Development and Support

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Speakers and Disclosures

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Accreditation Information

The American Pharmacists Association is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing pharmacy education (CPE). This activity, Anaphylaxis Screening and Protection is approved for 1.5 hours of CPE credit (0.15 CEUs). The ACPE Universal Activity Number assigned by the accredited provider is 0202-0000-12-255-L04-P for pharmacists and 0202-0000-12-255-L04-T for technicians.

To obtain CPE credit for this activity, participants will be required to actively participate in the entire webinar and complete an online evaluation and assessment located at www.pharmacist.com/live-activities by November 27, 2012. Instructions and an attendance code will be provided at the completion of the webinar.

Target audience: Pharmacist and Technicians
ACPE Activity Type: Knowledge-based
Learning Level: 2
Initial Release Date: November 13, 2012

Learning Objectives for Technicians

» Define the term “anaphylaxis,” list common symptoms, and identify key elements of anaphylaxis treatment.
» Name factors that increase a person’s risk of experiencing anaphylaxis as well as factors that increase the severity of anaphylaxis.
» Describe the elements of a comprehensive strategy for preventing and treating episodes of anaphylaxis in the community setting.
» Explain the appropriate use of epinephrine auto-injectors and identify errors commonly made by patients.
» Summarize the usual components of an emergency action plan for an individual patient at risk of anaphylaxis.

Only 1 dose of epinephrine should be used to reverse a severe allergic reaction or anaphylaxis event?

» True

» False
When should an epinephrine autoinjector be replaced?

a. If it was obtained more than 6 months ago.
b. If it will expire before the patient can return to the pharmacy for a replacement.
c. After it has expired.
d. It does not need to be replaced unless it has been used.

Side effects of epinephrine include:

a. Palpitations and difficulty breathing
b. Dizziness and lightheadedness
c. Leg weakness
d. Nausea

Introduction to Patient Case

› Roy Petrey is a 32-year-old male with a history of allergic reactions
› Through trial and error, he has eliminated multiple possible causes, such as dust, grass, and animal dander
› The most recent incident included complete body rash, facial swelling, and bronchospasm
Anaphylaxis Overview

- Definition
  - "A severe and sometimes fatal allergic reaction that is characterized by hives, itching, respiratory difficulty, and shock; this condition requires immediate medical attention"
  - "A severe, life-threatening, generalized or systemic hypersensitivity reaction that is characterized by rapidly developing life-threatening airway and/or breathing and/or circulation problems usually associated with skin and mucosal changes"

Clinical Criteria for Diagnosis of Anaphylaxis

- Highly likely when any one of the following 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., generalized hives, pruritus or flushing, swollen lips-tongue-uvula) AND AT LEAST ONE OF THE FOLLOWING
     - A. Respiratory compromise
     - B. Reduced Blood Pressure or symptoms of end-organ dysfunction

- 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
   - B. Respiratory compromise
   - C. Reduced BP or associated symptoms
   - D. Persistent gastrointestinal symptoms
Clinical Criteria for Diagnosis of Anaphylaxis

3. Reduced blood pressure after exposure to known allergen for that patient (minutes to several hours):
   - A. Infants and children: low systolic blood pressure (age specific) or >30% decrease in systolic blood pressure
   - B. Adults: systolic blood pressure of <90 mm Hg or >30% decrease from that person’s baseline

Anaphylaxis Incidence

- Overall incidence
  - Estimates range widely
  - Up to 49.8 per 100,000 person years
  - Up to 10.5-70 per 100,000 person years in those <19 years
- Compare to colorectal cancer
  - 52.7 per 100,000 person years (males)
  - 39.7 per 100,000 person years (females)

Anaphylaxis Statistics

- Admissions rate for anaphylactic shock
  - 3.8 cases per 100,000 hospital admissions
- Emergency room visits
  - 71% of patients present to ED or urgent care
  - Of these, only 11% required hospitalization
- Inpatients
  - 1 in 3,000 inpatients in US has an anaphylactic reaction
Anaphylaxis Statistics

- Ages
  - Peak occurrence: 15-55 years
  - Mean age 29 years, highest rates in <20 years
- Gender
  - 56% female
- Epinephrine prescriptions
  - More in men if <15 years
  - More in women if >15 years

Anaphylaxis Statistics

- Season
  - Peak: July-Sept (stings)
- Geographic region
  - More in North/East vs South/West
- Deaths
  - 1,443-1,503 deaths per year (0.002%)

Pathophysiology

- Anaphylaxis: IgE mediated
  - First exposure: sensitization
  - Subsequent exposure: release of inflammatory mediators (e.g., histamine, cytokines)
- Anaphylactoid: Non-IgE mediated
  - May occur after first exposure

Note: Distinction not recommended because presentation and treatment are identical
Common Triggers: Food

- Most commonly peanuts, milk, eggs, tree nuts, shellfish, soy, fish, wheat, sesame seed
- Usually immediate although may be delayed or return

Common Triggers: Medications

- Antibiotics
  - Penicillin most common medication cause
- NSAIDs or ASA
  - 2nd most common
  - May be med specific
- Other medications
  - Radio contrast media
  - IV anesthetics
  - Opioid analgesics
  - Omalizumab
  - All patients should have epinephrine Rx

Other Common Triggers

- Insect venom
  - Most commonly Hymenoptera order – honeybees, bumblebees, sweat bees, yellow jackets, hornets, wasps, ants
- Latex
- Exercise
- Idiopathic
- Autoimmune
### Incidence
- Food 33.2%
- Insect sting 18.5%
- Medication 13.7%
- Contrast 0.5%
- Other known 9%
- Unknown 25.1%

### Clinical Presentation
- **Typical**
  - Exposure to trigger
  - May not be identified
  - Rapid onset of symptoms
  - Resolves within minutes to hours
  - Spontaneous or with medical attention

- **Less likely**
  - Delayed onset
  - Prolonged duration
  - Biphasic reaction

*May vary between people and between episodes!*

### Clinical Presentation
- Most frequently encountered signs/symptoms
  - Mucocutaneous 94%
  - Respiratory 88%
  - Gastrointestinal 22%
  - Cardiovascular 21%

- Early signs/symptoms
  - Flushing
  - Urticaria
Biphasic Reactions

- Recurrence after remission of initial symptoms
  - Maximum incidence 20%
  - Variable severity
  - Difficult to predict
  - May require second dose
- Increased likelihood with:
  - Delay in epinephrine
  - Inadequate epinephrine
  - Need for large amounts of epinephrine

Most Common Symptoms

- Diffuse urticaria 51.2%
- Local angioedema 48.8%
- Dyspnea 48.3%
- Pruritis 48.3%
- Throat tightness/fullness 39.8%
- Flushing 38.4%
- Tachycardia 35.6%
- Wheezing/bronchospasm 26.5%
- Emesis 18.0%
- Local urticaria 17.1%
Dyspnea/difficulty breathing 48.8%
Intra-oral angioedema 15.6%
Hypotension 12.3%
Oro/hypo-pharyngeal edema 10.9%
Arrhythmia 6.6%
Syncope 6.6%
Diffuse angioedema 6.2%
Cyanosis 5.2%
Laryngeal edema 4.3%
Shock 1.0%

The Case of Mr. Petrey
- RP has determined that his most recent allergic reaction was actually anaphylaxis
  - Skin testing has revealed an allergy to beef protein
- RP has been educating himself about trigger avoidance but is worried and fearful about future episodes of anaphylaxis
- RP calls and asks if you can talk him through what might happen if he needs to be treated again

Management of Acute Anaphylaxis
- First line therapy
  - Epinephrine first and always!
Management of Acute Anaphylaxis

- **Second-line therapy**
  - Antihistamines
    - Symptomatic for urticaria, angioedema and pruritis
    - May use H1 + H2
  - Systemic corticosteroids
    - May prevent protracted or biphasic reaction

<table>
<thead>
<tr>
<th>Sample Regimen:</th>
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<tbody>
<tr>
<td>Diphenhydramine 25-50 mg</td>
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<tr>
<td>Ranitidine 300 mg</td>
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<tr>
<td>Methylprednisolone 1-2 mg/kg</td>
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<td>*or equivalents</td>
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- **Third-line therapy**
  - Bronchodilators
  - Supportive measures
    - Oxygen
    - Fluid resuscitation
    - Vasopressors
    - Glucagon
  - Positioning
    - Remain recumbent (unless vomiting/SOB prevents)
    - Legs elevated
  - It is not recommended to induce vomiting

Management of Acute Anaphylaxis

- **Observe patient after initial event**
  - Recommended: 8 hours
  - Longer if more severe
  - Caution in patients with reactive airway disease
    - More fatalities
- **At discharge**
  - Prescription: epinephrine auto-injector
  - Education: avoidance if trigger known
  - Follow-up: notify PCP/refer to allergist
The Case of Mr. Petrey

- That was awful—am I ever going to have to do it again?
- You really want me to give myself a shot?

Behavioral Barriers

- Access
  - Epinephrine auto-injector is not available
  - Not prescribed
  - Not on their person
  - Not able to use epinephrine auto-injector
  - Regulatory restrictions (schools, day care, etc.)
- Fear
  - Needle
  - Adverse effects
- Denial
  - Recognition of reaction
  - Severity of reaction

Behavioral Barriers

- "I had plenty of auto-injectors available, but that time the symptoms were different... it wasn’t until we got into the car (that) I suddenly thought, ‘no, this is the same thing.’"
- "I thought I was having an asthma attack; I thought if I had anaphylactic shock I would be throwing up, because that’s what I did when I was little."
- "I didn’t realize that I could use it if I was just going into the reaction. You don’t know if you should take it now or wait until it develops and see how it goes. Are you bad enough to use it, that’s the big issue…”
Overcoming Barriers

- Self-education
  - Food labels
  - “May contain”
  - Eating out
  - Travel
- Vigilance
- Parental role
  - Educating child on trigger avoidance
  - Reinforcement
  - Gradual hand over of responsibility/management to adolescent

Psychosocial Impact

- “I think if you have experienced an anaphylactic shock and you know what it’s like. Very, very frightening...the second time he had an anaphylactic reaction he hardly ate for 6 months.”
  - —Parent of child with anaphylaxis

Psychosocial Impact

- “Quite a lot of my friends go and kiss boys and things and it’s kind of awkward for me because I’ll have to kind of ask have you eaten nuts. And you can’t really do that in a club...”
The Case of Mr. Petrey

- After discussing treatment of acute anaphylaxis, RP feels reassured and is confident he can overcome any of the barriers he is facing.
- He asks if he is at high risk for experiencing a future episode—if so, is there anything he can do to prevent it?

Identifying Patients at Risk

- Previous episode: greatest predictor of future event
  - Within 10 years:
    - Median 395 days
    - Range 7 days to 13 years later
- Atopic history: present in 54%-60% of patients
  - i.e. Asthma, allergic rhinitis, atopic dermatitis, hives
  - More likely if food-induced or idiopathic

Identifying Patients with Increased Severity

- Patient age
- Concomitant disease states
  - Asthma
  - Allergies to anaphylaxis-causing substances
  - Heart Disease
- Medications
  - Beta blockers, alpha blockers (block epinephrine activity)
  - ACE inhibitors, ARBs (may interfere with endogenous compensatory responses)
Preventing Anaphylaxis

- Identify and avoid patient-specific triggers
- Manage relevant comorbidities
- Assess benefits, risks of concurrent meds
- Assess need for prophylactic therapy
  - Trigger not identified or not avoidable
    - Consider:
      - H1 and/or H2 antagonist
      - Leukotriene modifier
      - Corticosteroids
- Consider immunomodulation
  - Venom-induced anaphylaxis

Epinephrine Drug Interactions

- ACE inhibitors
- ARBs
- Beta blockers
- Alpha blockers
- Cocaine
- Amphetamines
- Tricyclic antidepressants
- Monoamine oxidase inhibitors

The Case of Mr. Petrey

- Has RP eliminated all possible allergens to protect himself from future episodes of anaphylaxis?
- What education does RP require to be prepared for the future?
  - Hint: He has never used an epinephrine auto-injector
- What are the elements of a complete emergency plan?
Autoinjectable Epinephrine

Also known as adrenaline

Mechanism of action
- Alpha and beta adrenergic agonist

Therapeutic effects
- Vasoconstriction
- Bronchodilation
- Decreased mucosal edema
- Decreased release of mast cells, basophils, tryptase, histamine
- Increased myocardial output and contractility

Adverse effects
- Anxiety
- Tremor
- Headache
- Difficulty breathing
- Palpitations (could be drug or disease)

Contraindications
- None!

Delivery systems
- EpiPen
- Auvi-Q
- No longer marketed: Twinject, Adrenaclick

Available in 0.15 mg or 0.3 mg doses
- Weight-based dosing:
  - If 10-25 kg: give 0.15 mg
  - If >25 kg: give 0.3 mg

Route of administration: intramuscular
Autoinjectable Epinephrine

- Site of administration: anterior lateral thigh
  - Inject through clothing
- May repeat every 5-15 minutes
- If in doubt, administer!
- 13% required >2 doses

Autoinjectable Epinephrine Comparison

- Both doses are available as auto-injections
  - EpiPen – Yes  Auvi-Q – Yes
- Needle left exposed after auto-injection
  - EpiPen – Yes  Auvi-Q – No
- Second dose can be saved and used later
  - EpiPen – Yes  Auvi-Q – Yes
- Trainer device is included
  - EpiPen – Yes  Auvi-Q – Yes

Autoinjector Administration Technique

1. Prepare the epinephrine autoinjector.
2. Position the autoinjector on the thigh.
3. Press the autoinjector to administer the dose.
What to Expect After Administration

- Common adverse effects
  - Anxiety
  - Tremors
  - Pallor
  - Tachycardia
- 10 seconds may feel like eternity
- Should feel improvement within 5-10 minutes

The Case of Mr. Petrey

- You receive a call from an EMT en route to the emergency room with RP, who appears to be having an acute cyanotic episode
  - The EMT has found the pharmacy telephone number on a prescription for a metered dose inhaler in RP’s hand
  - The EMT asks you what other medications RP is getting and if you have a history that would help them manage RP
- On questioning you find that they do not know of RP’s history of anaphylaxis!

The Case of Mr. Petrey

- The EMT determines that RP has already self administered an epinephrine auto-injector
- Based on patient reaction and vital signs, the EMT administers an additional dose (0.3mg) of epinephrine en route to the nearest ED
- RP is given supportive treatment and kept for observation, but makes a full recovery
The Case of Mr. Petrey

- RP arrives in your pharmacy and asks for you by name
- He shakes your hand and thanks you for “saving his life” during his recent ambulance ride
- You assure him that you are happy to assist and that keeping all of his records in one pharmacy helped his chances of having a complete medication history available for the EMT
- RP states that he will always keep his emergency action plan on his person, and needs to acquire an emergency ID bracelet

Emergency Action Plan

- Emergency action plan
  - Information necessary for urgent care
  - Instructions for family, others
- Emergency preparedness
  - Medical alert bracelet
  - Vigilance and education

Tips for Pharmacists

- Practice Improvements
  - Keep all brands of epinephrine necessary for your clientele
  - Keep emergency plan forms for patient education
  - Offer patients a method of purchasing a medical emergency identification
  - Consider collaborative drug therapy management agreement with allergist of primary care physician
  - Administer epinephrine and call 911 in patient presenting with anaphylaxis
Tips for Pharmacists

- Educate!
  - patients, parents, teachers, and others
  - 46% of people contacted friend or family member first when they had severe reactions
  - Counsel on secondary treatments and preventive measures, as necessary
  - Teach proper use, storage and administration of epinephrine
    - Review product insert/instructions with patients
    - Avoid excessive heat or cold
    - Remind about intramuscular injection
    - Replace if submersed in water
    - Inspect regularly for changes in color or clarity

- Alleviate patient fears
  - Provide necessary, patient specific information
  - Assure them this is a manageable situation
  - Address psychosocial barriers

- Help resolve access barriers
  - Physician collaboration for initial prescription
  - Second prescription for keeping at school or work
  - Prescription renewal/expiration reminders

Tips for Pharmacists

- Provide support
  - Offer to help complete the patient emergency plan
  - Suggest who should be informed and trained
  - Give the patient your contact information for follow up information with a copy for his/her primary care provider
  - Call the patient if an incident has occurred recently
  - Keep specialist contact information available
Patient Steps for Successful Management

- Educate close contacts
- Check expiration date on epinephrine
- Know and avoid triggers
- Recognize symptoms
- Carry self-injectable epinephrine at all times
- Use epinephrine early and correctly
- Seek medical care after epinephrine use

Only 1 dose of epinephrine should be used to reverse a severe allergic reaction or anaphylaxis event?

- True
- False

When should an epinephrine autoinjector be replaced?

- If it was obtained more than 6 months ago.
- If it will expire before the patient can return to the pharmacy for a replacement.
- After it has expired.
- It does not need to be replaced unless it has been used.
Side effects of epinephrine include:

- Palpitations and difficulty breathing
- Dizziness and lightheadedness
- Leg weakness
- Nausea

Additional Resources

For more information:
- EpiPen: [www.myepipen.com](http://www.myepipen.com)
- The American College of Allergy, Asthma, and Immunology: [http://www.acaai.org/allergist/allergies/Anaphylaxis/Pages/anaphylaxis-patient-tip-sheet.aspx](http://www.acaai.org/allergist/allergies/Anaphylaxis/Pages/anaphylaxis-patient-tip-sheet.aspx)
- The Food Allergy and Anaphylaxis Network: [http://www.foodallergy.org/section/education](http://www.foodallergy.org/section/education) - [http://www.foodallergy.org/section/support-groups](http://www.foodallergy.org/section/support-groups)

References

References


References

- Pumphrey R. Anaphylaxis: can we tell who is at risk of a fatal reaction? Curr Opin Allergy Clin Immunol 2004;4:395-400.