ADRENALINE AUTOINJECTORS IN ANAPHYLAXIS

This module is about the use of adrenaline autoinjectors (AAIs) in anaphylaxis

OBJECTIVES
- After completing this module you should:
  - Have a good understanding of anaphylaxis and its management
  - Understand the gaps in correct practice surrounding the provision of AAIs following an anaphylactic episode and their subsequent use
  - Feel confident in addressing management gaps with ongoing advice and training for patients and carers
  - Be aware of the different AAIs, their similarities and differences, and the support available

AUTHOR
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Anaphylaxis is a life-threatening allergic reaction of rapid onset that can affect people of any age, in any setting. Its management – intramuscular adrenaline – is universally agreed to be life-saving, and provision of AAIs to patients following an initial reaction should ensure prompt treatment in the event of recurrence. Despite the clear consensus on treatment for this life-threatening condition, substantial gaps exist in practice.

Evidence reveals areas for improvement in the management of anaphylaxis and AAI use in all settings,1,2 across healthcare professionals, patients and caregivers alike.3 The focus of this module is on two themes often placed on the initial episode, with long-term management of at-risk patients potentially being overlooked.4

A retrospective survey of first aid anaphylaxis management in children prescribed an AAI reported that it was used in less than a fifth of all anaphylactic reactions – just 29%.4 Potential cancers to administration include reluctance to carry the device, fear of needles and uncertainly about when and how to administer the AAI.5,6

Why do these gaps in practice persist today in the UK, and how can the pharmacist address them?

18. PHARMACY IN FOCUS

Anaphylaxis and the role of adrenaline
While the Resuscitation Council’s guidelines state that there is no universally agreed definition of anaphylaxis, they characterise it as a ‘life-threatening, generalised or systemic hypersensitivity reaction’7.

A broad range of anaphylactic triggers (allergic) exist, with food, drugs and venom being the most commonly identified.8 Adrenaline is the likely diagnosis if exposure to a trigger is associated with rapid onset of symptoms (within minutes of exposure) and life-threatening compromise of the airway, breathing or circulation.1

Approximately 20 deaths from anaphylaxis are reported annually in the UK, although this may well be an underestimate.9 The incidence of anaphylaxis has increased over the past decade or two in many parts of the world, including the UK.10 The risk of recurrent anaphylaxis (within minutes of exposure) following an initial reaction is high, estimated at approximately 1 in 12 per year.11

As described above, immediate intramuscular injection of adrenaline constitutes first-line treatment. Adrenaline is the only medication that reduces hospitalisation and death in anaphylaxis. Alpha-1 agonism strengthens cardiac contracttion and brings about bronchodilation.12 Delayed injection of adrenaline is associated with increased risk of fatality.13

Resolution of the acute episode, of course, does not signal the end of treatment of anaphylaxis.14 Given the unpredictable nature and rapid onset of anaphylaxis, guidelines recommend the provision of AAIs for patients with a history to a rapid treatment of future anaphylactic episodes.15 Provision of an AAI must be combined with specialist advice on allergen avoidance, a written treatment plan and clear training in AAI use.10

Potential pitfalls in AAI provision and use

• AAI availability
Patients prescribed AAI devices should make sure that they are accessible at all times, since they can’t predict when an anaphylactic episode will occur.16,17 And yet an alarming number of patients fail to do so; the proportion who do not keep their autoinjectors with them ranges, in different studies, from as low as 15% to 75%.1,18,19

Young people may feel uncomfortable carrying the device due to social implications, or may simply forget to do so. Pharmacists are well placed in the community to emphasise the importance of keeping AAIs to hand11, with regular checks to ensure they are not on infinite demand.20

• Dosing
The lowest AAI dose, 150 μg, is recommended for infants from the age of 6 months, as the cut-off for the strength is a minimum weight of 15 kg and avoidance should be possible for infants below 6 months of age. The AAI dose of 300 μg is recommended for children over 30 kg in weight, and for adults.21 One study indicated that some children were incorrectly prescribed a low-dose autoinjector even though they reached a weight of 30 kg, which would require a full dose.22

Children should be weighed regularly to ensure they are not on an incorrect dose.21

• Number of devices
The MHPA recommends that two AAIs are prescribed for patients at risk of anaphylaxis, and that these patients carry both AAIs at all times. This is due to uncertainties regarding the site of anaphylaxis and the spread of adrenaline action within the body.23

A UK study of AAI use in children and teenagers found that almost a third (32%) who used their AAI during anaphylaxis required more than a single dose.24

Available AAI devices
AAI devices utilise a multi-step technique that differs from one device to another. Introduction is provision and use varying degrees of informational materials and support.

The two main types of AAI delivery systems are cartridge-based or syringe delivery.25 Cartridge-based delivery appears to offer some advantage over syringe delivery,26 as adrenaline release only occurs once the needle is fully embedded into the tissue. Some devices carry a cartridge of adrenaline deposition throughout the needle track, potentially reducing the medication that reaches target muscles.

An overview of available AAIs is provided in table 1.27,28

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Doses</th>
<th>Container closure detail</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>EpiPen®</td>
<td>150 μg, 300 μg</td>
<td>Pre-filled cartridge encased in an autoinjector</td>
<td>Keep the autoinjector in the outer carton. Do not store above 25 °C. Do not refrigerate or freeze.</td>
</tr>
<tr>
<td>JetEd®</td>
<td>150 μg, 300 μg</td>
<td>Pre-filled cartridge encased in an autoinjector</td>
<td>Store below 25 °C. Do not freeze.</td>
</tr>
<tr>
<td>Emerade®</td>
<td>150 μg, 300 μg, 500 μg</td>
<td>Pre-filled syringe encased in an autoinjector</td>
<td>Store in the original package, a specially designed case to protect the pen and the labelling. Store below 25 °C. Do not freeze.</td>
</tr>
</tbody>
</table>

TAKING FIVE

5 minutes and 10 seconds.1

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Register your details for the relevant module, Adrenaline autoinjectors in anaphylaxis, Module 1.

Having studied the module and without referring to it again, complete the five minute test. If you need to refer to the test to answer the questions then you may need to study the module again.

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1. Frew AJ. Allergy 2011;66:15–24
9. 2015;8:32
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17. MHRA. Adrenaline auto-injectors: a review of adverse events. March 2018
19. 2015;3:159–167
20. 2015;8:32
21. 2015;8:32
22. 2015;8:32
23. 2015;8:32
24. 2015;8:32
25. 2015;8:32
26. 2015;8:32
27. 2015;8:32
28. 2015;8:32

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