



General Pharmacology



Overview

- We will review some of the medications used by the EMT-B.
- We will review:
 - Sub-therapeutic, Therapeutic, Toxic, Lethal dosing.
- We will clarify which meds may be given independently vs. those requiring Medical Control.
- We will discuss:
 - Desired effects, side effects and undesired effects of EMT meds.



Pharmacology

**The study of drugs their sources,
characteristics, effects & undesired
effects.**



EMT-B Medications

- Oxygen
- Oral Glucose
- Activated Charcoal
- Nitroglycerin
- Albuterol family multidose / meter dose inhalers (MDI)
- Epinephrine (EpiPen)



Medication “Names”

- Generic Name – listed in the U.S. Pharmacopeia.
 - Name given before it becomes officially listed.
 - Usually a simple abbreviated version of the chemical name.
- Brand Name –
 - Name given by the manufacturer when listed for use.
- Generic Name: **Ibuprofen** **Acetaminophen**
- Brand or Trade Name: **Motrin** **Tylenol**



Forms of Medications

- Compressed powders or tablets.
 - Nitroglycerin (NTG) pills
- Liquids:
 - Oral
 - Injectable
 - Sprays
 - NTG sublingual spray
 - Inhalation...
- Gels:
 - Glucose paste



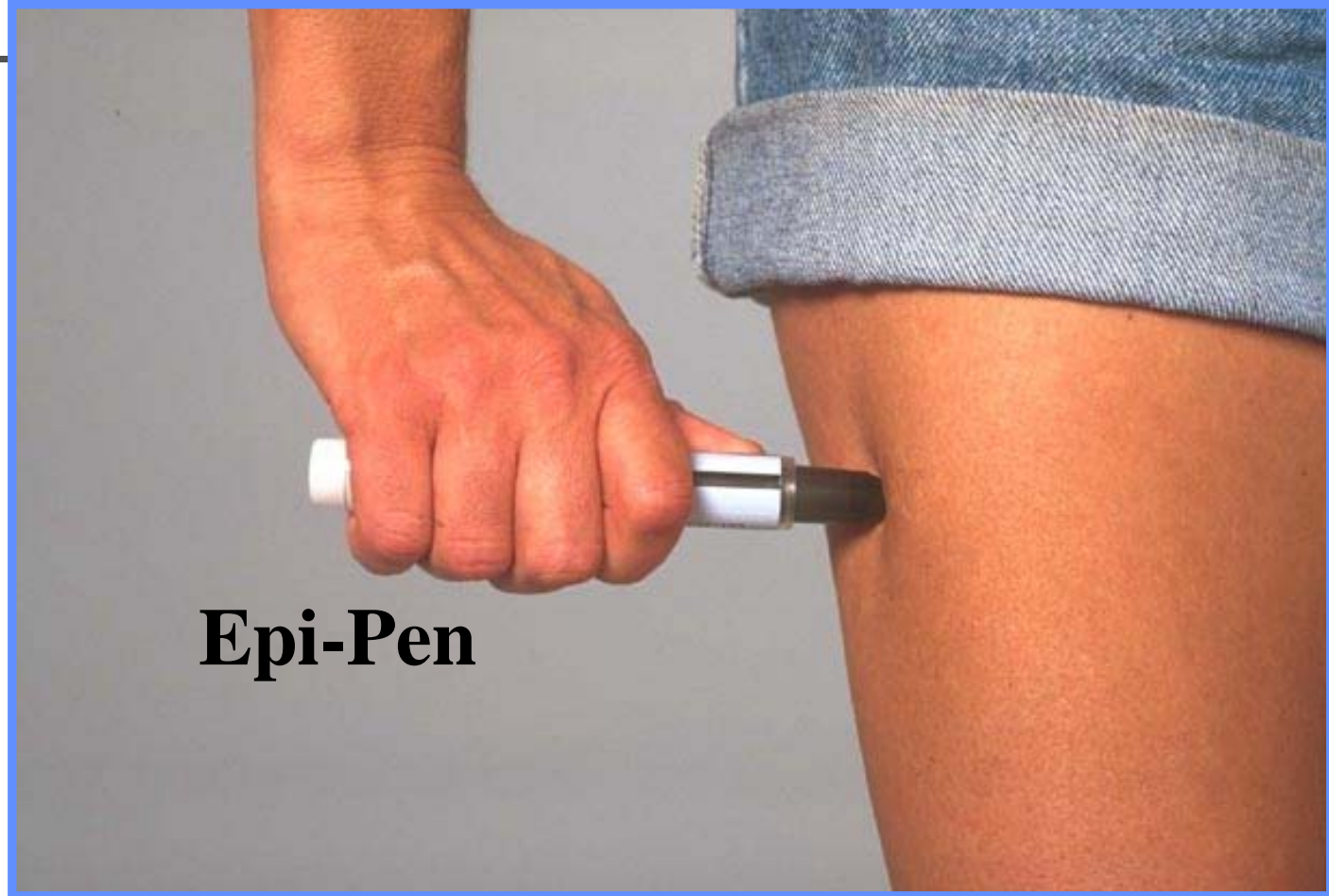
Forms of Medications

- Gases
 - Oxygen
- Fine powders for inhalation
 - Many inhalers
- Suspensions
 - Activated charcoal / Liqui-char
- Other:
 - Elixirs
 - Pastes...

Compressed Powders, or Tablets



Liquids for Injection



Epi-Pen

Gels



Suspensions

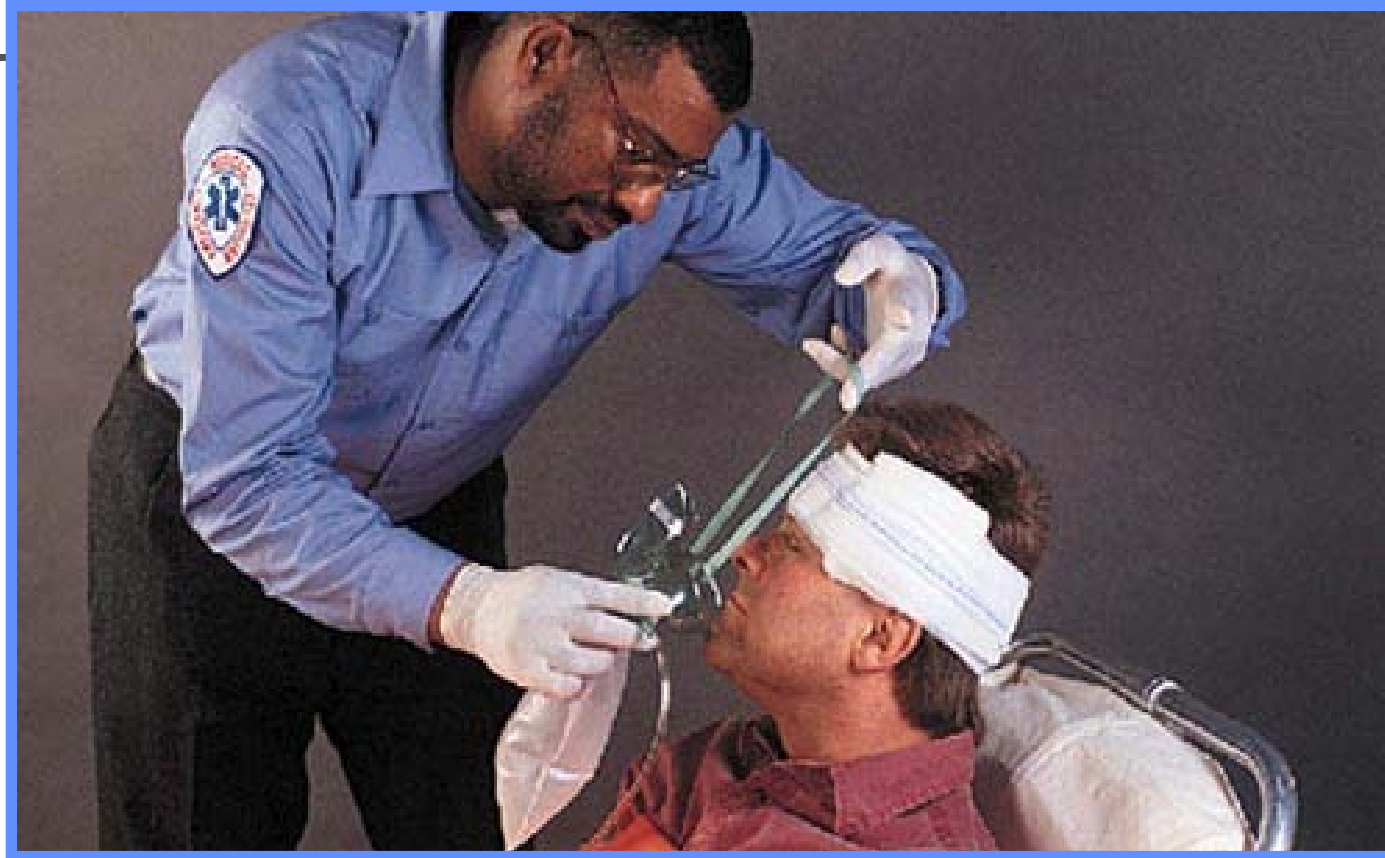


Fine Powder for Inhalation

**Steroid
inhaler –
among
others.**



Gases



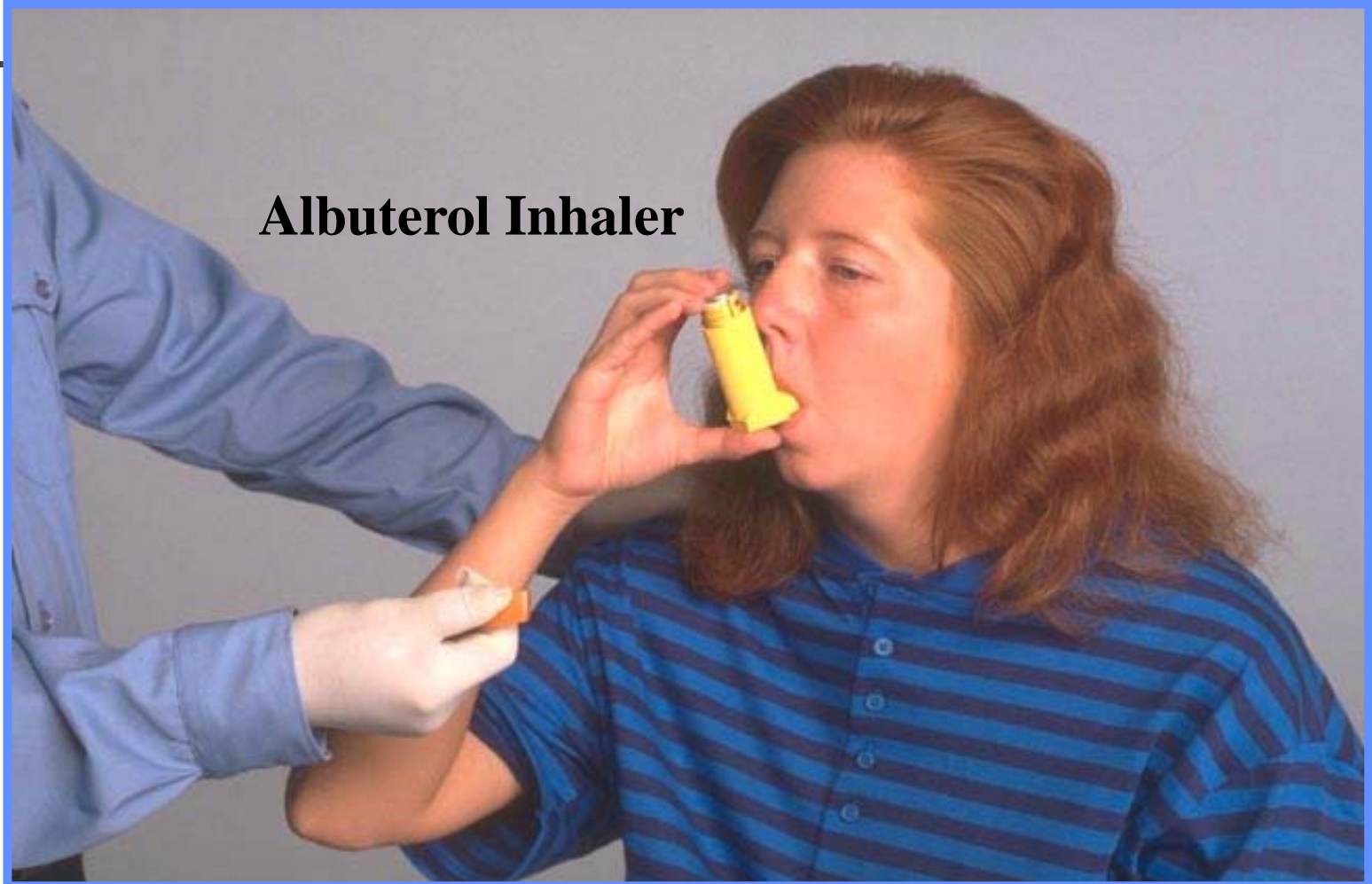
Sublingual Spray

Nitrolingual Spray



Metered-Dose Inhaler (MDI)

Albuterol Inhaler





Where Do Meds Come From?

- Plants
- Minerals
- Synthetics / Man-made
- Animals...



Terms of Importance

- **Indications:**
 - Conditions when a medication is appropriate for administration.
- **Contraindications:**
 - Situations when a medication should not be given or should be given with caution (Medical Direction).
- **Desired effects:**
 - What you would like the medication to accomplish.
- **Side effects / Untoward effects:**
 - Undesired effects of a medication. Sometimes predictable & seen at therapeutic doses.
- **Dose:**
 - The amount of medication to be administered to achieve the desired effect.



Terms of Importance

- Therapeutic dose:
 - The appropriate dose for the condition being treated.
- Sub-therapeutic dose:
 - A dose too low to achieve the desired effect.
- Toxic dose:
 - More medication than needed to treat the condition resulting in side effects.
- Lethal dose:
 - An excessive amount of medication that could cause death.



Terms of Importance

- Route of Administration:
 - Oral (PO)
 - Sublingual (SL)
 - Injectable
 - Intramuscular
 - Subcutaneous
 - Intradermal
 - Inhalation
 - Oxygen
 - Inhalers
 - Topical....



Proper Use of Medications in the Field



Medication Administration

- The “**6 Rights**”. (text may only refer to 4)
 - Right **patient**.
 - Right **condition**.
 - Right **medication**.
 - Right **dose**.
 - Right **route**.
 - Right **expiration date**.



EMT-B Medications: Activated Charcoal

- **Activated Charcoal - without Sorbitol.**

- **Indications:**

- Poisoning by mouth: **Medical Control / direction is required.**
- Typically used when ingestion wasn't very recent.
- A decision made by Medical Consult using information from Poison Control. **Charcoal is carried on the ambulance.**

- **Actions:**

- Sorbitol is a laxative.
- Charcoal lines the G.I. tract and prevents absorption of the ingested materials allowing it to pass through their body without being absorbed.



Activated Charcoal Dosing

- Adult: 1 gram / kg of body weight (0.5 gram / lb.).
- Pediatric: same as adult – based on body weight.

- Supplied in several types of containers:
 - 25 grams / 125 ml bottle
 - 50 grams / 250 ml bottle



Activated Charcoal

- May induce vomiting - though that isn't the intent.
- Have the patient drink the “slushy” as quickly as possible.
 - It may be flavored but it doesn't taste good.
- The charcoal stains whatever you get it on so be careful not to get it on your clothing.
- **NEVER** administer to a patient with an altered LOC.
- Charcoal doesn't absorb all toxic substances. Look to Poison Control for direction / advice.
- Some percentage of these patients will be uncooperative and may not accept the charcoal. **DO NOT** try to force it into someone's mouth.



Albuterol Inhaler (Proventil, Ventolin)

- Albuterol for field use is in the form of a “rescue” multi-dose inhaler (MDI).
 - It is also used as a nebulized home treatment.
 - There are many types of inhalers on the market. Make sure it is Albuterol, Proventil or Ventolin or it isn’t a part of your Protocols.
- Albuterol is a patient assist medication that **DOES NOT** require Medical Direction. The inhaler must belong to the patient.



Albuterol

- Indications:
 - “Reactive airway diseases”:
 - Asthma.
 - Emphysema.
 - Bronchitis.
 - Allergic reactions including anaphylaxis.
 - Pneumonia...
- Actions:
 - Bronchodilation.



Albuterol

- This is a patient assist medication prescribed to the patient by their doctor.
- Dosage: (shake and warm the inhaler prior to use)
 - 2 puffs = 1 dose.
 - 1 puff initially followed by a second puff 30 seconds later.
 - Have patient exhale fully then take a deep breath while depressing the inhaler piston.
 - Have them hold their breath as long as comfortable then slowly exhale through the nose.
 - Repeat an additional puff as with the first one to complete the 2 puff dose.
 - A total of 2 “**doses**” may be given over a 30 minute period.
 - Medical Direction can order additional doses at their discretion.



Albuterol

- Side Effects:

- Tachycardia
- Palpitations
- Tremors
- Anxiety
- Hyperactivity
- Hypertension
- Chest discomfort
- Sore throat
- Diaphoresis

Overuse can worsen their condition by causing bronchospasms.

These patients must have their own personal Inhaler.



Epinephrine Auto-Injector (Epi-Pen)

- **Indications:**

- Moderate to severe allergic / anaphylactic reaction with respiratory distress.
- Mild allergic reaction with history of life-threatening reaction.
- Pediatric patients with severe asthma.

- **Precautions:**

- Use cautiously in those with a hx of hypertension and other cardiac conditions.
- Use cautiously and obtain consultation before administering to the pregnant female.



Epi-Pen

- Dosing:
 - Adult Epi-Pen: 0.3 mg auto-injector.
 - Age 3 of age and older.
 - Epi-Pen Jr.: 0.15 mg auto-injector.
 - Less than 3 years of age.
 - Initial dosing is independent and may be either the patient's pen or the one carried by EMS.
 - Subsequent dosing per Medical Control.



Epi-Pen

- Adverse Effects:
 - Tachycardia / palpitations.
 - Chest discomfort.
 - Headache.
 - Nausea / vomiting.
 - Dizziness.
 - Hypertension.
 - Nervousness / Anxiety.
 - Tremors.



Epi-Pen & Epi-Pen Jr.

- Inject into the patients mid-lateral thigh.
- Hold the pen in place for 10 seconds before removal.
 - It takes the auto-injector about 10 seconds to fully inject the medication.
- Dispose of used pen in a sharps container.
- Monitor the patient very closely following administration of epinephrine.



Nitroglycerin

- Indications:
 - This is a medication that can only be used if it is the patients own prescribed sublingual (under the tongue) NTG.
 - Cardiac chest discomfort.
- Adverse Effects:
 - Hypotension.
 - Headache (advise the pt prior to administration).
 - Dizziness.
 - Tachycardia.



Nitroglycerin

- Precautions:

- Obtain VS's immediately before administration and every few minutes thereafter.
- Hypotension can be life-threatening and must be recognized quickly.
 - Place patient in a supine position ASAP.
 - Elevate the feet.
 - High flow oxygen.
- DO NOT administer if pt has ingested Viagra, Cialis or Levitra within the past 24 hours (Cialis lasts for up to 36 hours). Follow Medical Direction.



Nitroglycerin

- Dosing:
 - 1 tablet or sublingual spray.
 - May be repeated in 3 – 5 minutes if discomfort persists.
 - Up to a total of 3 doses may be administered.
 - Contact Medical Control ASAP if a second dose is indicated.
 - NTG is not indicated for pediatric patients (< 12 yrs of age).
 - A DROP OF SYSTOLIC BP OF **20 mm Hg** or > following NTG requires consult before additional is given.



Nitroglycerin

- Advise patient a headache is very likely.
- Instruct the patient to inform you of any “different” feelings – dizziness, lightheadedness, weakness...
- Monitor the patient very closely following NTG administration.
- Inform the patient that the taste may be bitter or create a tingling sensation under the tongue.
- The pill is to be allowed to dissolve – not swallowed.



Oral Glucose

- Indications:
 - Altered LOC in the diabetic patient.
 - Unconsciousness of unknown reason.
- Essentially no side effects.
- Patients without a gag reflex may aspirate so administer small amounts and monitor the airway closely.
- Supplied in a variety of tube sizes.
 - 10 – 15 grams of glucose per tube.



Oral Glucose

- Administer a small amount at a time between the cheek and gum.
- Dosing:
 - Adult & Pediatrics:
 - 10 – 15 grams of glucose in small doses as tolerated.
 - Response can occur in 5 – 15 minutes.
 - Patient may be confused as they regain consciousness.
- Glucose can be independently administered without Medical Direction.



Important Consideration When Administering Meds

- Most EMT meds are “assist” meds. You are assisting the patient with their own medication in many situations.
- Always evaluate the “**6 Rights**”.
- Assess VS’s immediately before administration.
- Assess VS’s within a couple minutes following medication administration and every few minutes thereafter.
- Advise patient of any expected side effects – headache...
- Document the time of administration, the dose and the effects (good or bad) on your runsheet.



Home Assignment

- List the meds that the EMT-B can administer or assist / administer.
- Make a list of meds requiring Medical Control.
- Make a list of meds that can be given without Medical Control.
- List the indication(s) for each med.
- List the side effects for each med.
- List the dose for each medication – adult & pediatric.
- List the route of administration of each medication.

- **A spreadsheet program would work best for this assignment.**



Summary

- If given properly meds can be very beneficial – if given incorrectly they can be lethal.
- Always stick with the “**6 Rights**”.
- Assess before and after all meds.
- Always be prepared to manage the complications of your actions.