



Anaphylaxis Awareness

Course Notes

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**The Emergency Medical Treatment of Anaphylactic Reactions
for First Medical Responders and for Community Nurses**

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Throughout this document the masculine is used to denote the masculine or feminine.

1 Objective of document

Anaphylaxis seems to be increasingly common, almost certainly associated with an appreciable increase in the prevalence of allergic disease over the last two or three decades. Although the drug treatment and management of anaphylaxis is described elsewhere,¹ anaphylaxis continues to be poorly managed. There are two main problems. First, adrenaline (epinephrine) is greatly under-used: chlorphenamine (chlorpheniramine) and hydrocortisone injections are given more often. Second, there has been a vogue for inappropriate use of intravenous adrenaline, both by paramedics and in Accident & Emergency departments, when adrenaline should have been given intramuscularly. Published recommendations for the management of anaphylaxis also vary. This document provides a broad consensus on the appropriate emergency management of acute anaphylactic reactions by first medical responders and community nurses who are unlikely to have specialised knowledge.

No definitive clinical trials exist to provide an unequivocal evidence base: moreover such evidence is unlikely to be forthcoming. A wealth of experience does, however, exist. This has been integrated through the wide membership of the Project Team which was convened under the aegis of the Resuscitation Council of the United Kingdom with representation from five Royal Colleges and three specialist associations: other members were co-opted because of their individual expertise. Consensus was achieved after two meetings and multiple circulation of working papers. An earlier document from broadly the same group (but at that time representing the Joint Royal Colleges and Ambulance Liaison Committee) has dealt with the management of anaphylaxis by paramedics - who are often the first to attend out of hospital emergencies.² This complementary document offers guidance to community nurses, general practitioners and Accident & Emergency staff who are usually the first to become involved. Anaphylactic reactions may occur after vaccinations, within hospital as a result of attempted hyposensitisation, after the administration of drugs including anaesthetic agents, or with contrast media. Some specialist groups have issued recommendations for the management of emergencies that occur under these specific circumstances.^{3 4 5 6} The present guidance is not intended to replace existing advice for defined groups in hospital nor to influence the essential individual advice and management provided in specialist clinics.

2 Recognition of anaphylactic and anaphylactoid reactions

2.1. There are no universally accepted definitions of anaphylactic and anaphylactoid reactions. Disparate mechanisms can lead to serious symptoms and signs due to sudden activation of mast cells and basophils. The term anaphylaxis is commonly used for hypersensitivity reactions typically mediated by immunoglobulin E (IgE). Anaphylactoid reactions are similar, but do not depend upon hypersensitivity. For simplicity the term anaphylaxis will be used here for both types of reactions unless there is an important distinction to be made. Their manifestations and management are similar so that the distinction becomes important only for follow-up management. Both may present clinically with angio-oedema, urticaria, dyspnoea, and hypotension. But some patients may die from acute irreversible asthma or laryngeal oedema with few more generalised manifestations.



Urticaria



Facial oedema

Other symptoms include rhinitis, conjunctivitis, abdominal pain, vomiting, diarrhoea, and a sense of impending doom. The skin colour usually changes: the patient may appear either flushed or pale. Cardiovascular collapse is a common manifestation⁷ especially in response to intravenous drugs or stings, and is caused by vasodilatation and loss of plasma from the blood compartment. Any cardiac dysfunction is due principally to hypotension, or rarely to an underlying disease,^{8,9} or to adrenaline that has been administered intravenously.¹⁰

Anaphylactic reactions vary in severity and progress may be rapid, slow, or (unusually) biphasic.¹¹ Rarely manifestations may be delayed by a few hours (adding to diagnostic difficulty), or persist for more than 24 hours.⁸ Reactions may follow exposure to a variety of agents - with insect stings, drugs or contrast media, and some foods being the most common. Peanut and tree nut allergy now accounts for a significant incidence of anaphylaxis.¹² Muscle relaxants may cause anaphylaxis whilst anaesthetic agents are important causes of anaphylactoid reactions.^{3,13} Beta blockers may increase the severity of an anaphylactic reaction and antagonise the response to adrenaline.¹⁴ They may also increase the incidence of anaphylaxis, but the data are limited.^{14,15} The complex nature of anaphylaxis has been described in reviews.^{16,17,18}

2.2. The lack of any consistent clinical manifestation and a wide range of possible presentations may cause diagnostic difficulty. Clinical experience has shown that many patients with genuine anaphylaxis do not always receive appropriate medication. Rarely, patients have been given injections of adrenaline inappropriately for vasovagal reactions or panic attacks. Diagnostic problems have arisen particularly in children. Guidelines for the management of shock from anaphylaxis must therefore take into account the inevitability of some diagnostic errors, with an emphasis on the need for safety of any recommended measures.

2.3. In each case, a full history and examination should be undertaken as soon as circumstances permit. The history of previous allergic reactions is important as well as that of the recent incident. Special attention should be paid to the condition of the skin, the pulse rate, the blood pressure, the upper airways, and auscultation of the chest. Peak flow should be measured where possible, and recorded.

2.4. Investigations prove anaphylactic sensitivity to an allergen by giving a challenge with the suspect agent. But an attempt should always be made retrospectively to assess the likelihood that a severe reaction was genuinely of an anaphylactic nature. Whilst this is a matter for a specialist clinic rather than part of emergency management, a possible anaphylactic emergency provides an opportunity for specific blood tests. Measurements of specific IgE antibody are useful but must be interpreted carefully. Measurement of mast cell tryptase can also assist with retrospective diagnosis.¹⁹ Both of these tests can be performed on 10 ml of clotted blood which hospitals can send to a reference laboratory. Ideally blood should be taken 45 to 60 minutes after the reaction, but in any case not later than six hours after the event. The use of blood tests is to be encouraged because future management can be helped by increased diagnostic certainty.

2.5. No reliable epidemiological data are available on the incidence of anaphylaxis partly because of the difficulty defining anaphylactic reactions, but one study found an incidence of 1:2300 attendees at an Accident & Emergency Department, (equivalent to 1 episode per 15,000 of the population per annum) and fourfold more (1 in 3,700 pa) in the second part of the study the following year.²⁰ Another report, published since this monograph went to press, showed that 1 in 5800 emergency inpatient admission had a primary diagnosis of anaphylaxis.^{20a} A detailed prospective survey of fatal and severe reactions in children 0-15 years, conducted primarily through British Paediatric Surveillance Unit, will be available in 2002.^{20b} The overall mortality, however, is unknown. Some allergens may cause short lived sensitivity. Only a minority of patients may suffer second attacks in response to penicillin²¹ and contrast agents, and approximately half do so after insect stings.²² Peanuts on the other hand, may leave patients with a persisting predisposition to anaphylaxis after a first attack, but eventual resolution occurs in some.

3 Considerations in relation to treatment

3.1. Adrenaline is generally regarded as the most important drug for any severe anaphylactic reaction,⁷ although there has been no standard recommendation for dose or route. As an alpha-receptor agonist, it reverses peripheral vasodilatation and reduces oedema. Its beta-receptor activity dilates the airways, increases the force of myocardial contraction, and suppresses histamine and leukotrine release. Adrenaline works best when given early after the onset of the reaction²³ but it is not without risk, particularly when given intravenously.¹⁰ But adverse effects are extremely rare with appropriate doses administered intramuscularly; the only reported case of myocardial infarction had numerous risk factors for coronary

disease.²⁴ Sometimes there has been uncertainty as to whether complications (for example myocardial ischaemia) have been due to the effects of the allergen itself or to adrenaline given as treatment for it.

3.2. Adrenaline is generally the only drug available for use by community nurses. After consultation with representatives of the Department of Health and the British National Formulary, the guidelines were modified for use in this setting.²⁵ It is anticipated, however, that patients who have had this first line treatment will be transferred rapidly to hospital where any necessary further measures can be taken.

3.3. Adrenaline may rarely fail to reverse the clinical manifestation of anaphylaxis, especially in late reactions or in patients treated with beta blockers. Other measures then assume greater importance, particularly volume replacement.

3.4. Antihistamines (H1 blockers) should be used routinely in the management of all anaphylactic reactions by medical practitioners to help counter histamine mediated vasodilatation. They may be unhelpful for at least some anaphylactoid reactions that depend in part on other mediators but have the virtue of safety. Their use alone is, however, unlikely to be life-saving.

3.5. Corticosteroids are considered as slow acting drugs and may take up to 4-6 hours to have an effect even if given intravenously. They may, however, help in the emergency treatment of an acute attack, and they also have a role in preventing or shortening protracted reactions. They form an essential part of management in recurrent idiopathic anaphylaxis^{26 27} and are also of special importance in asthma especially those who have been treated recently with corticosteroids. Although some authors are unenthusiastic about corticosteroids,²⁷ and the contribution of individual drugs when several are given is difficult to prove, clinical experience shows that parenteral hydrocortisone is of value in anaphylaxis. The safest practice is to use corticosteroids for all victims likely to be suffering from a severe anaphylactic reaction.

4 Recommendation for management

4.1. The recommendations for treatment by medical practitioners are summarised in the algorithm shown on page 8 (for adults) and page 9 (for children). The modified algorithms for use by community nurses are shown on page 10 (for adults) and page 11 (for children).

4.2. All victims should recline in a position of comfort. Lying flat with or without leg elevation may be helpful for hypotension but unhelpful for breathing difficulties. If available, oxygen should be administered at high flow rates (10-15 L per minute). Cardiopulmonary resuscitation must be performed if the need arises.

4.3. Adrenaline should be administered intramuscularly to all patients with clinical signs of shock, airway swelling, or definite breathing difficulty,⁷ and will be rapidly absorbed. Manifestations such as inspiratory stridor, wheeze, cyanosis, pronounced tachycardia, and decreased capillary filling alerts the physician to the likelihood of a severe reaction. For adults, a dose of 0.5 ml adrenaline 1: 1000 solution (500 micrograms) should be administered intramuscularly, and repeated after about 5 minutes in the absence of clinical improvement or if deterioration occurs after the initial treatment especially if consciousness becomes - or remains - impaired as a result of hypotension. In some cases several doses may be needed, particularly if improvement is transient. See also further notes under algorithms on pages 8 and 10.

The doses of adrenaline recommended for children have been modified slightly²⁵ since the original publication to take account of difficulties that had been reported relating to dilution of the smallest injections. We have also taken the opportunity of modifying the age brackets to bring them more closely into line with the recommendations from the Royal College of Paediatrics and Child Health.²⁸ The consultations have also led to compatibility of dose recommendations between the Project Team and the British National Formulary. The modified recommendations are as follows:

> 12 years :	up to 500 micrograms IM (0.5 ml 1:1000 solution) 250 micrograms if child is small or prepubertal
6 - 12 years:	250 micrograms IM (0.25 ml 1:1000 solution)
> 6 months - 6 years:	120 micrograms IM (0.12 ml 1: 1000 solution)
< 6 months:	50 micrograms IM (0.05 ml, absolute accuracy not essential)

As for adults, doses may be repeated after 5 minutes if necessary. See further notes under algorithms on pages 9 and 11.

Devices are available for home use, currently known as the EpiPen (or Anapen) and the EpiPen Jr (or Anapen Junior) that can inject 300 micrograms or 150 micrograms respectively. The drug may therefore have been administered by parents before medical help is available. The doses can be regarded as equally suitable as the 250 micrograms and 125 micrograms more generally recommended. Other pre-loaded devices include Min-I-Jet Adrenaline (not for self-administration), which currently contains 1 mg (1000 micrograms) of adrenaline. This allows incremental dose selection, but it should not be used in children because of the risk of overdose.



The EpiPen (adult & junior)

4.4. Intravenous administration of adrenaline is hazardous and should be given in a dilution of at least 1:10 000 (**never** 1:1000). Intravenous injection of adrenaline must be reserved for patients with profound shock that is immediately life threatening and for special indications, e.g. during anaesthesia. The injection should be given as slowly as seems reasonable while monitoring heart rate and the electrocardiogram.

4.5. An antihistamine (chlorphenamine) should be administered. Caution is needed to avoid "drug induced" hypotension: administer either by slow intravenous injection or by intramuscular injection. Its use may be helpful and is unlikely to be harmful. The dose for children and adults is determined by age as follows:

> 12 years :	10 - 20 mg IM
6 - 12 years:	5 - 10 mg IM
1 - 6 years:	2.5 - 5 mg IM

As for adrenaline doses, the age brackets have been modified slightly since the previous publication.

4.6. Hydrocortisone (as sodium succinate) should be administered after severe attacks to help avert late sequelae. This is of particular importance for asthmatics (who are at increased risk of severe or fatal anaphylaxis) if they have been treated with corticosteroids previously. The dose of hydrocortisone should be given by slow intravenous or intramuscular injection - care being taken to avoid inducing further hypotension. The dose for adults and children is determined by age as follows:

> 12 years :	100 to 500 mg IM
6 - 12 years:	100 mg IM
1 - 6 years:	50 mg IM

As for adrenaline and chlorphenamine doses, the age brackets have been modified slightly since the previous publication.

4.7. If severe hypotension does not respond rapidly to drug treatment, fluid should be infused. A crystalloid may be safer than a colloid.²⁹ A rapid infusion of 1-2 L may be needed. Children should receive 20 ml/kg rapidly, followed by another similar dose if there is no clinical response.

4.8. Patients with even moderately severe attacks should be warned of the possibility of an early recurrence of symptoms and in some circumstances should be kept under observation for up to 8 -24 hours. This caution is particularly applicable to:

- severe reactions with slow onset due to idiopathic anaphylaxis
- reactions in individuals with severe asthma or with a severe asthmatic component
- reactions with the possibility of continuing absorption of allergen
- patients with a previous history of biphasic reactions.

4.9. An inhaled beta₂ agonist such as salbutamol is useful³⁰ as an adjunctive measure if bronchospasm is a major feature that does not respond rapidly to other treatment.

4.10. All sufferers from anaphylaxis should be advised of the benefits of wearing some device such as a bracelet that will inform bystanders at the time of any future attack. Precautions should be taken, where practicable, to avoid exposure to the suspected allergen.

4.11. Investigation and assessment at a specialist allergy clinic is recommended for all patients who have suffered a severe reaction

5 Cautions

5.1. Patients who are taking tricyclic antidepressants or monoamine oxidase inhibitors should receive only 50% of the usual dose of adrenaline because of an interaction, which is potentially dangerous. Some fluorohydrocarbons used as refrigerants as well as cocaine sensitise the heart to adrenaline and are contraindications to its use.³¹

5.2. The use of adrenaline by the intravenous route in the special circumstances given in paragraph 4.4 should usually be reserved for medically qualified personnel who have experience of it, who know that it must be administered with extreme care, and who are aware of the hazards associated with its use.

5.3. The subcutaneous route for adrenaline, sometimes recommended for children on anecdotal evidence only, has no role in anaphylaxis because its absorption is appreciably slower.³² Unnecessary delay in achieving adequate plasma concentrations is inappropriate when dealing with this emergency.

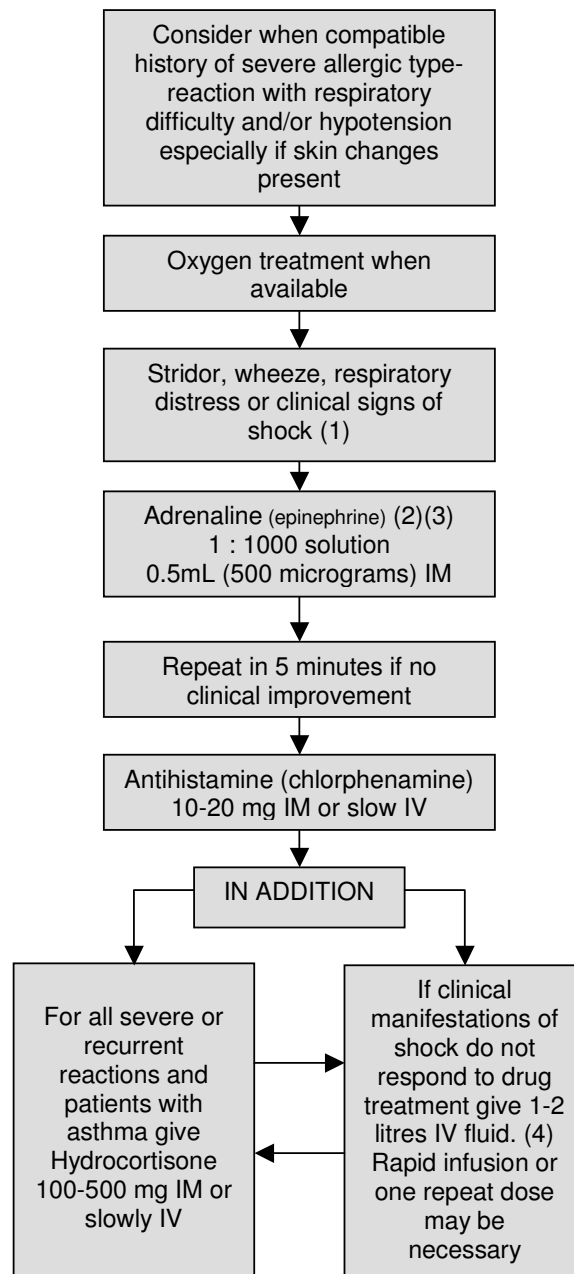
5.4. Warnings must be given, when appropriate, in relation to the two strengths of adrenaline that are available for injection. For anaphylaxis, adrenaline is used in a dilution of 1:1000 intramuscularly whereas a dilution of 1:10 000 is used intravenously principally for cardiac arrest (with the rare additional indications outlined in paragraphs 4.4 and 5.2).

5.5. All who treat anaphylaxis should be aware of the potential for confusion between anaphylaxis and a panic attack. Victims of previous anaphylaxis may be particularly prone to panic attacks if they think they have been re-exposed to the allergen that caused a previous problem. The sense of impending doom and breathlessness leading to hyperventilation are symptoms that resemble anaphylaxis in some ways. Whilst there is no hypotension, pallor, wheeze, or urticarial rash / swelling, there may sometimes be an erythematous rash associated with anxiety which adds to the diagnostic difficulty. A mild anaphylactic reaction that triggers panic causes particular diagnostic difficulty. Problems can also arise with vasovagal attacks after immunisation procedures, but the absence of rash, breathing difficulties, and swelling is a useful distinguishing feature as is the slow pulse of a vasovagal attack compared with the rapid pulse of a severe anaphylactic episode.

6 References

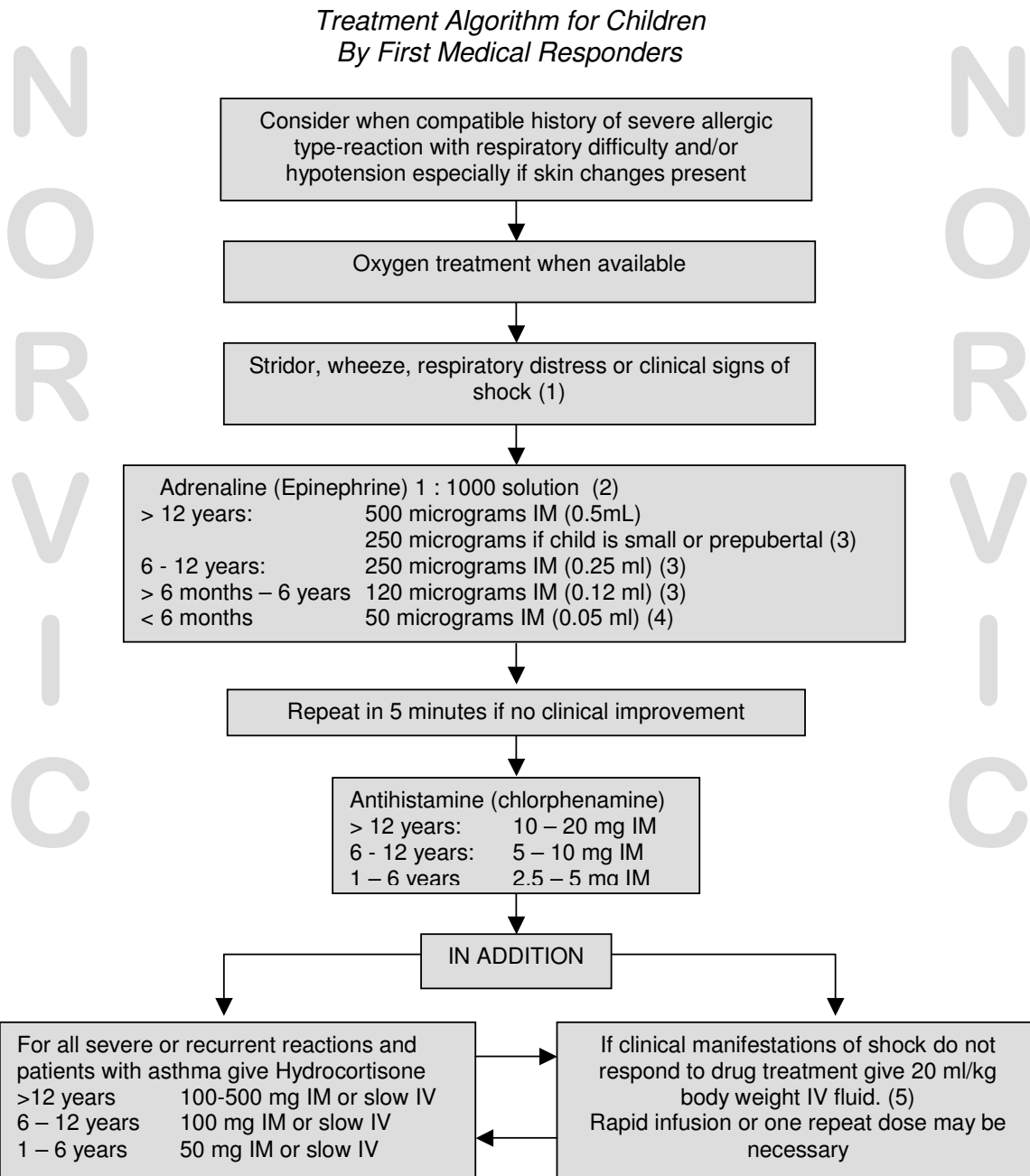
- 1 Ewan PW. Treatment of anaphylactic reactions. *Prescribers' Journal* 1997;**37**:125-32.
- 2 A Statement from the Resuscitation Council (UK) & the Joint Royal Colleges Ambulance Service Liaison Committee. The use of adrenaline for anaphylactic shock (for ambulance paramedics). *Ambulance UK* 1997; **12**:
- 3 Gavalas M, Sadana A, Metcalf S. Guidelines for the management of anaphylaxis in the emergency department. *J Accid Emerg Med* 1998; **15**: 96-98.3
- 4 Suspected Anaphylactic Reactions Associated with Anaesthesia. Revised Edition 1995. The Association of Anaesthetists of Great Britain and Ireland and The British Society of Allergy and Clinical Immunology.
- 5 Advice on the management of reactions to intravenous contrast media. Board of Faculty of Clinical Radiology. The Royal College of Radiologists, 1996. ISBN 872599 22 2. Royal College of Radiologists, London.
- 6 Immunisation against infectious disease. Department of Health, Welsh Office, Scottish Office Department of Health, DHSS (Northern Ireland). HMSO 1996.
- 7 Fisher M. Treatment of acute anaphylaxis. *Br Med J* 1995;**311**:731-3.
- 8 Fisher M McD. Clinical observations on the pathophysiology and treatment of anaphylactic cardiovascular collapse. *Anaesth Intens Care* 1986;**14**:17-21.
- 9 Jones E, Joy M. Acute myocardial infarction after a wasp sting. *Br Heart J* 1988;**59**:506-8.
- 10 Barach EM, Nowak RM, Lee TG, Tom Lanovich MC. Epinephrine for treatment of anaphylactic shock. *JAMA* 1984; **251**:21 18-22.
- 11 Douglas DM, Sukenick E, Andrade WP, Brown JS. Biphasic systemic anaphylaxis: an inpatient and outpatient study. *J Allergy Clin Immunol* 1994;**93**:977-985.
- 12 Ewan PW. Clinical study of peanut and nut allergy in 62 consecutive patients; new features and associations. *Br Med J* 1996;**312**:1074-8.
- 13 Fisher M McD, Baldo BA. Anaphylactoid reactions during anaesthesia. *Clin Anaesth* 1984;**2**:677-92.
- 14 Toogood JH. Risk of anaphylaxis in patients receiving beta-blocker drugs. *J Allergy Clin Immunol* 1988;**81**:1-5.
- 15 Hepner MJ, Ownby DR, Anderson JA, Rowe MS, Sears-Ewald D, Brown EB. Risk of systemic reactions in patients taking beta-blocker drugs receiving allergen immunotherapy injections. *J Allergy Clin Immunol* 1990;**86**:407-11
- 16 Bochner BS, Lichtenstein LM. Anaphylaxis. *N Engl J Med* 1991;**324**:1785-90.
- 17 Brown AFT. Anaphylactic shock: mechanisms and treatment. *J Accid Emerg Med* 1995;**12**:89-100.
- 18 Ewan PW. Anaphylaxis. *Br Med J* 1998;**316**: 1442-5
- 19 Schwartz LB, Bradford TR, Rouse C, Irani A-M, Rasp G, van der Zwan JK, van der Linden P-W G. Development of a new, more sensitive immunoassay for human tryptase: use in systemic anaphylaxis. *J Clin Immunol* 1994;**14**:190-204.
- 20 Stewart AG, Ewan PW. The incidence, aetiology and management of anaphylaxis presenting to an Accident and Emergency department. *Q J Med* 1996;**89**:859-64.
- 20a Sheikh A, Alves B. Age, sex, geographical and socio-economic variations in admission for anaphylaxis: analysis of four years of English hospital data. *Clin Exp Allergy* 2001;**31**:1571-76.
- 20b Macdougall CF, Cant AJ, Colver AF. How dangerous is food allergy in childhood? The incidence of severe and fatal allergic reactions across the UK and Ireland.
- 21 Weiss ME, Adkinson NF. Immediate hypersensitivity reactions to penicillin and related antibiotics. *Clin Allergy* 1988;**18**:515-40.
- 22 Hunt KJ, Valentine MD, Sobotka AK, Benton AW, Amodio FJ, Lichtenstein LM. A controlled trial of immunotherapy in insect hypersensitivity. *N Engl J Med* 1978;**299**:157-61.
- 23 Patel L, Radivan FS, David TJ. Management of anaphylactic reactions to food. *Arch Dis Child* 1994;**71**:370-5.
- 24 Saff R, Nahhas A, Fink JN. Myocardial infarction induced by coronary vasospasm after self-administration of epinephrine. *Ann Allergy* 1993;**70**:396-8.
- 25 Project Team of the Resuscitation Council (UK). Update on the emergency medical treatment of anaphylactic reactions for first medical responders and for community nurses. *Resuscitation* 2001; **48**: 241-243. Also published in *Emergency Medicine, Professional Nurse, Community Nurse, and Nursing Standard, Nursing in Practice*.
- 26 Wiggins CA, Dykewicz MS, Patterson R. Idiopathic anaphylaxis: a review. *Ann Allergy* 1989;**62**:1-5.
- 27 Brown AFT. Therapeutic controversies in the management of acute anaphylaxis. *J Accid Emerg Med* 1998;**15**:89-95.
- 28 Medicines for children. Royal College of Paediatrics and Child Health (London) 1999 p viii
- 29 Schierhout G, Roberts I. Fluid resuscitation with colloid or crystalloid solutions in critically ill patients: a systematic review of randomised trials. *Br Med J* 1998, **316**: 961-4.
- 30 Turpeinen M, Kuokkanen J, Backman A. Adrenaline and nebulised salbutamol in acute asthma. *Arch Dis Child* 1984;**59**:666-8.
- 31 Cregler LL. Cocaine: the newest risk factor for cardiovascular disease. *Clin Cardiol* 1991;**14**:449-56.
- 32 Simons FE, Roberts JR, Gu X, Simons KJ. Epinephrine absorption in children with a history of anaphylaxis. *J Allergy Clin Immunol* 1998;**101**:33-7.

*Treatment Algorithm for Adults
By First Medical Responders*



- (1) An inhaled beta² antagonist such as salbutamol may be used as an adjunctive measure if bronchospasm is severe and does not respond to any other treatment.
- (2) If profound shock judged **immediately** life threatening give CPR/ALS if necessary. Consider **slow** IV adrenaline (epinephrine) 1:10,000 solution. This is **hazardous** and is recommended only for an experienced practitioner who can also obtain IV access without delay. Note the different strength of adrenaline (epinephrine) that may be required for IV use.
- (3) If adults are treated with an EpiPen, the 300 micrograms will usually be sufficient. A second dose may be required. Half doses of adrenaline (epinephrine) may be safer for patients on amitriptyline, imipramine or beta blocker.
- (4) A crystalloid may be safer than a colloid.

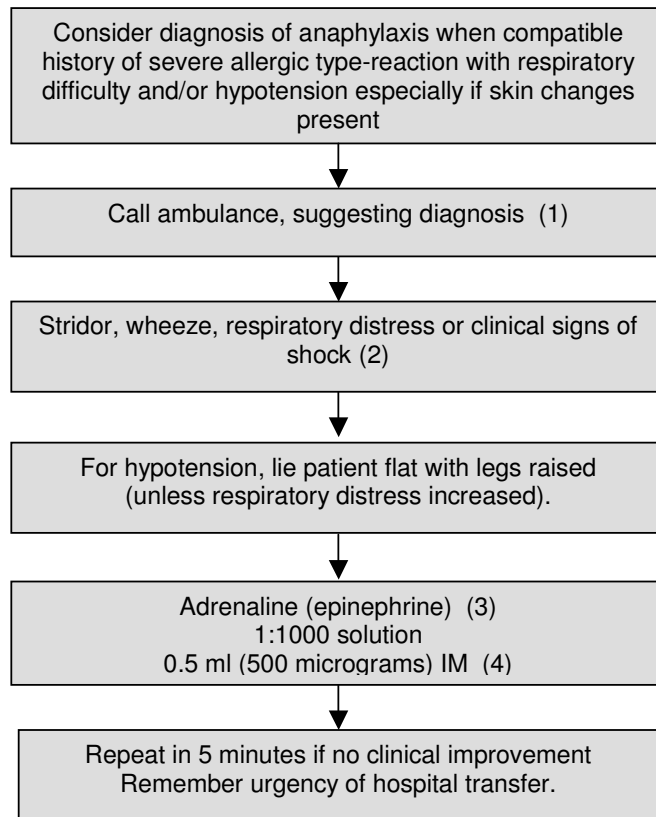
7 Treatment algorithms (cont.)



- (1) An inhaled beta² antagonist such as salbutamol may be used as an adjunctive measure if bronchospasm is severe and does not respond to any other treatment.
- (2) If profound shock judged **immediately** life threatening give CPR/ALS if necessary. Consider **slow** IV adrenaline (epinephrine) 1:10,000 solution. This is **hazardous** and is recommended only for an experienced practitioner who can also obtain IV access without delay. Note the different strength of adrenaline (epinephrine) that may be required for IV use.
- (3) For children who have been prescribed Epipen, 150 micrograms can be given instead of 120 micrograms, and 300 micrograms can be given instead of 250 or 500 micrograms.
- (4) Absolute accuracy of the small dose is not essential.
- (5) A crystalloid may be safer than a colloid.

7 Treatment algorithms (cont.)

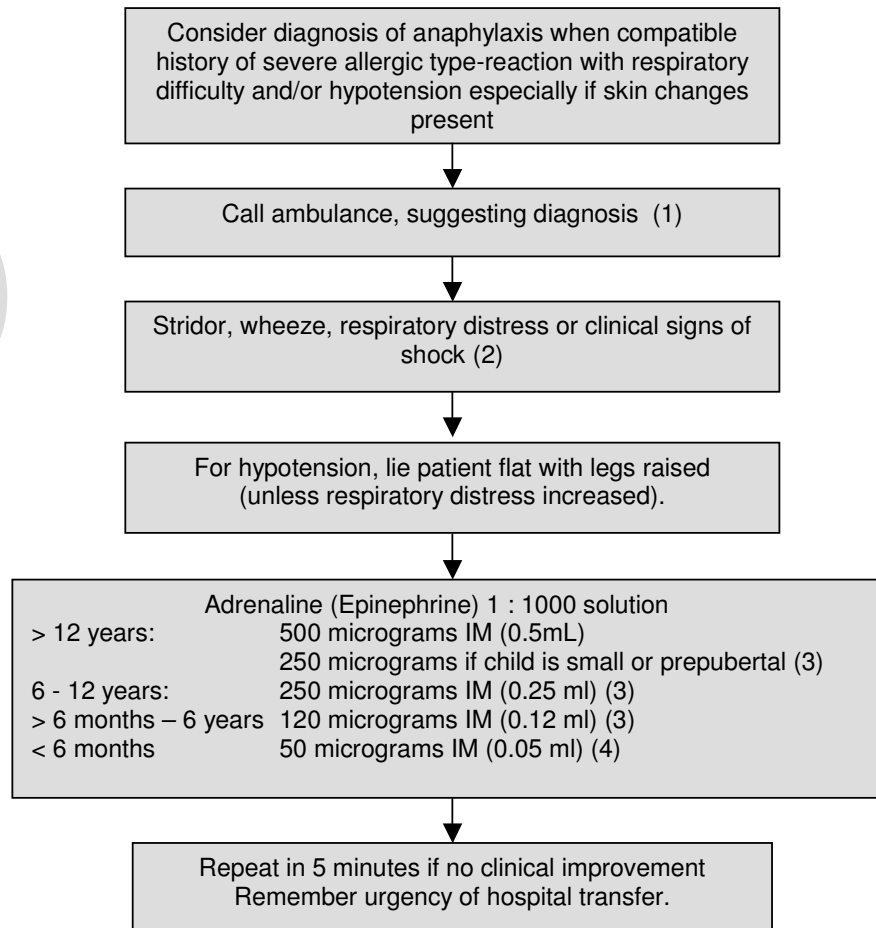
Treatment Algorithm for Adults in the Community



- (1) Ambulance will be equipped with oxygen, salbutamol and fluids which may be used as adjunctive therapy.
- (2) If profound shock judged to be **immediately** life threatening give CPR/ALS if necessary.
- (3) Half doses of adrenaline (epinephrine) may be safer for patients on amitriptyline, imipramine or beta blocker.
- (4) If adults are treated with an EpiPen, the 300 micrograms will usually be sufficient. A second dose may be required but this should be considered **ONLY** if the patient's condition continues to deteriorate 5 minutes after the first dose.

7 Treatment algorithms (cont.)

Treatment Algorithm for Children in the Community



- (1) Ambulance will be equipped with oxygen, salbutamol and fluids which may be used as adjunctive therapy.
- (2) If profound shock judged to be **immediately** life threatening give CPR/ALS if necessary.
- (3) For children who have been prescribed Epipen, 150 micrograms can be given instead of 120 micrograms, and 300 micrograms can be given instead of 250 microgram or 500 micrograms.
- (4) Absolute accuracy of small doses is not essential.