Anaphylaxis

October 13, 2021

Christine A. Sorkness, Pharm.D.

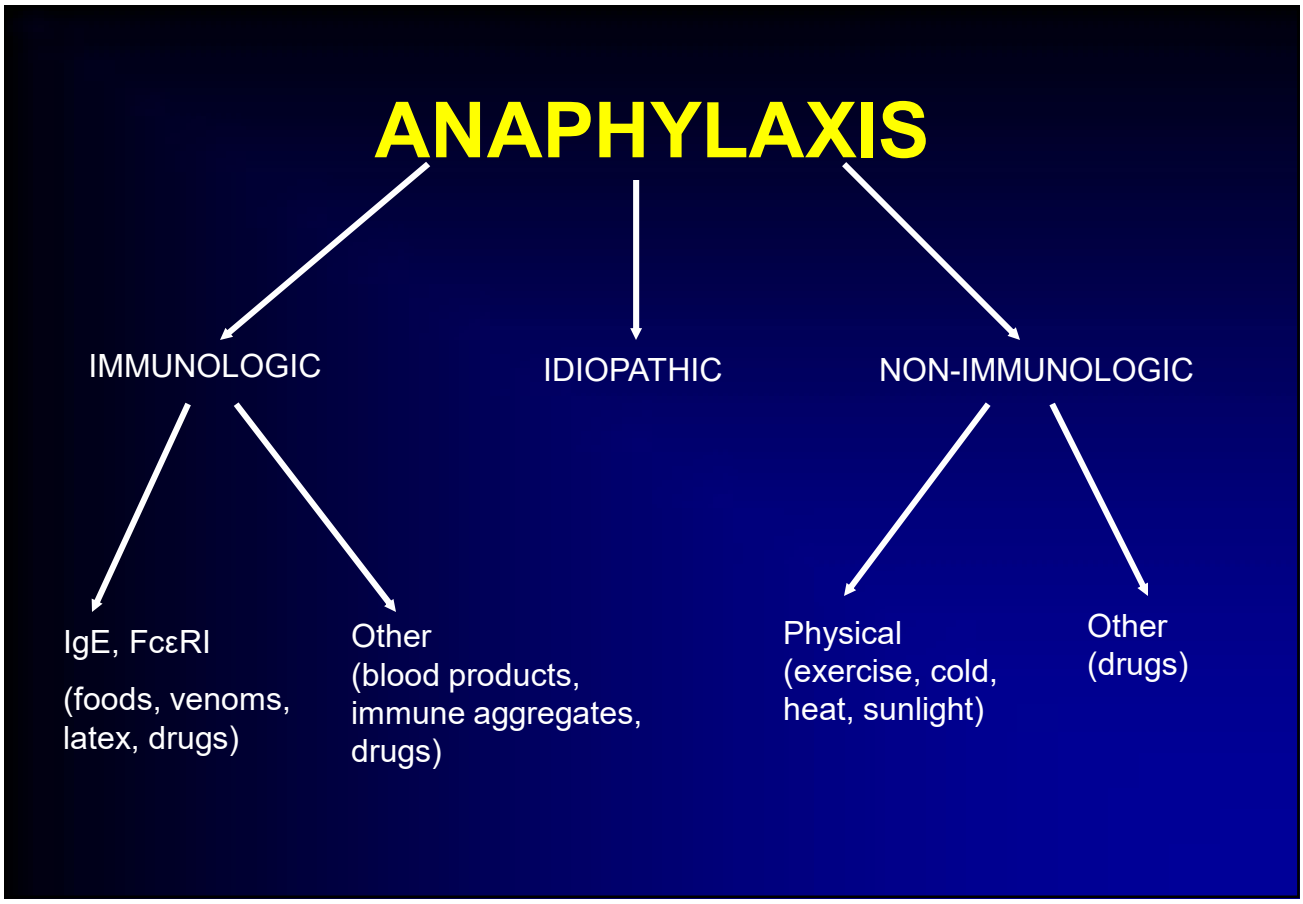
Professor of Pharmacy & Medicine (CHS)
University of Wisconsin School of Pharmacy
and School of Medicine and Public Health

1

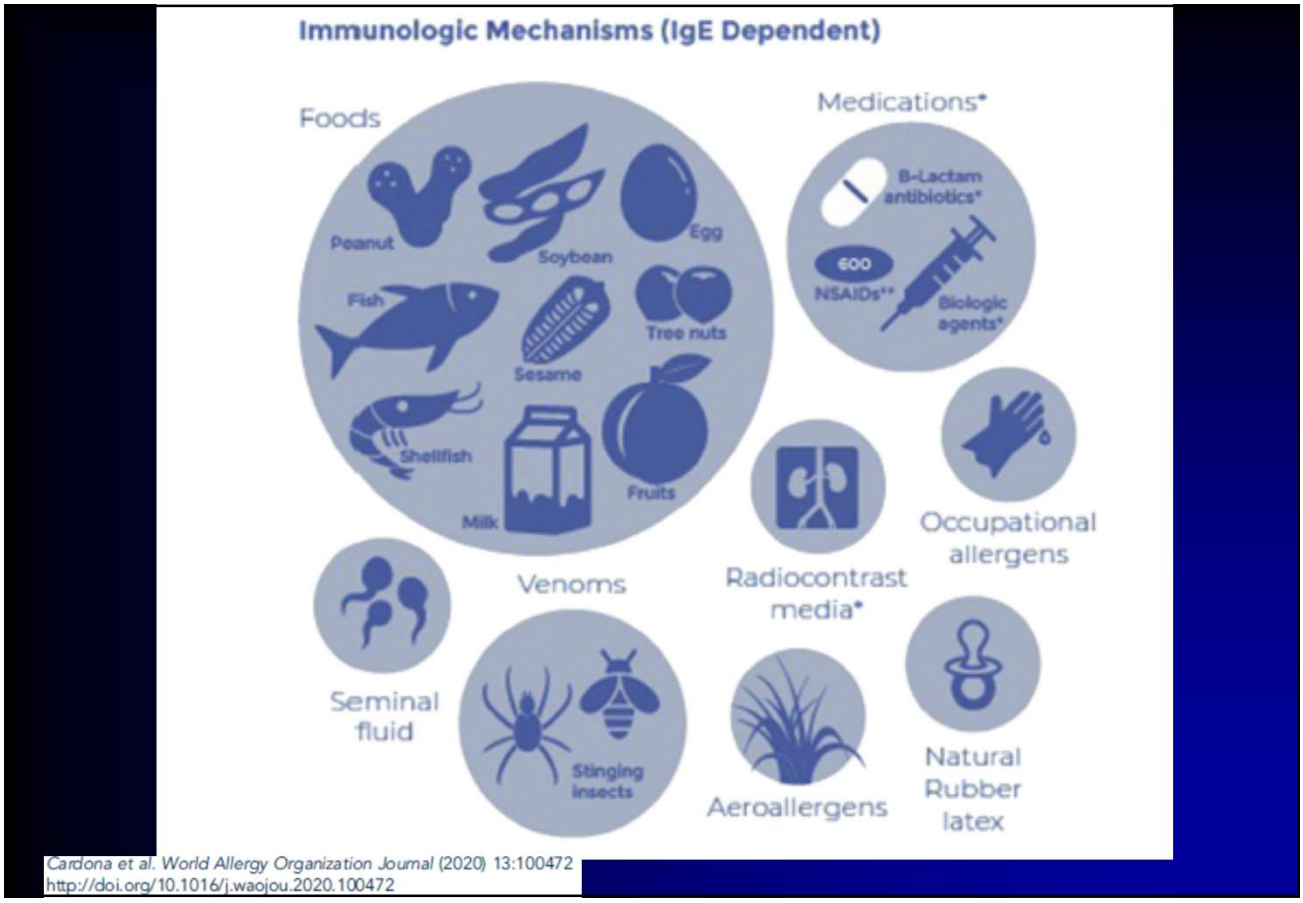
Objectives

1. Outline the definition and diagnosis of anaphylaxis
2. Describe anaphylaxis triggers and comorbidities
3. Discuss dosing and drug delivery issues for epinephrine as first-line management of anaphylaxis
4. Outline general and secondary measures for anaphylaxis management
5. Discuss specific issues related to insect stings, foods, and latex anaphylaxis
6. Outline key messages in anaphylaxis education

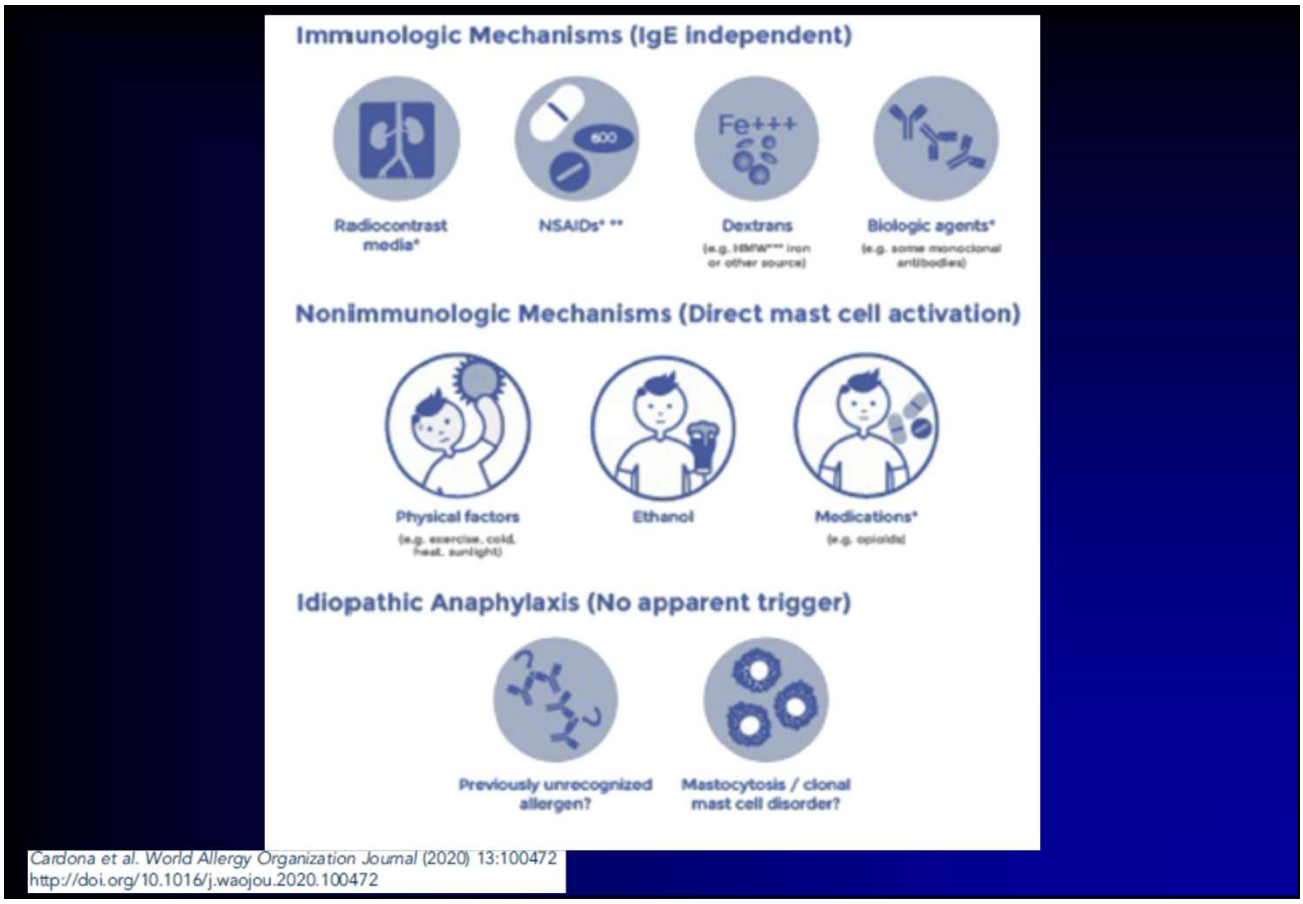
2


ANAPHYLAXIS
IMMUNOLOGIC
IDIOPATHIC
NON-IMMUNOLOGIC
IgE, FcεRI
(foods, venoms, latex, drugs)
Other
(blood products, immune aggregates, drugs)
Physical
(exercise, cold, heat, sunlight)
Other
(drugs)

3


Immunologic Mechanisms (IgE Dependent)
Foods
Peanut
Soybean
Egg
Fish
Tree nuts
Sesame
Shellfish
Milk
Fruits
Medications*
β-Lactam antibiotics*
600
NSAIDs**
Biologic agents*
Occupational allergens
Radiocontrast media*
Venoms
Stinging insects
Seminal fluid
Aeroallergens
Natural Rubber latex
Cardona et al. World Allergy Organization Journal (2020) 13:100472
http://doi.org/10.1016/j.waojou.2020.100472

4



Cardona et al. World Allergy Organization Journal (2020) 13:100472
http://doi.org/10.1016/j.waojou.2020.100472

5

ANAPHYLAXIS:
Definition & Diagnosis

DEFINITION

- "A serious allergic reaction that is rapid in onset and may cause death"
- focus on signs & symptoms versus mechanistic definition

DIAGNOSIS

- detailed description of the episode
- pattern recognition & probability
- presence of co-triggers e.g. ingestion of specific foods or any food with exercise-induced anaphylaxis; also EtOH & NSAIDS
- exclusion of other diseases/syndromes
- laboratory tests
  - ↑plasma histamine or serum tryptase – time-sensitive
  - skin tests or allergen specific IgE levels – only select antigens

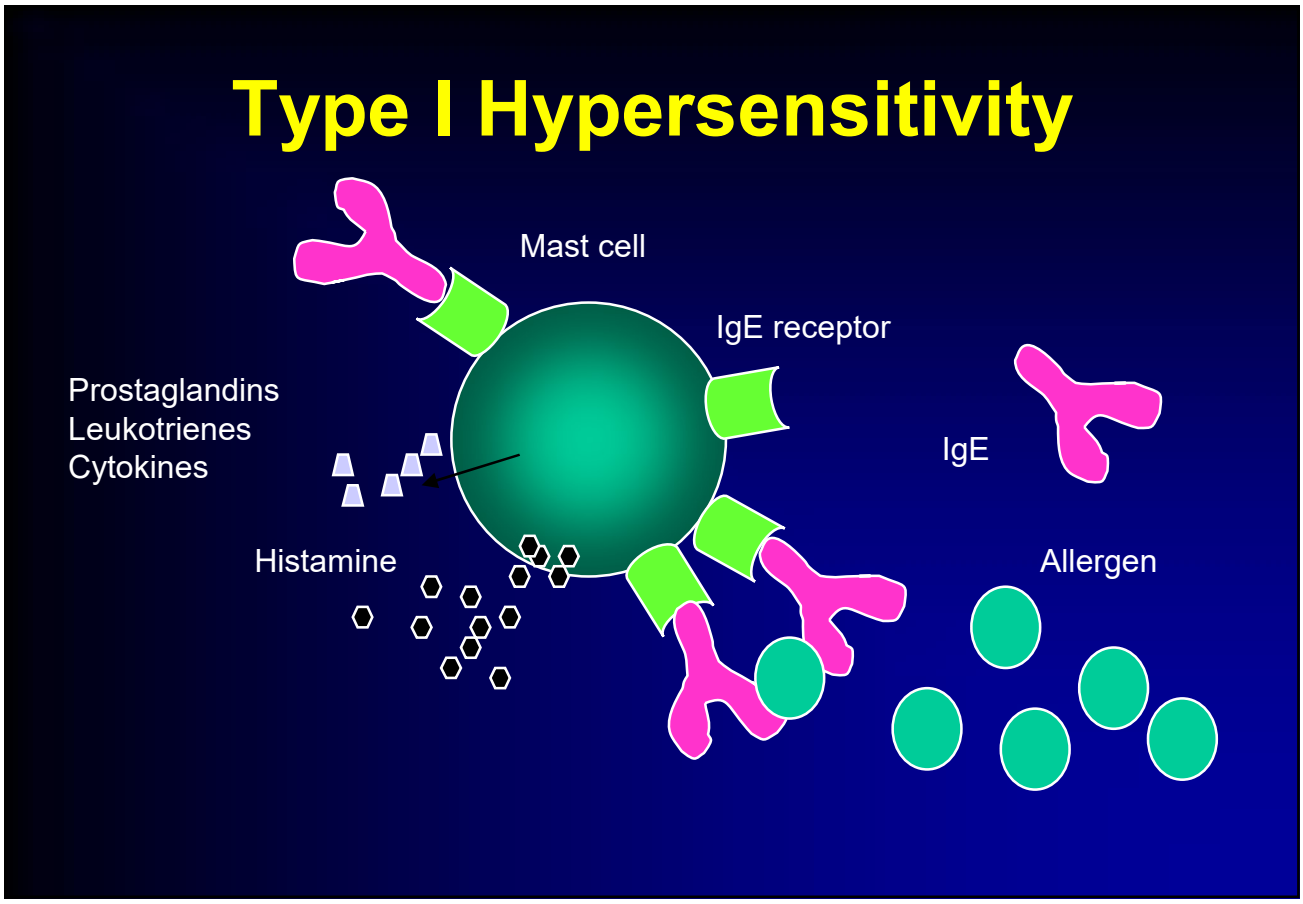
Lieberman JA et al. JACI: In Practice 2020; 8(4): 1177-84

6

Anaphylaxis: Immunologic

- Occurs shortly after exposure (minutes to hours)
- Exposed to antigen previously
- Mediated by IgE
- IgE-antigen complex attaches to receptors on basophils and mast cells
- Basophils and mast cells release preformed mediators (eg histamine)
- Allergic response occurs as mediators react with target organ tissues

7


Type I Hypersensitivity
Mast cell
IgE receptor
Prostaglandins
Leukotrienes
Cytokines
IgE
Histamine
Allergen

8

Signs & Symptoms of Anaphylaxis

- Skin & mucosa
  - flushing, itching, hives (urticaria), morbilliform rashes, angioedema
  - itching or swelling of lips, tongue, uvula, palate
  - eye swelling, erythema, itch, conjunctival injection, lacrimation
- Respiratory
  - nasal itch, stuffiness, rhinorrhea, sneezing
  - throat itch, dysphagia, dysphonia, hoarseness, stridor, laryngeal edema, ear pruritus
  - SOB, cough, wheeze, bronchospasm, ↓PEF, hypoxemia tachypnea, cyanosis

Samson HA et al J Allergy Clin Immunol 2005; 115; 584-591
Muraro A et al. EAACIl guildeline: Ana;hylaxis (2021 Update). Allergy. 2021

9

Signs & Symptoms of Anaphylaxis (cont)

- Cardiovascular
  - low BP
  - chest pain or abnormal heart rhythm
  - syncope or near syncope, change in mental status
- GI
  - diarrhea, nausea, abdominal pain, vomiting
- Other
  - sense of impending doom
  - seizures
  - uterine contraction

Samson HA et al J Allergy Clin Immunol 2005; 115; 584-591
Muraro A et al. EAACIl guildeline: Ana;hylaxis (2021 Update). Allergy. 2021

10

Biphasic Anaphylaxis

- Recurrent anaphylaxis after complete improvement
- Occurs 1-78 hrs after onset of initial reaction
- Clinically differentiated from a reaction that does not fully respond to initial Tx and persists or quickly returns
- Rates up to 20%; 2005 diagnostic criteria 4-5%
- Therapy for 2nd phase is similar to initial phase
- Optimal duration of extended observation unknown (1hr versus ≥ 6 hrs)
- Risks: severe episode; need for > 1 dose epi
- Risk factors: multi-organ involvement, severe respiratory component, continued absorption of allergen(food), unknown elicitor of anaphylaxis

Shaker MS et al 2020; J Allergy Clin Immunol 145(4): 1082-1122 1123

11

Frequency of Signs and Symptoms of Anaphylaxis*

Signs/Symptoms	Percent
Urticaria & angioedema	85-90%
Upper airway edema	50-60%
Flush	45-55%
Dyspnea & wheeze	45-50%
Dizziness, syncope, hypotension	30-35%
GI symptoms	25-30%
Rhinitis	15-20%
Headache	5-8%
Substernal pain	4-6%
Itch without rash	2-5%
Seizure	1-2%

*Compilation of 1865 cases from available literature; %'s are approximations

Lieberman P et al. J Allergy Clin Immunol 2005; 115(3)i S483-S523

12

Clinical Criteria for Diagnosing Anaphylaxis

Anaphylaxis is highly likely when any <u>one</u> of these 3 criteria are fulfilled:

1. Acute onset of an illness (minutes to several hours) with involvement of the skin, mucosal tissue, or both (e.g. hives, pruritus or flushing, swollen lips, tongue, or uvula) AND AT LEAST ONE OF THE FOLLOWING
   a. Sudden respiratory compromise (eg dyspnea, wheeze, cough, bronchospasm, stridor, hypoxemia)
   b. Sudden reduced BP or assoc. symptoms of end-organ dysfunction (eg hypotonia [collapse], incontinence)

Sampson HA et al. J Allergy Clin Immunol 2006; 117:391-7.
Muraro A et al. EAACI Guideline: Anaphylaxis (2021 Update). Allergy. 2021

13

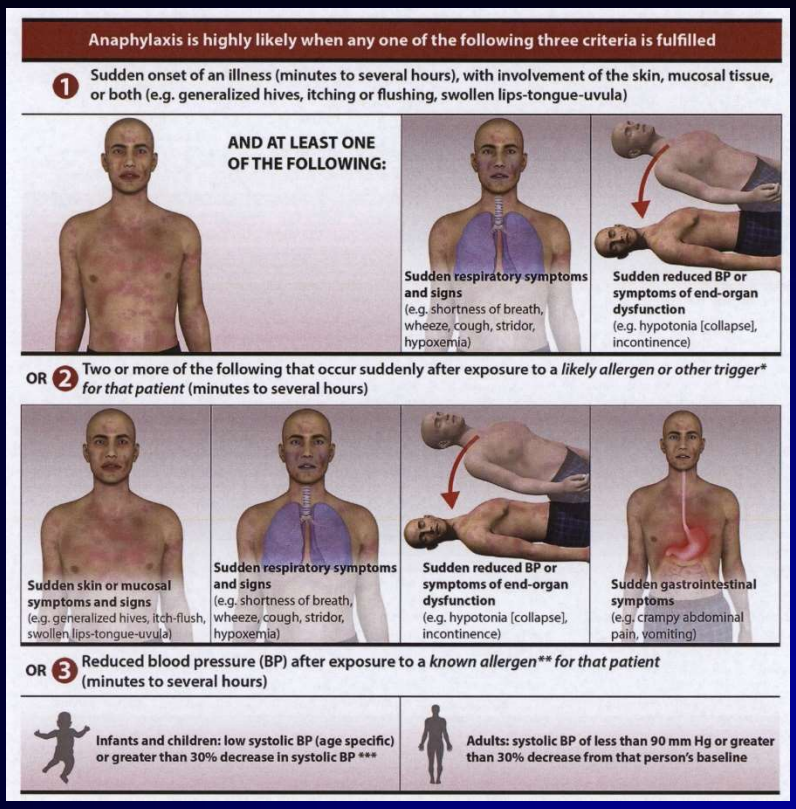
Clinical Criteria for Diagnosing Anaphylaxis (Cont'd)

2. Two or more of the following that occur suddenly (minutes to several hours) after exposure to a likely allergen or other trigger for that patient:
   a. Involvement of the skin or mucosal tissue
   b. Resp. compromise
   c. Reduced BP or Sx of end-organ dysfunction
   d. Persistent GI Sx (eg crampy abdominal pain, vomiting)
3. Reduced BP after exposure to known allergen for that patient:
   a. Infants & children: low systolic BP* or > 30% ↓ systolic BP
   b. Adults: BP < 90 mmHg or > 30% ↓ from baseline

   * age specific

Sampson HA et al. J Allergy Clin Immunol 2006; 117:391-7.
Muraro A et al. EAACI guideline: Anaphylaxis (2021 Update). Allergy. 2021

14


Anaphylaxis is highly likely when any one of the following three criteria is fulfilled
1 Sudden onset of an illness (minutes to several hours), with involvement of the skin, mucosal tissue, or both (e.g. generalized hives, itching or flushing, swollen lips-tongue-uvula)
AND AT LEAST ONE OF THE FOLLOWING:
Sudden respiratory symptoms and signs (e.g. shortness of breath, wheeze, cough, stridor, hypoxemia)
Sudden reduced BP or symptoms of end-organ dysfunction (e.g. hypotonia [collapse], incontinence)
OR 2 Two or more of the following that occur suddenly after exposure to a likely allergen or other trigger* for that patient (minutes to several hours)
Sudden skin or mucosal symptoms and signs (e.g. generalized hives, itch-flush, swollen lips-tongue-uvula)
Sudden respiratory symptoms and signs (e.g. shortness of breath, wheeze, cough, stridor, hypoxemia)
Sudden reduced BP or symptoms of end-organ dysfunction (e.g. hypotonia [collapse], incontinence)
Sudden gastrointestinal symptoms (e.g. crampy abdominal pain, vomiting)
OR 3 Reduced blood pressure (BP) after exposure to a known allergen** for that patient (minutes to several hours)
Infants and children: low systolic BP (age specific) or greater than 30% decrease in systolic BP ***
Adults: systolic BP of less than 90 mm Hg or greater than 30% decrease from that person's baseline

15

Mediators

Preformed, Granule-associated

Mediator	Function
Histamine	Powerful vasodilator, ↑ vascular permeability
Heparin	Anticoagulant
Serotonin	↑ vascular permeability
Tryptase	Protease
Chymase	Protease

16

Newly Synthesized Mediators

- Prostaglandins
  - PGD_2
- Leukotrienes (SRS-A)
  - LTC_4
  - LTD_4
  - LTE_4
- Platelet activating factor
- Cytokines

17

Mediator/Receptor Interactions in Anaphylaxis

Skin: $H_1 + H_2$

Heart: H_1 (AV node) + H_2 (atrium and ventricles) – effect rate and conduction

PGD_2 – coronary flow

LTC_4 – contractility

Peripheral Vessels: $H_1 + H_2 + PGD_2$

Lungs: PGD_2, LTC_4 (H_1)

Upper airway: H_1 , others

Gastric mucosa: H_2

18

Anaphylaxis Triggers

- Allergen Triggers
  - Drugs
  - Foods
  - Insect venoms
  - Natural Rubber Latex
  - Biologic materials
  - Food additives
  - Inhalants
  - Seminal fluid
  - Occupational allergens
  - Allergen immunotherapy
- Non Allergen Triggers
  - Physical Factors
    - Exercise
    - Cold
    - Heat
    - Sunlight/UV
  - Drugs
  - Ethanol

19

Mortality Due to Anaphylaxis

- Lifetime prevalence of anaphylaxis 1.6%-5.1%
- Estimated case fatality rate of 0.3% (drugs, venom, foods)
- Direct causes
  - upper airway obstruction
  - bronchial dysfunction
  - hypotension
- Indirect causes
  - myocardial infarction
  - cerebral injury
  - ischemia, hypoxia
  - Epinephrine-induced cardiac disorders (1° due to IV administration)
  - failure to use epinephrine, or delay in administration

20

Comorbidities and Concurrent Medications Relevant to Anaphylaxis

COMORBIDITIES

- Might interfere with recognition of triggers or symptoms
  - Impairment of vision/hearing
  - Psychiatric disease
  - Developmental disease
  - Behavioral problems
  - Substance abuse
- Might affect treatment
  - Asthma (esp. uncontrolled)
  - Cardiovascular disease
  - Lack of coordination or strength

21

Comorbidities and Concurrent Medications Relevant to Anaphylaxis

Concurrent Medications

- Might Interfere with recognition of trigger or Sx
  - Sedatives
  - Hypnotics
  - Ethanol
  - Recreational drugs

- Might affect treatment
  - β-adrenergic blockers
  - α-adrenergic blockers
  - ACE inhibitors
  - Angiotensin II receptor blockers
  - Tricyclic antidepressants
  - MAO inhibitors
  - ADHD medications

22

Management of Anaphylaxis
Immediate Intervention

- Assess: airway, breathing, circulation, mentation
- Administer epinephrine – early use recommended
- Call 9-1-1
- Remove trigger
- Posture: lie flat with legs elevated
- Repeat epinephrine if no improvement in 5-10 minutes

Muraro A et al. EAACI guideline: Anaphylaxis (2021 Update). Allergy. 2021

23

Management of Anaphylaxis

Immediate Intervention

- Epinephrine IM into the deltoid every 5 to 20 minutes, to control symptoms and blood pressure. Dose of 0.01mg/Kg of a 1:1000 [1mg/ml] solution to a max. of 0.5mg in adults and 0.3mg in children.
- Epinephrine autoinjector may be administered through clothing into the anterolateral thigh, every 5 to 20 minutes.
- Epinephrine 1:1000, 0.1-0.3 ml in 10 ml normal saline (1:100,000 to 1:33,000 dilution) administered IV over several minutes and repeated as necessary, in anaphylaxis not responding to IM injections and volume Rx.

Kemp SF & Lockey RF. J Allergy Clin Immunol 2002; 110:341-8.

24

ABC's of Anaphylaxis

- Airway
  - Persistent cough, hoarseness, difficulty swallowing, swollen tongue
- Breathing
  - Difficult or noisy breathing, wheezing or persistent cough
- Circulation
  - Persistent dizziness, sudden sleepiness, collapse/unconsciousness

Muraro A et al. EAACI guideline: Anaphylaxis (2021 Update). Allergy. 2021

25

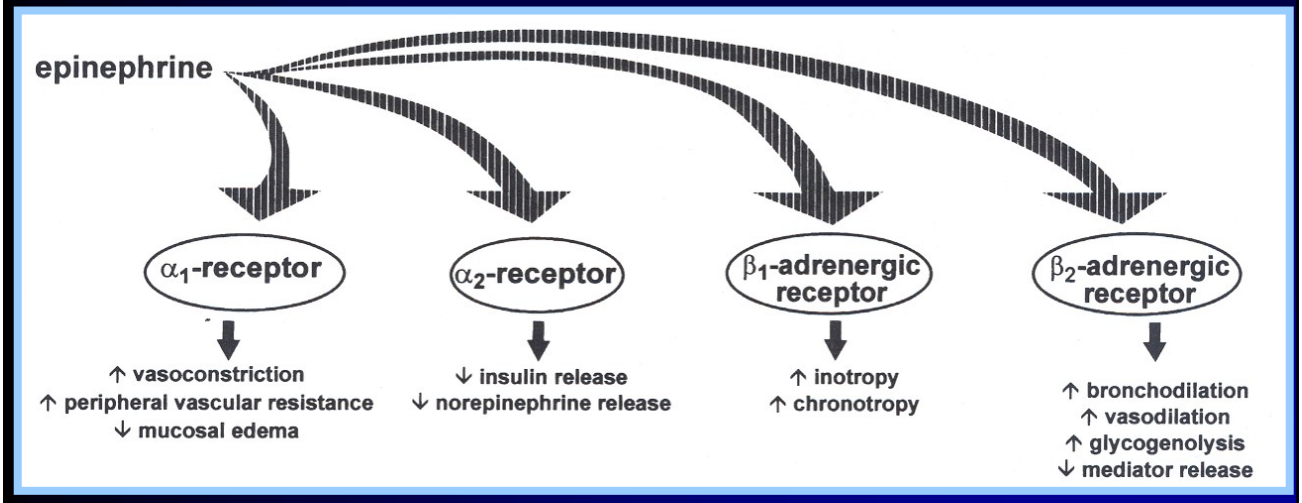
Mild/Moderate Reaction

- Swollen, lips, face or eyes
- Itchy/tingly mouth
- Hives or itchy skin rash
- Abdominal pain or vomiting
- Actions:
  - Inform others/get help
  - Locate epinephrine autoinjector
    - If in doubt, treat
  - Watch for worsening symptoms

Muraro A et al. EAACI guideline: Anaphylaxis (2021 Update). Allergy. 2021

26

Pharmacology of Epinephrine



Simons FER. J Allergy Clin Immunol 2004; 113:837-844.

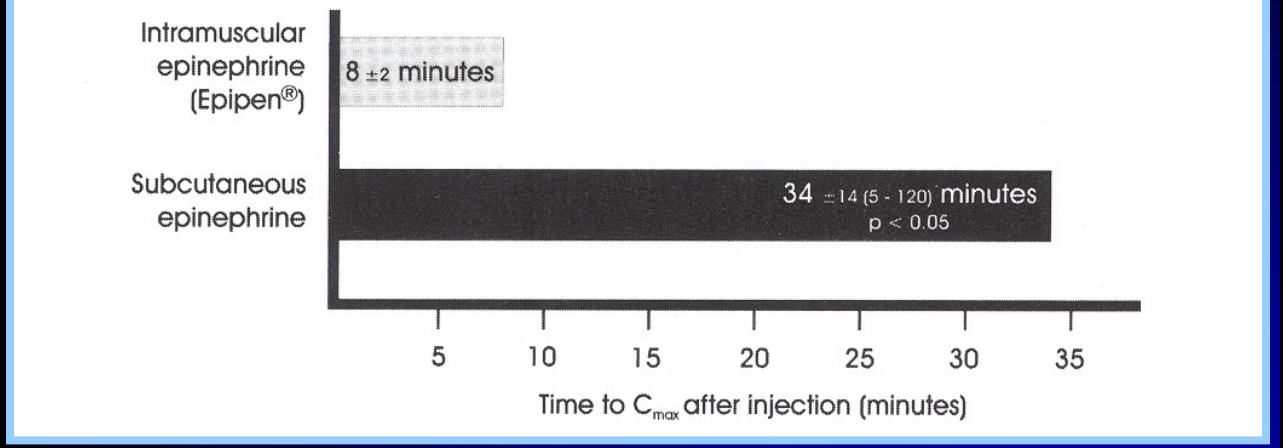
27

Route of Administration of Epinephrine

- **Intramuscular** in the mid-outer thigh (vastus lateralis muscle)
  - Autoinjectors with variable exposed needle lengths (range of 11.7mm – 15.2mm); 0.1mg Auvi-Q has 7.4mm length
  - Fixed dose injectors (Auvi-Q, and Mylan EpiPen and Mylan generic): 0.1mg, 0.15 mg, and/or 0.30 mg
  - Epinephrine ampule with syringe and needle
- Subcutaneous – not preferred
- Never administered in subcutaneous tissues of stomach or buttock (slower absorption due to fat composition)

28

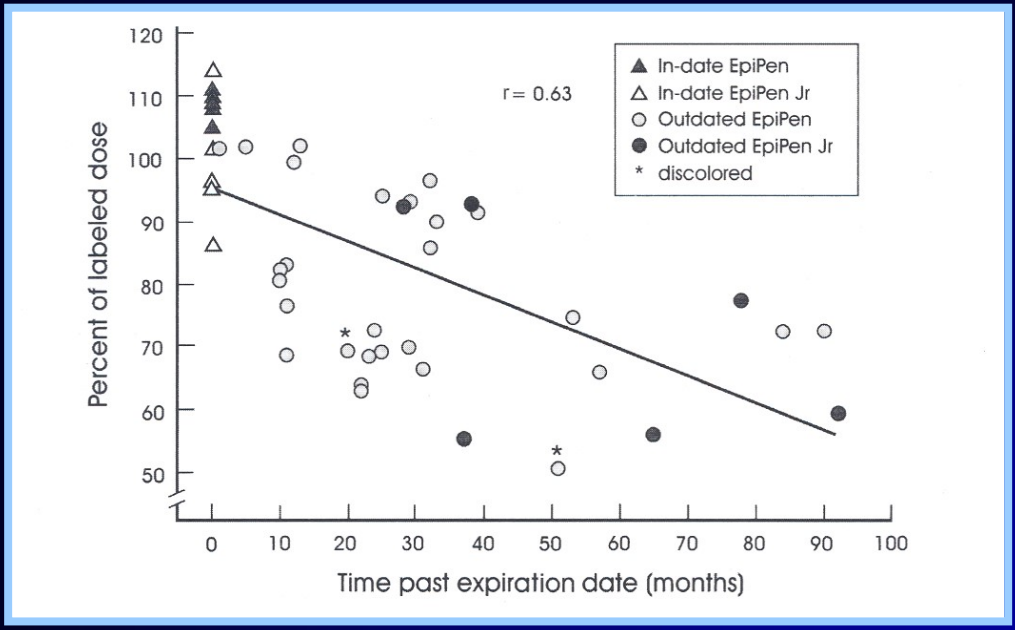
Absorption of Epinephrine IM vs SQ



Simons FER. J Allergy Clin Immunol 2004; 113:837-844.

29

Implications of Outdated Epi Pen: Potential Injection of a Suboptimal Dose



Simons FER. J Allergy Clin Immunol 2004; 113:837-844.

30

Epipen® Jr or Epipen® for Infant/Child?

Body Weight	≤ 5 kg	10 kg	15 kg	20 kg	25 kg	≥30 kg
50th %ile	2 mo	14 mo	3 yr	6 yr	9 yr	12 yr
Optimal dose (mg)	0.05	0. 1	0. 15	0. 2	0. 25	0. 3
EpiPen® Jr	3x OD	1.5x OD	optimal	1.3x UD	1.7x UD	--
EpiPen®	--	--	--	1.5x OD	1.2x OD	optimal

OD—overdose; UD--underdose

Simons FER. J Allergy Clin Immunol 2004; 113:837-844.

31

Pediatric Guidelines for Self-Injecting Epinephrine

- 0.1 mg (Auvi-Q) for those weighing 7.5-15 Kg (16.5-33 lb)
- 0.15 mg for otherwise healthy young children weighing 10-25 Kg (22-55 lb)
  - May be used in infants in 0.1 mg unavailable
- 0.30 mg for those weighing 25 Kg (55 lb) or more
  - Some providers might recommend at 50 lb weight
- Clinical issues that may add risk to underdosing and indicate a relative benefit for a higher dose:
  - concurrent asthma
  - previous anaphylaxis to peanut, tree nut, milk, egg, seafood, and/or finfish
  - poor access to emergency services
  - lack of supervision; dual households
  - engagement of other caregivers eg grandparents

Sicherer SH and Simons FER. Pediatrics 2007; 119(3): 638-46

32

Training Patients to Use Epi Pen ®, Generics, Mylan

- Proper injection technique, IM in anterolateral thigh (outer thigh); hold in place 3 seconds
- Common mistakes
- Counseling tips (yellow or green carrier cap, blue safety release or pen; needle comes out of orange tip)
- Dispensing reminders
  - Epi Pen 0.3 mg (0.3 ml, 1:1000) ➞ 55 pounds (25 Kg) or more [yellow colored label]
  - Epi Pen Jr. 0.15 mg (0.3 ml, 1:2000) ➞ 33-55 pounds (15-25 Kg) [green colored label]
  - Auto-injectors contain 2 ml; 1.7 ml remains after activation and cannot be used

https://www.epipen.com/

33

Figure 3. Administration of an epinephrine auto-injector to a well-restrained infant, demonstrating how a single holder can bunch the thigh muscle during administration to increase the skin-to-bone depth.

34

Auvi-Q™, Kaleo, Inc.

- Voice-guided epinephrine auto-injector; audible (electronic voice instructions, beeps) and visible (LED lights) cues
- Size of a credit card, thickness of a cellphone
- Retractable needle mechanism to prevent accidental needle sticks after injection
- Pre-filled single-use auto-injector: 0.3mg (orange), 0.15mg (blue), and 0.1mg (white and lavender)
- IM or SQ into anterolateral thigh; OK thru clothing
- Steps:
  1. Pull from outer case
  2. Pull off red safety guard
  3. Place black end against thigh, press firmly until you hear a click & hiss sound, then hold 2 sec

https://www.auvi-q.com/hcp

35

Resources

- References

1. Brown JC. Epinephrine, auto-injectors, and anaphylaxis: challenges of dose, depth, and device. Ann Allergy Asthma Immunol 2018; 121: 53-60
2. Brown JC et al. Epinephrine in the management of anaphylaxis. J of Allergy & Clin Immunol: In Practice 2020; 8(4): 1186-95

- Websites

https://www.epipen.com/en/about-epipen-and-generic/how-to-use-epipen

https://www.auvi-q.com/public-access/auvi-q-training-resources

36

Oral H_1-antihistamines have a slow onset of action

	Healthy, fasting young adults, single dose		Healthy, fasting children, single dose	
	T_{max}(h)	Onset of activity (h postdose)	T_{max}(h)	Onset of activity (h postdose)
Chlorpheniramine	2.8 ± 0.8	1	2.5 ± 1.5	1
Diphenhydramine	1.7 ± 1.0	1	1.3 ± 0.5	1
Hydroxyzine	2.1 ± 0.4	1	2.0 ± 0.9	NA
Cetirizine	1.0 ± 0.5	0.7	1.1 ± 0.8	0.7-1
Desloratadine	1-3	NA	NA	NA
Fexofenadine	2.6	2	2.4 ± 0.2	1
Loratadine	1.2 ± 0.3	3	1	1-2

Not recommended for initial/sole treatment of anaphylaxis

- might be helpful if itching is present

Simons FER. J Allergy Clin Immunol 2004; 113:837-844.

37

Management of Anaphylaxis

Immediate Interventions

- Assess airway, breathing, circulation
- IV access, oxygen, monitor
- BP, pulse, pulse oximetry, ECG
- Recumbent position
- IM epinephrine

Campbell R et al. Ann Allergy Asthma Immunol; 2014; 113:599-608

38

Management of Anaphylaxis
Specific Measures that Depend on Clinical Scenario

- Rapid fluid infusion (IV, IO)
- Repeat IM epinephrine
- IV epinephrine infusion
  - Adults: 1mcg/min up to 10mcg/min
  - Children: 0.1mcg/Kg/min
- Bronchodilators
  - Nebulized albuterol 2.5-5 mg in 3 ml saline or levalbuterol 0.63-1.25 mg unit dose; repeat prn

Campbell R et al. Ann Allergy Asthma Immunol; 2014; 113:599-608

39

Management of Anaphylaxis

Specific Measures that Depend on Clinical Scenario

- Corticosteroids
  - Methylprednisolone 1-2 mg/Kg/day (administered in divided doses q 6 hrs) or prednisone q 0.5 mg/Kg in less critical anaphylaxis episodes.
- H1/H2 Antihistamines
  - Diphenhydramine 1-2 mg/Kg or 25-50 mg per dose parenterally (max 300 mg for children and 400 mg for adults)
  - Ranitidine 50 mg in adults and 12.5-50 mg (1 mg/Kg) in children, diluted in 5% dextrose to a total volume of 20 ml and injected IV over 5 minutes (cimetidine 4 mg/Kg is an alternative in adults)
- Glucagon
  - Glucagon 1-5 mg (20-30 mcg/Kg with max. dose of 1 mg in children) IV over 5 minutes, then infusion 5-15 mcg/min
    (activates adenylcyclase directly and bypasses the β adrenergic receptor)
- Hypotension
  - Dopamine 400 mg in 500 ml of 5% dextrose in water IV; infused at 2-20 mcg/Kg/min and titrated to BP maintenance of > 90 mmHg

Campbell R et al. Ann Allergy Asthma Immunol; 2014; 113:599-608

40

Anaphylaxis During Pregnancy

- Can be catastrophic for mother and infant
- Sx can include intense vulvar & vaginal itching, low back pain, uterine cramps, fetal distress, preterm labor
- 1st 3 trimesters – etiologies the same as w/o pregnancy
- Etiologies in labor and delivery – β-lactams, latex, neuromuscular blockers, oxytocin, local anesthetics, blood products
- Tx: prompt epi, high-flow O_2, positioning mother on L side to ↑ venous return to heart, maintain sys. BP ≥ 90 mmHg, continuous electronic monitoring
- Defer skin tests, challenge tests, desensitization, IT

Simons FER and Schatz M. J Allergy Clin Immunol 2012; 130: 597-606

41

Insect Sting Anaphylaxis

Clinical Presentation

- Immediate reactions
  - local
  - large local
  - systemic
    - generalized
  - toxic
    - Non-immunologic (due to multiple stings)
- Delayed reactions
  - serum sickness
  - Guillain-Barre syndrome
  - glomerulonephritis
  - myocarditis

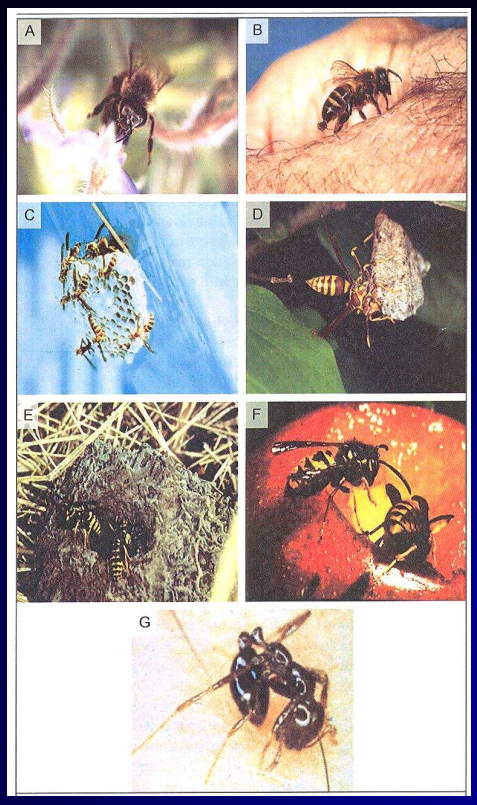
42

Hymenoptera Order Stinging Insects

- Apidae
  - Honeybees (panel A and panel B showing evisceration)
  - Africanized honey bees
  - bumblebees
- Vespidae
  - hornets (white-faced or bald-faced; yellow-faced)
  - paper wasps (panel C shows nest and panel D is close-up)
  - yellow jackets (panel E shows ground nest & panel F is close-up)
- Formicidae
  - fire ants (panel G)

Casale TB and Burks AW. N Engl J Med; 2014 (April 10); 370(15): 1432-39.

43



44

Insect Sting Anaphylaxis

Diagnosis

- Clinical History
- Skin test
    - intradermal test with venom
- In vitro testing for insect-specific IgE

45

Insect Sting Anaphylaxis

Management

- Natural history
- Insect Avoidance
- Epinephrine kits with instructions
- Venom immunotherapy (90-98% effective)
  - Candidates
  - Regimens
  - Avoidance of beta-blockers, ACE inhibitors??
  - Duration of treatment (3-5 years)

46

Influenza Vaccination & History of Egg Allergy

- Many influenza vaccines are prepared by propagation of virus in embryonated eggs & may contain trace amounts of egg proteins such as ovalbumin; referred to as egg-based products
- Only RIV4 (Flublock Quadrivalent) and cc11V4 (Flucelvax Quadrivalent) are considered “egg-free”

MMWR Recomm Rep 2021;70(No. RR-5)

47

Recommendations for Persons with a Hx of Egg Allergy

- Persons who have experienced only hives after exposure to egg may receive any licensed, recommended influenza vaccine appropriate for their age and health status
- Hx of severe allergic reaction (eg anaphylaxis) to egg is a labeled contraindication to the use of most IIV4s and LAIV4.
- Persons reporting symptoms other than hives (eg angioedema, resp. distress, lightheadedness, or recurrent emesis) after egg exposure or required epinephrine or another emergency intervention, should be vaccinated in a medical setting supervised by a health care provider able to recognize and manage severe allergic reactions, **IF A VACCINE OTHER THAN ccIIV4 or RIV4 IS USED**.

MMWR, 8/25/21, Prevention & Control of Seasonal Influenza with Vaccines: reco. of ACIP, 2020-21; volume 70, No. 5.

48

COVID-19 Vaccine Allergy/Anaphylaxis

- Proposed allergen – PEG2000
- Vaccine excipient – PEG2000 (polyethylene glycol)
  - Moderna: Rates of anaphylaxis 1:360,000
  - Pfizer: Rates of anaphylaxis 4.7:1,000,000
    - Comirnaty® PPI
    - Contraindications: known history of a severe allergic reaction (e.g., anaphylaxis) to any component of Comrinaty
- Vaccine excipient – Polysorbate 80
  - J&J, Astra Zeneca
- Deaths related to anaphylaxis: 0

49

CDC Guidelines
re: COVID vaccine Anaphylaxis

1. Ensure necessary supplies to manage anaphylaxis are available (ie epinephrine)
2. Screen potential vaccine recipients to ID contraindications and precautions
3. Implement postvaccination observation periods (15-30 minutes) based on patient history
4. Ensure health care team recognize signs & symptoms of anaphylaxis
5. Immediately treat suspected anaphylaxis with epinephrine and transport for further medical care

cdc.gov/mmwr/volumes/70/wr/mm7002e1.htm

50

Contraindications

- Severe allergic reaction (e.g. anaphylaxis) after a previous dose or to a component of the COVID-19 vaccine
- Immediate allergic reaction of any severity to a previous dose or known (diagnosed) allergy to a component of the COVID-19 vaccine

https://www.cdc.gov/vaccines/covid-19/clinical-considerations/covid-19-vaccines-us.html#Contraindications

51

Enhanced Vaccine Protocol

- Shavit R et al. Prevalence of Allergic Reactions After Pfizer-BioNTech COVID-19 Vaccination Among Adults With High Allergy Risk
- 429 highly allergic adults (8102 screened)
  - 1st dose: 420 no immediate reaction, 6 minor reactions, 3 anaphylactic reactions -
  - 2nd dose n=218: 214 no reaction, 8 minor rxn
- Other immediate and late reactions comparable to general population
  - Delayed itch, skin eruptions more common in allergic population

JAMA Network Open. 2021;4(8)

52

Enhanced Vaccine Protocol

- Low risk
  - History of sensitivity to aeroallergens or insect bite, food, latex, or contrast media
  - Prior non-anaphylactic reaction to a single drug group
  - Chronic urticaria
- High risk – patients were immunized in a specialized setting with 2 hour observation period and no specific pretreatment
  - Prior anaphylaxis to any drug or vaccine
  - Multiple drug allergies
  - Multiple allergies (including food, drug, insect sting)
  - Mast cell disorders
  - Patients with PEG allergy were not eligible

JAMA Network Open. 2021;4(8)

53

Diagnosis and Management of Adverse Reactions to Foods

Definitions

- Adverse Food Reaction
- Reproducible Adverse Reactions
- Food Allergy

54

Food Allergy

- Epidemiology
- Clinical Manifestations
  - Urticaria and Angioedema
  - GI “anaphylaxis”
  - Pollen-food syndrome (oral allergy syndrome)
  - Asthma
  - Anaphylaxis
  - Atopic dermatitis
  - Contact dermatitis
  - Allergic eosinophilic esophagitis/gastroenteritis
  - Food protein-induced proctocolitis, enterocolitis, enteropathy
- Diagnosis (skin tests, in vitro testing, and food challenges

55

Food Allergy

- Common food allergens
  - Cow's milk, egg white, soy, peanut, tree nuts, shellfish, fish, wheat
- Foods most likely to cause anaphylaxis
  - Peanut
  - Shellfish
  - Tree nuts
  - Milk
  - Eggs
  - Fish

56

Food Allergy Prevention

- Early introduction of allergenic food (@4-6 months)
  - Once introduced, maintain regular ingestion
- WHO guidelines – introduction of solid foods after age 6 months
- Development of peanut immunotherapy strategies

Allen KJ et al. J Allergy Clin Immunol Prac 2016; 4:215-20.

57

Groups Historically at Risk for Anaphylaxis to Latex During Surgical or Medical Procedures

- Report reactions: Type I and Type IV contact dermatitis
  - Chronic bladder care
    - Neural tube defects e.g., spina bifida
    - Spinal cord trauma
    - Urogenital malformations
    - Neurogenic bladder
  - Health care workers (especially in OR)
  - Patients with multiple surgical procedures
  - Atopic individuals
  - Workers in industries that manufactured rubber products

TODAY, < 1% of population develops latex allergy

Kelly KJ & Sussman G. J Allergy Clin Immunol 2017; 5:1212-6

58

Management of Latex Allergy

- Diagnosis:
  - Comprehensive history, skin test/IgE, provocation test
- Avoid exposure
- "Latex-safe" Environment
- Premedication? (prednisone + H_1 receptor antagonist)
- Latex-safe products (powder-free latex gloves, gloves with negligible allergen content)
- Potential cross reactivity to specific foods (banana, kiwi, avocado, chestnut, papaya, pear) - "latex-fruit syndrome"

59

Recommendations for Longer-Term Management of People Predisposed to Anaphylaxis

- Ensure the diagnosis and trigger agent(s) are clearly documented in electronic health records
- Ensure that patient/caregiver is aware of diagnosis, trigger, and ways to minimize re-exposure
- Avoid use of non-cardiac selective beta-blockers in those with a history of anaphylaxis, if possible
- Optimize asthma control in those with co-existing asthma
- Allergy and Anaphylaxis Emergency Plan

60

Recommendations for Longer-Term Management of People Predisposed to Anaphylaxis (cont'd)

- Patient Education – structured & comprehensive
  - Recognition of signs & symptoms
  - Management
    - Issue self-administered epinephrine
    - Education and training appropriate use of device-specific autoinjector
- Recommend a Medic Alert bracelet/necklace
- Consider immunotherapy for venom-induced anaphylaxis
- Referral to an allergist

61

Key Messages in Anaphylaxis Education
ANAPHYLAXIS = KILLER ALLERGY

- **Who is at risk?** Anyone, esp. those allergic to foods, such as peanut, tree nut, seafood, fin fish, milk, or egg, or to insect stings or bites, natural rubber latex, or medications.
- **When can it happen?** Within minutes, anytime the allergic person comes in contact with his or her trigger.
- **How do we know?** Several symptoms occur at the same time, such as: itching, hives, flushing, difficulty breathing, vomiting, diarrhea, dizziness, confusion, or shock

Simons FER. J Allergy Clin Immunol 2006; 117:367-377.

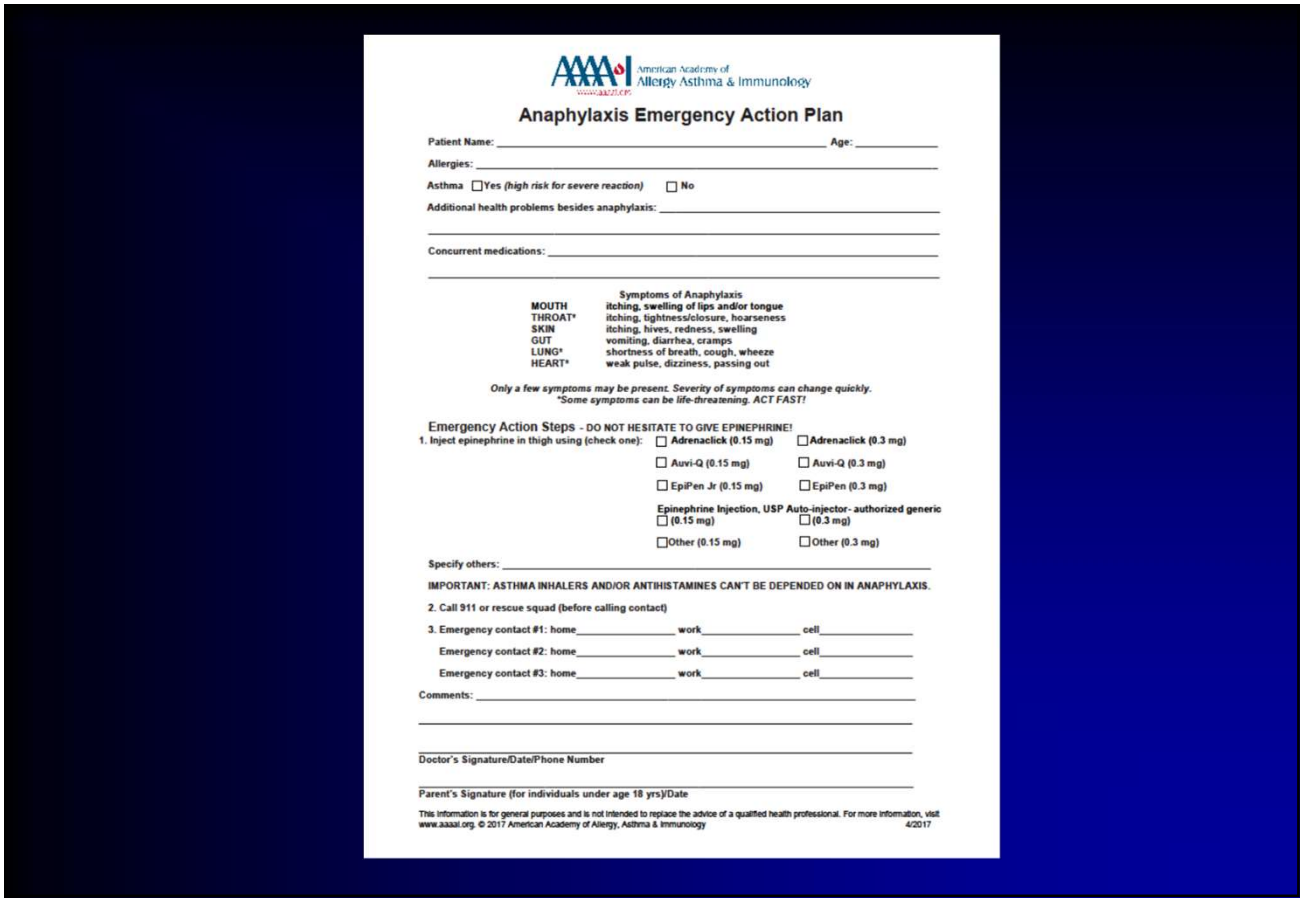
62

Key Messages in Anaphylaxis Education (cont'd)
ANAPHYLAXIS = KILLER ALLERGY

- **Where can it happen?** Anywhere: home, restaurant, school, child care, sports facility, camp, car, bus, airplane.
- **What should we do?** Inject epinephrine, call 911 or local EMS number, and notify the individual's family (in that order)! Act quickly. Anaphylaxis can be mild, or it can be fatal.
- **Why is follow-up needed?** Anaphylaxis can occur repeatedly. The trigger needs to be confirmed, and long-term prevention strategies need to be implemented.

Simons FER. J Allergy Clin Immunol 2006; 117:367-377.

63



American Academy of Allergy Asthma & Immunology
www.aaaai.org

Anaphylaxis Emergency Action Plan

Patient Name: _____ Age: _____

Allergies: _____

Asthma ☐ Yes *(high risk for severe reaction)* ☐ No

Additional health problems besides anaphylaxis: _____

_____

Concurrent medications: _____

_____

Symptoms of Anaphylaxis

MOUTH	itching, swelling of lips and/or tongue
THROAT*	itching, tightness/closure, hoarseness
SKIN	itching, hives, redness, swelling
GUT	vomiting, diarrhea, cramps
LUNG*	shortness of breath, cough, wheeze
HEART*	weak pulse, dizziness, passing out

Only a few symptoms may be present. Severity of symptoms can change quickly.
****Some symptoms can be life-threatening. ACT FAST!***

Emergency Action Steps - DO NOT HESITATE TO GIVE EPINEPHRINE!

1. Inject epinephrine in thigh using (check one):
   - ☐ Adrenaclick (0.15 mg)
   - ☐ Adrenaclick (0.3 mg)
   - ☐ Auvi-Q (0.15 mg)
   - ☐ Auvi-Q (0.3 mg)
   - ☐ EpiPen Jr (0.15 mg)
   - ☐ EpiPen (0.3 mg)
   - Epinephrine Injection, USP Auto-injector- authorized generic
     - ☐ (0.15 mg)
     - ☐ (0.3 mg)
     - ☐ Other (0.15 mg)
     - ☐ Other (0.3 mg)

Specify others: _____

IMPORTANT: ASTHMA INHALERS AND/OR ANTIHISTAMINES CAN'T BE DEPENDED ON IN ANAPHYLAXIS.

2. Call 911 or rescue squad (before calling contact)

3. Emergency contact #1: home_____ work_____ cell_____

   Emergency contact #2: home_____ work_____ cell_____

   Emergency contact #3: home_____ work_____ cell_____

Comments: _____

_____

_____
Doctor's Signature/Date/Phone Number

_____
Parent's Signature (for individuals under age 18 yrs)/Date

64