement before this date. Each of the three companies listed above runs an expiry alert service. If you register your device and expiry date, they will send you a reminder when it is due to expire.

### Who should be prescribed adrenaline?

In the past, this question has caused some disagreement among medical experts. Most would agree that adrenaline should be prescribed to **anyone** who has previously experienced anaphylaxis. However, identifying people who have never had a severe allergic reaction, but are at risk of anaphylaxis, can be difficult. In our view, this requires the experience of an allergy specialist and any GP who is in doubt about an individual case should refer their patient to an allergy clinic.

The most recent specialist advice in the UK comes from the 2016 guideline of the British Society for Allergy and Clinical Immunology (BSACI), 'Prescribing an adrenaline auto-injector', which can be summarised as follows:

People who should be considered for long-term provision of an adrenaline auto-injector include those:

- Who have suffered an anaphylactic reaction where the cause is unknown (known as idiopathic anaphylaxis)
- Who have suffered an anaphylactic reaction where the known allergic trigger cannot easily be avoided
- Who are allergic to high-risk allergic triggers, for example nuts, with other risk factors also present, such as asthma, even if the reaction was relatively mild
- Who had a reaction in response to **trace amounts** of the allergic trigger
- Where an anaphylactic reaction triggered by food is only likely to occur if that food is eaten around the time of physical exercise (known as Food-Dependant Exercise-Induced Anaphylaxis or FDEIA).
- Where other significant other risk factors are present (e.g. asthma in someone with food allergy)

In our view, the above advice is sound. We believe the decision to prescribe adrenaline should be part of an approach that includes a thorough assessment of the patient. This can best be done at a specialist allergy clinic or by a GP who has had specialist training in allergy management.

### How is adrenaline administered?

The place where the adrenaline is administered is the same for all three auto-injectors. Emerade®, EpiPen® and Jext® are injected into the middle of the outer thigh (upper leg), through clothing if necessary. We would advise you to discuss this with your GP or allergy specialist so you are clear on this point. Training should also be given to everyone who might be required to give you the adrenaline in an emergency, such as your family members, school staff and day nursery staff.

You can find help on the website relevant to the adrenaline auto-injector you carry.

### When should adrenaline be administered?

This is something that should be discussed with your allergy specialist. As a general rule, you should administer your adrenaline auto-injector without delay if you believe your allergic reaction is severe, or becoming severe. Call for an ambulance immediately or get someone else to call for you. They should state that the person is suffering from anaphylaxis (pronounced ana-fill-axis).

The BSACI highlights the following symptoms that should help you recognise a potentially life-threatening reaction (BSACI, 2013).

- **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

Steady deterioration is also a warning sign that may mean an injection of adrenaline is vital. In our view you should be prepared to **play safe** if you have any suspicion that a reaction is getting worse. Your allergy specialist should help you understand in advance what symptoms provide a signal that a severe reaction is occurring.

The BSACI recommends that a written **Allergy Action Plan** should be provided by your doctor or allergy specialist, which should be individually tailored for each patient and should include advice as to when the adrenaline auto-injector should be used.

### How many injectors should I carry?

Over the past few years several guidelines have addressed this question.

### MHRA and EMA Guidelines

The Anaphylaxis Campaign supports the view of the UK's Medicines and Healthcare Products Regulatory Agency (MHRA) and European Medicines Agency (EMA). Their guidelines include a recommendation that

medical professionals should prescribe **two** auto-injectors, which patients should carry at all times. This is because some people can require more than one dose of adrenaline or the adrenaline auto-injector device can be used wrongly or occasionally misfire.

Depending on their age and level of understanding, we believe children should carry their adrenaline auto-injectors on their person at all times or they should be quickly and easily accessible at all times.

You can read the MHRA Report published in June 2014 here:

<http://www.mhra.gov.uk/home/groups/comms-ic/documents/websitesresources/con423091.pdf>

This was followed by an update published in August 2017 which can be found here:

<https://www.gov.uk/drug-safety-update/adrenaline-auto-injectors-updated-advice-after-european-review>

You can read the EMA recommendation here:

[www.ema.europa.eu/ema/index.jsp?curl=pages/news\\_and\\_events/news/2015/06/news\\_detail\\_002351.jsp&mid=WC0b01ac058004d5c1](http://www.ema.europa.eu/ema/index.jsp?curl=pages/news_and_events/news/2015/06/news_detail_002351.jsp&mid=WC0b01ac058004d5c1)

### BSACI Guideline

In September 2016 The British Society for Allergy and Clinical Immunology (BSACI) published their guideline entitled 'Prescribing an adrenaline auto-injector' (Ewan et al, 2016). This advised that 'normally only one auto-injector is needed for self-administration during a reaction' but acknowledged there may be exceptions when two auto-injectors need to be carried. These exceptions include:

- Where the patient is obese
- Where the patient is a long way from medical help
- Where there has been a previous life-threatening reaction
- If two injections were required in a short time period during previous reactions

The guideline says that in the case of children, two should usually be prescribed, one for home and one for school.

In order to provide clarity, a joint statement was issued in November 2016 by the BSACI and the two relevant patient support groups, the Anaphylaxis Campaign and Allergy UK. This states:

*'The BSACI has not made a blanket recommendation on the number of auto-injectors anyone should carry as this should be based on a risk assessment. The medical evidence shows that every patient should have a personally tailored management plan, which should determine whether one, two (or no) auto-injectors should be prescribed... Referral to an allergy specialist should be made to enable a comprehensive risk assessment to be carried out and where a personal management plan can be developed and talked through thoroughly...'*

*'The BSACI are in communication with the MHRA with a view to discussing how best to explain the apparent differences in their guidance, and the circumstances in which patients should be prescribed one, two (or no) auto-injectors. Meanwhile, the Anaphylaxis Campaign and Allergy UK will continue to support the MHRA line.'*

Should the dialogue between the BSACI and MHRA result in more clarity and consensus, we will amend this Factsheet accordingly.

The Anaphylaxis Campaign actively campaigns for people to be prescribed two AAI.

### The 2017 legislation covering adrenaline in schools

Legislation which came into effect in 2017 enables schools in the UK to buy AAIs without a prescription for emergency use on children who are at risk of anaphylaxis but whose own device is not available or not working.

The injection can be given to a child where both medical authorisation and written parental consent for use of the spare AAI has been provided.

Read the Department of Health's 2017 guidance document here:

<https://www.gov.uk/government/publications/using-emergency-adrenaline-auto-injectors-in-schools>

Also, read our Factsheet on frequently asked questions in schools:

<https://www.anaphylaxis.org.uk/wp-content/uploads/2019/07/Frequently-Asked-Questions-in-Schools-Factsheet-Jan-2018.pdf>

### Does adrenaline carry any risk?

Some people worry that adrenaline may be harmful, but evidence supports the relative safety of prescribed adrenaline devices so long as they are used correctly (Sheikh et al, 2011). Taking into account this evidence, we advocate that if you are unsure whether an allergic reaction is severe enough to require adrenaline, then it should be administered.

### Does adrenaline have any important drug interactions?

Anaphylaxis may be made worse by beta blockers (used to control heart rhythm, treat angina, and reduce high blood pressure) as these drugs decrease the effectiveness of adrenaline. Other drugs may also be contra-indicated. This is a matter for discussion with your GP or allergy specialist.

### How useful are adrenaline inhalers?

Leading allergy experts advise adrenaline by injection is essential in the treatment of life-threatening anaphylaxis and that adrenaline inhalers are less effective and not to be regarded as a substitute. This view is supported by the Resuscitation Council UK in its guidance for healthcare providers (Resuscitation Council,

2012).

Though inhalation of adrenaline from a pressurised inhaler was once recommended as a non-invasive alternative to an adrenaline injection, these are no longer available on prescription in the UK. This is because they are propelled by CFCs (chlorofluorocarbons), which are not used in Europe as they are suspected to damage the earth's ozone layer, which protects us from the Sun's ultraviolet radiation.

### Storage of adrenaline auto-injectors

All three of the adrenaline auto-injectors (AAIs) prescribed in the UK come with the following instructions on storage of the device: keep AAIs in their original containers to prevent light exposure, do not store above 25°C and do not freeze.

For EpiPen devices there is an additional instruction to not refrigerate the device. Adrenaline auto-injectors should be regularly checked to ensure the liquid is clear and colourless. If at any time the solution appears discoloured or contains particles the device should be replaced.

### Key messages

Adrenaline is the first line treatment for anaphylaxis but it will only be effective if it is available at all times, is used correctly and is used promptly. If you have been prescribed an adrenaline auto-injector, you should have it with you everywhere you go and you should ask the doctor who prescribed your adrenaline to show you how to use it. Follow-up training at various intervals is also important. Trainer auto-injectors without a needle or drug can be ordered from the websites of the three UK distributors (see web addresses above).

A call for an ambulance must always be made immediately after the adrenaline auto-injector is used. If your condition deteriorates after making the initial 999 call, a second call to the emergency services should be made to ensure that an ambulance has been dispatched.

You should discuss first aid measures during your consultation with an allergy specialist. BSACI guidelines state that if breathing is the main problem, the patient should sit up. If their blood pressure has fallen, they should lie flat, ideally with legs raised; however, if there is loss of consciousness or vomiting, they should be in the recovery position (Ewan et al 2016).

### References (in alphabetical order)

British Society for Allergy and Clinical Immunology (BSACI), 2013. Allergy Action Plan published in conjunction with the Royal College of Paediatrics and Child Health (RCPCH).

Department of Health, 2017. Using emergency adrenaline auto-injectors in schools, Crown Copyright.



European Medicines Agency, 2015. Better training tools recommended to support patients using adrenaline auto-injectors.

Ewan P, Braithwaite N, Leech S, Luyt D, Powell R, Till S, Nasser S, Clark A, 2016. BSACI Guideline: prescribing an adrenaline auto-injector. *Clinical and Experimental Allergy*, Vol 46, Issue 10, October 2016, Pages 1258-1280.

Medicines and Healthcare Products Regulatory Agency, 2014. Adrenaline auto-injectors: a review of clinical and quality considerations.

Sheikh A, Shehata YA, Brown SGA, Simons FER, 2011. Adrenaline (epinephrine) for the treatment of anaphylaxis with and without shock (review). *The Cochrane Collaboration* 2011.

Working Group of the Resuscitation Council UK, 2012. Emergency treatment of anaphylactic reactions, guidelines for healthcare providers.

### Reviewers

The content of this Factsheet has been peer-reviewed by Dr Adam Fox, consultant children's allergist and joint clinical lead at Guy's & St Thomas' Hospitals, London; Dr Trevor Brown, Honorary Consultant Paediatric Allergist, Ulster Hospital, Belfast; and Sue Clarke, Specialist Allergy Health Visitor.

### Disclosures

Dr Adam Fox has undertaken research funded by ALK-Abello; and has received consultancy fees from Mylan.

In 2016 ALK-Abello gave Sue Clarke an educational grant to attend the annual conference of the British Society for Allergy and Clinical Immunology.

### Disclaimer

The information provided in this Factsheet is given in good faith. Every effort is taken to ensure accuracy. All patients are different, and specific cases need specific advice. There is no substitute for good medical advice provided by a medical professional.