PA EMS

Syringe-Based EPINEPHrine Administration:

Education for Pennsylvania EMTs

The Pennsylvania Emergency Health Services Council serves as the advisory board to the Pennsylvania Department of Health on all matters related to emergency medical services.

The administration of EPINEPHrine using an alternative device to the traditional auto-injector is an initiative by the Council's statewide medical advisory committee, which is comprised primarily of the regional medical director and approved by the board of directors.

The education program that follows was designed with the input and review of the statewide medical advisory committee and other stakeholders. It is the first of a two-part education process, which will conclude with a practical skills lab conducted by the agency medical director.

Course Objectives

- Provide a rationale for syringe-based EPINEPHrine administration vs. auto injector
- Review anaphylaxis pathophysiology
- Review basic EPINEPHrine pharmacology
- Review safe medication administration practices
- Demonstrate medication administration procedure

Why Syringe-Based EPINEPHrine?

- Rising cost of auto-injector devices
  - $400 to $600 per vehicle
  - 2-year expiration date and low frequency of use
- With appropriate education, EMTs can safely administer EPINEPHrine using a dose-limited syringe
- Significant savings at both EMS agency and system level

History of Syringe EPINEPHrine Kits

- King County, Washington (2014)
  - 3500 EMTs trained
  - No injuries to providers
  - No reported medication administration errors or bad patient outcomes
  - First year system savings estimated to be $150,000
- Other states with similar programs include: New York, West Virginia, Florida, Alaska and Montana

Anaphylaxis Overview

- A serious and systemic allergic reaction
  - Multi-system involvement
  - Rapid onset
  - Upper airway swelling
  - Respiratory distress symptoms
  - Shock

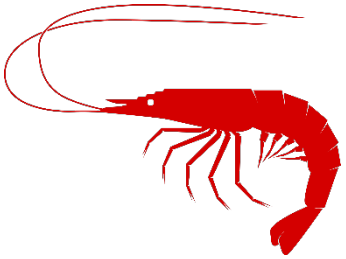
If left untreated, anaphylaxis can cause DEATH!

Anaphylaxis is NOT…

- An insect bite with localized swelling and itching
- A runny nose
- Sneezing
- Watery eyes
- Hives/Rash without respiratory distress

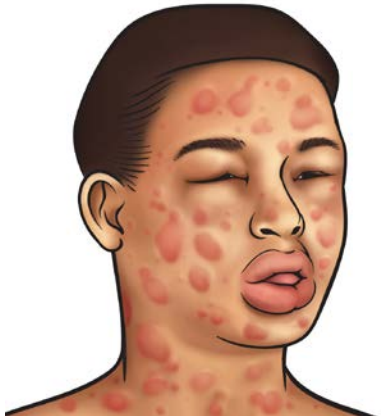
Common Causes of Anaphylaxis

- Foods
  - Nuts
  - Shellfish
  - Fruits
- Insects
  - Bees
  - Spiders
- Medications/Latex
  - Antibiotics



Signs & Symptoms

- Respiratory distress and wheezing or stridor
- Swollen tongue and/or lips
- Difficulty swallowing
- Hypotension
- Tachycardia
- Extensive hives with itching



Case Study 1

- 35 yo male was working in his garden when stung by a bee
- Experienced pain, swelling and itching at the sting site and is concerned he is having an allergic reaction
- No known allergy to bee stings
- No of shortness of breath w/ clear lungs fields
- Visible hives
- Appears very anxious

Vital signs on EMS arrival:

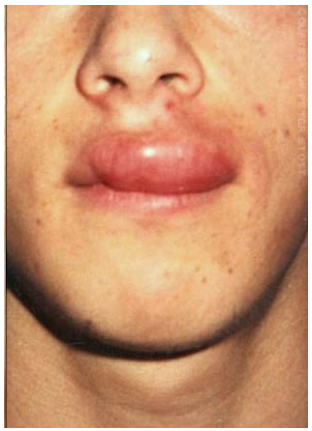
- HR 90
- RR 24
- BP 122/80
- SPO2 98% on room air

Case Study 2

- 15 yo male at summer camp when stung by a bee
- Presents to camp nurse 30 minutes later
- Patient has known allergy to bee stings
- Painful swelling at sting site
- Complains of shortness of breath with audible wheezing
- Nurse administered patient prescribed epi auto-injector before calling 911

Vital signs on EMS arrival:

- HR 96
- RR 24
- BP 132/64
- SPO2 96% - lungs now clear



Case Study 3

- 79-year-old female with allergy to shellfish
- Taken out to dinner – no known exposure
- Developed hives over face, chest and back
- Took OTC Benadryl
- EMS called after patient started to experience dyspnea

Vital signs on EMS arrival:

- HR 106
- RR 36
- BP 102/52
- SPO2 88% with shallow respirations and audible wheezes

Case Study 4

- 3-year-old female felt sick after eating strawberries at a picnic
- Rash noted around mouth
- Over the next 15 minutes, patient becomes pale and has < LOC; only responds to painful stimuli

Vital signs on EMS arrival:

- HR: 120
- RR: 10
- BP: capillary refill >4 sec
- SPO2: 85% with almost barely audible breath sounds and wheezes noted

Treatment

- Dispatch ALS if not responding (Protocol 210)
- Perform assessment (Protocol 201)
- Monitor SPO2 (Protocol 226)
- Administer oxygen if SPO2 <95% (Protocol 202)
- If anaphylaxis suspected, administer EPINEPHrine using 1mg/ml concentration (Protocol 411)
  - Adult Dose 0.3 mg (0.3ml) IM
  - Pediatric Dose 0.15 mg* (0.15ml) IM

**A pediatric patient is defined as a child < 8 y.o. or < 55lbs (25 kg) body weight*

PA BLS Protocol 411

ALLERGIC REACTION / ANAPHYLAXIS
STATEWIDE BLS PROTOCOL

Criteria:

A. Severe Allergic Reaction: A patient with the following symptoms of severe allergic reaction or anaphylaxis after suspected exposure to an allergen:

1. Symptoms of severe allergic reaction include:
   a. Difficulty breathing and wheezing.
   b. Swollen tongue and lips or difficulty swallowing.
   c. Hypotension.
2. Common allergens that may lead to allergic reactions include
   a. Bee/ Wasp/ Hornet stings
   b. Medications (e.g. antibiotics)
   c. Foods (e.g. peanuts, seafood)

B. Moderate Allergic Reaction: A patient with a moderate allergic reaction may have:

1. Mild shortness of breath with wheezing
2. Extensive hives and itching
3. Mild tongue/ lip swelling without difficulty swallowing of shortness of breath.

Exclusion Criteria:

A. Mild allergic reaction isolated to minor hives without any of the criteria listed above.[1]

PA BLS Protocol 411

C. [Optional] BLS agencies may carry **EPINEPH**rine in 1mg/mL vials for administration by the agency's EMTs.

1. These agencies must comply with Department of Health **EPINEPH**rine "check and inject" requirements, This includes verification by the agency medical director the training of agency providers, before the agency is permitted to stock and carry **EPINEPH**rine 1mg/mL for injection.
2. These agencies must carry, at a minimum, and in a specially marked kit/case in their primary responding vehicle, stored and maintained in a manner consistent with Department requirements.
   a. Two (2) vials of **EPINEPH**rine 1mg/mL
   b. Five (5) alcohol prep pads
   c. Two (2) appropriate sterile needles for intramuscular injection
      1) If glass ampules of **EPINEPH**rine are stocked,
         a) Two (2) sterile filter needles or straws to draw from the glass vial
         b) Gauze or commercially available shielding to protect providers drawing the **EPINEPH**rine into the syringe
      2) Glass ampules are strongly discouraged due to their increased hazards of breakage and EMS provider injury

EPINEPHrine

- Synthetic version of naturally occurring adrenalin
- Dilates bronchioles to ease breathing
- Increases heart rate and strength of contractions
- Increases blood pressure

Note: Due to the cardiovascular effects of epinephrine, consider medical command consult before administering to a patient with a history of cardiovascular disease or ≥ 55 y.o.

EPINEPHrine

- Onset of action
  - Typically, 90 seconds in a healthy patient
  - In anaphylaxis, may take 3-5 minutes
  - If no change after 5 minutes, contact medical command for possible 2nd dose
- Duration of action
  - Typically, 1-4 hours
- Possible side effects
  - Palpitations
  - Anxiousness and/or Tremors
  - Headache

Medication Administration

Medication Administration

1. Verify Medication

- ✓ EPINEPHrine 1mg in 1 ml container
- ✓ Expiration Date
- ✓ Contents of vial should be clear

Medication Administration

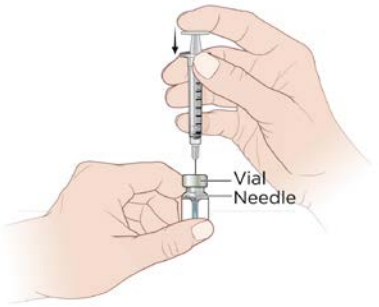
A dose-limiting syringe that is specifically marked for adult or peds epinephrine is required for this method of administration.

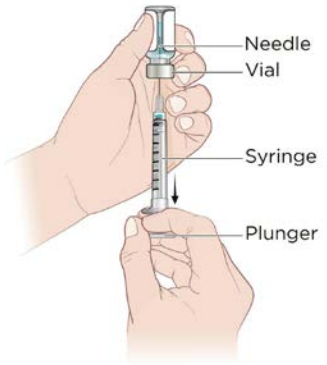
Pre-packaged kits are also available which contain the medication, special syringe and other ancillary supplies.

Medication Administration

2. Draw up epinephrine with a 1ml syringe

- ✓ Remove protective cap from the vial, clean rubber stopper with alcohol pad
- ✓ Place vial on flat surface
- ✓ Instill air in the vial equal to amount of fluid to be removed
- ✓ With the needle still in vial, invert both syringe and vial together
- ✓ Withdraw desired amount of medication
- ✓ Expel any bubble and excess liquid
- ✓ To ensure penetration of the muscle, use a needle that is <u>1-1 ½ inches in length</u>



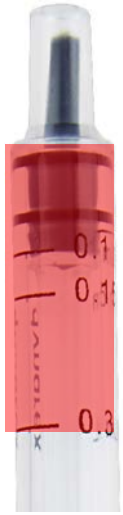


Medication Administration

Using Dose-Limiting Syringe

3. VERIFY DOSAGE

ADULT:
0.3 mg (0.3ml)



0.3ml

PEDIATRIC:
0.15 mg (0.15ml)

0.15ml
(Half of Adult Dose:
for children < 8 yo or
< 55lbs/25kg)

Medication Administration

Intramuscular Injection Guidelines
for Needle Length and Gauge Selection*

Patient Size	Location of Injection	Needle Length	Needle Gauge (Size)	Needle Angle to Skin
Adult	• Deltoid • Vastus Lateralis (side of thigh)	1" - 1 1/2 "	19—25 ga	90°
Pediatric	• Deltoid • Vastus Lateralis (side of thigh)	1" - 1 1/4"	22—25 ga	90°
Infant < 18 months	• Vastus Lateralis (side of thigh)	7/8" - 1"	25—27	90°

ISO Hub Color Standards for safety-engineered needles

* Adapted from Fundamentals of Nursing: Human Health and Function, R. Craven, C. Hirnle, 4th ed. Lippincott Williams & Wilkins 2003

Medication Administration

If epi is supplied in a glass ampule, caution must be used when detaching the top of the container to avoid injury from sharp or jagged glass.

A barrier, such as an alcohol prep pad or gauze sponge should be used when detaching the ampule's top.

Ampules are not recommended for BLS providers.

A filter straw (below) or filter needle should be used to withdraw the medication first, then switch to an appropriate size hypodermic needle for administration.

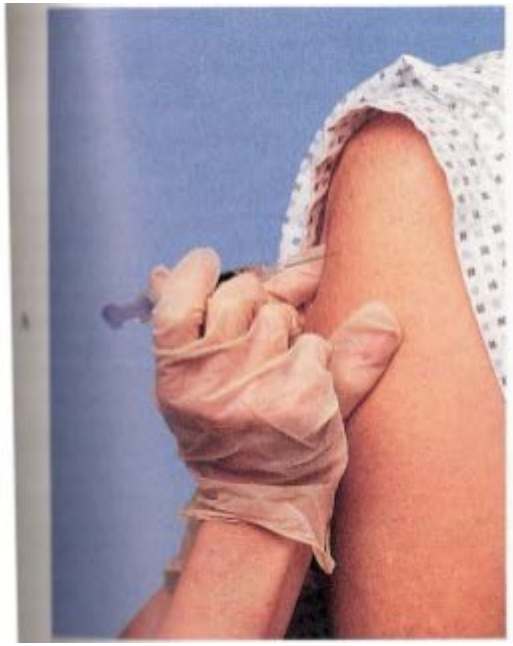
The filter device will capture any glass fragments that may fall into the ampule when the top is detached.

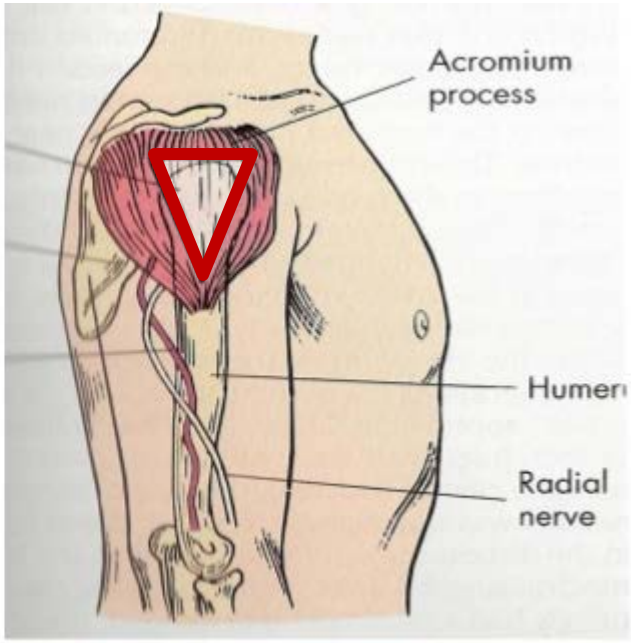
Medication Administration

Medication Administration

4. Select Injection Site

- Pediatrics (preteen/teenager)
- Adults

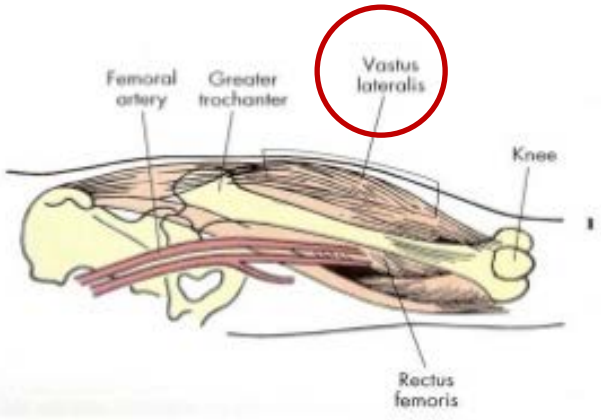




Deltoid

Medication Administration

- Pediatrics (infant/toddler)
- Adults
- Adults w/ little arm muscle

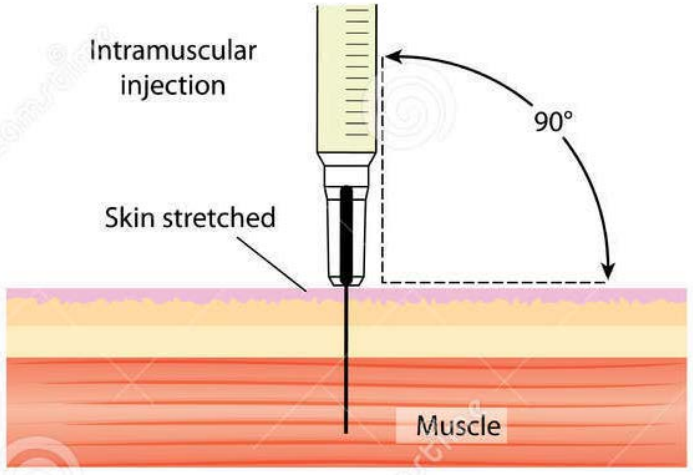


Vastus Lateralis
(Lateral Thigh)

Medication Administration

5. Inject

- ✓ To ensure penetration of the muscle, use a needle 1-1 ½ inches in length
- ✓ Cleanse injection site with an alcohol prep pad using circular motion working from center outward
- ✓ Stretch the skin taut over inject site and insert needle at 90º angle
- ✓ Pull back on plunger to aspirate for blood. If blood is noted in syringe barrel, withdraw needle and prepare a new syringe and different injection site
- ✓ If no blood, inject medication; when complete withdraw needle and dispose of syringe in sharps container



Medication Administration

6. Document

- ✓ Time
- ✓ Medication Name → EPINEPHrine
- ✓ Concentration → 1mg/ml
- ✓ Amount Administered → 0.3mg or 0.15mg
- ✓ Injection Site → L/R Deltoid or Lateral Thigh
- ✓ Patient response to medication

Medication Administration

7. Monitor Patient

- ✓ Anticipated response to medication
- ✓ Common side effects
  - ➢ Anxiousness
  - ➢ Tremors
  - ➢ Increases heart rate or palpitations
  - ➢ Headache
- ✓ Vital Signs, SPO2 and lung sounds
- ✓ If no improvement after 5 minutes and ALS not yet on scene – contact medical command to discuss repeat dose of epinephrine

Review

- Anaphylaxis is a serious and systemic reaction
- Rapid recognition and treatment is essential
- Symptoms may include difficultly breathing, facial/airway swelling and shock
- EPINEPHrine, a synthetic version of adrenalin, is the drug of choice in anaphylaxis
- EPINEPHrine administered by a special dose-limiting syringe is an economical alternative to an auto-injector

References

1. Husain S, Nolan J, Latimer A, Eisenberg M, (2017, June) EPINEPHrine Economics. Journal of Emergency Medical Services 27-30.
2. Caroline N, (2013) Emergency Care in the Streets 511-520 Burlington: Jones Bartlett
3. 2023 Pennsylvania Statewide Basic Life Support Protocols
4. 2023 Pennsylvania Statewide Advanced Life Support Protocols
5. New York State “Check and Inject” EMT EPINEPHrine Program
6. West Virginia EMT EPINEPHrine Training Module


Proceed to Skills Verification
with Medical Director