



Differentiating between anxiety, syncope & anaphylaxis

Dr. Réka Gustafson
Medical Health Officer
Vancouver Coastal Health

Introduction

Anaphylaxis is a rare but much feared side-effect of vaccination. Most vaccine providers will never see a case of true anaphylaxis due to vaccination, but need to be prepared to diagnose and respond to this medical emergency.

Since anaphylaxis is so rare, most of us rely on guidelines to assist us in assessment and response.

Due to the highly variable presentation, and absence of clinical trials, guidelines are by necessity often vague and very conservative.

Guidelines are no substitute for good clinical judgment.

Anaphylaxis Guidelines

- “Anaphylaxis is a **potentially life-threatening** IgE mediated allergic reaction”
 - How many people die or have died from anaphylaxis after immunization?
Can we predict who is likely to die from anaphylaxis?
- “Anaphylaxis is **one of the rarer** events reported in the post-marketing surveillance”
 - How rare? Will I or my colleagues ever see a case?
- “Changes develop over **several** minutes”
 - What is “several”? 1, 2, 10, 20 minutes?
- “Even when there are mild symptoms initially, there is a potential for progression to a severe and even irreversible outcome”
 - Do I park my clinical judgment at the door? What do I look for in my clinical assessment?
- “Fatalities during anaphylaxis usually result from **delayed** administration of epinephrine and from severe cardiac and respiratory complications. “
 - What is delayed? How much time do I have?

What is anaphylaxis?

- an **acute**, potentially lethal, **multisystem** syndrome resulting from sudden release of mast cell- and basophil-derived mediators into the circulation
- triggered by the binding of allergen to specific immunoglobulin E (IgE)
 - Most common allergens are food, medications, and insect bites
 - Anaphylaxis to vaccines is thought to be most often due to vaccine components other than the antigen, such as gelatin, eggs, latex, yeast, antibiotics, adjuvants and preservatives
- implies previous exposure and sensitization to the triggering substance or a cross reactive allergen

How rare is anaphylaxis after vaccination?

Kari Bohlke et al. Risk of Anaphylaxis After Vaccination of Children and Adolescents Pediatrics, 2003; 112;

- Reviewed records from 3 HMOs from 1991-1997
- Estimate of anaphylaxis was 0.26-0.65/ million doses of vaccine or 2-5 cases in 7.5 million doses. None were fatal.
- Vaccine specific risks from other studies:
 - **MMR** : 3.5/million doses; **no fatalities** in large studies
 - **Hepatitis B**: 1/million doses; **no fatalities** in large studies)
 - **Diphtheria**: few case reports; **no fatalities**
 - **Pneumococcal** vaccine: single report of anaphylaxis; **not fatal**
 - **Tetanus**: few reports consistent with anaphylaxis and some confirmed with skin test; **fatalities have been reported**
 - **Varicella**: 3/1,000,000, due to gelatin allergy; **no fatalities**

Frequency of vaccine associated anaphylaxis

Anaphylaxis secondary to vaccination can occur but is exceedingly rare; fatalities are even more rare

Most vaccine providers will never see a case of anaphylaxis due to vaccination

Most of what we know about the clinical presentation and course of anaphylaxis following vaccination is extrapolated from anaphylaxis due to food, medications or insect bites.



Clinical Features of Anaphylaxis

“HIGHLY VARIABLE”

Diagnostic Criteria for Diagnosis of Anaphylaxis

- Acute onset of an illness (over minutes to several hours) involving the skin, mucosal tissue, or both (eg, generalized hives, pruritus or flushing, swollen lips-tongue-uvula).

AND AT LEAST ONE OF THE FOLLOWING:

- Respiratory compromise (eg, dyspnea, wheeze-bronchospasm, stridor, reduced peak expiratory flow, hypoxemia)
- Reduced blood pressure (BP) or associated symptoms of end-organ dysfunction (eg, hypotonia [collapse] syncope, incontinence)

Clinical Manifestations of Anaphylaxis

- **Dermatologic:** Itching, flushing, urticaria, angioedema (90%)
- **Eyes:** conjunctival injection, lacrimation, periorbital edema
- **Nose:** sneezing, rhinorrhea, nasal congestion
- **Upper airway:** glossal/pharyngeal edema, hoarseness, stridor, sense of choking (50-60%)
- **Lower airway:** dyspnea, tachypnea, wheezing, dry and repetitive cough, cyanosis (45-50%)
- **Gastrointestinal:** nausea, vomiting, crampy pain, diarrhea, uterine contractions (25-30%)
- **Cardiovascular:** hypotension, tachycardia (sometimes bradychardia), palpitations, lightheadedness, syncope (30-35%)

Causes of death in anaphylaxis

Circulatory collapse-distributive and hypovolemic shock

Respiratory failure

Fatal anaphylaxis

- What is the frequency of fatal anaphylaxis?
- What are the characteristics of individuals who die from anaphylaxis?
- How can we prevent death due to anaphylaxis?

Frequency of fatal anaphylaxis

- Anaphylaxis is fatal in 0.7-2% of cases
- In the UK, where there is a registry, approximately 20 people die of anaphylaxis every year.
- The incidence of fatal anaphylaxis may or may not be increasing: conflicting evidence
- Most cases of fatal anaphylaxis are due to food, medications and insect bites –NOT VACCINES

Since there are very few cases of fatal anaphylaxis due to vaccines, we need to extrapolate from what we know about fatal anaphylaxis due to other antigens

Causes of death in anaphylaxis

- Respiratory arrest and/or shock with cardiovascular collapse are responsible for most fatalities
- Food induced fatal anaphylaxis: respiratory arrest
- Medication and venom: Cardiovascular collapse
- Risk factors for death:
 - Asthma in food induced anaphylaxis
 - Cardiovascular disease in medication/venom induced anaphylaxis

Timing of fatal anaphylactic reactions

- Following medications:
 - Mean after 5 minutes in inpatients
 - 10-20 minutes in ambulatory patients
- Insect stings 10-15 minutes
- Food: 25-35 minutes
- Vaccines: no information available
 - Evolution of symptoms is expected to be on the order of 15-20 minutes (*Dr. John Dean, personal communication*)

Danger signs in anaphylaxis

- Early onset after exposure to antigen
- Rapid progression
- Evidence of respiratory distress
- Evidence of hypoperfusion: eg: syncope

NOTE: Cutaneous symptoms are present in only a minority of fatal cases of anaphylaxis

Modifiable risk factors for fatal anaphylaxis

Delayed or no administration of epinephrine:

- Early administration of epinephrine appears to be critical for survival after severe anaphylaxis
- A series of 30 fatal or near fatal anaphylaxis suggested that epinephrine is most effective when given in the initial 30 minutes of the reaction.

Upright position

- Empty ventricle syndrome leading to pulseless electrical activity

Misdiagnosis

Unwitnessed

Summary: anaphylaxis

- exceedingly rare after immunization
- is generally responsive to proper treatment
- early recognition is critical
 - Clinical assessment of patient is very important for essential treatment
- epinephrine is most effective if given within the first minutes (within 30 minutes is associated with increased survival)
- patients with hypotension, presyncope, or collapse should be immediately placed in supine with legs elevated to avoid empty ventricle syndrome

Syncope after immunization

- Relatively common after immunization
 - Adolescents
 - Girls>Boys
- Pathophysiology:
Autonomic nervous system → Bradycardia,
vasodilation → hypoperfusion of brain → temporary
loss of consciousness
- Can lead to serious injury while falling

What does all this mean for clinical assessment?

- Common things are common
- **Assess the patient:**
 - Take a **quick** history
 - Take vital signs
 - Observe progression
 - Place patient in supine position if possible
- Respond quickly if danger signs present

Frequency after immunization

ANAPHYLAXIS

Rare as hen's
teeth

ANXIETY

In a kid getting a shot?

SYNCOPE

Common
especially
among
adolescent girls

Onset

ANAPHYLAXIS

- Usually slower
 - 5-30 minutes after immunization
- Sometimes onset not for an hour
- Post recovery prolonged
- 20% are biphasic with a second phase 2-9 hours

SYNCOPE

- Sudden
- Before during or immediately after immunization
- Recovery within 1-2 min

ANXIETY

- Before, during or shortly after
- Recovery is usually rapid

General disposition

ANAPHYLAXIS

- Sense of impending doom, agitation
- If loss of consciousness:
 - Usually have warning signs
 - Gradual fall to floor
 - Tonic-clonic jerking unlikely

SYNCOPE

- Light-headedness/dizziness
- Numbness/weakness
- Tingling around lips/extremities
- Slumping to floor
- Tonic/Clonic posturing possible if hypoxia severe enough

ANXIETY

- Fearfulness
- Light-headedness/dizziness
- Numbness/weakness
- Tingling around lips and extremities

Skin/Mucosa

ANAPHYLAXIS

- Flushed, red
- Generalized hives
 - Look at the injection site
- Progressive painless swelling about face, mouth, tongue, uvula

SYNCOPE

- Pale
- Excessive perspiration
- Cold and clammy

ANXIETY

- Pale
- Excessive perspiration
- Cold and clammy

**RAPIDLY SATELLITING
HIVES AT THE
INJECTION SITE**

Breathing

ANAPHYLAXIS

- Sneezing, coughing, **wheezing**, laboured breathing
- Upper airway swelling (indicated by hoarseness and/or difficulty swallowing)

SYNCOPE

- Normal or
- Shallow, irregular, laboured

ANXIETY

- Rapid
- Shallow

Blood Pressure

ANAPHYLAXIS

- Decreased

SYNCOPE

- Decreased

ANXIETY

- Normal
- Elevated systolic

Usually don't have a BP cuff at a school

Abdomen/GI

ANAPHYLAXIS

- Persistent
- Nausea and vomiting
- Crampy, abdominal pain, diarrhea

SYNCOPE

- Nausea

ANXIETY

- Nausea

Pulse

ANAPHYLAXIS

- Rapid, weak

SYNCOPE

- Slow

ANXIETY

- Rapid

TAKE THE PULSE

Summary of clinical assessment

- Goal is early recognition and treatment with epinephrine
- Remember:
 - Anaphylaxis involves multiple organ systems
 - Cutaneous symptoms are present in up to 90 percent of anaphylactic reactions. This criterion will therefore be used most frequently to make the diagnosis. But hives are not necessarily a feature of severe anaphylaxis
- Injection site reactions can be observed for 30 minutes for danger signs:
 - *Rapid progression of symptoms (eg: rapidly satelliting or generalized hives)*
 - *Hypotension/tachycardia*
 - *Any respiratory involvement*
 - *Persistent vomiting*

Good Clinical Judgment is Important

- As a public health nurse you have the tools to diagnose and respond to anaphylaxis
- Guidelines are just guidelines
- There are harms associated with overcalling anaphylaxis:
 - Unnecessary trauma/anxiety
 - Avoidance of further vaccinations, leaving a child susceptible to potentially serious infections



Thank You

Acknowledgments

- Dr. John Dean
- Carol Lajeunesse