Anaphylaxis and Epinephrine Administration by the MR/EMT

Davidson County EMS System

Lisa Evans Taylor, MD
System Medical Director

Pilot Training Program conducted with permission from the NC Office of EMS and the NC College of Emergency Physicians

Learning Objectives:

Upon successful completion of this training module, the MR/EMT will be able to describe and/or correctly demonstrate …

- Common allergens which may produce an allergic reaction
- Signs and Symptoms of Anaphylaxis
- Patient assessment for a suspected allergic reaction
- Epinephrine indications and contraindications
- Epinephrine packaging (volume and concentration)

Learning Objectives:

Upon successful completion of this training module, the MR/EMT will be able to describe and/or correctly demonstrate …

- Steps in aseptic technique
- Preparation of Epinephrine for administration
- Adult and pediatric dosages
- The Six Rights of medication administration
- Intramuscular administration of Epinephrine
- The mechanism of action and effects of Epinephrine
- Proper disposal of sharps

Key Terms

Anaphylaxis - a life-threatening, hypersensitivity reaction of the immune system

Aseptic technique - a procedure performed under sterile conditions

Asphyxia - suffocation as a result of blockage of the airway

Dyspnea - labored or difficult breathing

Epinephrine - a hormone released from the adrenal glands that activates several tissues in the "fight-or-flight" response

Intramuscular - a medication route by injection into a muscle which encourages rapid transport by the bloodstream

Shock - a severe reduction in blood pressure (by any cause) that results in inadequate blood flow (oxygen & glucose) to tissues

Anaphylaxis

Most people are protected by an immune system that guards against the incursion of foreign substances and micro-organisms that do not belong in the body.

The word **anaphylaxis** comes from the Greek and means "without protection"

An anaphylactic reaction, which is a "superhuman" effort by our body's immune system to protect us from a foreign invader, can also lead to death if not recognized and treated.

Anaphylactic Reaction

An anaphylactic reaction may affect the cardiovascular system, respiratory system, neurologic system, digestive tract, and the skin.

COMMON ALLERGENS/ANTIGENS

- **INSECT STINGS**
  Wasp, Yellow Jacket, Hornet, Fire ant, Honey Bee

- **FOODS**
  Milk, Egg white, Shellfish / fish,
  Citrus fruits, Nuts, Beans, Chocolate

Many children have a Peanut allergy!

COMMON ALLERGENS/ANTIGENS

- **DRUGS**

Penicillin, Aspirin, Antibiotics,

Allergy injections, Hormones (Insulin), Vaccines

- **OTHER**

X-ray contrast media, Latex products (gloves, etc)

PHYSICAL FINDINGS

- It is important to know that any of the signs and symptoms detailed next may be associated with an allergic reaction. Signs and symptoms may range from simple sneezing (a mild allergic reaction) to severe respiratory distress and hypotension in Anaphylaxis.
- Prompt recognition of signs and symptoms is imperative!

SKIN

- Warm, tingling feeling in the face, mouth, chest, feet, or hands
- Pruritis (itching)
- Urticaria (hives)
- Erythema (red, flushed skin)
- Edema (swelling) to face, neck, hands, feet and/or tongue

RESPIRATORY

- Tightness in the throat/chest
- Cough
- Hoarseness
- Tachypnea (rapid breathing)
- Dyspnea (difficulty breathing)
- Stridor caused by larynogospasm
- Wheezing caused by severe broncho-constriction (audible without stethoscope)

ABDOMINAL

- Nausea and vomiting
- Diarrhea
- Abdominal pain and cramping

SYSTEMIC

- Hypotension (low blood pressure)
- Poor perfusion (increased capillary refill)
- Incontinence
- Seizures
- Confusion
- Decreased level of consciousness
- Fainting

GENERAL FINDINGS

- Itchy, watery eyes
- Headache
- Rhinorrhea (runny nose)

ASSESSMENT AND TREATMENT

Is there a SUSPECTED or KNOWN exposure to an allergen?

- A child eats a Snickers bar and has a known allergy to peanuts
- An adult reports he was bitten or stung by something in the yard, but he doesn't know what it was (suspected)

ASSESSMENT AND TREATMENT

- Perform initial assessment
- Complete focused history and physical examination

1. History of allergies?
2. What was the patient exposed to?
3. How was the patient exposed?
4. What affects is the exposure having on the patient?
5. Progression of signs/symptoms
6. Interventions

ASSESSMENT AND TREATMENT

- Assess baseline vitals and complete SAMPLE history.
- Administer high flow oxygen if not already done in initial assessment.

SYMPTOM SEVERITY

- MILD: Flushing, hives, itching, redness (erythema); normal BP and perfusion
- MODERATE: above, plus respiratory or abdominal symptoms; normal BP and perfusion
- SEVERE: Skin plus respiratory or GI with hypotension (BP < 100) and poor perfusion

RECOGNITION AND TREATMENT OF MILD ALLERGIC REACTIONS

- Allergic reaction WITHOUT signs and symptoms of respiratory distress or shock
- Continue with focused assessment

Administer EPINEPHRINE

- If known or suspected allergen exposure
- IF SIGNS AND SYMPTOMS OF A MODERATE OR SEVERE ALLERGIC REACTION ARE PRESENT
- OR if any TWO systems are involved (skin, respiratory, abdominal, systemic)

It is possible to have anaphylaxis without skin involvement

INDICATIONS FOR USE OF THE EPINEPHRINE

- Remember, look for symptoms in two systems

Skin

Respiratory

Abdominal

Systemic

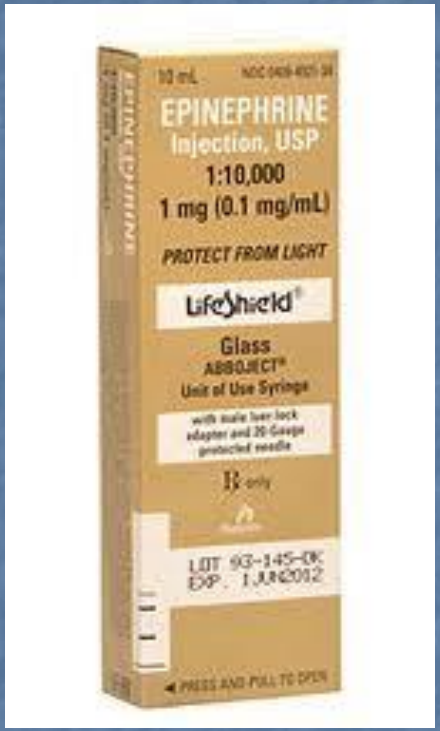
If in doubt, give the epinephrine!

What is Epinephrine?

- A synthetic reproduction of the naturally occurring hormone ADRENALIN
- Released during "fight or flight" responses

"Epinephrine" and "Adrenalin" mean the same

Examples of the Medication

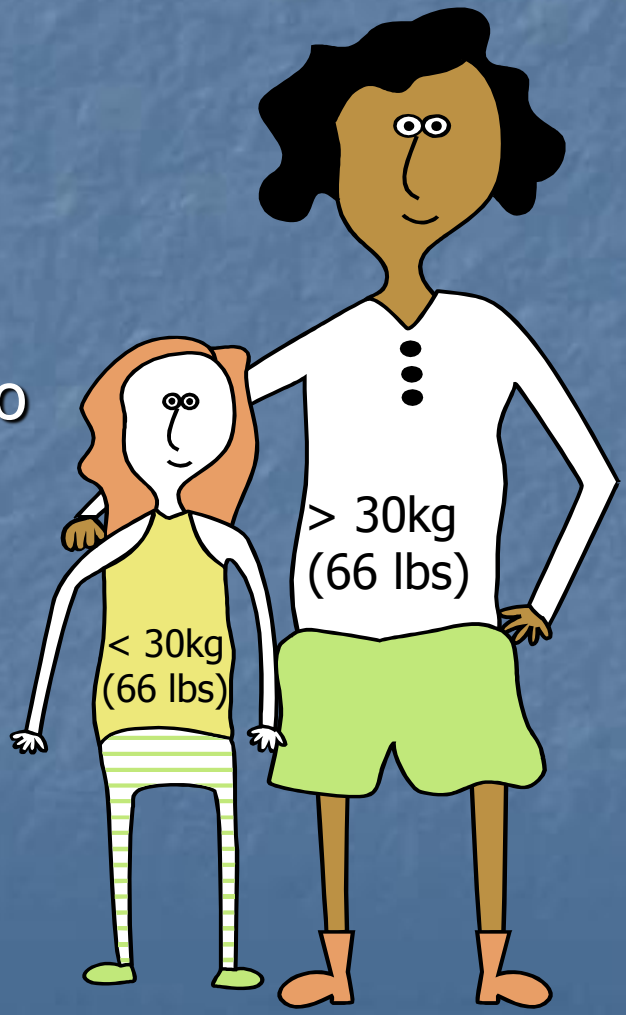


Dosage in Anaphylaxis

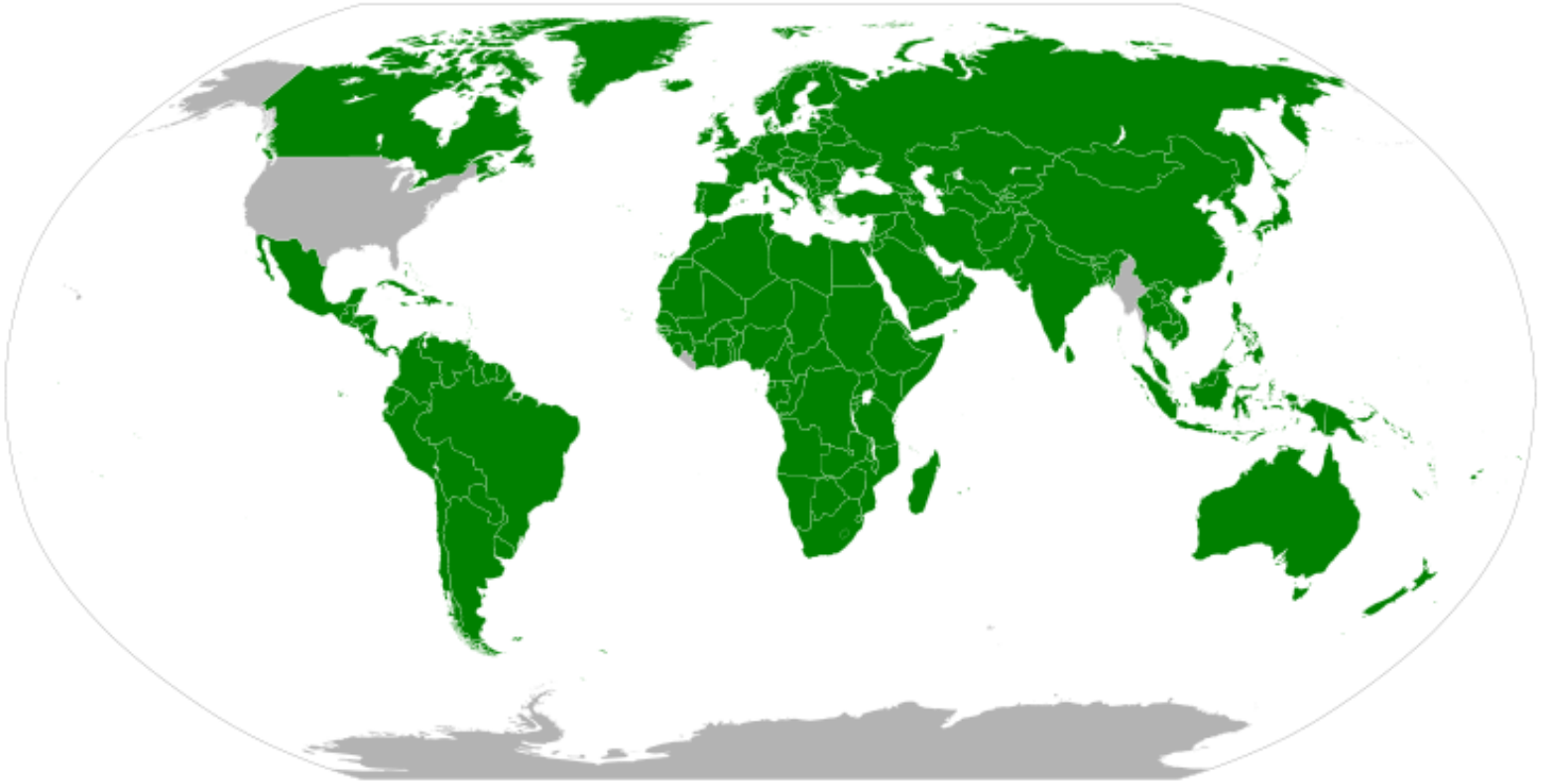
Dosage:

- Adults - 0.30 mg of 1:1,000 epi
- Children - 0.15 mg of 1:1,000 epi

- Adults 50 years of age or older, or who have a cardiac history, or who have a heart rate > 150 should receive a Half-dose (0.15mg)



Metric System Adoption



Countries which have officially adopted the metric system

Countries which have not officially adopted the metric system (US, Myanmar, Liberia)

The Metric System

There are two metric units of volume.

- Liter (L)
- Milliliter (ml)

1 liter = 1,000 milliliters

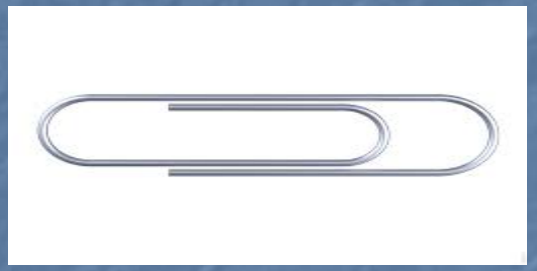
The Metric System

There are three metric units of mass.

- Kilogram (kg)
- Gram (g)
- Milligram (mg)

1 kilogram = 1,000 grams

1 gram = 1,000 milligrams



We will use 1 mg of epinephrine in 1 ml of fluid

Note: A milliliter (ml) is the same as a cubic centimeter (cc)

We will use a 1ml/1cc syringe containing 1mg of epi

- Children - 0.15 mg of epi
- Adults - 0.30 mg of epi (or 0.15 as noted earlier)

- Measure to top of black plunger
- This shows **.05ml** drawn up from a vial (Same as **.05cc**)

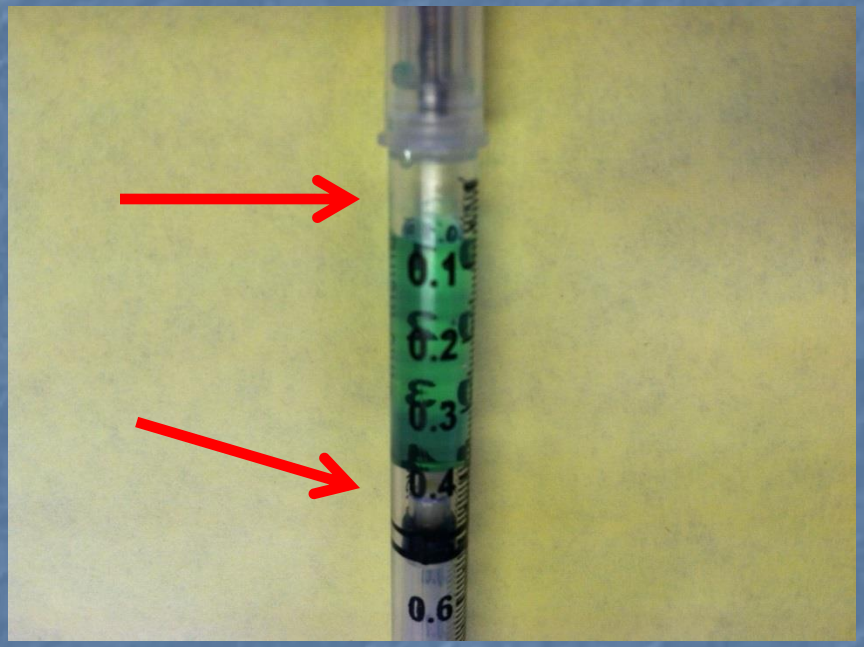
Dosage Comparison

Ped Dose= 0.15mg

Adult Dose= 0.30mg

Draw up correct dosage

Check for Air Bubbles



Your instructor will show you how to expel the bubbles

Air bubbles will result in an incorrect dosage of epi

Six Rights of Drug Administration

1. Right person---- pt in anaphylaxis
2. Right drug---- epinephrine 1:1000
3. Right dose---- 0.15mg or 0.30mg
4. Right time---- immediately for anaphylaxis
5. Right route---- intramuscular (IM)
6. Right documentation---- record before & after

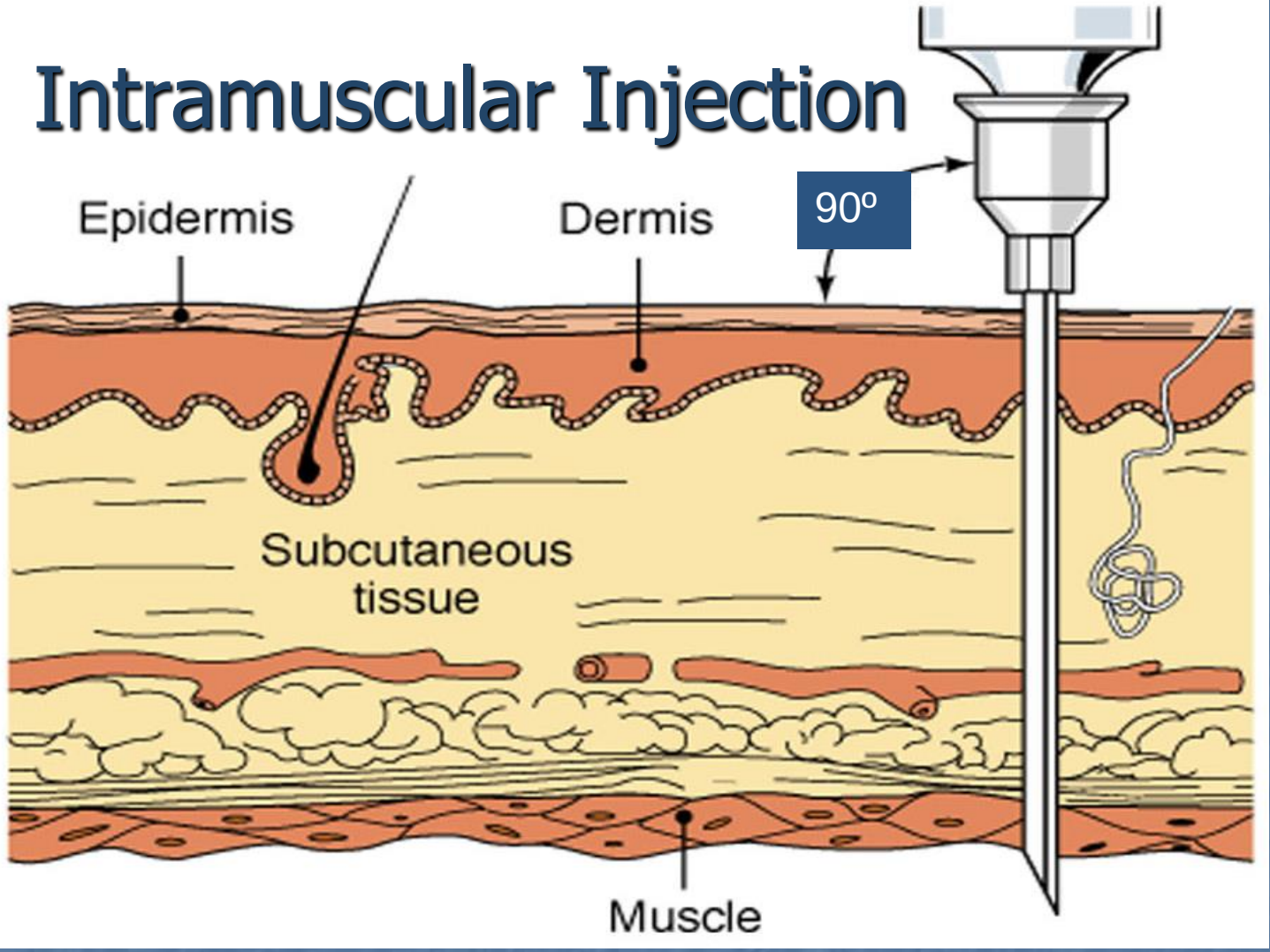
Site Selection and Preparation

Intramuscular sites allow a drug to be injected into a muscle so that the blood vessels supplying that muscle distribute the medication to its site of action via the bloodstream.

First steps:

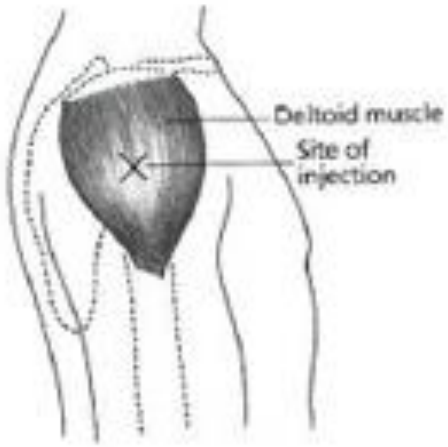
- Prep the site with approved antiseptic by scrubbing vigorously and allowing to dry. DO NOT TOUCH, BLOW ON OR FAN THE INJECTION SITE!
- Align the syringe and needle above the injection site at a 90 degree angle, with the bevel of the needle facing up.

Intramuscular Injection

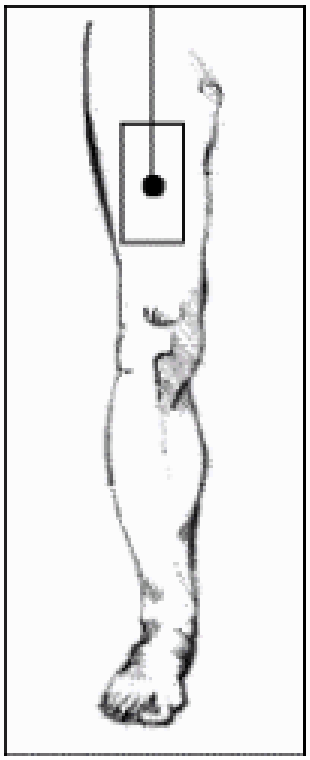


Insert needle, pull plunger slightly back, and if no blood return is visible, inject epi

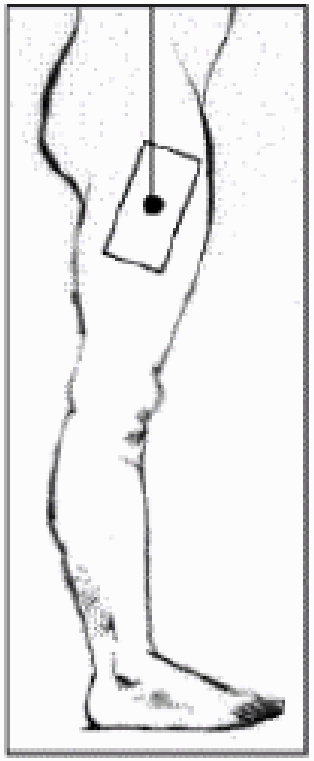
Intramuscular Injection Sites



Deltoid



Rectus femoris



Vastus lateralis

Action of Epinephrine

- Relaxes smooth muscle in the airways
- Counteracts histamine
- Raises blood sugar level
- Raises heart rate, blood pressure, and myocardial oxygen demand

For Intramuscular injection of Epinephrine…

Onset of effect: 3-5 min

Duration of effect: 1-4 hours

Some Side Effects of Epinephrine may occur:

- Palpitations
- Tachycardia & arrhythmias
- Hypertension
- Headache
- Tremor, weakness
- Pallor, sweating
- Nausea & vomiting
- Nervousness & anxiety
- Pain, redness at the injection site

Needle Handling Precautions

- Minimize the tasks performed
- Immediately dispose of used sharps in a sharps container
- DO NOT RECAP NEEDLE

Document all information concerning the patient and medication, including:

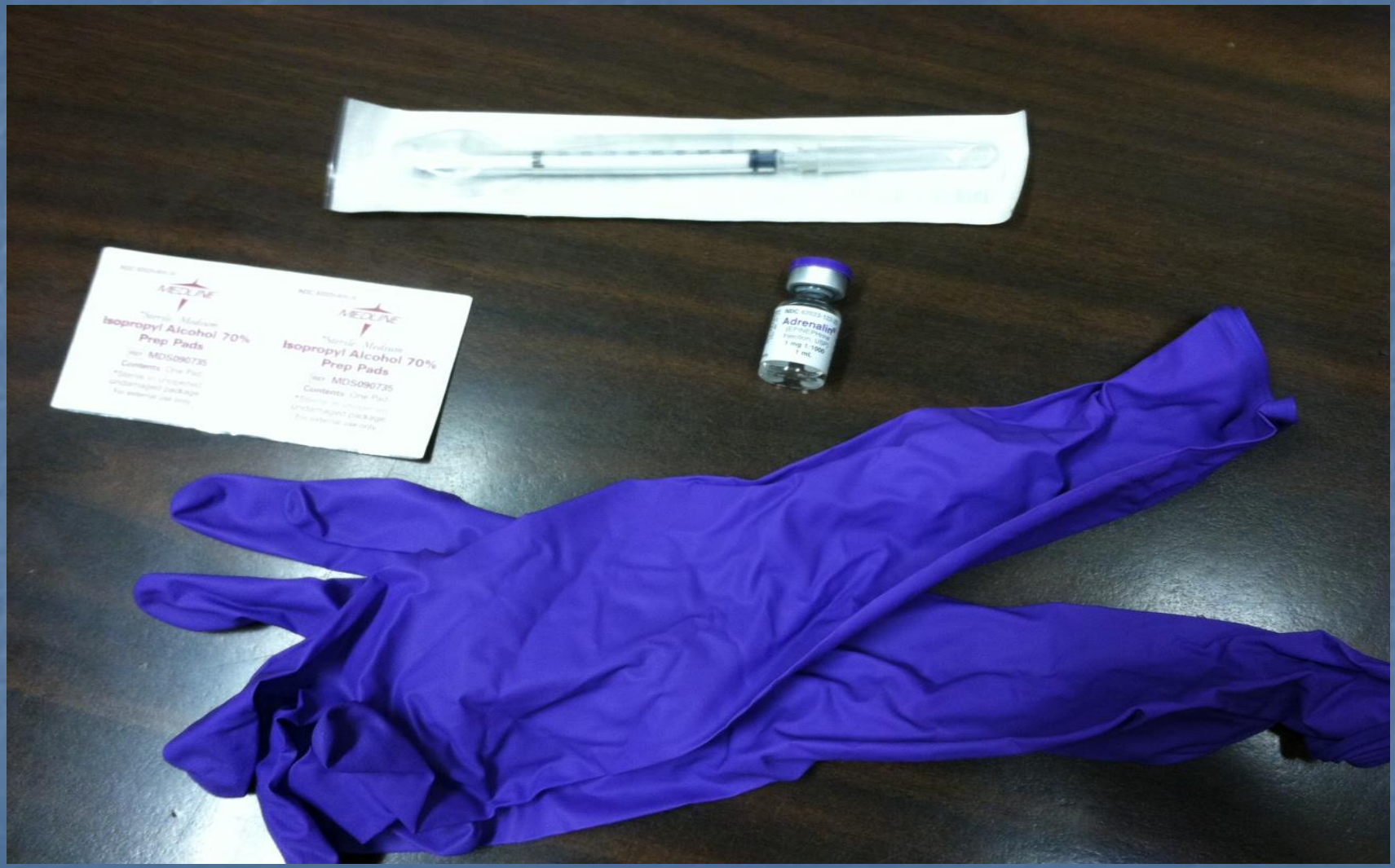
1. Indication for drug administration
   - include appearance, work of breathing, vitals, lung sounds, skin signs, and ability to speak
2. Drug, dosage, and delivery site
3. Patient response to the medication
   - include appearance, work of breathing, vitals, lung sounds, skin signs, and changes in ability to speak
   - both positive and negative responses

Let's Review the Procedure

Confirm the Medication

- Medication name
- Amount in vial (1:1,000 & 1mg/1ml)
- Expiration date
- Not cloudy; no color or precipitate

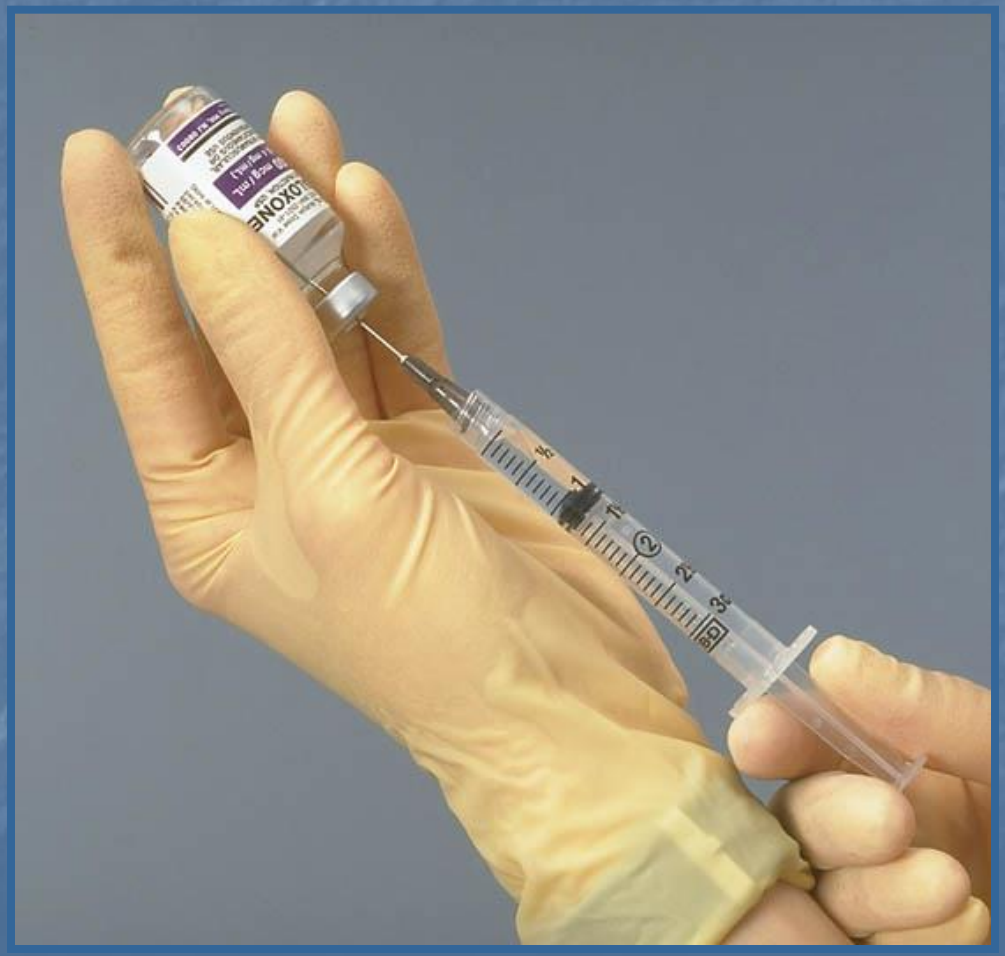
Gather what you need.



Clean the vial's rubber top.

Do not use the vial if the seal is absent

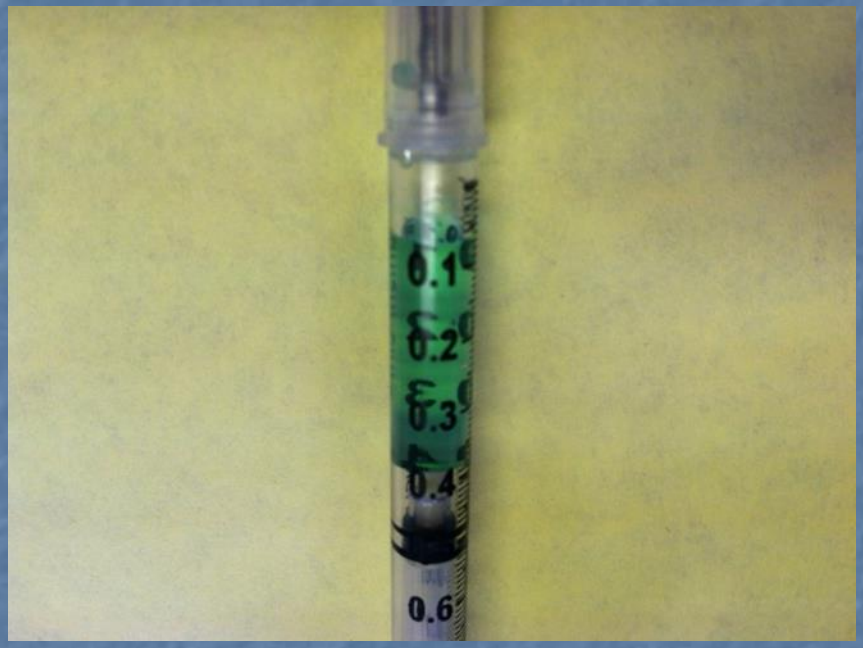
Insert the hypodermic needle into the rubber top



Withdraw the appropriate volume of medication.

Using a 1cc syringe, insert the needle into the vial, draw the plunger back on the syringe until you reach the 0.15 or 0.30cc mark on the syringe.

Expel any bubbles



Draw up more epi if needed until you have correct dose

Prepare the site.

- Scrub the skin vigorously with an alcohol wipe
- Allow to air dry (do not blow on or fan it)

Insert the needle at a 90-degree angle.

- Stretch the skin taut
- Do not pinch it
- Hold the syringe like a dart
- Insert the needle with a quick stab at a 90° angle to the skin surface
- Pull plunger slightly back
- Inject the epi

Assess Patient Response

Document patient's response to treatment:

- LOC, behavior, breathing effort, lung sounds, skin signs, vital signs, and changes in ability to speak

- Document adverse effects, if any

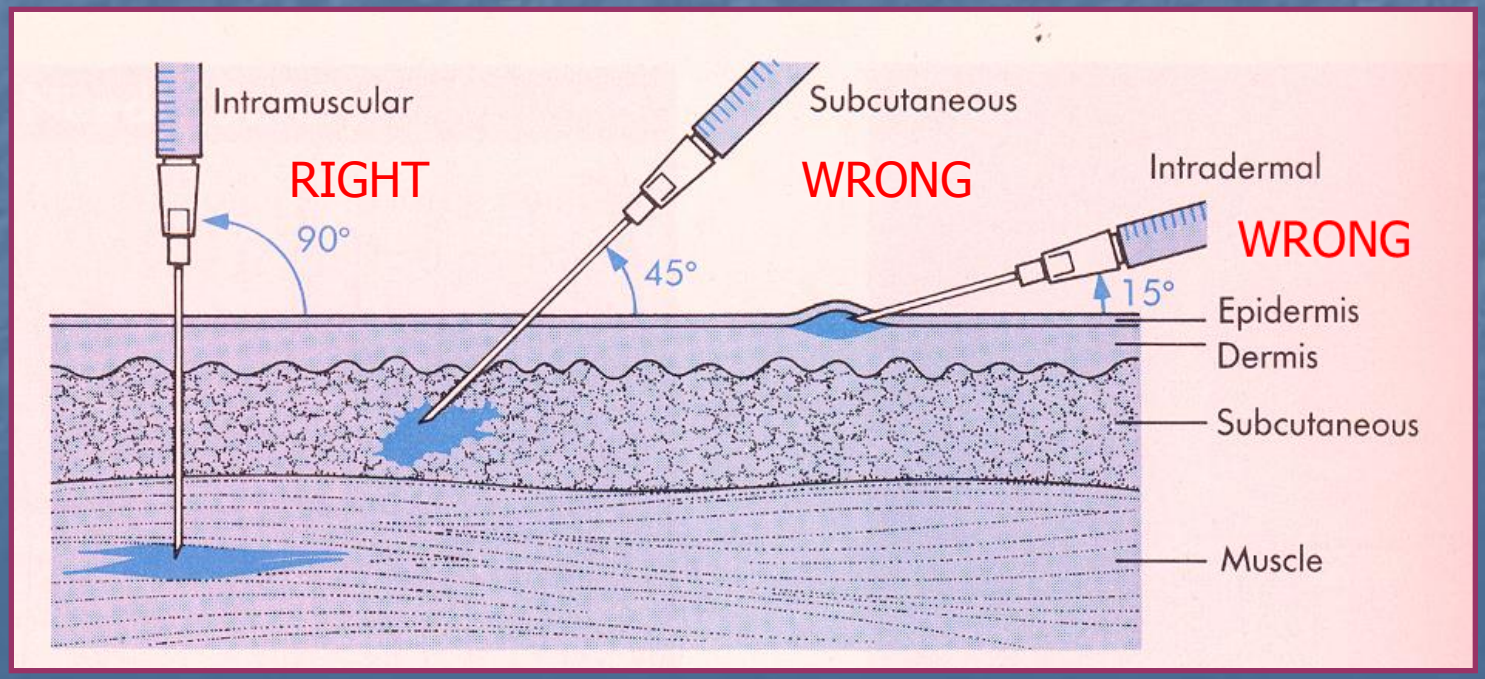
Document Vital Signs before and after treatment with Epinephrine

Because epinephrine is expected to cause widespread changes in function, it is important to frequently monitor and document vital signs:

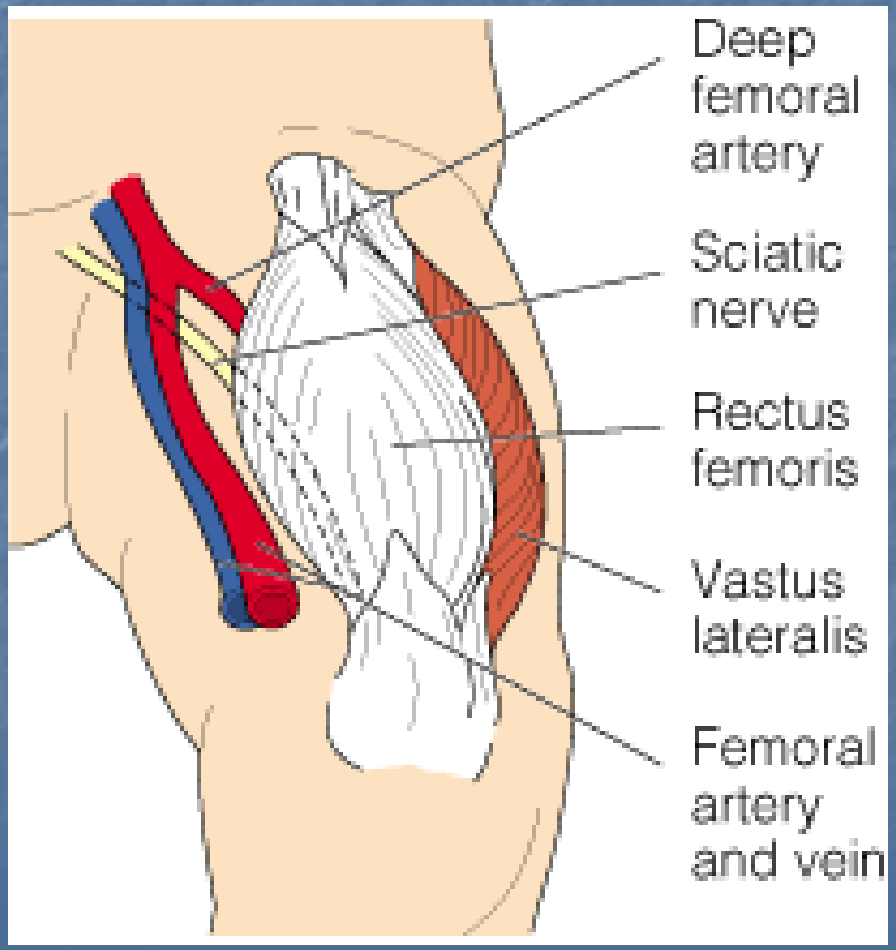
- LOC, HR, RR, BP
- include general appearance, work of breathing, lung sounds, skin signs, and ability to speak

Be sure to inject Epinephrine into the muscle

It may take twice as long (up to 10 min) for epinephrine to have its life-saving effect if not injected into the muscle.



Lateral thigh (the outside) is the best site for infants



- Good site for all ages
- Far from major blood vessels & nerves

Questions?

Let's Practice!