Update on Anaphylaxis: Recognition and Treatment in a College Health Service

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Our backgrounds

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Identified gaps

- Not all clinicians aware of more unusual presentations of anaphylaxis
- Not all clinicians are familiar with different preparations of epinephrine
- Some clinicians are confused about potential contraindications to giving epinephrine
- Not all clinicians are aware of risks caused by delay in administering epinephrine
- All schools should have written policy & procedure for responding to anaphylaxis
18 year old first year student has flavored coffee & fruit at Einstein bagel store on campus
Next events—as best as we could piece it together

Student and friend walk in to Health Service, complaining of allergic reaction but she is in “no apparent distress” at appointment desk.

Usual appointment person is not in. Nurse is covering. [change in standard practice]

Nurse goes back to clinic to see what to do. Physician’s schedule already full. MD and RN advise: student should go to the emergency room.

Someone calls for a ride to ER and sends student out back to wait for transport.
Symptoms at ER:
difficulty breathing, wheezing, facial swelling

History of anaphylaxis at age 12, “aviary pavillion”
Has epipen but not with her

Also has an anxiety disorder
Initial questions

Did clinicians not recognize anaphylaxis—student had no objective signs early on?

Did they recognize it but were hesitant to treat:
  Unsure about dose of epinephrine?
  Unsure about safety of epinephrine?
  Unsure if beginning treatment meant you had to keep patient there?

Do pediatricians have different experience-base than internists? How does that affect treatment choices?

Do we train clinicians well enough in “urgent care?”
Other quality issues

Several staff were substituting for people in the usual roles
Do you have “three deep” trained to handle emergency situations?
So these were the questions that led us to our original presentation at ACHA in Chicago (2012).

We looked at a variety of reasons clinicians might have trouble recognizing & treating anaphylaxis.

We looked at systems-changes that could prevent repeat errors.
What is anaphylaxis?

Acute allergic reaction involving 2 or more organ systems or hypotension alone

Potentially life-threatening event that requires vigilance on the part of the healthcare provider who needs to recognize the condition quickly and initiate early treatment

Exaggerated response to an allergen
What causes anaphylaxis?

3% of teenagers have food allergies (may be as high as 4-8%), and number is increasing.

Anaphylaxis may also be increasing – Pediatric ED visits for food-induced anaphylaxis doubled from 2001 to 2006 in one study.

Usually triggered by food, insect stings, or medications.

IgE mediated or other immunologic mechanisms.
How does anaphylaxis present?

- **General**
  - Anxiety, weakness, malaise

- **Dermatologic**
  - Eye redness, lid swelling
  - Swelling of tongue and lips
  - Rash, itching, flushing

- **Cardiovascular**
  - Tachycardia, hypotension

- **Respiratory**
  - Wheezing, difficulty breathing, throat constriction, stridor

- **Gastrointestinal**
  - Nausea, vomiting, diarrhea, abdominal cramps

- **Neurologic**
  - Headache, dizziness, confusion
Clinical Criteria for Diagnosing Anaphylaxis

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<tr>
<th>National Institute of Allergy and Infectious Disease and Food Allergy and Anaphylaxis Network criteria for anaphylaxis</th>
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<td><strong>Anaphylaxis is likely when any one of these three criteria is fulfilled:</strong></td>
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<td><strong>1. Acute onset of illness</strong> (minutes to several hours) with involvement of the skin, mucosal tissue, or both (e.g., generalized hives, pruritus or flushing, swollen lips, tongue, or uvula) and at least one of the following:</td>
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<td>(a) Respiratory compromise (e.g., dyspnea, wheeze or bronchospasm, stridor, reduced peak expiratory flow, hypoxemia)</td>
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<td>(b) Reduced blood pressure or associated symptoms of end-organ dysfunction (e.g., hypotonia [collapse], syncope, incontinence)</td>
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<td><strong>2. Two or more of the following that occur rapidly after exposure to a likely allergen for that patient (minutes to several hours):</strong></td>
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<td>(a) Involvement of the skin or mucosal tissue (e.g., generalized hives, itch or flush, swollen lips, tongue, or uvula)</td>
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<td>(b) Respiratory compromise (e.g., dyspnea, wheeze or bronchospasm, stridor, reduced peak expiratory flow, hypoxemia)</td>
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<td>(c) Reduced blood pressure or associated symptoms (e.g., hypotonia [collapse], syncope, incontinence)</td>
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<tr>
<td>(d) Persistent gastrointestinal tract symptoms (e.g., crampy abdominal pain, vomiting)</td>
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<td><strong>3. Reduced blood pressure after exposure to known allergen for that patient (minutes to several hours):</strong></td>
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<td>(a) Infants and children: low systolic blood pressure (age specific) or &gt;30% decrease in systolic blood pressure(^a)</td>
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<td>(b) Adults: systolic blood pressure &lt;90 mmHg or &gt;30% decrease from that person’s baseline</td>
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\(^a\) Low systolic blood pressure for children is defined as <70 mmHg from 1 month to 1 year, < (70 mmHg + [2 × age]) from 1 to 10 years, and <90 mmHg from 11 to 17 years.

Modified from Sampson et al. [7]
Why does anaphylaxis get missed?

Anaphylaxis is under-recognized
Clinicians may miss anaphylaxis for a number of reasons:
- No history of exposure to typical offending agent
- Varied and atypical features
- No lab tests that help acutely

List of possible diagnoses includes anxiety, vocal cord dysfunction, vasovagal reaction, panic attacks
Is anaphylaxis in college students more likely to be missed?

Adolescents and young adults appear to be at increased risk for Fatal food allergic reactions
Less parental oversight
Increased risk-taking

College students
Are unaware of the symptoms of anaphylaxis
Have low reported maintenance of any emergency medication
Do not tell close campus contacts, campus health services, or dining services
Willingly ingest self-identified food allergen (particularly those who have not experienced anaphylactic symptoms)
In this case

Not a factor:

Student stated she was having allergic reaction.

What did we think?

Consider routinely asking a colleague to help decide
Management of anaphylaxis

**Assessment**

**Airway** – speaking sentences, stridor, wheezing

**Breathing** – RR, work of breathing

**Circulation** – P, BP, capillary refill

**Disability** – consciousness

**Exposure** – rashes
Management of anaphylaxis

Administer IM epinephrine every 5 to 15 minutes until appropriate response is achieved using:

*Commercial auto-injector*

0.3 mg for patients who weigh more than 66 lb

Or

Vial 0.01 mg per kg with a maximal dose 0.5 mg in adults

0.3 cc of 1:1000 dilution is usual dose

Call 911 or Rescue Squad or Campus Security (know ahead of time which you will use)
Epinephrine is essential

Alpha-1 adrenergic agonist vasoconstrictor effects prevent and relieve laryngeal edema, hypotension, and shock

Delayed epinephrine is associated with increased risk of fatal reaction
Policy on allergic reactions:

Your policy states that you follow current recommendations from CDC’s Immunization Guide and you follow state law.
Your procedure book tells how you plan to enact your policy. It is more of a “how to” document.

You can print out the information on the next slide and keep it in your clinic procedure book (see Ref #2).
Supplies you may need at a community Immunization clinic

- **First-line treatment:** Aqueous epinephrine 1:1000 (i.e., 1 mg/mL) dilution, in ampules, vials of solution, or prefilled syringes, including epinephrine autoinjectors (e.g., EpiPen). If EpiPens are stocked, at least three adult EpiPens (0.30 mg) should be available.

- **Secondary treatment option:** Diphenhydramine (Benadryl) injectable (50 mg/mL solution) or oral (12.5 mg/5 mL liquid, 25 or 50 mg capsules/tablets)

- Syringes: 1 and 3 cc, 22 and 25g, 1", 1½", and 2" needles for epinephrine and diphenhydramine (Benadryl)

- Alcohol wipes

- Tourniquet

- Adult airways (small, medium, and large)

- Adult size pocket mask with one-way valve

- Oxygen (if available)

- Stethoscope

- Sphygmomanometer (blood pressure measuring device) with adult-size and extra-large cuffs

- Tongue depressors

- Flashlight with extra batteries (for examination of the mouth and throat)

- Wristwatch with ability to count seconds

- Cell phone or access to onsite phone

Emergency medical protocol for management of anaphylactic reactions in adults

1. If itching and swelling are confined to the injection site where the vaccination was given, observe patient closely for the development of generalized symptoms.

2. If symptoms are generalized, activate the emergency medical system (EMS; e.g., call 911) and notify the on-call physician. This should be done by a second person, while the primary nurse assesses the airway, breathing, circulation, and level of consciousness of the patient.

3. Drug Dosing Information:
   a. **First-line treatment:** Administer aqueous epinephrine 1:1000 dilution intramuscularly, 0.01 mL/kg/dose (adult dose ranges from 0.3 mL to 0.5 mL, with maximum single dose of 0.5 mL).

   b. **Secondary treatment option:** For hives or itching, you may also administer diphenhydramine either orally or by intramuscular injection; the standard dose is 1–2 mg/kg, up to 50 mg maximum single dose.

4. Monitor the patient closely until EMS arrives. Perform cardiopulmonary resuscitation (CPR), if necessary, and maintain airway. Keep patient in supine position (flat on back) unless he or she is having breathing difficulty. If breathing is difficult, patient’s head may be elevated, provided blood pressure is adequate to prevent loss of consciousness. If blood pressure is low, elevate legs. Monitor blood pressure and pulse every 5 minutes.

5. If EMS has not arrived and symptoms are still present, repeat dose of epinephrine every 5–15 minutes for up to 3 doses, depending on patient’s response.

6. Record all vital signs, medications administered to the patient, including the time, dosage, response, and the name of the medical personnel who administered the medication, and other relevant clinical information.

7. Notify the patient’s primary care physician.
Procedure book

You may also want to specify how students with anaphylaxis will be transported to ER.
You may also want to specify who will be notified (student affairs, parents, etc)

This kind of information goes into the procedure book rather than the policy book so you aren’t revising a huge book of policies every year.
Epinephrine is essential – but providers and patients do not use it

Epinephrine is used infrequently in emergency settings

Despite universal recommendations for the use of epinephrine in anaphylaxis, it is uncommonly used by patients and providers

Symptoms perceived as not severe enough

Perceived as dangerous
Epinephrine effects

Expected:
- Anxiety, headache, dizziness, palpitations, pallor, tremor

Rare:
- Arrhythmias, myocardial infarction, pulmonary edema, intracranial hemorrhage

There are no absolute contraindications to epinephrine in anaphylaxis
Auto-injector v ampoules: considerations

Cost
Do you have more than 1 nurse on hand?
Drawing it up with “filter needle” (glass particles)
   3 cc syringe with 1” 25 gauge needle
Have to use a lot of force to trigger the auto-injector

Don’t have to calculate dose with auto-injector—may help overcome hesitancy to use it
Local considerations will help you decide which to use.
References


2. Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Atkinson W, Wolfe S,


10. Sampson MA, Muñoz-Furlong A, Sicherer SH. Risk-taking and coping strategies of adolescents and young adults with food allergy.

Additional Resources

Food Allergy and Anaphylaxis Network’s College Network (www.faancollegenetwork.org)

National Institute of Allergy and Infectious Disease (www.niaid.nih.gov)

www.theinvisiblegorilla.com

www.beingwrongbook.com
Thanks for your time and attention!

Questions?