Anaphylaxis
Rapid recognition and treatment

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Past President and current Conference Chair - The American Academy of Physician Assistants in Allergy, Asthma & Immunology
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Disclosures

INDUSTRY AFFILIATIONS
Grifols Pharmaceutical - speaker, consultant
Boehringer Ingelheim Pharmaceuticals – consultant, speaker
Meda Pharmaceuticals – speaker, consultant
Circassia Pharmaceuticals – advisory panel
GSK – advisory panel
Genentec - speaker

CLINICAL RESEARCH
2017 – Sub-I, Genetech Zenyatta Severe Asthma Study
2016 – Sub-I, Biota Human Rhinovirus Study
2015 – Sub-I, Sanofi Traverse Severe Asthma Study
2015 – Sub-I, Sanofi Liberty Severe Asthma Study
2013 – Study Coordinator: MediVector Influenza Study

Brian Bizik does not intend to discuss the use of any off-label use/unapproved use of drugs or devices
12 YO MALE with an insect sting (stung once) at a park. Had the following:

Hives, tongue felt thick but did not look swollen
Cough, a bit of a wheeze and chest felt tight
Runny nose and sneezed once
Felt nausea and like “he was going to throw up”
Hands and feet felt swollen
IS THIS ANAPHYLAXIS?

12 YO MALE with an insect sting (stung once) at a park. Had the following:

Hives, tongue felt thick but did not look swollen
Cough, a bit of a wheeze and chest felt tight
IS THIS ANAPHYLAXIS?

12 YO MALE with an insect sting (stung once) at a park. Had the following:

Hives, tongue felt thick but did not look swollen
In a few seconds it was extremely ill; breathing became distressful and panting; it could scarcely drag itself along, lay on its side, was seized with diarrhea, vomited blood and died in twenty five minutes.

Charles Richet 1902
ANAPHYLAXIS

Instead of inducing tolerance (prophylaxis), Richet’s experiments in dogs injected with sea anemone toxin resulted in lethal responses to doses previously tolerated. He coined the word ‘ana’ (without) ‘phylaxis (protection). He won the Nobel prize for this work.
Definition of Anaphylaxis

• An acute allergic reaction resulting in widespread allergic symptoms which involves two or more organ systems, and is potentially life-threatening, resulting from an IgE-mediated mechanism.

• Anaphylactoid – term falling into disuse but meant to describe anaphylaxis without IgE involvement ie a non-allergic mechanism.

• Anaphylaxis now describes a clinical event, regardless of mechanism
Current Definition of Anaphylaxis

- Short practical form – ‘Anaphylaxis is a serious allergic reaction that is rapid in onset and may cause death’
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 (eg, generalized hives, itch-flush, swollen lips-tongue-uvula)

B. Respiratory compromise (eg, dyspnea, wheeze-bronchospasm, stridor, reduced PEF in older children and adults, hypoxemia)

C. Reduced BP or associated symptoms (eg, hypotonia, collapse, syncope, incontinence)

D. Persistent gastrointestinal symptoms (eg, crampy abdominal pain, vomiting)
Quick Example

• This happened 3 weeks ago
• 48 Y O Female, known sensitivity to sunflower seeds takes a bite of a granola bar without reading ingredients.
• Walks over (she works in administration next to my clinic) and looks like this:
• Facial flushing
• Feels like her tongue might be getting bigger but not sure.
• No GI symptoms, no cough, wheeze, stridor, not itching anywhere, drank water without a problem
• Anaphylaxis???
Mast cell with IgE bound to surface; mediators contained within granules in cytoplasm

Allergen cross-links IgE on mast cell surface

Mediators (e.g., histamine) released from mast cells
IgE Mediated Allergic Reactions

- Allergen bridges 2 molecules of IgE causing mediator release
- **Early phase manifestations** are due to release of preformed mediators, histamine & tryptase, and newly generated leukotrienes, which cause
  - vasodilation and increased vascular permeability, itching, sneeze and bronchospasm
- **Late phase manifestations** are due to recruitment of eosinophils, neutrophils & TH2 cells and other inflammatory cells 4-12 hrs later due to cytokines released in the early phase
- As well, interleukin 4 formed by mast cells can stimulate further production of IgE and potentiate other allergic reactions
### EARLY

<table>
<thead>
<tr>
<th>Immediate symptoms (mins to few hrs) due to mediator release</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allergic rhinitis – rhinorrhea, sneeze, itch</td>
</tr>
<tr>
<td>Asthma – bronchospasm, wheeze, dyspnea</td>
</tr>
<tr>
<td>Urticaria – short lived lesions &lt; 24 hrs, responds well to antihistamines</td>
</tr>
<tr>
<td>Anaphylaxis – occurs</td>
</tr>
</tbody>
</table>

### LATE PHASE

<table>
<thead>
<tr>
<th>Begins 4-12 hrs after allergen exposure due to inflammatory cell influx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allergic rhinitis – nasal congestion</td>
</tr>
<tr>
<td>Asthma – increased bronchial irritability and inflammation with increased tendency to asthma flareups and increased severity</td>
</tr>
<tr>
<td><strong>Urticaria</strong>-lesions last &gt;24 hrs, poor response to antihistamines</td>
</tr>
<tr>
<td>Anaphylaxis -No late phase</td>
</tr>
<tr>
<td>EARLY</td>
</tr>
<tr>
<td>-----------------------------</td>
</tr>
<tr>
<td>Responds to symptom-relief therapy</td>
</tr>
<tr>
<td>antihistamines for urticaria and rhinitis; bronchodilators for bronchospasm</td>
</tr>
<tr>
<td>Response to steroids – minimal for acute relief but symptoms subside with control of late phase reaction and its effects on target cells</td>
</tr>
</tbody>
</table>
ACTIONS OF HISTAMINE

- Peripheral vasodilation
- Increased vascular permeability
- Altered cardiac conduction
- Bronchial/intestinal smooth muscle contraction
- Nerve stimulation-Cutaneous pruritus/pain
- Increased glandular mucus secretions
Knowing the actions of histamine and other mediators, what would you predict to be the clinical effects on the body?
CLINICAL MANIFESTATIONS OF ALLERGY

• Vasodilation – erythema, nasal congestion, hypotension, anaphylaxis

• Increased vascular permeability – urticaria, hypotension, anaphylaxis

• Smooth muscle spasm – asthma, intestinal cramps, diarrhea, anaphylaxis

• Mucus secretion – allergic rhinitis, asthma

• Nerve stimulation - itch, sneeze
URTICARIA

- Raised central white or red wheals
- Surrounding erythema or flare, with itch or burning
- Histamine mediated
- Varies in shape & size – circular, gyrate, linear, isolated or coalescent
- Well demarcated, blanch with pressure
- Predisposition to warm areas, pressure sites
- Lasts hours, max 24 - 48
ANGIOEDEMA

- Diffuse skin colored subcutaneous swelling
- Pathology similar to urticaria except it occurs in deeper subcutaneous tissues
- Not itchy or painful, unless in confined site
- Can be histamine, bradykinin etc mediated
- Can last hours or days
- Not very responsive to antihistamines
- Approx 40% of urticaria cases
ANAPHYLAXIS: OVERVIEW

• Anaphylaxis is a **severe**, potentially fatal systemic allergic reaction that occurs suddenly (minutes to hours) after contact with an allergy-causing substance.

• Death can occur in **minutes**, usually due to closure of airways.

• Allergic reaction affects many body systems: rash & swelling, breathing difficulties, vomiting & diarrhoea, heart failure & low blood pressure → **ANAPHYLACTIC SHOCK**
Girl, 14, dies after sampling sauce

Undetected allergy to peanuts fatal

By Tony Lotaro
Citizen staff writer

Christiane Guay enjoyed most foods, though like many teenagers she balked at eating broccoli or brussels sprouts. But the thing she hated most was the smell and taste of peanuts, and purposely avoided them.

The 14-year-old student at Lester B. Pearson High School in Gloucester had no inkling a normal meal made with peanut sauce, prepared by her mother, Jacinthe, would prove to be deadly.

At the family dinner table Wednesday night, Christiane sat with her mother, her sister, Marie-Lyne, 17, and brother, Matthieu, 16, and sampled a mere teaspoon of a peanut sauce dish. It was enough to bring on an immediate violent reaction. Her throat swelled and blocked her breathing before she passed out on the kitchen floor of her Ogilvie Road home.

She was rushed to the Children’s Hospital of Eastern Ontario and was placed on a life-support system. She died a few days later after her heart stopped. Christiane, an asthma sufferer, had an anaphylactic reaction to the peanut sauce. CHEO doctors told the family.

On average, three children per year in Ontario die from an allergic reaction to food, although there could be more because many deaths are probably not reported that way says a local pediatric allergist. The most serious kinds of allergic reactions affect about 150,000 Canadians.

After Christiane’s death, her family acted quickly and donated her heart, lungs and kidneys to two patients in London, Ont.

The girl’s father, Jacques Guay, was working in Thunder Bay when the accident happened.

Christiane Guay disliked peanuts and avoided them, but her family never had any reason to believe she had an allergy

Peanut, other allergies can surface at any time

Citizen-staff

Peanut and other allergies can suddenly become life-threatening long after infancy, an Ottawa pediatric allergist says.

The fact that a person did not have a serious reaction in the past does not rule out a life-threatening reaction later, Dr. Antony Ham Pong warned on Monday. And, in a fact sheet he has prepared for parents, Ham Pong says that in cases where mild allergic reactions have occurred in the past, severe reactions can occur later with the same amount of food.

Ham Pong said that in recent years, he has been seeing more cases of children developing a reaction to peanuts.

The influx of patients at his Russell Road practice is largely due to a greater public awareness of the dangers of peanut allergies, he said.

While the bulk of his patients are children under ten, the biggest increase is among children under three years of age.
Mom's heartbreaking warning after 11-year-old daughter dies from allergic reaction to toothpaste

The mother of an 11-year-old girl who died after an allergic reaction to toothpaste is sharing her story.

The family of Denise Saldate is in mourning after her sudden death caused by a reaction to a milk protein in prescription toothpaste.

The West Covina, Calif. girl died on April 6, just two days after she received a prescription for Mi Paste One brand of medicated toothpaste to help strengthen her tooth enamel.

**ALSO SEE:** Mum urges parents to vaccinate their children, shares photos of her newborn with measles
Univ. of Maryland puts EpiPens in campus dining halls
Anaphylaxis: Rapid recognition and treatment
# Fatal anaphylaxis

<table>
<thead>
<tr>
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<th>Median</th>
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<td>30</td>
<td>6–360</td>
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<tr>
<td>venom</td>
<td>15</td>
<td>4–120</td>
</tr>
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</table>

Pumphrey RSH, Clinical and experimental allergy, 2000
Anaphylaxis: Rapid recognition and treatment
• Underrecognized, undertreated
• Most important diagnosis marker is trigger
• Over 40 symptoms and signs described

<table>
<thead>
<tr>
<th>System</th>
<th>Frequency</th>
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<tr>
<td>cutaneous</td>
<td>&gt;80%</td>
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<tr>
<td>respiratory</td>
<td>up to 70%</td>
</tr>
<tr>
<td>gastrointestinal</td>
<td>up to 40%</td>
</tr>
<tr>
<td>cardiovascular</td>
<td>up to 35%</td>
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</table>
CLINICAL MANIFESTATIONS OF ANAPHYLAXIS

• SKIN- urticaria, angioedema, pruritus, erythema
• RESPIRATORY- rhinitis, conjunctivitis, cough, dyspnea, wheeze, stridor, voice change
• GI — throat swelling or tightness, dysphagia, vomiting, diarrhea, cramps
• CVS — hypotension, dizziness, syncope, cyanosis, secondary myocardial infarction
• CNS —hypoxic seizures
Anaphylaxis: clinical features

- Skin: 85%
- Upper respiratory: 56%
- Lower respiratory: 47%
- Cardiovascular: 33% (30% of adults, 5% of children)
- Gastrointestinal: 30%
- Rhinitis: 16%
- BIPHASIC ANAPHYLAXIS: 5 - 8%
Anaphylaxis: Causes of Death

- Upper and/or Lower Airway Obstruction (70%)

- Cardiac Dysfunction (24%)
Late Phase or Biphasic Reactions

Much controversy –
The incidence of biphasic anaphylactic reactions as described in the literature is highly variable, ranging from a low of 1% to a high of 20% of episodes.

There is no clear consensus regarding distinguishing features but:
The severity of the reaction
The time of onset after administration of antigen before the occurrence of symptoms of the primary response,
The presence of hypotension or laryngeal edema during the primary response, and the history of a previous biphasic reaction have all been shown to be risk factors
BIPHASIC ANAPHYLAXIS

• 95% of Biphasic reactions happen within 6 hours, of those that don’t, the average time to onset was 41 hours

• Important to monitor in ER for 4-6 hrs after an anaphylactic reaction

• Steroids may not prevent it, but often used

Ann Allergy Asthma Immunol. 2005 Sep;95(3):217-26
Potentional pitfalls in recognition of anaphylaxis

• Absent / missed skin symptoms

• Non-specific signs of hypotension (confusion, collapse, incontinence...)

• Certain conditions (surgery)

• DDx – asthma exacerbation

  – Lab tests to support Diagnosis (tryptase)
Causes of Anaphylaxis

- Food allergy
- Medication allergy
- Insect (hymenoptera) sting allergy
- Physical eg exercise, cold,
- Latex allergy
- Allergy to vaccines, hormones, seminal fluid
- Allergic reactions to immunotherapy, skin tests
- Idiopathic
Anaphylaxis: Rapid recognition and treatment
GENERAL MANAGEMENT OF ANAPHYLAXIS

• Airway
• Breathing
• Circulation

• But use epinephrine promptly
Fatal anaphylaxis: risk factors

- Concomitant asthma
- No epinephrine
- Non effective epinephrine
- Other cardiopulmonary disease
Initial Anaphylaxis Treatment

- Epinephrine (adrenaline) is first line treatment
- Epinephrine IM
- Antihistamines & bronchodilators are not first line treatment but may be given after epinephrine.
- Once epi is given then throw everything else you have at them . . . .
Management of anaphylaxis: Initial

- Epinephrine 0.01mg/kg (max 0.5mg) IM X3, every 5-20min as needed. In severe cases epinephrine IV
- H1 antagonists Diphenhydramine (Benadryl) 25-100mg
- H2 antagonists eg ranitidine
- IV fluids, O2 etc if in hospital
- Corticosteroids
Management of anaphylaxis:
Bronchospasm

- SVN albuterol
- Oxygen
- Intubation and ventilation if needed
Management of anaphylaxis: Hypotension

- Trendelenberg position
- Volume expansion with crystalloid
- Vasopressors eg dopamine, norepinephrine, metaraminol, vasopressin
- Glucagon esp if on beta-blocker
Treatment of Anaphylaxis in Beta Blocked Patients

- Give epinephrine initially.
- If patient does not respond to epinephrine and other usual therapy:
  - Glucagon 1 mg IV over 2 minutes
EFFECTS OF EPINEPHRINE

• Increases BP, reverses peripheral vasodilation, (alpha-adrenergic activity)
• Reduces urticaria and angioedema by vasoconstriction (alpha)
• Bronchodilation – relaxes bronchial smooth muscle (beta-2 adrenergic activity)
• Increases cardiac contractility – force and volume, increasing heart rate & BP (beta-1)
• Prevents further mast cell degranulation (beta)
SIDE EFFECTS OF EPINEPHRINE

• Based on the effects of epinephrine, what would you predict as the possible side effects?
• What conditions or factors would you consider as higher risk for side effects of epinephrine use?
If you (heaven forbid) should give epi when you didn’t need to. . . What bad stuff happens to the patient???
Who needs to carry an epinephrine autoinjector?

Cleveland Clinic Journal of Medicine. 2019 January;86(1):56-72

Author(s): T. Ted Song, DO, FAAAI, FACP; Phil Lieberman, MD

ABSTRACT

Patients who have had anaphylaxis or who are at risk of it (e.g., due to food allergy or Hymenoptera hypersensitivity) should carry an epinephrine autoinjector at all times. However, the risks and benefits must be considered on an individual basis, especially in patients with atherosclerotic heart disease, elderly patients on polypharmacy, patients receiving allergen immunotherapy, those with large local reactions to insect stings, and individuals with oral allergy syndrome.

KEY POINTS

- Based on current data, there is no absolute contraindication to epinephrine for anaphylaxis. And failure to give epinephrine promptly has resulted in deaths.
- Clinicians concerned about adverse effects of epinephrine may be reluctant to give it during anaphylaxis.
- Education about anaphylaxis and its prompt treatment with epinephrine is critical for patients and their caregivers.
Epinephrine Auto-Injectors

- Epinephrine Auto-injectors are easy to use
- Come with instructions
  - Trainers available for practice use
- Websites have video demonstrations – know how to administer your auto-injector!

<table>
<thead>
<tr>
<th>Epi-Pen® video</th>
<th><a href="http://www.epipen.com/how-to-use-epipen">http://www.epipen.com/how-to-use-epipen</a> Epipen4schools.com</th>
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</thead>
<tbody>
<tr>
<td>Auvi-Q® video</td>
<td><a href="https://www.auvi-q.com/">https://www.auvi-q.com/</a></td>
</tr>
<tr>
<td>Generic</td>
<td><a href="http://www.epinephrineautoinject.com/">http://www.epinephrineautoinject.com/</a></td>
</tr>
</tbody>
</table>
TRAINER for AUVI-Q

Outer Case

Device

Speaker

Housing

LEDs

Base

Safety Guard

Top view

AUVI-Q

AUVI-Q 0.3 mg is orange

AUVI-Q 0.15 mg is blue

AUVI-Q 0.1 mg is white and lavender
Auvi-Q Versus EpiPen: Preferences of Adults, Caregivers, and Children

Carlos A. Camargo Jr., MD, DrPH, FAAAAI®; Adriana Guana, MD; Sheldon Wang, PhD; F. Estelle R. Simons, MD, FRCP, FAAAAI®

PtumX Metrics

DOI: https://doi.org/10.1016/j.jaci.2013.02.004

Abstract

Auvi-Q is a novel epinephrine autoinjector (EAI) that provides audio and visual cues for patients at risk for life-threatening allergic reactions.

Objective

We tested the preference for Auvi-Q or EpiPen with regard to method of instruction, preference to carry, device reliability, and side effects.

Related Articles

Patient Carrying Time, Confidence, and Training with Epinephrine Auto-Injectors: the RACE Survey

Jay Portnoy, Robin L. Wade, Catherine Kessler

Open Access
Epinephrine (EpiPen)
Generic EpiPen, Epipen JR

Epinephrine (EpiPen, EpiPen Jr) is an expensive drug used for the emergency treatment of severe allergic reactions. You should keep this medicine with you at all times. This drug is slightly more popular than comparable drugs. It is available in brand and generic versions. Alternate brands include AdrenaClick. Generic epinephrine is covered by most Medicare and insurance plans, but pharmacy coupons or cash prices may be lower. The lowest GoodRx price for the most common version of epinephrine (EpiPen) is around $118.07, 69% off the average retail price of $388.14. Compare catecholamines.

Savings Alert: Generic Adrenaclick, another epinephrine pen, sells for as low as $9.95 with a manufacturer coupon. Learn More

Prices and coupons for 1 package (2 auto-injectors) of epinephrine (EpiPen) 0.3mg

<table>
<thead>
<tr>
<th>Store</th>
<th>Est Retail Price</th>
<th>With Discount/FREE Discount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walmart</td>
<td>$373</td>
<td>$118.07 ($155.93)</td>
</tr>
<tr>
<td>Rite Aid</td>
<td>$413</td>
<td>$121.50 ($291.32)</td>
</tr>
<tr>
<td>Walgreens</td>
<td>$376</td>
<td>$126.13 ($249.88)</td>
</tr>
<tr>
<td>Target (CVS)</td>
<td>$340</td>
<td>$134.27 ($205.73)</td>
</tr>
</tbody>
</table>
Auvi-Q

EPINEPHRINE is used for the emergency treatment of severe allergic reactions. You should keep this medicine with you at all times. The lowest GoodRx price for the most common version of Auvi-Q is around $4,859.40, 20% off the average retail price of $6,105.81. Compare catecholamines.

### Prices and coupons for 1 package (2 auto-injectors) of Auvi-Q 0.3mg

<table>
<thead>
<tr>
<th>Store</th>
<th>Price</th>
<th>Offer</th>
<th>Link</th>
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</thead>
<tbody>
<tr>
<td>Costco</td>
<td>$4,859.40</td>
<td>with free coupon</td>
<td>[GET FREE COUPON]</td>
</tr>
<tr>
<td>Albertsons</td>
<td>$5,007.50</td>
<td>with free coupon</td>
<td>[GET FREE COUPON]</td>
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<tr>
<td>Safeway</td>
<td>$5,007.50</td>
<td>with free coupon</td>
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<tr>
<td>Smith's</td>
<td>$5,021.05</td>
<td>with free coupon</td>
<td>[GET FREE COUPON]</td>
</tr>
</tbody>
</table>

Set your location for drug prices near you.
Epinephrine (Adrenaclick)

Generic Adrenaclick

Epinephrine (Adrenaclick) is an expensive drug used for the emergency treatment of severe allergic reactions. You should keep this medicine with you at all times. This drug is slightly less popular than comparable drugs. It is available in brand and generic versions. Alternate brands include EpiPen and EpiPen Jr. Generic epinephrine is covered by most Medicare and insurance plans, but pharmacy coupons or cash prices may be lower. The lowest GoodRx price for the most common version of epinephrine (Adrenaclick) is around $109.99, 58% off the average retail price of $267.77.

Prices and coupons for 1 package (2 auto-injectors) of epinephrine (Adrenaclick) 0.3mg

- **Target (CVS)**: $109.99 retail price
- **Costco**: $142.48 with free coupon
- **Walgreens**: $146.99 retail price
- **Walmart**: $430 est retail price, $202.49 with free discount

Set your location for drug prices near you

Learn more and get free coupons for these prices.
<table>
<thead>
<tr>
<th>Product</th>
<th>Strengths Available</th>
<th>Price Estimate (2-pack)</th>
<th>Ways to Save</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EpiPen; EpiPen Jr.</strong> (epinephrine auto-injector)</td>
<td>0.15 mg; 0.3 mg</td>
<td>About $650-$700 cash price (two auto-injectors).</td>
<td>Possibly save $300 on EpiPen or EpiPen Jr from Mylan.</td>
</tr>
<tr>
<td><strong>Authorized Generic for EpiPen and EpiPen Jr.</strong> (epinephrine auto-injector) from Mylan</td>
<td>0.15 mg; 0.3 mg</td>
<td>About $150 to $300; possibly higher priced at other pharmacies; call ahead.</td>
<td>Coupon may be needed.</td>
</tr>
<tr>
<td><strong>Epinephrine</strong> (generic for EpiPen, EpiPen Jr.) from Teva</td>
<td>0.15 mg; 0.3 mg</td>
<td>Price not yet available.</td>
<td>Expected to be low cost but coupon may still be beneficial.</td>
</tr>
<tr>
<td><strong>Adrenaclick</strong></td>
<td>0.15 mg; 0.3 mg</td>
<td>Roughly $450 to $500; price varies among pharmacies.</td>
<td>Drugs.com Discount Card</td>
</tr>
<tr>
<td><strong>Authorized Generic for Adrenaclick</strong> (epinephrine auto-injector) from Impax</td>
<td>0.15 mg; 0.3 mg</td>
<td>$109.99 at CVS Pharmacy; higher at other pharmacies.</td>
<td>No coupon needed; possibly save $50 from Impax at epinephrineautoinject.com</td>
</tr>
<tr>
<td><strong>Auvi-Q</strong></td>
<td>0.1 mg (coming in 2018), 0.15 mg; 0.3 mg</td>
<td>$0 copay for insured patients and for families with income of less than $100,000/year without insurance. One prescription includes two auto-injectors. Has voice instructions.</td>
<td>AUVI-Q AffordAbility Patient Assistance</td>
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<tr>
<td><strong>Symjepi</strong></td>
<td>0.3 mg</td>
<td>Price not yet available; launch date unknown. One prescription includes two syringes.</td>
<td>See manufacturer’s website for patient assistance.</td>
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</tbody>
</table>
# Epinephrine Auto-Injectors

**Allergy & Asthma Network**

Allergy & Asthma Network is a national nonprofit organization dedicated to ending needless deaths and suffering due to asthma, allergies and related conditions through outreach, education, advocacy and research.

<table>
<thead>
<tr>
<th></th>
<th>Auvi-Q®</th>
<th>EpiPen®</th>
<th>Generic Epinephrine Auto-Injector (2mg/mL)</th>
<th>Epinephrine Auto-Injector (Impox)</th>
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<tbody>
<tr>
<td><strong>Pediatric</strong></td>
<td>a 0.15 mg for 22-50 lbs.</td>
<td>a 0.15 mg for 22-50 lbs.</td>
<td>a 0.15 mg for 20-56 lbs.</td>
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<td><strong>Adult</strong></td>
<td>0.3 mg for over 66 lbs. 32 to 70 degrees F Outer middle of thigh 3 seconds</td>
<td>0.3 mg for over 66 lbs. 32 to 70 degrees F Outer middle of thigh 3 seconds</td>
<td>0.3 mg for over 66 lbs. 32 to 70 degrees F Outer middle of thigh 3 seconds</td>
<td>0.3 mg for over 66 lbs. 32 to 70 degrees F Outer middle of thigh 3 seconds</td>
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<tr>
<td><strong>Phone</strong></td>
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<td>800-336-3276</td>
<td>800-336-3276</td>
<td>800-336-3276</td>
</tr>
<tr>
<td><strong>Patient Assistance</strong></td>
<td><strong>$50 OFF</strong></td>
<td><strong>$50 OFF</strong></td>
<td><strong>$50 OFF</strong></td>
<td><strong>$50 OFF</strong></td>
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</tbody>
</table>


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*Disclaimer: This information is not intended to be a substitute for medical advice.*
Anaphylaxis At a Glance

Anaphylaxis is a life-threatening allergic reaction that affects more than one organ system.

Allergens that can set off anaphylaxis

Foods:
- Peanuts
- Tree nuts
- Almonds
- Hazelnuts
- Walnuts
- Sesame
- Crustacean shellfish
- Milk
- Eggs
- Soy

Venom:
- Stings
- Bites
- Rattlesnakes
- Scorpions
- Wasps
- Bees

Latex:
- Rubber gloves
- Luggage
- Tires

Medication:
- Inhaled agents
- Oral medications

Common symptoms

Throat:
- Swelling
- Hoarseness

Heart:
- Fast and weak
- Chest pain

Lungs:
- Shortness of breath
- Wheezing

Skin:
- Itching
- Rash

Stomach:
- Nausea
- Vomiting

Epi Everywhere! Every Day! Right Away!

Recognize the severity:
- Anaphylaxis is life-threatening, can be treated, and must be treated quickly.

Use epinephrine immediately:
- Give 0.3 ml or 0.15 ml for children weighing 10 kg or less, respectively.

Call 911:
- Call 911 with any emergency medical concerns.

Carry two auto-injectors:
- Keep your syringe with you at all times.

Follow up:
- Consult your doctor or allergist for a follow-up appointment.
The TEN study: time epinephrine needs to reach muscle

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Abstract

Background
An epinephrine autoinjector (EAI) is designed to deliver epinephrine into the vastus lateralis muscle. Several studies have demonstrated both patient and physician difficulties in correctly using EAs, specifically premature removal of the device from the thigh.

Objective
To evaluate the correlation between duration of injection with an EAI and amount of epinephrine absorbed into muscle tissue.

Methods
Twenty-one EAI devices (0.3 mL) were used to determine the amount of epinephrine injected into marbledized beef during 7 time periods. A digital scale was used to record preinjection and postinjection weights of EAs and beef. The weight difference between the preinjection and postinjection periods of the EAs was used to calculate the total amount of epinephrine released and available for absorption into the marbledized beef. The difference between the preinjection and postinjection beef weight was used to determine the amount of epinephrine absorbed into the meat.

Results
The correlation with duration of injection for both the amount of epinephrine absorbed and released was 0.321 (P = .40). At all intervals, 95.9% or more of epinephrine was absorbed into the marbledized beef. The correlation with duration of injection and percent of epinephrine absorbed was 0.404 (P = .29). There were no time periods that were significantly different from the percentage of epinephrine absorbed by the marbledized beef at 10 seconds (analysis of variance P = .16).

Conclusion
No linear relationship between time and amount of epinephrine injected or absorbed into muscle tissue was demonstrated. These data suggest that holding the device in place for 1 second is as effective as 10 seconds.
What’s new: Food introduction

• New data (LEAP study) suggests early introduction in high risk infants may reduce risk of allergy by 80%+

• For low risk infants, introduce peanut protein between 4-6 months of age

• Moderate risk (moderate eczema) introduce 4-6 months or allergy referral

• High risk infants – egg allergy, severe eczema or both – 4-6 months AFTER allergy referral
What’s new: Peanut desensitization

- Take those with CONFIRMED anaphylaxis to peanut and start them on a tiny dose of peanut protein.
- Slowly raise the level to a maximum of approx. 2 peanut kernels (600mg) of peanut protein.
- 80% or so can get to this point – take away accidental exposure – which is most causes of anaphylaxis.
5 EASY WAYS TO INTRODUCE PEANUT FOODS TO YOUR INFANT

1. **Mix with Water, Formula or Breast Milk**
   Thin 2 tsp. of peanut butter with 2-3 tsp. hot water, formula or breast milk. Allow to cool before serving.

2. **Mix with Food**
   Blend 2 tsp. of peanut butter into 2-3 Tbsp. of foods like infant cereal, yogurt (if already tolerating dairy), pureed chicken or tofu.

3. **Mix with Produce**
   Stir 2 tsp. of powdered peanut butter into 2 Tbsp. of previously tolerated pureed fruits or vegetables.

4. **Peanut Snacks**
   Give your baby a peanut-containing teething food, such as peanut puffs.

5. **Teething Biscuits**
   Teething infants who are older and self-feeding may enjoy homemade peanut butter teething biscuits. Find a recipe for teething biscuits at nationalpeanutboard.org

Remember:
The recommended way to introduce baby-friendly peanut foods depends on each child's individual risk factors. Depending on your child's risk, peanut foods should be introduced according to NIAID guidelines after they’ve already started other solid foods. Whole nuts should not be given to children under 5 years of age. Peanut butter directly from a spoon or in lumps/dollops should not be given to children less than 4 years of age. This content is not intended to be a substitute for professional medical advice, diagnosis or treatment. Always seek the advice of your pediatrician.

preventpeanutallergies.org
10 FACTS about Food Allergies

1. Food allergies affect 15-32 million Americans, including 6 million children. Studies report that 1 in 13 children and up to 1 in 10 adults in the United States have a food allergy. For children, this averages to two children per classroom.

2. A food allergy is an immune system response to a food that the body mistakenly believes is harmful.

3. Eight foods account for 90% of all food allergy reactions: Peanuts, Tree nuts, Milk, Egg, Wheat, Soy, Fish, & Shellfish. However, almost any food can cause a reaction.

4. There is no cure for food allergies and strict avoidance is the only way to prevent an allergic reaction.

5. Trace amounts of an allergen can trigger an allergic reaction in some individuals. Past reactions to a food allergy do not predict future reactions! Someone can still have a life-threatening reaction to a food they are allergic to, even if they have never had a serious reaction before.

6. Symptoms can develop rapidly after exposure to an allergen, often within minutes and usually within 30 minutes. However, it can take up to 2 hours for symptoms to occur after exposure to a food allergen.

7. Anaphylaxis is a serious allergic reaction that comes on quickly and has the potential to become life-threatening. Anaphylaxis requires immediate medical treatment, including an injection of epinephrine and a visit to the emergency room.

8. It is important to be deliberate and not hesitate when you have to use epinephrine. The device is potentially life-saving. A call to 9-1-1 and a trip to the emergency room should always follow epinephrine administration.

9. Individuals at risk should carry two epinephrine auto-injectable devices with them at all times AND an Allergy and Anaphylaxis Emergency Care Action Plan signed by a board-certified allergist.

10. Food allergies continue to rise and are a safety and public health concern across the United States. You can get free resources and find out how to help keep those with food allergies safe at:

   www.FoodAllergyAwareness.org
SafeFARE: Chef Card Template

How to use your chef card: In addition to asking a lot of questions about the ingredients and preparation methods, carry a "chef card" that outlines the foods you must avoid. Present the card to the chef or manager for review.

Fold your card in half, then tape it together and store in your wallet. You can even laminate it to make it more durable. Be sure to make several copies in case you forget to retrieve it from the restaurant or to store in multiple locations.

This is an interactive PDF that will allow you to type your allergens directly onto the chef card.

Food Allergy Alert

I have severe food allergies. In order for me to avoid a life-threatening reaction, I must avoid all foods that contain:

Please make sure that my food does not contain any of the ingredients on the front of this card, and that any utensils and equipment used to prepare my meal, as well as prep surfaces, are fully cleaned immediately before using. THANK YOU for your help.

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Thank you!!

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