

Anaphylaxis

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Anaphylaxis

- Epidemiology
- Clinical features
- Pathophysiology
- Management
 - Acute
 - Long term (prevention)

A (na) phylaxis

Originates from Greek, meaning against or without protection.

vs. prophylaxis, for protection

“A rapidly evolving, generalised multi-system reaction characterized by one or more symptoms or signs of respiratory, cardiovascular and other systems such as the skin and/or GI tract.”

Epidemiology

- Uncommon
- Incidence:
 - 8.4 - 21 per 100,000 patient years¹
 - 30-950 per 100,000 patient years²
 - Lifetime prevalence of 1:1333 for UK population³

¹Brown et al., MJA (2007); Sampson et al. JACI (2005)

²Lieberman et al, (2006) quoted by Resuscitation Council (UK) 2008

³Stewart AG, Ewan PW, Quarterly Journal of Medicine (1996)

Mortality

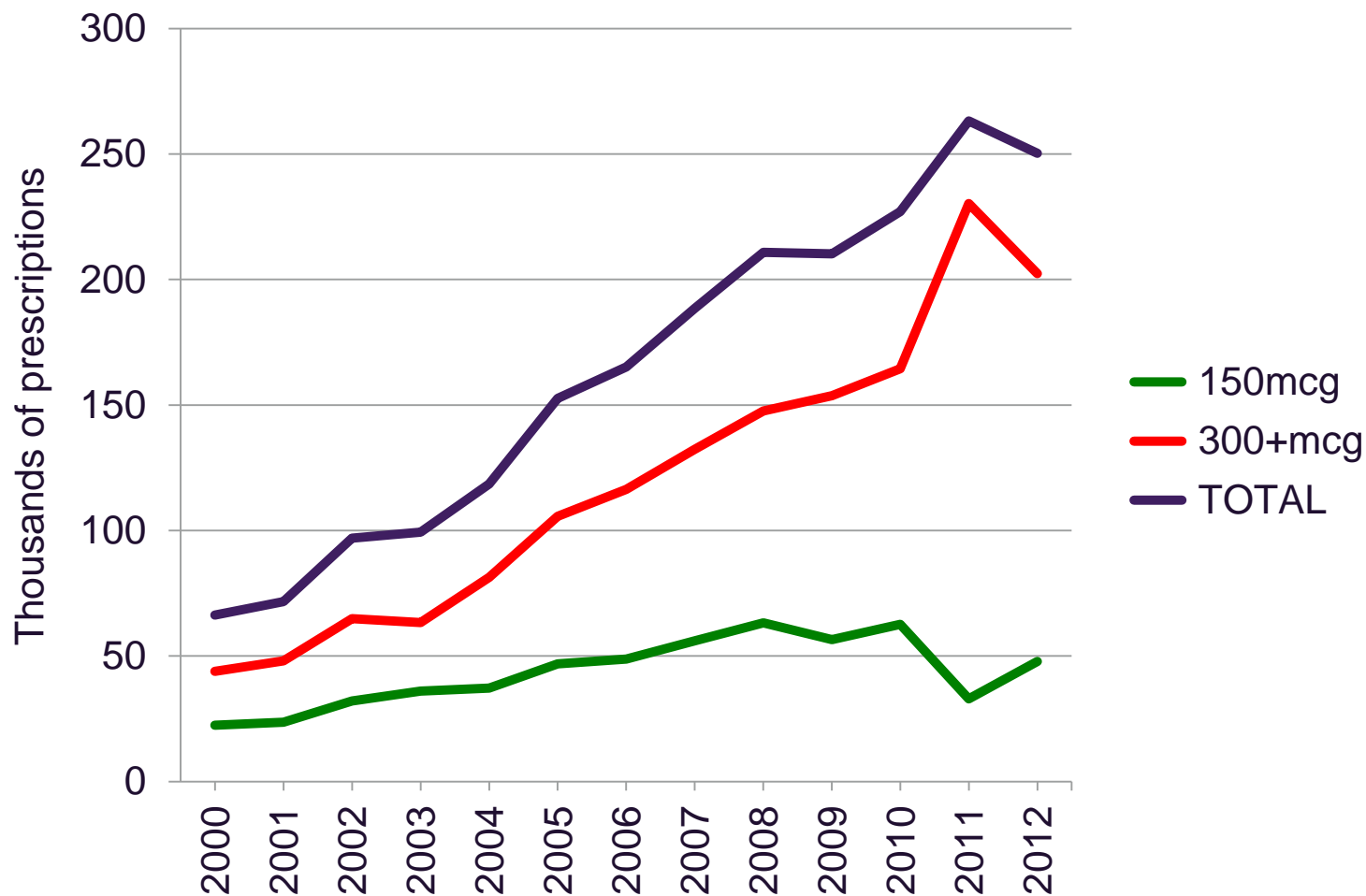
- About 1 per 1 - 3 million population p.a.
- In ED (Aus): 1 per 100-200 episodes
- Approx 20-30 deaths p.a. in UK, probably an underestimate.

≈ 1 per 100,000 patient years
- Most due to medication or blood Tx, sometimes to insect stings; food less common.

Mortality

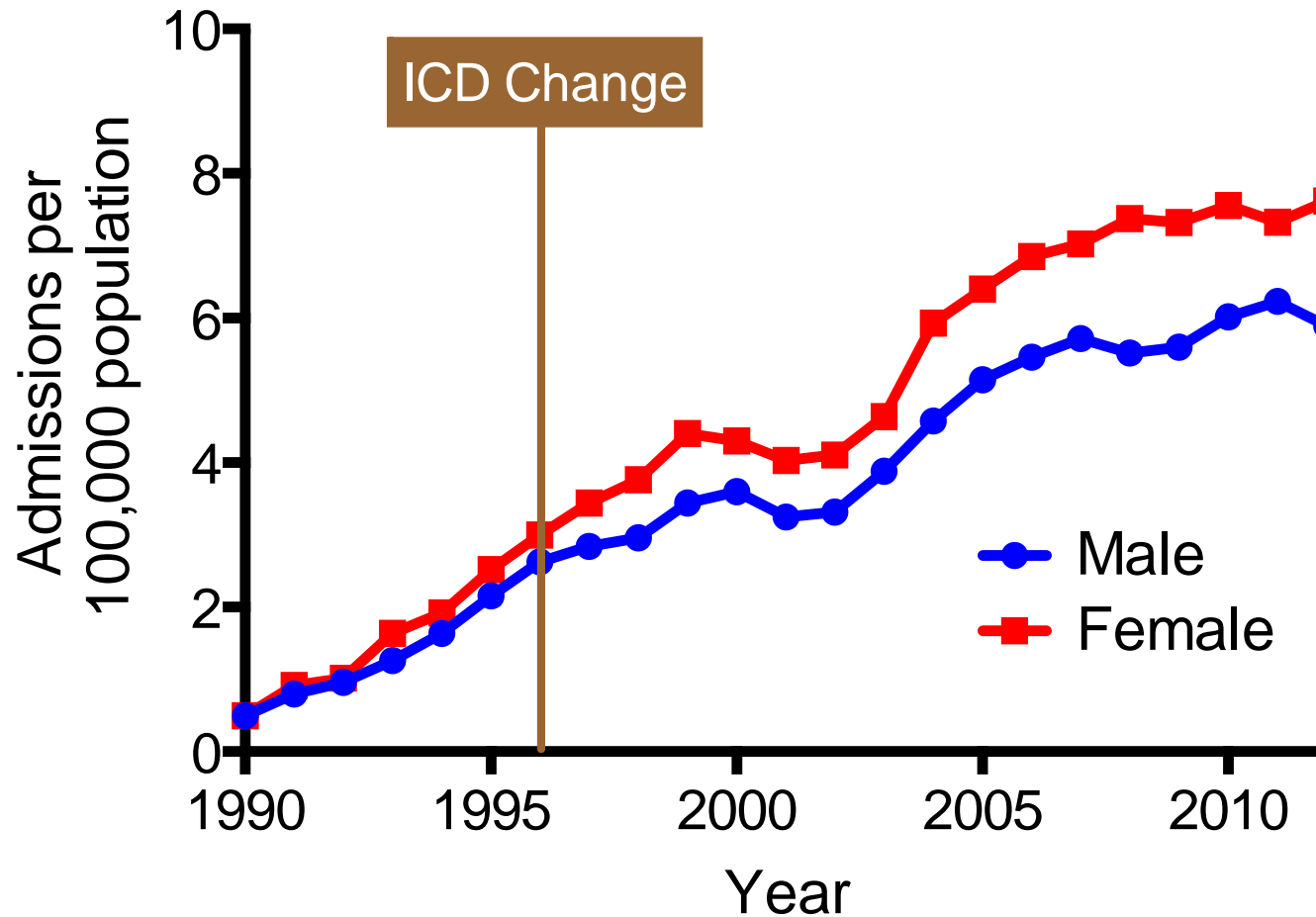
Anaphylaxis is not uncommon,
but death from anaphylaxis is very rare.

Adrenaline auto-injector devices

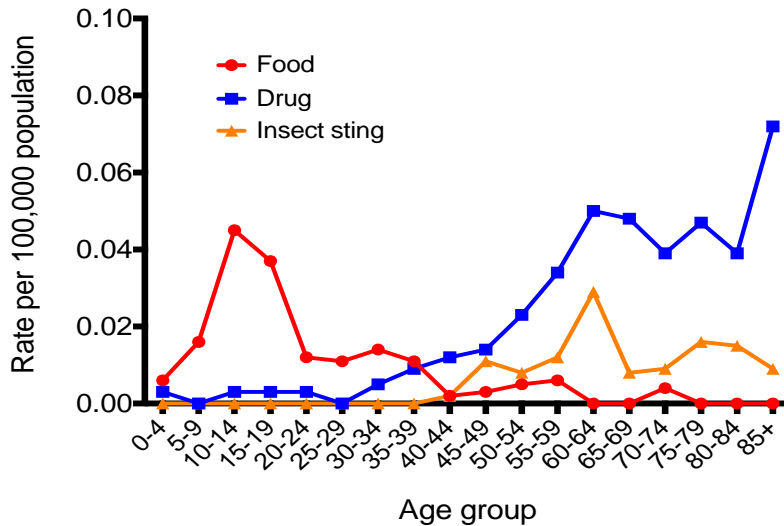
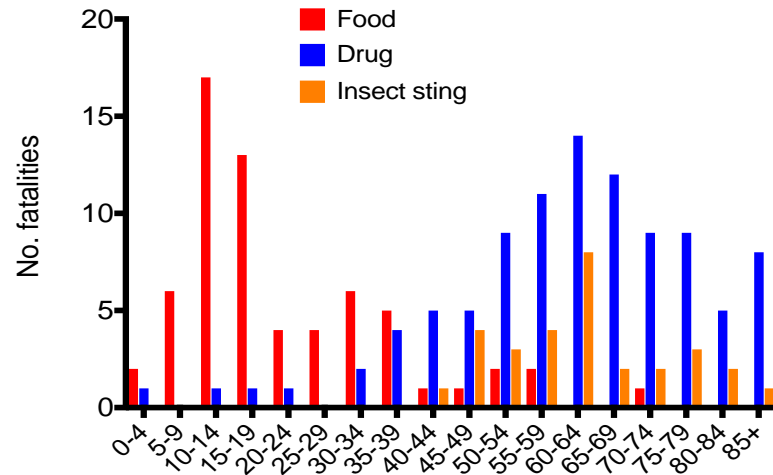


Data: NHS Prescription Cost Analysis for England, 2000-2012

Hospital admissions for anaphylaxis



Anaphylaxis: fatalities by age group



Causes

- Foods
- Drugs
- Insect Stings
- Exercise
- Idiopathic

Foods commonly causing anaphylaxis

- Peanut
- Tree nuts
- Shellfish
- Milk
- Egg
- Fish
- Fruit
- Wheat
- Soy
- Sesame

Drugs causing anaphylaxis

Antibiotics

Penicillins/other Beta-lactams

Non-Beta-lactam antibiotics

General anaesthesia

Neuromuscular blockers

Anaesthetic agents

Latex

Aspirin/NSAID's

ACE-inhibitors

IV radiocontrast media

Others:

Local anaesthetics

Plasma expanders

Insulin

Heparin




Chlorhexidine

Opiates

Vaccines

Corticosteroids

Stinging insects in UK

Insect	Description	Image*	Field stings-usual time of year
Wasp (<i>Vespula vulgaris</i>)	~19 mm long, yellow head with black stripes, black thorax with yellow sides, yellow abdomen with black bands, black antennae and yellow legs.		March-October
European Hornet (<i>Vespa crabro</i>)	35 mm long, reddish brown head, black and brown shaded thorax, yellow and black shaded abdomen.		March-October
Honey bee (<i>Apis mellifera</i>)	12.7-25.3 mm, covered with short dense hair, usually golden brown and black, abdomen striped.		March-October, occasionally even in warm winter days

Key clinical features of anaphylaxis

1. Generalized allergic reaction with respiratory and/or cardiovascular involvement
 - » Respiratory much more prevalent in children
2. Involvement of many parts of the body
3. Rapid onset and progression.

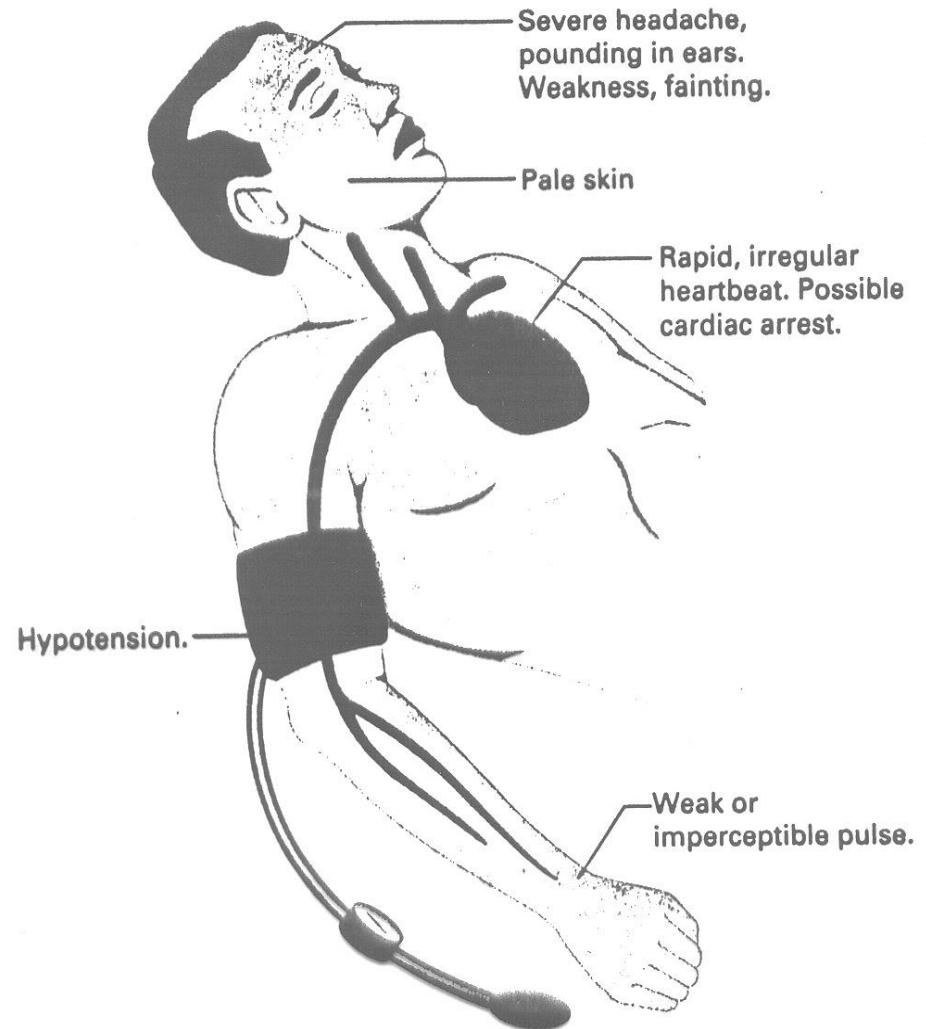
Clinical Manifestations

Skin:

- Flushing
- Pruritus
- Urticaria
- Angioedema

CVS:

- Tachycardia (bradycardia)
- Hypotension/shock
- Arrhythmias
- Ischaemia, chest pain



Clinical Manifestations

Upper respiratory:

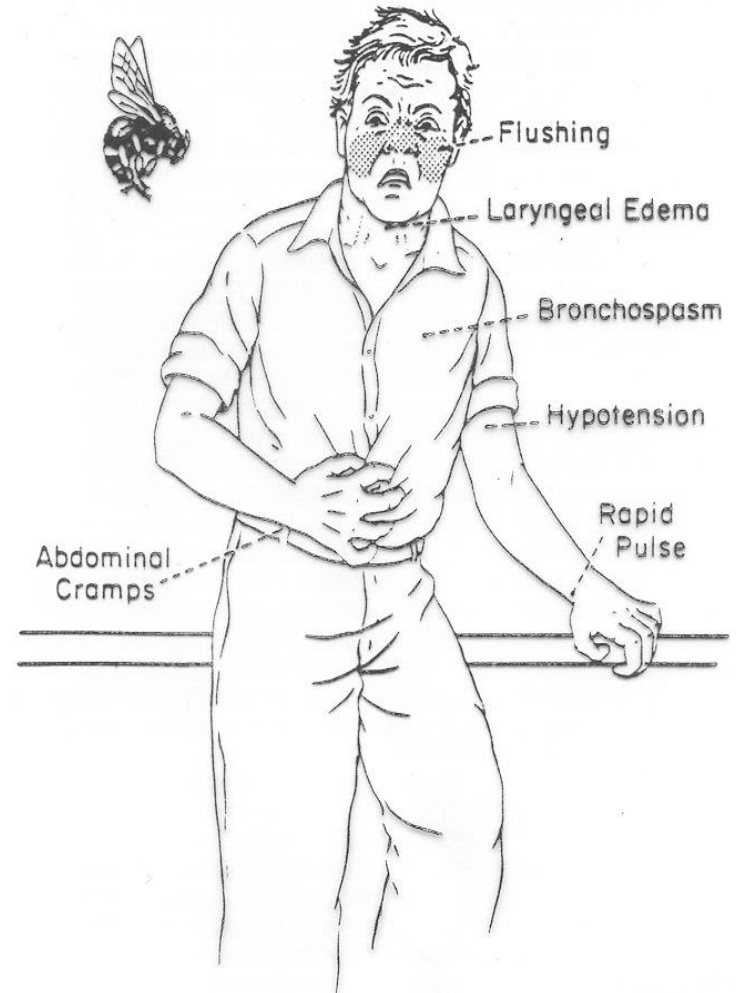
- Congestion
- Rhinorrhoea
- Swelling

Lower respiratory:

- Throat/chest tightness
- Hoarseness
- Bronchospasm
- Wheeze, cough

GI tract:

- Oral pruritus
- Cramps, nausea, vomiting, diarrhoea



Clinical Manifestations

<u>Cutaneous</u>	90%
• Urticaria and Angioedema	85-90%
• Flushing	45-55%
<u>Respiratory</u>	40-60%
• Dyspnea and Wheeze	45-50%
• Laryngeal Angioedema	50-60%
• Rhinitis	25-20%
<u>CVS</u> : Dizziness, syncope, hypotension	30-35%
<u>Gut</u> : n+v, cramp, diarrhoea	25-30%

Is anaphylaxis different depending on trigger?

	Food	Non-food
Symptoms	Respiratory	CVS Respiratory less common
Asthma/atopy	Common	Uncommon
Onset	Less rapid	Rapid
Site of Ag presentation	Orogastric mucosa	Parenteral
Triggering threshold	++ interperson variability (up to 4 log)	Less variability
Mechanism	No change in MCT seen, frequently	Increased MCT often (frequently?) seen

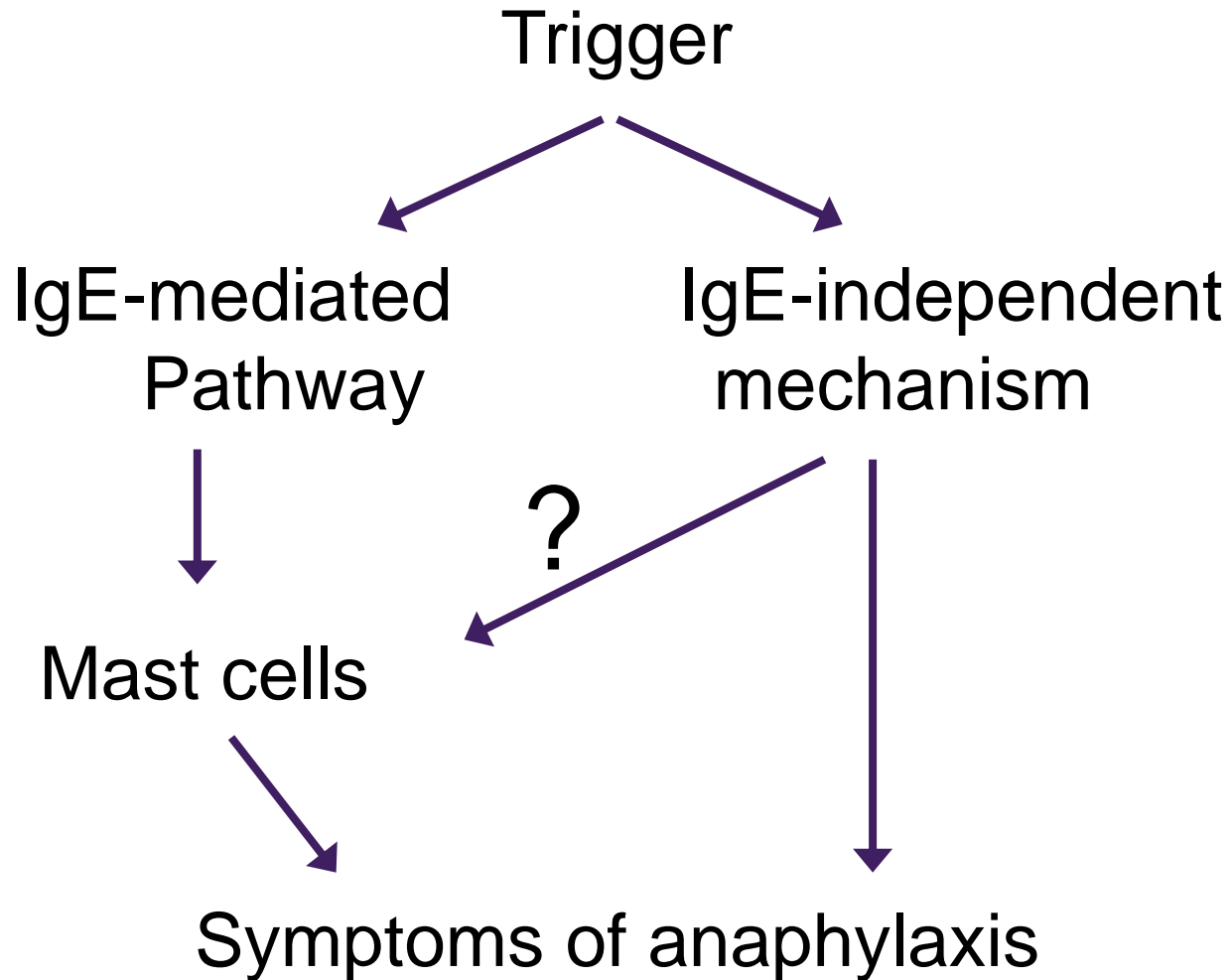
Risk factors for death from food-induced anaphylaxis

- Trigger: Peanut / tree nut / fish most common
- Asthma (even well controlled), cardiac disease
- Mastocytosis
- Previous allergic reaction to same food
- Biphasic course
- Not at home when reaction occurs
- Non-timely delivery of adrenaline *but mortality not prevented by early adrenaline alone*

Sampson et al, NEJM (1992)

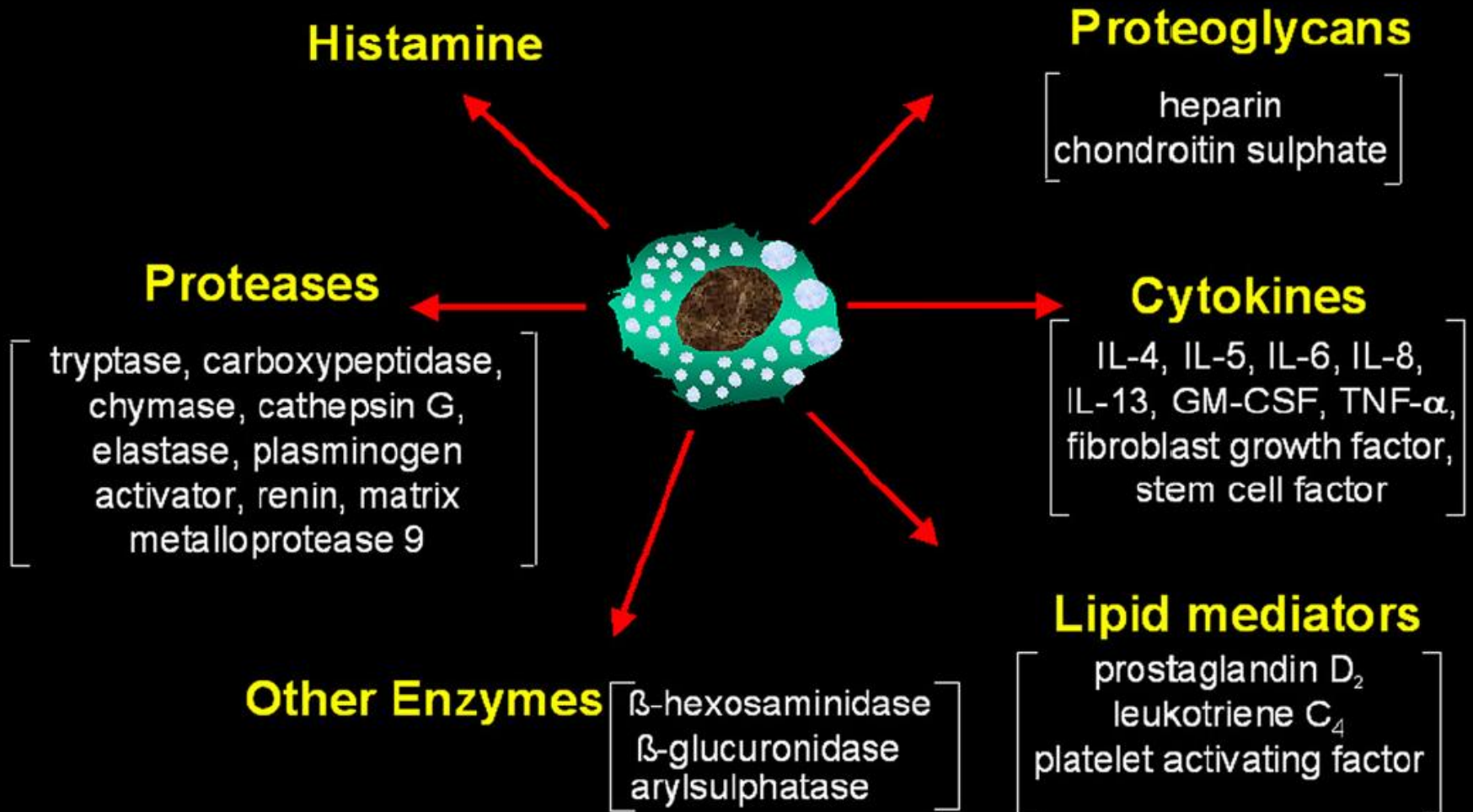
Pumphrey, Curr Opin Allergy Clin Immunol. (2004)

Pathophysiology

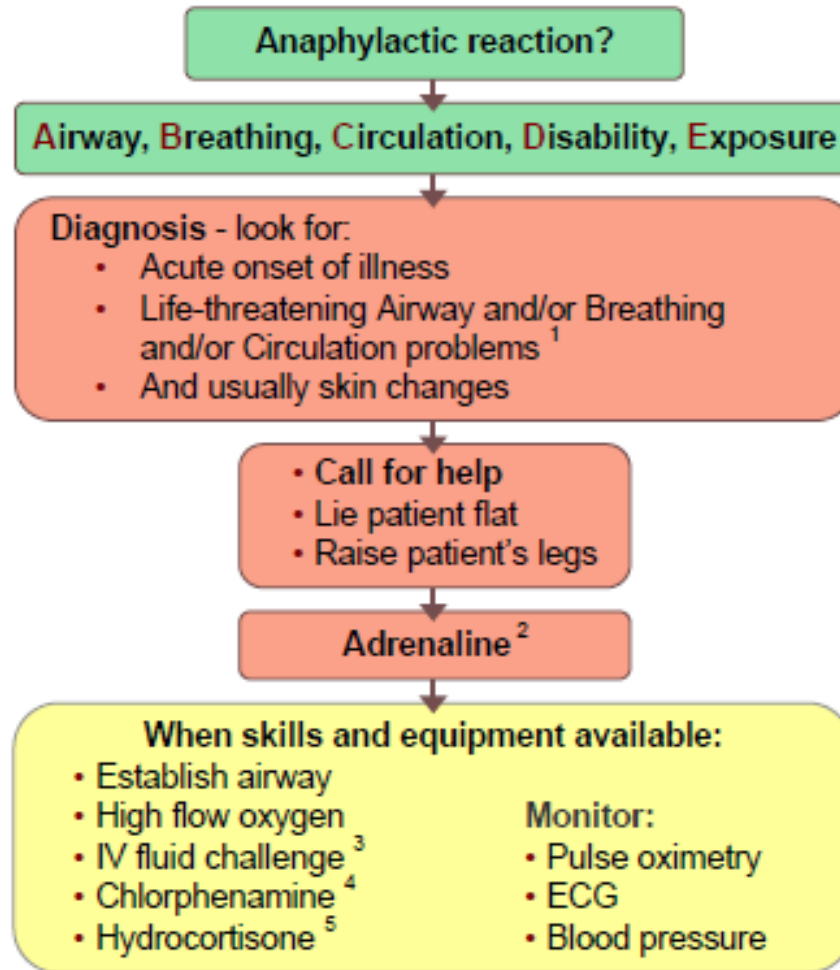


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PRODUCTS OF MAST CELL ACTIVATION



MANAGEMENT



Management

Check ABC

Call for help

Lie person flat, raise legs

Give IM adrenaline

Establish Airway, high flow O2

Establish IV line, fluid challenge

Chlorpheniramine IV

Hydrocortisone IV

Repeat IM Adrenaline

(if no response after 5 min)

Monitor

Pulse

Blood pressure

Pulse Oximetry

Peak flow rate

Blood sample for tryptase at 60 min

First Line Treatment of Anaphylaxis: Adrenaline IM:



0.5 ml of
1:1000
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 Auto-injectors

- Recommended for patients with previous anaphylaxis
- Training essential
- Anaphylaxis action plan essential
- Seek advice if needed.



Who needs an AAI - EAACI Guidance

Absolute indications:

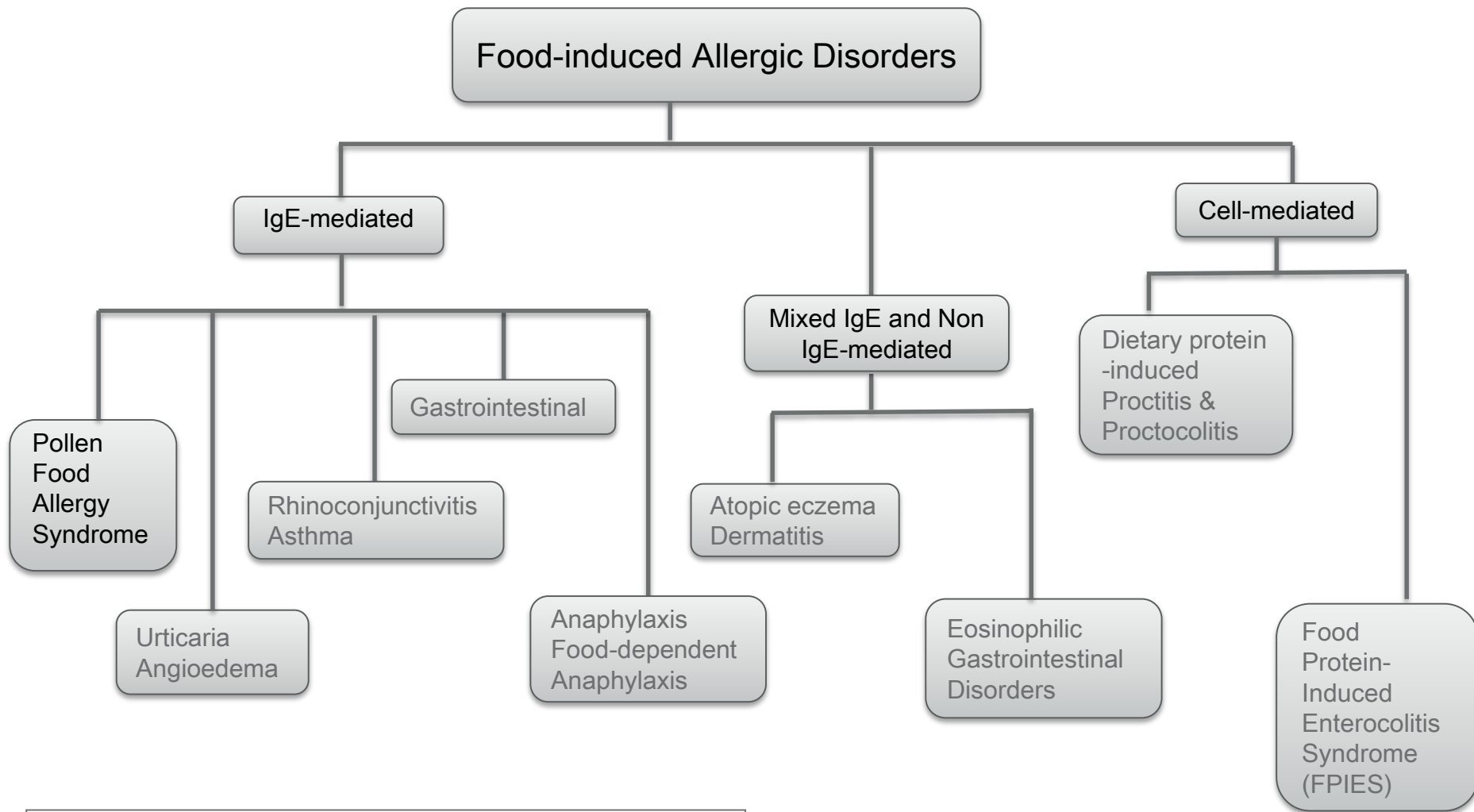
- Previous cardiovascular or respiratory reaction to a food, insect sting or latex.
- Exercise induced anaphylaxis.
- Idiopathic anaphylaxis.
- Child with food allergy and co-existent persistent asthma*.

Relative indications:

- Any reaction to small amounts of a food (e.g. airborne food allergen or contact only via skin).
- History of only a previous mild reaction to peanut or a tree nut.
- Remoteness of home from medical facilities.
- Food allergic reaction in a teenager.

NOT Recommended:

- Asthma without anaphylaxis or systemic allergy
- Positive skin or sIgE test only
- Family history of anaphylaxis
- Local reactions to insect stings
- Resolved food allergy



EAACI Food Allergy and Anaphylaxis Guidelines: diagnosis and management of food allergy

A. Muraro^{1,*}, T. Werfel^{2,*}, K. Hoffmann-Sommergruber^{3,*}, G. Roberts^{4,5,6}, K. Beyer⁷, C. Bindslev-Jensen⁸, V. Cardona⁹, A. Dubois¹⁰, G. duToit^{11,12}, P. Eigenmann¹³, M. Fernandez Rivas¹⁴, S. Halken¹⁵, L. Hickstein¹⁶, A. Høst¹⁴, E. Knol¹⁷, G. Lack^{11,12}, M. J. Marchisotto¹⁷, B. Niggemann⁷, B. I. Nwaru¹⁸, N. G. Papadopoulos^{19,20}, L. K. Poulsen²¹, A. F. Santos^{11,22,23}, I. Skypala²⁴, A. Schoepfer²⁵, R. Van Ree²⁶, C. Venter⁴, M. Worm⁷, B. Vlieg-Boerstra²⁷, S. Panesar²⁸, D. de Silva²⁹, K. Soares-Weiser³⁰, A. Sheikh^{28,31}, B. K. Ballmer-Weber³², C. Nilsson³³, N. W. de Jong³⁴, & C. A. Akdis^{35,36} on behalf of the EAACI Food Allergy and Anaphylaxis Guidelines Group

Food Allergy Standard diagnostic tests

- Clinical history is cornerstone of diagnosis
- Skin tests/sIgE provide objective confirmation of IgE sensitisation
- Skin tests/IgE have a good negative predictive value
- Skin tests/ IgE have low positive predictive value
- If history suggestive, interpret negative SPT/sIgE with caution (Muraro 2014)

- IgE sensitization to foods is common and often related to IgE sensitization to pollen allergens (Burney et al 2014)
- High total IgE may skew results (Gupta et al 2014)

Aeroallergen sensitisation

Establishing symptoms to pollens, mites and animal dander is vital when interpreting the history.

Positive tests to pollen or house dust mite can be linked to reported cross-reactive reactions to fruits, vegetables, nuts or shellfish

SPT to common inhalant allergens



Prick-to-prick testing for foods



Component resolved diagnosis

- Molecular allergy testing
- Immunocap or microarray tests (eg ISAC chip)
- If tests inconclusive, CRD provides additional diagnostic information (Muraro et al 2014)

Foods

(component resolved diagnosis)

The following have been associated with severe allergy and *high risk* of anaphylaxis:

Peanut (Ara h 1, Ara h 2, Ara h3 and Ara h 9)

Hazelnut (Cor a 9, Cor a 14)

Soya bean (Gly m 5, Gly m 6)

Foods

(component resolved diagnosis)

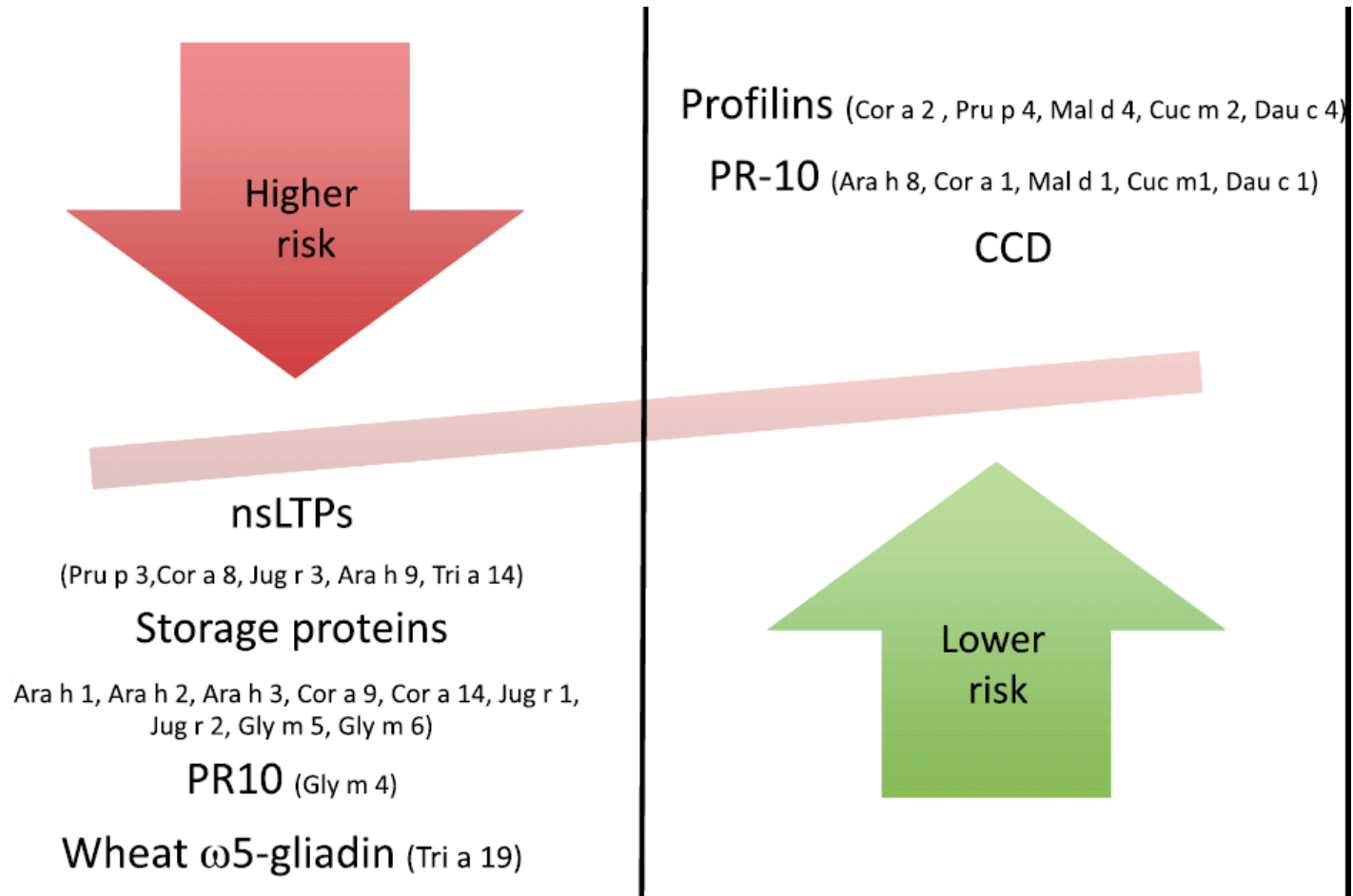
The following have been associated with cross reactive sensitisation birch pollen Bet v 1 (pollen food syndrome) and *low risk* of anaphylaxis:

Peanut (Ara h 8)

Hazelnut (Cor a 1)

Soya bean (Gly m 4)

Risk assessment in food allergy (role of CRD?)



Insect stings

(component resolved diagnosis)

Wasp venom

- rVes v 1
- rVesp v 5

Bee venom

- Api m 1

Polistes (paper wasp) venom

- Pol d 5

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Recommendations for Diagnosis

Standardised tests and procedures should be used

IgE sensitisation does not always predict clinically relevant food allergy –
specific allergy testing should be directed by case history

Either SPT or sIgE can be used depending on local availability and
contraindications for SPT

Evidence of IgE sensitisation can support a diagnosis of food allergy in
conjunction with clinical history and/or food challenge

In the presence of a suggestive history, a negative SPT/sIgE needs to be
interpreted with caution

If tests inconclusive, CRD may provide additional diagnostic information

If clinical history plus SPT/sIgE results not highly predictive then oral food
challenge is required

Total IgE useful in patients with severe eczema; high total IgE suggests +ve
sIgE tests should be interpreted with care

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Education & Risk Assessment

Education:

Diagnosis communicated to patients, parents/caregivers care givers

Management plan - allergen avoidance, symptom recognition, indication for treatment and administration of specific medication

Encourage contact with patient organisations

Medication:

Adrenaline - previous anaphylaxis, asthma, FDEIA

- persistent FA, peanut/tree nut FA, low threshold, high risk

When – cardiovascular/respiratory altered voice, stridor, bronchospasm

Short-acting beta agonists required for all with co-existing asthma

Patient-held glucocorticosteroids to prevent late phase reactions

Review in emergency department for all who have received adrenaline

Acknowledgements

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