Anaphylaxis

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Declaration

No conflict of interest to declare
Content

• Definition
• Classification
• Risk factors
• Approach to patient with anaphylaxis
• Diagnosis and management
• Ethical issues in anaphylaxis
• Conclusion
LET'S TALK
ANAPHYLAXIS
Definition

• Anaphylaxis is defined as a “severe, potentially fatal, systemic allergic reaction that occurs suddenly after contact with an allergy-causing substance”.

• Anaphylaxis is classified as **allergic and non-allergic**

• The term “anaphylactoid” is no longer use
Anaphylaxis

Immunological
- IgE mediated: Foods, venoms, drugs, latex,
- Other: Blood products, drugs, immune aggregates

Idiopathic

Non-Immunological
- Physical: Exercise, Cold
- Other: Drugs
Causes

• Causes can be immune mediated, non-immunological or idiopathic.

• Immunological anaphylaxis is either IgE-mediated or non-IgE mediated.

• Common causes of anaphylaxis in children is food with pollen allergy and asthma being important risk factors. Anaphylaxis in adults is commonly triggered by drugs and Hymenopter venom.

• Idiopathic anaphylaxis occurs in 30-60% of adults and 10% of children.
Risk for severe anaphylaxis

• Food:
  ✓ peanut allergy
  ✓ tree nut allergy
Continued..

• **Insect venom allergy:**
  ✓ older age
  ✓ pre-existing cardiovascular disease
  ✓ mast cell disorder
  ✓ elevated baseline serum tryptase levels
  ✓ concomitant treatment with a beta-adrenergic-blocker and/or angiotensin converting enzyme (ACE) inhibitor
  ✓ previous severe reaction
• **Concomitant disease**
  ✓ Co-existing asthma
  ✓ Mast cell disorders
  ✓ Cardiovascular disease
  ✓ Mast cell disorders
Continued..

- **Co-factors**
  - exercise-induced anaphylaxis (EIA)
  - food-dependent, exercise-induced anaphylaxis (FDEIA)
  - Fever
  - acute infection
Approach to patient with anaphylaxis

HISTORY:

• **Time** of occurrence of the reaction
• The **setting** in which it happened,
• **Location** (indoor vs outdoor or home vs school/work)
• Any **sting or insect bite** before the reaction
• Whether the event was **related to exposure** to heat, cold, exercise or occurred during sexual activity (seminal fluid related)
Continued..

• A list of **food eaten or medications** used within 6 hours of the reaction.

• Association with physical factors or **triggers**

• In women, the history should include any **relationship** between the attack and their **menstrual cycle**

• **Duration** of the reaction
Continued..

- Treatment administered during the reaction
- **History of atopy** because food-induced, seminal fluid-related, and idiopathic anaphylaxis episodes are more common in patients with atopy.
- Biphasic reaction occurs if there is a history of another reaction after remission of symptoms
Signs & Symptoms
<table>
<thead>
<tr>
<th>Signs and symptoms</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cutaneous</strong></td>
<td></td>
</tr>
<tr>
<td>Urticaria and angioedema</td>
<td>62-90</td>
</tr>
<tr>
<td>Flushing</td>
<td>45-55</td>
</tr>
<tr>
<td>Pruritus without rash</td>
<td>2-5</td>
</tr>
<tr>
<td><strong>Respiratory</strong></td>
<td></td>
</tr>
<tr>
<td>Dyspnoea, wheeze</td>
<td>45-50</td>
</tr>
<tr>
<td>Upper airway angioedema</td>
<td>50-60</td>
</tr>
<tr>
<td>Rhinitis</td>
<td>15-20</td>
</tr>
<tr>
<td><strong>Cardiac</strong></td>
<td></td>
</tr>
<tr>
<td>Hypotension, dizziness, syncope, diaphoresis</td>
<td>30-35</td>
</tr>
<tr>
<td><strong>Abdominal</strong></td>
<td></td>
</tr>
<tr>
<td>Nausea, vomiting, diarrhoea, abdominal pain</td>
<td>25-30</td>
</tr>
<tr>
<td><strong>Miscellaneous</strong></td>
<td></td>
</tr>
<tr>
<td>Headache</td>
<td>5-8</td>
</tr>
<tr>
<td>Substernal pain</td>
<td>4-5</td>
</tr>
<tr>
<td>Seizure</td>
<td>1-2</td>
</tr>
</tbody>
</table>
Anaphylaxis is highly likely when any one of the following 3 criteria are fulfilled:
(WAO Criteria, 2011)

1. **Acute onset of an illness** (minutes to several hours) with involvement of the skin, mucosal tissue, or both (e.g., generalized hives, pruritus or flushing, swollen lips-tongue-uvula). **AND** at least one of the following:
   a) Respiratory compromise (e.g. dyspnoea, wheeze-bronchospasm, stridor, reduced PEF, hypoxemia)
   b) Reduced BP or associated symptoms of end-organ dysfunction (e.g. hypotonia [collapse], syncope, incontinence)

2. Two or more of the following that occur rapidly after exposure to a likely allergen for that patient
   (minutes to several hours):
   a) Involvement of the skin-mucosal tissue (e.g. generalized hives, itch-flush, swollen lips-tongue-uvula)
   b) Respiratory compromise (e.g. dyspnoea, wheeze-bronchospasm, stridor, reduced PEF, hypoxemia)
   c) Reduced BP or associated symptoms (e.g. hypotonia [collapse], syncope, incontinence)
   d) Persistent gastrointestinal symptoms (e.g. crampy abdominal pain, vomiting)

3. Reduced BP after exposure to known allergen for that patient (minutes to several hours):
   a) Infants and children: low systolic BP (age specific) or greater than 30% decrease in systolic BP*
   b) Adults: systolic BP of less than 90 mm Hg or greater than 30% decrease from that person’s baseline

*Low systolic blood pressure for children is defined as less than 70 mm Hg from 1 month to 1 year, less than (70 mm Hg 1 [2.3 age]) from 1 to 10 years, and less than 90 mm Hg from 11 to 17 years.

2012 Update: WAO Anaphylaxis Guidelines Simons et al.
Immediate diagnostic test
First line management

✓ Removal of the trigger allergen
✓ ABC of resusc
✓ Administration of neat adrenalin 1:1000 at 0.01ml/kg body, maximum of 0.5ml intramuscularly on the mid-outer thigh.
✓ Repeat adrenalin administration in 5 minutes if no response.
First line management
Second line management

✓ Call for help
✓ Position the patient in a recumbent position
✓ Give oxygen by face mask
✓ Nebulise patients with bronchospasm or asthmatics: Use 1 mL salbutamol respirator solution in 3 mL sodium chloride 0.9% every 20 minutes or continuous. Ipratropium bromide 0.5 mg can be added to salbutamol.
Anaphylaxis without shock

✓ Administer oral antihistamine e.g. allergex 0.2mg/kg
✓ Observe and repeat adrenalin after 5 minutes if no improvement
✓ Oral corticosteroid e.g. prednisone 2mg/kg
Anaphylaxis with shock

✓ Administer IV crystalloid preferably or colloid at 20ml/kg as a bolus in the first five minutes. Repeat if necessary until blood pressure improves.

✓ Repeat 2\textsuperscript{nd} dose adrenalin after 5 minutes

✓ Initiate inotropic support if more fluid is needed (dopamine, adrenalin infusion).

✓ Call ICU
Continued..

✓ Administer corticosteroids IVI e.g. hydrocortisone 4mg/kg
✓ Antihistamine IVI e.g. promethazine 1mg/kg
✓ Glucagon (0.025–0.1 mg/kg up to 1 mg intravenously every 20 minutes) is administered in patients that are failing to respond to adrenalin, especially those on beta-blockers.
Critical facts

• Adrenalin is safe to administer and there is no absolute contraindication!!!

• Patients may experience transient pallor, palpitations and headache

• Corticosteroid is used to prevent biphasic reaction and do not prevent cardiorespiratory arrest or death.
Long term management

• Discharge with anaphylaxis action plan to identify reaction early
• Adrenalin emergency kit or epipen
• Education on avoidance
• Refer to allergist for further assessment and management (e.g. venom immunotherapy)
• Follow up closely after allergist refers back to family doctor
• Ensure medic alert is worn
ANAPHYLAXIS
ACTION PLAN

Medical Emphasis:

Emergency Contact:

Patient:

First Name:

Last Name:

Cell:

Mail:

I am allergic to:

My medical card number is:

MILD REACTION

Skin:

Sneezing, diaphoresis, urticaria,” swelling

Stomach:

Pain, vomiting, diarrhea.

SEVERE REACTION: any one of

DYSPEPSIA:

Dyspnea, wheezing, hoarseness,

Sneeze:

Swelling.

OTHER:

Change in color

Severe, sharp, sense of impending doom,

Loss of consciousness

Both skin and mucous signs = SEVERE reaction

If first aid was allergy, stomach signs are a SEVERE reaction.

GIVE ANTIHISTAMINE

OCTOL: 

Give anti-insect pump 5-10 puffs in spacer

Leaves adrenaline in case of progression

Look closely for signs of severe reaction

Contact family / emergency contact

Consult your doctor as soon as possible

GIVE EPINEPHRINE IMMEDIATELY (PEO for instructions)

AND ANTIHISTAMINE

If asymptomatic, give anti-intestinal pump 5-10 puffs in spacer

Call Ambulance and say “ANAPHYLAXIS”

Send to closest doctor/clinic/hospital immediately

If no improvement in 5 minutes give a second dose of adrenaline

This medication plan has been recommended by your child’s allergist and evaluated in consultation. Administer plan in case of reaction.

This is a good indication to start giving permission to restrained children, children less than an hour or an allergic event is severe if your child

This is not the case, in applying these steps. In the case of this is a severe allergic episode.

Patient / Parents (Signatures (Name and Signature))
Ethical Issues in Anaphylaxis
The Four Principles

• Respect for autonomy
• Beneficence
• Non-maleficence
• Justice

Beauchamp & Childress 2013
Respect for autonomy

• Autonomous people should be able to take control of their lives in accordance with their core values
• Includes self-determination, independence, freedom
• Patient-doctor confidentiality
• Telling the truth
Respect for autonomy 2

• Informed consent / decision making
  • Western view: liberal-individual
  • Traditional African context: community involvement

• Children may not be fully autonomous
  • Age, maturity, experience, IQ, EQ, gravity of decision to be made
Beneficence

• Obligation to do good for the patient

• In moral problem situations, the first concern ought to be the benefit and interests of the patient

• The “best interests” principle
Non-maleficence

• Do no harm
• Do not kill
• Avoid therapies that do not provide benefit
• Do not cause pain or suffering to others
Justice

• Respect for people’s rights (rights-based justice)
• Respect for morally accepted laws (legal justice)
• Fair distribution of limited resources (distributive justice)
Using the four principles

• Each principle carries equal weight
• If conflict occurs, the principles must be balanced and weighed against the others
• E.g., beneficence may conflict with justice - expensive treatment for few vs. vaccination for many
Ethics application: Cases in Anaphylaxis
Sabrina Shannon

- Allergic to peanut, dairy products, soya – high risk of anaphylaxis
- At age 10 made a documentary about living with allergies
- Grade 8 at Bishop Smith Catholic High School in Pembroke, Ottawa, Canada
- On 29 September 2003 13-yo Sabrina refused her usual home-made allergen-free sandwich and opted to eat French fries at the school cafeteria; safely eaten the previous week.
- Sabrina checked that the fries were cooked in vegetable, not peanut oil
• Started to wheeze in class after lunch, thought it was an asthma attack
• Collapsed and arrested before teacher could get her EpiPen auto-injector from her locker
• Brain dead on 30 September, removed from life support
• Cause of death: anaphylaxis from food tongs contaminated by cheese curds
Sabrina’s Law

• Chief Coroner for Eastern Ontario, Dr Andrew McCallum, called for the implementation of comprehensive anaphylaxis management plans in schools

• Adrenaline auto-injectors have to be available in school office

• Staff and teachers must be trained to use auto-injectors

• Eventually Sabrina’s Law came into effect on 1 January 2006 in Canada
Sabrina’s Law

• School Boards to ensure that all principals implement anaphylaxis plans including:
  • Strategies to reduce exposure to allergens
  • Procedures to communicate to parents, students and employees about life-threatening allergies
  • Regular training for teachers and other staff on dealing with life-threatening allergies
  • Individual anaphylaxis plan for each student at risk
Girl, 13, tragically dies from peanut butter allergy after eating Rice Krispie treat at summer camp

- Natalie Giorgio was with her family at Sacramento Camp in California on Friday night when she ate the dessert, not realizing it contained nuts.
- The girl immediately spat it out and told her mother but it was too late.
- She began vomiting, had trouble breathing then went into cardiac arrest.
- She was then taken to hospital where she was pronounced dead.

By HELEN POW
PUBLISHED: 00:23 BST, 30 July 2013 | UPDATED: 11:38 BST, 31 July 2013

A 13-year-old California girl has died after she ate a Rice Krispie snack made with peanut butter at a summer camp and had an intense allergic reaction.

Natalie Giorgio, from Carmichael, California, was with her family at Camp Sacramento in El Dorado County when she ate the dessert on Friday night not realizing it contained nuts.

The girl immediately spat out the treat but it was too late. After 20 minutes, she...
Anthony Lyson, a high school senior who overcame a difficult childhood and had dreams of becoming an aeronautical engineer, has died of an anaphylactic reaction after eating part of a nutrition bar that contained tree nuts.

Anthony's grandfather, David Lyson of Sparks, Nevada, told Allergic Living that on July 20, his grandson had been hanging out with friends, including his girlfriend, when he started to feel really hungry. According to the grandfather, the 18-year-old, who had allergies to tree-nuts including walnuts and cashews, grabbed a power bar and began eating without first checking the ingredients.

Shortly after eating at least half of it, a friend asked Anthony if he was aware that this brand of bar contained nuts.

"Immediately, Anthony threw the bar down when he heard that," says Lyson, who says his grandson was usually vigilant about asking about or reading ingredients to avoid nuts. The friends told the grandfather that Anthony tried to vomit to get rid of
Post-operative anaphylaxis

Fatal inaction

01 September 2010

Mr W, a 19-year-old drama student, was admitted to his local hospital where he was diagnosed with an acute testicular torsion. He was listed for an emergency exploration.

Dr H, an anaesthetic trainee, saw him beforehand and found him to be well with no allergies (ASA1). Dr H performed a rapid sequence induction of anaesthesia, and secured the airway with a cuffed endotracheal tube. Anaesthesia was maintained with isoflurane vapour. Atracurium was given as a muscle relaxant, and fentanyl and diclofenac were administered for analgesia. The operation was uneventful and lasted about 30 minutes.
Fatal inaction 2

• Extubated patient, but subsequent desaturation
• Developed pulmonary oedema
• Diagnosed non allergic anaphylactic reaction; admitted to ICU
• Decided to intubate patient – unsuccessful - arrested
• Severe hypoxic brain damage
• Died 10 days later
MPS Learning points

• Must be able to recognise and treat emergencies
• Do not give a drug with which you are unfamiliar
• 50-70% of cases of anaphylaxis during anaesthesia triggered by muscle relaxants. Patients can deteriorate very rapidly.
• Know the limits of your competence
• In a critical incident, call for senior help immediately
What do these cases have in common?

• Delayed recognition of anaphylaxis
• Auto-injector not accessible:
  • Safely locked away
  • Failure to carry auto-injector
  • Failure to store auto-injector correctly?
Theme Editorial

Anaphylaxis: Recognizing Risk and Targeting Treatment

David B.K. Golden, MD  Baltimore, Md


Clinical Commentary Review

Epinephrine Autoinjectors: New Data, New Problems

Susan Waserman, MSc, MDCM, FRCPC®, Ernie Avilla, MBA(c)®, Moshe Ben-Shoshan, MD, MSc®, Lana Rosenfield, MD®, Andrea Burke Adcock, MD®, and Matthew Greenhawt, MD, MBA, MSc®  Hamilton, Ontario and Montreal, Québec, Canada; Aurora, Colo

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SEPTEMBER/OCTOBER 2017
Food allergy risk and the ethics of uncertainty in allergic disease
Ethics in practice
Making clinical decisions when the stakes are high and the evidence unclear
Wendy Hu, Andrew Kemp, Ian Kerridge
Children with peanut allergy are often provided with adrenaline (epinephrine) in case of a severe reaction. The probability of a life-threatening reaction is low, however, and the criteria for provision are controversial. How should the costs and benefits be balanced?
Food allergy risk and uncertainty

• Dylan, aged 20 months, peanut allergy
• At 12 months of age facial contact urticaria to peanut butter
• SPT 9 mm reaction to peanut (positive)
• No further reaction, but avoids peanuts
• Would you prescribe an autoinjector for Dylan?
• Should the family avoid peanuts in the home?
Food allergy risk and uncertainty

• Jarred, 23 months

• At 9 months of age, peanut butter contact with face resulted in local urticaria, lip and periorbital swelling, no systemic symptoms

• At hospital placed on monitor, 2x adrenaline IMI

• SPT 9 mm reaction to peanut

• **Would you prescribe an autoinjector for Jarred? Advice to family re avoidance?**
Uncertainty and the ethics of allergy care

Andrew S. Nickels, MD †; and Jon C. Tilburt, MD, MPH †

† Division of Allergy, Diseases, Departments of Medicine and Biomedical Ethics Program, Mayo Clinic, Rochester, Minnesota
† Division of General Internal Medicine, Department of Medicine and Division of Healthcare Policy & Research, Department of Health Sciences Research Biomedical Ethics Program, Mayo Clinic, Rochester, Minnesota

Ethics in practice
Making clinical decisions when the stakes are high and the evidence unclear

Wendy Hu, Andrew Kemp, Ian Kerridge

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Food allergy risk and uncertainty

• Peanut allergy: what is the risk of a severe reaction if a child tests positive? And what is the risk of anaphylaxis? And of death?

• If uncertain – how to counsel parents and child? What is in child’s best interests?

• Respect for parental autonomy in decision making regarding preventive management

Hu BMJ 2004;329:852-4
Food allergy risk and uncertainty

- Dylan, aged 20 months, peanut allergy
- At 12 months of age facial contact urticaria to peanut butter
- SPT 9 mm reaction to peanut
- No further reaction, but avoids peanuts
- Family does eat peanuts and other nuts
- No adrenaline autoinjector prescribed
• Jarred, 23 months
• At 9 months of age, peanut butter contact with face resulted in local urticaria, lip and periorbital swelling, no systemic symptoms
• At hospital placed on monitor, 2x adrenaline IMI
• SPT 9 mm reaction to peanut
• Paediatric allergist prescribed adrenaline autoinjector
• Peanuts removed from household and family’s diet
• Childcare centre banned peanuts, nuts, food labelled “may contain nuts” when Jarred enrolled there

Hu BMJ 2004;329:852-4
Ethics in practice
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Summary points

- Peanut allergy is an increasingly common problem.
- The risk of anaphylaxis is difficult to predict.
- Providing adrenaline autoinjectors to every child with food allergy is costly and criteria for provision are uncertain.
- Risk perceptions are influenced by the value society places on children’s lives.
- Management should be decided with parents after discussing the uncertainties.
Anaphylaxis: Recognising risk

- Prevent both alarmism and complacency
- Prevent severe reactions in those at greatest risk
- Avoid unnecessary prescription of adrenaline and associated impairment in quality of life in those at low risk
- Risk stratification depends on identification of clinical and laboratory markers of risk
- Risk of dying from anaphylaxis is never zero, but lower than previously thought
Problems with autoinjectors

- Information on features and functionality: Epinephrine Autoinjectors (EAIs) vs injectable adrenaline using ampoules
- Underprescribing
- Training on the use of an EAI (including schools)
- Carriage and use at the time of a reaction by patients, schools, camps, ECs, paramedics
Celine has mild atopic dermatitis and has a number of food allergies.

During the December school holidays she had a severe reaction after eating a peanut butter sandwich, and had to be taken to hospital, where she received an adrenaline injection.

When she enrolled at her new school in January the following year, her mom, Mrs Abrahams, informed the school principal of her allergy.
Celine continued

• Mrs Abrahams asked the principal to instruct all the other children’s parents not to allow their children to bring peanut butter sandwiches to school
• She also requested the school to identify a teacher who could be trained to administer an adrenaline autoinjector to Celine in the event of a severe reaction
• The principal refused on both counts
• What are Celine’s rights? And those of the other children?
• How would you advise the mother? And the principal?
Food allergy and anaphylaxis in schools: The issues

- Tension between respecting individual child’s rights and the rights of other children
- Confidentiality of food allergic child’s diagnosis
- Avoidance of stigmatisation vs risk and potential harm
- What is the responsibility of the school in ensuring a safe environment for the food allergic child?
Anaphylaxis through the eyes of the food-allergic child

• Environmental and social barriers left children feeling isolated, excluded, teased
• Missing out on school activities (e.g. camps)
• Deprived of time with friends
• Being singled out as being different, “on the outside”
• Emotional burden of responsibility when negotiating situations with potential for exposure to allergens
• Food allergy is a “big deal” because it is a life or death issue

Fenton Risk Analysis 2010 DOI:10.1111/j.1539-6924.2010.01488.x
1. Allergy (chronic disease) action committee
2. Written chronic and emergency treatment plan, signed by doctor, + ID photo per child with chronic illness
3. Reduce exposure to allergens
4. Emergency medicine; availability
5. Training of staff to recognise and treat severe allergic reactions
Legal and civil liability, beneficence and non-maleficence

- Pule attends a private school in Polokwane
- A school outing is arranged, and Pule is stung by a bee. He develops facial swelling and his breathing becomes very laboured
- The school nurse is in attendance and recognises that he is having an anaphylactic reaction. She knows that another learner, Samantha, has peanut allergy and carries an adrenaline autoinjector
- May the nurse use Samantha’s autoinjector for Pule?
- What are the potential consequences if she does?
Beneficence vs. Justice

• South Africa has limited resources
• Limited access to specialised allergy services for investigation
• Cost of adrenaline autoinjector: if risk of anaphylaxis uncertain it is difficult to motivate for access in public sector
• Explore alternative options e.g. adrenaline ampoule & syringe
• Advocate with funders and pharmaceutical industry
Labelling of foods for allergen content

• SA legislation requires food allergen labelling of food
• Statements “made in a factory that also uses nuts” insufficient information
• Independent testing by laboratories
Medical liability and negligence

- Fatal or near-fatal anaphylaxis: could it have been prevented or managed better?
  - Critical issue: administration of adrenaline
- Standard: care given by a reasonable medical practitioner
- The healthcare practitioner should express regret, but must not admit liability; consult legal advisor or risk manager
Conclusion

• Anaphylaxis is potentially life-threatening
• Management of anaphylaxis poses numerous ethical and legal dilemmas and concerns
• Main ethical issues are uncertainty regarding risk and avoidance of harm
• Schools play important role in avoidance of exposure and treatment of anaphylaxis
• Legal issues: lack of due care and liability
• “Good Samaritan” rule for rescuers – not applicable in South Africa
References

- Ethics slide given permission by Prof Sharon Kling
QUESTIONS