Anaphylaxis: Recognition and Response

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Overview

- **Definition of Anaphylaxis**
- **Overview of Triggers**
- **Recognition of anaphylaxis**
- **Treatment of anaphylaxis**
- **Device overview and positioning for administration**
- **Practice questions**

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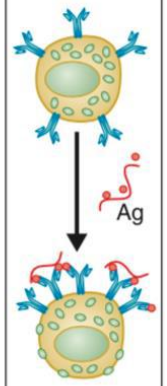
Anaphylaxis

- **Acute, potentially life-threatening allergic reaction**
  - **Involves multiple organ systems**
  - **Rapid onset**
  - **IgE mediated**

Type 1 or IgE Mediated (IMMEDIATE)

- Allergen binds to IgE on mast cells and basophils➔leads to degranulation with release of leukotrienes and histamine/tryptase➔anaphylaxis
- Symptoms include: hives, angioedema, coughing/difficulty breathing, vomiting +/- diarrhea, low blood pressure or passing out
- Symptoms occur within minutes—usually within 30-120 minutes

	Type I
Immune reactant	IgE
Antigen	Soluble antigen
Effector	Mast cell activation
	
Example of hypersensitivity reaction	Allergic rhinitis, sytemic anaphylaxis

Middleton's Allergy: Principles and Practice, 9th edition

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Anaphylaxis

- Sudden onset of illness
  - Skin, mucosal tissue + respiratory symptoms OR hypotension
- 2 or more of the following after exposure to likely trigger
  - Skin, mucosal symptoms OR respiratory symptoms OR hypotension OR vomiting
- Hypotension after exposure to known allergen for that patient

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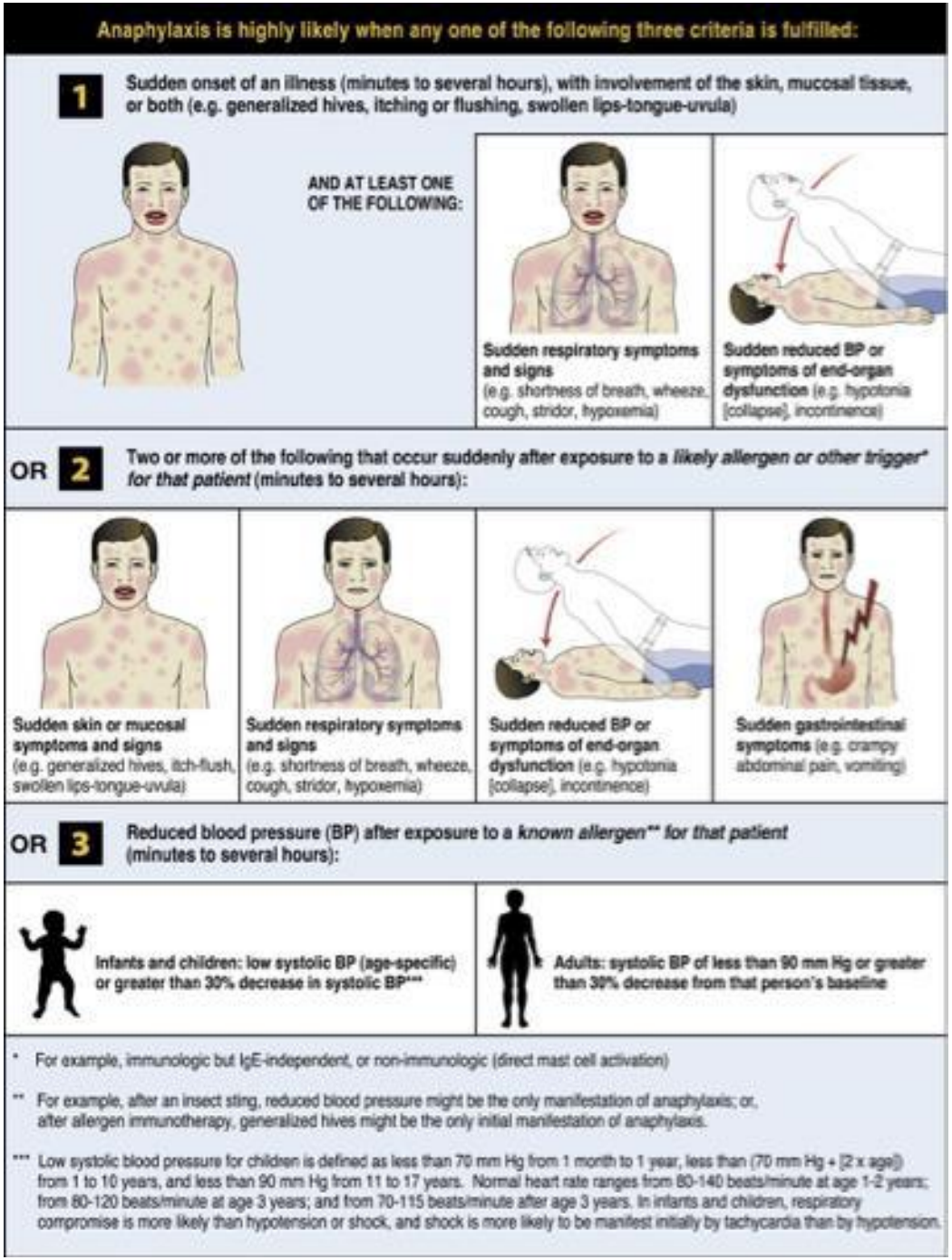
https://www.jacionline.org/article/S0091-6749(11)00128-X/pdf



Anaphylaxis Triggers

- **Food**
  - **Top 9: milk, egg, peanut, tree nuts, fish, shellfish, sesame, soy, wheat**
    - **Food allergy bans in schools do not work—instead, focus on allergy awareness and management plans**
  - **Need to be ingested (exception for fish)**
- **Medication**
- **Insect venoms (fire ant, honeybee, yellow jacket, wasps, hornets)**
- **Idiopathic (extremely unlikely)**

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While anaphylaxis can be fatal, it is RARELY fatal.

Stay calm. Breathe.

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J Allergy Clin Immunol Pract. 2017 Sep-Oct;5(5):1169–1178. doi: 10.1016/j.jaip.2017.06.031

Fatal Anaphylaxis: Mortality Rate and Risk Factors

Paul J Turner [a,b], Elina Jerschow [c], Thisanayagam Umasunthar [a], Robert Lin [d], Dianne E Campbell [b,e], Robert J Boyle [a,*]

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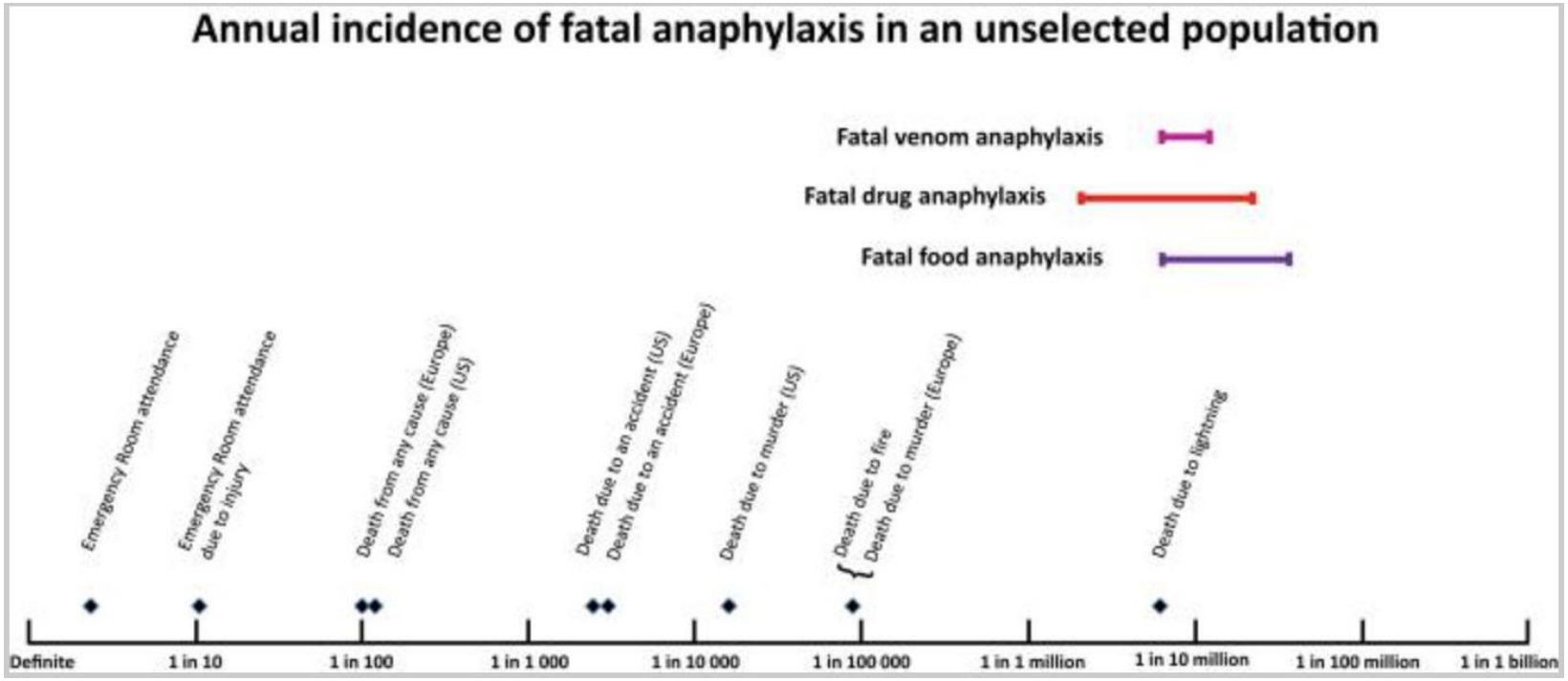

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Fatal Anaphylaxis

- **Very rare**
  - **Known venom or food allergy→fatal anaphylaxis constitutes <1% of total mortality risk**
- **Upright posture is a feature of fatal anaphylaxis for food and venom**

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Fatal Anaphylaxis

- **Fatal food anaphylaxis**
  - **Most commonly occurs in the 2nd and 3rd decades**
  - **Delayed epinephrine is a risk factor**
  - **Milk in children, nuts and seafood**
- **Fatal venom anaphylaxis**
  - **Risk factors: middle age, male sex, white race, CV disease, possible mastocytosis**
- **Fatal Drug anaphylaxis**
  - **Risk factors: CV morbidity, older age**

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Anaphylaxis

Recognition

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Quick Assessment

- **Any known allergies? (food, insect stings?)**
- **Known history of idiopathic anaphylaxis?**

FOOD ALLERGY EMERGENCY CARE PLAN FOR CHILDREN (AGES 3 AND UP)

Name _____ Date of Birth _____

Allergic to _____ Asthma ☐ Yes (higher risk of severe reaction) ☐ No

Child trained and able to self-administer epinephrine ☐ Yes (may need assistance) ☐ No

Contact name _____ Contact phone number _____

Allergist/doctor name _____ Allergist/doctor phone number _____

Allergist/doctor signature _____ Date _____

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Quick Assessment

- **What is the child's complaint?**
- **What does the child look like?**
  - **Check skin for hives, angioedema**
  - **Assess for airway/respiratory compromise**
    - **Listen to lungs if possible (if not just assess for dry coughing or signs of respiratory distress,**
    - **difficulty speaking in full sentences**
    - **muffled voice, drooling**
  - **General demeanor (look anxious, pale, faint)?**
  - **Vomiting? (Or abdominal discomfort?)**

Quick Assessment

IF YOUR CHILD IS HAVING MILD SYMPTOMS:

SKIN: A few hives, mild itch, lip swelling
NOSE: Itchy, runny nose, sneezing
GUT: Mild nausea, discomfort, single vomit

DO THIS

1. Stay with child and give antihistamine.
2. If two or more mild symptoms present or symptoms progress. **GIVE EPINEPHRINE** and follow directions below.

IF YOUR CHILD IS HAVING SEVERE SYMPTOMS:

LUNGS: Shortness of breath, wheeze, coughing
MOUTH: Visible swelling of the tongue
THROAT: Tight, hoarse, trouble swallowing
SKIN: Many hives over body, widespread red/purple/gray color
HEART: Faint, weak pulse, dizzy, pale, blue/gray skin, lips, nails
GUT: Ongoing vomiting or diarrhea
OTHER: Feeling something bad is about to happen, confused/agitated

1. **GIVE EPINEPHRINE right away and note the time when it is given. Stay with your child.**
2. Next, when to **WATCH AND WAIT** and when to **CALL 911 EMERGENCY MEDICAL SERVICES (EMS):**

Call 911/EMS at any time, for any symptom, if you are not comfortable or if your doctor told you to do so after using epinephrine.

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What is the treatment for Anaphylaxis?

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EPINEPHRINE!!!!

(IM or Intranasal)

There is no absolute contraindication for epi.

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1. **GIVE EPINEPHRINE right away and note the time when it is given. Stay with your child.**
2. Next, when to **WATCH AND WAIT** and when to **CALL 911 EMERGENCY MEDICAL SERVICES (EMS):**

Call 911/EMS at any time, for any symptom, if you are not comfortable or if your doctor told you to do so after using epinephrine.

- Are you able to assess and check the child?
- Are you comfortable watching the child?
- Do you have a second dose of epinephrine?

NO →
- CALL 911 / EMS now
- Give second dose of epinephrine if needed

YES ↓

OK
- Symptoms are gone or almost gone within 5-15 minutes
- Hives/rash can still be there
- NO new symptoms have occurred

→
- Watch child, no need to call 911 / EMS

WATCH
- You feel symptoms are getting better within 5-15 minutes
- Rash, mild throat discomfort/tightness, nausea, cough, or stomachache can still be there
- NO new symptoms have occurred

→
- Watch child carefully for any symptoms getting worse
- Consider second dose of epinephrine and call 911/EMS if symptoms are not clearly getting better

CALL 911
- Still having trouble breathing, throat symptoms, heart symptoms, poor alertness, vomiting
- Child is or was unresponsive or collapsed

→
- CALL 911 / EMS NOW, DO NOT WATCH & WAIT
- Give second dose of epinephrine if needed

3. For heart symptoms or if two doses epinephrine given, lay child on their back with their legs raised. If it is hard for the child to breathe or they are throwing up, it is ok for them to sit or lay on their side.
4. Give asthma quick-relief/rescue inhaler (see below) if your child has asthma.
5. Give antihistamine (see below).

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Treat

- **If anaphylaxis or concerns for possible anaphylaxis:**

GIVE RESCUE EPINEPHRINE!!!!!

- **Consider calling 911***
- **Monitor for response. Make sure the patient remains laying down. Do not allow the patient to stand back up.**
- **If symptoms are not resolving after 5-10 minutes or symptoms resolve and then return…**

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Treat

GIVE RESCUE EPINEPRHINE!!!!!

- **Call 911***
- **Continue monitoring. Patient should remain laying down.**
- **If symptoms are still not improving/resolving after 5-10 minutes or if symptoms resolve and then return—repeat epi… continue this until EMS arrives**

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Medications:

Epinephrine Auto-injector:

☐ 0.15 mg ☐ 0.3 mg

(inject outside thigh)

Epinephrine Nasal Spray:

☐ 1 mg ☐ 2 mg

(1 spray to nostril)

Asthma Quick Relief/Rescue Inhaler:

☐ Albuterol ____ puffs

☐ Albuterol/Budesonide ____ puffs

☐ Salbutamol ____ puffs

☐ Budesonide/Formoterol ____ puffs

☐ Mometasone/Formoterol ____ puffs

Antihistamine*:

☐ Cetirizine _____ mg

☐ Diphenhydramine _____ mg

☐ Other: _____

*Use epinephrine first for severe symptoms

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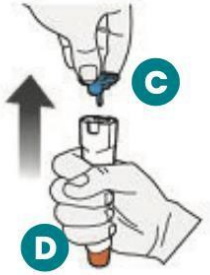
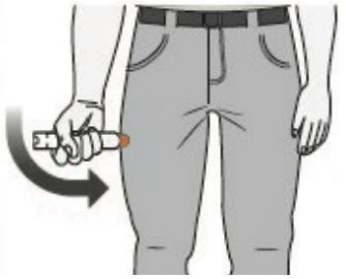
EpiPen® Auto-Injector or Generic Directions





1. Remove the EpiPen Auto-Injector from the clear carrier tube.
2. Remove the blue safety release (labeled "C") by pulling straight up without bending or twisting it.
3. Swing and firmly push orange tip (labeled "D") against mid-outer thigh until it "clicks".
4. Hold firmly in place for 3 seconds (count slowly 1, 2, 3).
5. Remove auto-injector from the thigh and massage the injection area for 10 seconds.

Neffy® Epinephrine Nasal Spray Directions

1. Remove neffy from packaging. DO NOT TEST PUMP THE DEVICE.
2. Hold the device with your thumb on the bottom of the plunger and a finger on either side of the nozzle.
3. Insert the nozzle into a nostril until your fingers touch your nose. Keep nozzle straight into the nose pointed toward your forehead.
4. Press plunger up firmly until it snaps up and sprays liquid into the nostril.
5. If second dose needed, spray into same nostril.

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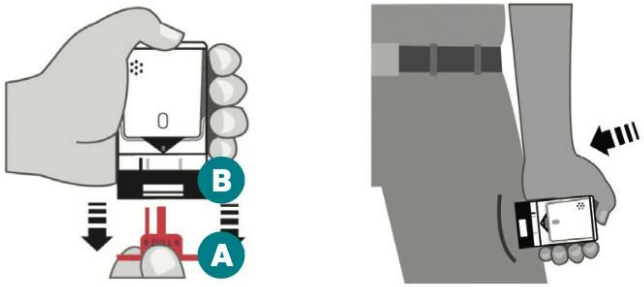
HOW TO USE EPINEPHRINE TO TREAT ANAPHYLAXIS
(SERIOUS ALLERGIC REACTION)

There is one dose in each device. If a second dose is needed, use a second device.

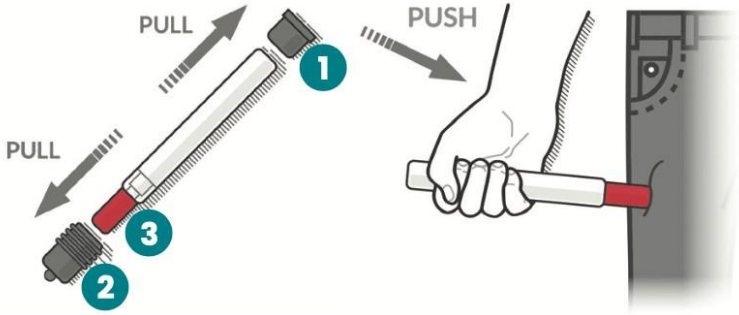
AUVI-Q™ (Epinephrine Injection, USP) Directions

1. Pull AUVI-Q up from outer case. This will automatically activate the voice instructions.
2. Pull off the red safety guard (labeled "A").
3. Place black end (labeled "B") against mid-outer thigh.
4. Press firmly and hold for 2 seconds.
5. Remove from thigh.



Generic Adrenaclick® (Epinephrine Injection, USP) Auto-Injector Directions

1. Remove the outer case.
2. Remove gray caps labeled "1" and "2".
3. Place red rounded tip (labeled "3") against mid-outer thigh.
4. Press down hard until needle enters thigh.
5. Hold in place for 10 seconds. Remove from thigh.



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J Allergy Clin Immunol. 2021 Nov;148(5):1307–1315. doi: 10.1016/j.jaci.2021.03.042

Use of multiple epinephrine doses in anaphylaxis: A systematic review and meta-analysis

Nandinee Patel [a], Kok Wee Chong [b], Alexander YG Yip [c], Despo Ierodiakonou [d], Joan Bartra [e], Robert J Boyle [a], Paul J Turner [a,*]

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PMCID: PMC8588837 PMID: 33862009

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How much EPI?

- Around 1 in 10 anaphylaxis reactions are treated with more than 1 dose of epi
  - Thus recommendation to have 2 doses available at all times
- At least 3 doses of epi were administered in 2.2% of anaphylaxis reactions
  - Patients with severe prior reactions may have recommendations to carry 4 doses

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Calling 911

- **Make sure that EMS dispatcher knows:**
  - **the patient has a known allergy**
  - **is experiencing anaphylaxis**
  - **has gotten epinephrine**

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Epinephrine Delivery Devices

https://www.foodallergy.org/resources/epinephrine-options-and-training

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Rescue Epinephrine for Anaphylaxis + Dosing

- **IM epinephrine (EpiPen, Auvi Q, generics)**
  - **0.1 mg (less than 14 kg or 33lbs)**
  - **0.15 mg (less than 25 kg or 66 lbs)**
  - **0.3 mg (more than 25 kg or 66 lbs)**
- **Nasal epinephrine (Neffy)**
  - **1 mg (15 kg to less than 30 kg)**
  - **2 mg (30 kg of greater)**
- **And more to come… Sublingual (Anaphylm)**

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Rescue Epinephrine for Anaphylaxis

- **IM epinephrine (EpiPen, Auvi Q, generics)**
  - **Shelf live of 12-18 months**
  - **Store at temps between 68-77°F**
    - **Brief excursions between 59-86°F are ok, but prolonged elevated temps will ruin the device/medication**
- **Nasal epinephrine (Neffy)**
  - **Shelf life of 2-2.5 years**
  - **Store at temps between 68-77°F**
    - **but is stable if exposed to temps up to 122°F**
    - **If accidentally frozen, thaw for 20 minutes before use**

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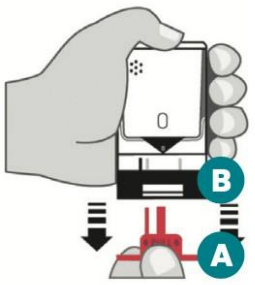

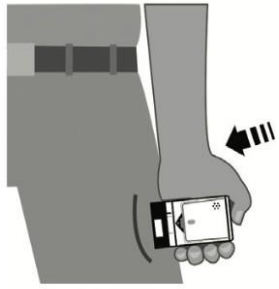

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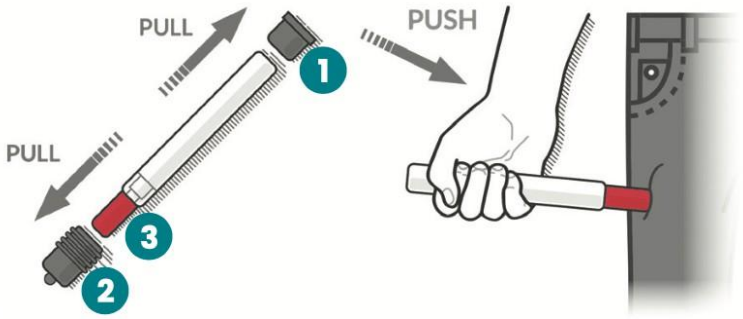

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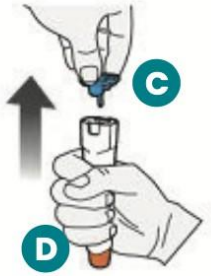

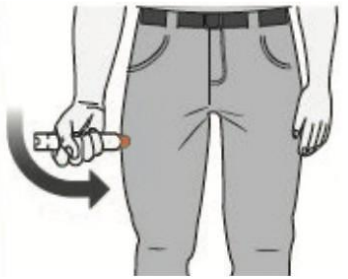

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Positioning-examples

Positioning-examples

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7-year-old child with is bitten by something while playing outside. 10 minutes later they develop a widespread itchy, bumpy rash and then some coughing. They have rescue epi for a known fire ant allergy. Which of the following is the most appropriate next step?

A. Give 10 mg of cetirizine and observe for improvement.

B. Administer epinephrine immediately.

C. Give oral corticosteroids and wait 30 minutes.

D. Apply ice to the bite site and monitor symptoms.

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Correct Answer: B. Administer epinephrine immediately.

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8-year-old child with a known cow milk allergy accidentally takes a bite of regular ice cream instead of sherbert. Within a few minutes, the child reports that their mouth feels itchy. They have no hives, swelling, vomiting, cough, wheezing, difficulty breathing, or dizziness. What is the most appropriate initial management?

A. Administer epinephrine immediately.
B. No treatment is needed because the reaction is mild.
C. Induce vomiting to remove the allergen.
D. Give an oral antihistamine and closely monitor for progression of symptoms.

Correct Answer: D. Give an oral antihistamine and closely monitor for progression of symptoms.

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10-year-old child is being treated for anaphylaxis and is lying flat on the floor after receiving epinephrine. The child suddenly complains they feel like vomiting. What is the most appropriate way to position the child?

A. Sit the child upright in a chair.
B. Help the child stand and walk to the bathroom.
C. Turn the child onto their side (recovery position) while keeping them lying down.
D. Place the child flat on their back and continue to face upward.

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Correct Answer: C. Turn the child onto their side (recovery position) while keeping them lying down.

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Questions?

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