A trust-wide strategy for the management of anaphylaxis

**REFERENCES**


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Anaphylaxis is a life-threatening medical emergency. Although it is uncommon, when it does occur prompt recognition and appropriate treatment are essential. This article describes how a multidisciplinary working party review of practices concerning the management of anaphylaxis in an acute hospital trust led to the introduction of standardised anaphylaxis emergency boxes.

Many people experience minor allergy symptoms. However, a small number of individuals are susceptible to a life-threatening allergic reaction called anaphylaxis. Anaphylaxis is a medical emergency involving an acute allergic systemic reaction and although it is rare, survival depends on rapid recognition and appropriate treatment. Common causes are food, insect bites and stings, latex, and certain drugs.

Adrenaline (epinephrine) is generally regarded as the most effective drug in the treatment of a severe anaphylactic reaction (Fisher, 1995), and works best when given early after the onset of the reaction (Patel et al, 1994). Anaphylaxis can be frightening to deal with because of its rapid onset. Most reactions occur within minutes of exposure to the trigger, although occasionally they can be more delayed. The speed of onset depends on how the allergen has entered the body. In the case of an intravenous injection the reaction is almost immediate. In severe cases death can occur within 10 minutes. In drug-related reactions the time to respiratory or cardiac arrest can be as little as five minutes (Pumphrey, 2000).

Despite the life-threatening nature of anaphylaxis, mortality is rare. A study by Pumphrey in 2000 showed anaphylaxis to be the recorded cause of death in 20 patients per year in the UK. Of these, 10 were associated with drugs and contrast media (dyes used in investigations such as computerised tomography scans), while the other 10 were equally divided between foods and insect venom. He suggests that these figures may underestimate the true incidence. Little data is available on the incidence of anaphylaxis, which is possibly due to the difficulty of defining anaphylactic reactions. However, a report published in 2001 (Sheikh and Alves, 2001) shows that approximately one in 5,800 emergency inpatient admissions had a primary diagnosis of anaphylaxis.

**RECOGNISING AN ALLERGIC REACTION**

Since an anaphylactic reaction has the potential to progress to death within minutes, it is important that nurses are able to recognise the signs and act upon them swiftly and appropriately.

**Anaphylactic reactions**

Anaphylactic reactions occur following exposure to an allergen to which the person has been sensitised. It is an immunoglobulin E (IgE) mediated response. On first exposure to the allergen sensitisation occurs and the body produces antibodies or immunoglobulin E (IgE). IgE attaches itself to the surface of connective tissue cells of the mucous membranes, skin, and lymphatic system called mast cells. Mast cells contain powerful inflammatory mediators such as histamine, leukotrienes, prostaglandins, and tryptase.

On subsequent exposure to the allergen, the sensitised specific IgE antibodies recognise and react with it, thus stimulating the mast cells to release the inflammatory mediators and thereby causing an anaphylactic reaction (Ewan, 1998).

**Anaphylactoid reactions**

Anaphylactoid reactions do not require previous sensitisation as they are not IgE mediated so they can occur on first exposure. Certain drugs act directly on the mast cells and basophils causing non-immunological degranulation and subsequent release of inflammatory mediators as above. Anaphylactoid reactions may be caused by contrast
media, aspirin, and non-steroidal anti-inflammatory drugs or anaesthetic drugs such as opiates and muscle relaxants. Human blood products can also be a cause of anaphylactoid reactions as they cause activation of the complement system (a cascade system of plasma proteins that form part of the body’s immune response).

Presentation and management
Despite the different mechanisms of anaphylactic and anaphylactoid reactions, both present in exactly the same way and require the same management. The difference is only relevant after recovery when investigations are being carried out. Measuring the mast cell tryptase level in the bloodstream following suspected anaphylaxis can be helpful in retrospective diagnosis, but alone does not enable differentiation between anaphylactic and anaphylactoid reactions. Accurate documentation and referral to a specialist clinic are essential to find the cause of the reaction and reduce any future risk.

Once the mast cells have been activated, either by IgE, drugs or the complement system, the mediators are released (Fig 1).

<table>
<thead>
<tr>
<th>TABLE 1. THE EFFECTS OF ANAPHYLAXIS</th>
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<tbody>
<tr>
<td>SYSTEM</td>
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<tr>
<td>Respiratory tract</td>
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<tr>
<td>Cardiovascular system</td>
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<td>Gastrointestinal system</td>
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<td>Skin</td>
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<td>Nervous system</td>
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<td>Genitourinary system</td>
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Signs and symptoms of anaphylaxis
Initial symptoms may be anxiety, flushing, itching, urticaria (nettle rash or hives), swelling of the face and/or lips, and wheezing. Symptoms can deteriorate very rapidly without appropriate treatment. Anaphylaxis can affect all the systems of the body (Table 1).

A review of current practice
With the aim of reviewing current practice concerning the management of anaphylaxis within the immunology department at the Hull and East Yorkshire Hospitals NHS Trust the clinical governance pharmacist approached the resuscitation department regarding the number of emergency boxes labelled allergy or anaphylaxis within the trust. Overall, there were 11 boxes, the contents of which vastly differed. Taking this into account it was apparent that a working party should be established to review and standardise practice.

Some of the emergency boxes contained drugs that were not associated with or appropriate for the management of anaphylaxis. Some of the boxes included 1:10,000 adrenaline for intravenous administration as well as 1:1,000 adrenaline, usually used for intramuscular administration. These variations meant there was the potential for drug dose error, such as the administration of the drug via an inappropriate route. Adrenaline given intravenously can lead to cardiac dysfunction. Some of the drugs included in the boxes were inappropriate, including isoprenaline, aminophylline, and atropine – drugs not even used for anaphylaxis.

The Hull and East Yorkshire Hospitals NHS Trust was an amalgamation of two trusts and this was one reason for the numerous emergency boxes. However, there was obviously potential for drug error. Therefore, it was essential to standardise the contents of the emergency boxes for use throughout the trust.

Managing change
Once the need for a new system was recognised it became necessary to adopt a multidisciplinary approach involving individuals with specialist interests. The following specialties were involved:

- Consultant and clinical nurse specialist for adults and paediatrics in immunology;
- Resuscitation officer;
- Clinical pharmacist.

Following discussion with the above professionals and with reference to the Resuscitation Council (UK), which strives to produce clear, precise guidelines for anaphylaxis management, a draft list of appropriate drugs was compiled (Project Team of the Resuscitation Council UK, 2001). A beta2 agonist such as salbutamol can be extremely useful in treating bronchospasm (Turpeinen et al, 1984). As some areas would not have access to nebulisers a spacer device was considered the preferred method of administration.

Training needs were identified at an early stage as a requirement for all areas where an emergency box would be sited. The list of box contents was presented to

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both the resuscitation committee and the trust allergy management team for consideration. Discussion took place, particularly around the delivery device for the adrenaline. It was debated whether this should be in the form of ampoules and needles and syringes or as a pre-filled injection. Other issues were also considered and these included:

- Cost (£180 including all drugs and pharmacy costs);
- Drug lifespan – date visible and shelf-life;
- Risk assessment with reference to the calculation of correct dose in an unfamiliar emergency situation;
- Dosage of adrenaline if the use of a preloaded device was recommended;
- Needles, syringes, and swabs to be included to ease prompt intervention.

As anaphylaxis is uncommon and staff in most areas are likely to be unfamiliar with its management it was agreed that a pre-filled, dose-specific injection device would be the safest and most appropriate option (Simons et al, 2001).

Another consideration was whether there should be one box for the adult and paediatric areas or two separate boxes. After discussion it was agreed to have one box that would cater for both. The box would contain two adult and two junior dose EpiPens and the other drugs were in an ampoule suitable for both adult and paediatric doses. The box would contain treatment suitable for patients from the age of six months upwards (Box 1).

### Managing children under six months

As the junior EpiPen is only licensed for use in children over the age of six months, the issue of what to use in babies under six months was raised. Anaphylaxis is very rare within this group and the identification of such an event extremely difficult.

Advice was sought from the Resuscitation Council (UK), and from the trust’s paediatricians and immunologists and the decision was made to offer basic life support and/or airway support if needed, with swift transfer to a paediatric area. If the use of adrenaline was indicated over the age of six months, the issue of what to use in calculating such doses, as this would reduce the risk of a miscalculation. The details of how the strategy was implemented are given in Box 2.

### Conclusion

Within a large organisation, the process of implementing change can be slow and time consuming. However, at the Hull and East Yorkshire Hospital NHS Trust, it has led to service improvements.

The standardisation to one emergency box for all departments should reduce the risk of drug error, unavailability of drugs and inappropriate drug routes. The choice of preloaded adrenaline pens will lead to easier and quicker administration.

Because of the varied user groups a trust-wide patient group directive would be impractical. Therefore, each clinical area has been advised to produce their own PGD to improve early adrenaline administration.

By looking at the way anaphylaxis is managed, staff are becoming aware of their department’s needs and addressing issues specific to their work environment and the availability of anaphylaxis drug boxes has increased both in adult and paediatric areas. A training programme has been well attended by all levels of staff and feedback has been very positive. This has led to improved multidisciplinary communication.

Work is under way to produce documentation for an anaphylaxis reporting system and database, similar to one used within the trust for cardiac arrest. This will allow us to record when anaphylaxis has occurred and the outcome and usefulness of the boxes. We will also be able to monitor the referral and follow-up of patients.