Pharmacology for the EMT

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Pharmacodynamics

- Everybody reacts to drugs differently
  - Factors altering drug responses
    - Age
    - Body mass
    - Sex
    - Pathologic state
    - Genetic factors
    - Psychological factors
    - Other drugs

Drug Storage

- Potency can be altered by:
  - Temperature
  - Light
  - Moisture
  - Expiration date

Forms of Medications

- Solution
- Topical
- Tablet
- Capsule
- Suspension
- Transdermal
- Inhalation

Routes of medications

- PO (by mouth)
- IV (intravenous)
- IM (intramuscular)
- SQ (subcutaneous)
- SL (sub-lingual)
- IO (intraosseous)
- Inhalation
**Essential Medication Information**

- **Indications**
- **Contraindications**
- **Dose**
- **Administration**
- **Actions**
- **Side Effects**

The indications for a medication include the most common uses of the drug in treating a specific condition.

The contraindications are situations in which the drug should not be administered because of the potential harm that could be caused to the patient.

The dose simply indicates how much of the drug should be given to the patient.

Administration refers to the route and form in which the drug is given.

The actions are the therapeutic effects the drug will have.

Side effects are actions that are not desired and occur in addition to the desired therapeutic effects. Some side effects are unpredictable.
Know Your Local Protocols

- Follow local protocols for guidelines on approved medication usage
- Check for allergies & sensitivities before administering any medication

EMT Medications

- Oxygen – Medical/Trauma conditions
- Nitroglycerin – Suspected MI
- Aspirin – Suspected MI
- Epinephrine & Auto-Injector – Anaphylaxis

Oxygen

- Indications
  - Hypoxia, respiratory distress, chest pain
- Contraindications
  - None in EMS
- Dose
  - 1-15 LPM
- Administration
  - Blow-by, NC, NRB mask, Bag-valve

Six Rights of Drug Administration

- Right person
- Right drug
- Right dose
- Right time
- Right route
- Right documentation

Confirm with your partner if possible

EMT Medications

- Bronchodilator Inhalers – Asthma, Emphysema
- Oral Glucose – Hypoglycemia
- Activated Charcoal – Poisoning/OD

Oxygen

- Actions
  - Absorbed into blood from lungs and carried by hemoglobin to cells
- Side Effects
  - Dry nose & secretions if not humidified
  - Oxygen toxicity can cause inflammatory process and retinopathy (in newborns)
  - Respiratory depression in some COPD patients
**Oxygen**

- How much to give?
  - Let oximetry be your guide
  - SpO2 goal 94-96%
- What about COPD patients?
  - Chronically high CO₂ “burns out” that stimulus to breathe so they rely on hypoxic drive

**Nitroglycerin**

- Indications
  - Chest pain, MI, CHF
- Contraindications
  - Known hypersensitivity, hypotension (SBP<90), recent Viagra or Cialis use
- Dose
  - 400 mcg (0.4mg) SL tablet or spray
- Administration
  - Sublingual

**Nitroglycerin**

- Actions
  - Dilates blood vessels including coronary arteries and reduces cardiac workload
- Side Effects
  - Hypotension, headache

**Administration of NTG**

- Assess vitals
  - B/P >90 systolic
  - Meds, allergies
  - Have patient sit or lie down with HOB up
  - SL spray or tablet under tongue
  - Reassess
  - Repeat up to 3 times prn

**Aspirin (ASA)**

- Aspirin given in AMI has been shown to decrease mortality.

**Aspirin**

- Indications
  - Chest pain, MI
- Contraindications
  - Known allergy or ASA-induced asthma
  - Hx of active bleeding disorder
  - Current ulcer or GI bleed
  - Receiving anticoagulation therapy
Aspirin

- **Dose**
  - 325 mg (check local protocol)
- **Administration**
  - Oral (have patient chew it)
- **Actions**
  - Inhibits platelet aggregation
  - Mild analgesic and anti-inflammatory agent

- **Side Effects**
  - GI upset, Bleeding with chronic use

- **What if patient takes daily aspirin?**
  - Follow local protocol

Epipen or epinephrine

- **Indication**
  - Anaphylaxis
- **Contraindications**
  - None in true severe anaphylaxis
  - Caution in patients with heart disease
- **Dose**
  - Epipen 0.3mg IM
  - Epipen Jr 0.15mg IM

- **Administration**
  - IM injection
- **Actions**
  - Vasoconstriction
  - Bronchodilation
  - Increases HR & BP
- **Side Effects**
  - Tachycardia, hypertension

Inhalers

- **Albuterol, Proventil, Ventolin, Combivent most common**

- **Indications**
  - Respiratory distress/wheezing due to asthma/COPD
- **Contraindication**
  - Known hypersensitivity (rare)
- **Dose**
  - 2 puffs or as prescribed
**Albuterol Inhaler**

- **Administration**
  - Inhalation (use spacer if available)
- **Actions**
  - Bronchodilation (smooth muscle dilator)
- **Side Effects**
  - Tremors, tachycardia

**Oral Glucose Gel**

- **Indications**
  - Hypoglycemia (measured blood glucose <60 g/dl) Check local protocol
- **Contraindications**
  - Unconscious and unable to protect airway
- **Dose**
  - 25 grams is common
  - Follow local protocols and know what form you carry (15-45 grams)

**Oral Glucose Gel**

- **Administration**
  - Oral (patient must be able to swallow and protect airway)
- **Action**
  - Absorbed by GI tract and provides glucose to cells
- **Side Effects**
  - Too much can cause hyperglycemia

**Activated Charcoal**

- **Indications**
  - Poisoning when directed by medical control
- **Contraindication**
  - Unable to protect airway
- **Dose**
  - 25-50 grams (check protocol)

**Activated Charcoal**

- **Administration**
  - Orally, tastes bad (can mix with cola, chocolate syrup)
- **Action**
  - Absorbs certain drugs & poisons but is itself non-absorbable
- **Side Effects**
  - Nausea, vomiting, constipation
**Reassess**

- Mental status
- Airway patency
- Vital Signs
- Subjective improvement in signs & symptoms
- Side effects

**Document**

- Allergies
- Indication
- Dosage
- Administration route
- Expiration date
- Patient's response after reassessing

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**Case 1**

- Husband of a 68-year-old female calls 911 because she is confused with fatigue, nausea & shortness of breath
- Initial assessment
  - Airway patent, RR 20
  - HR 96, BP 158/90, SpO2 92%
  - BS: Fine inspiratory crackles in both bases

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**Case 1**

- SAMPLE history
  - S: Fatigue, nausea, dyspnea, chest heaviness
  - A: None
  - M: Nitrostat prn, oral insulin
  - P: Diabetes and coronary artery disease
  - L: 8 hours ago (didn't eat much)
  - E: Doing light housework

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**Case 1**

- OPQRST
  - O: Came on gradually while trying to do housework
  - P: Symptoms a little better after lying down
  - Q: Heaviness
  - R: None
  - S: Can't rate on a scale
  - T: Several hours ago

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**Case 1**

- Management
  - Oxygen
    - NC for SpO2 94-96%
  - Aspirin (takes 81mg/day)
    - Give additional up to 325 mg
  - Nitroglycerin (verify Rx and exp date)
    - 1 tablet sublingual
  - Check blood sugar
  - 12-lead ECG if able
Case 1
- Management
  - Oxygen
    - NC for SpO2 94-96%
  - Aspirin (takes 81mg/day)
    - Give additional up to 325 mg
  - Nitroglycerin (verify Rx and exp date)
    - 1 tablet sublingual
  - Check blood sugar (55)
    - Oral glucose gel per protocol

Case 1
- Reassess
  - HR 92, BP 144/84, R16, SpO2 97% on 2L NC
  - Feels a bit better, chest heaviness remains
  - More Nitroglycerin?
  - Blood sugar (110)

Case 2
- 4-year-old girl, history of Asthma
- Moderate Respiratory Distress
- Pulse 134, BP 110/64, R30, SaO2 94% room air
- BS: Expiratory Wheezes

Case 2
- Impression
  - Acute Asthma attack
- Management
  - Oxygen - Be prepared to assist ventilations
  - Bronchodilators: Patient has two inhalers (Proventil and Advair)-which one is appropriate to give?
    - Use spacer if available

Case 2
- Reassessment after 2 puffs
  - Pulse 130, BP 112/68, R24, SaO2 98% on NRB mask
  - BS: Expiratory Wheezes continue
- Can you give 2 more puffs?
  - Check with medical control

Questions?
**Question 1**
You’re caring for a 75-year-old patient with a probable stroke. He is not short of breath and SpO2 is 97%. Oxygen:
- a) Should be given but no more than 4 LPM
- b) Should never be given to stroke patients
- c) Should be given by NRB mask to all stroke patients
- d) Should only be given if needed to keep SpO2 94-96%

**Question 2**
You’re caring for a 68-year-old man with chest pain. His HR is 88, BP 86/50, RR16, SpO2 93% on room air. What medications are indicated (pt. has no allergies)?
- a) Oxygen, aspirin and SL nitro
- b) Oxygen and aspirin only
- c) Nitro only
- d) None are indicated

**Question 3**
What is the dose of epinephrine in the EpiPen Jr?
- a) 0.15mg
- b) 0.25mg
- c) 0.35mg
- d) 0.5mg

**Question 4**
A patient with a shellfish allergy is having a severe anaphylactic reaction. He states he is “allergic to epinephrine” because it makes him shaky. You should:
- a) Not give the epi to avoid the allergic reaction
- b) Give a half dose of epi
- c) Give the epi IV instead of IM
- d) Explain the shakiness is a side effect, not an allergy, and strongly recommend giving the epi

**Question 5**
You’re a basic EMT caring for an unresponsive diabetic. Your glucometer reads “LOW”. You should:
- a) Call ALS because you can’t give oral glucose to an unresponsive patient
- b) Give oral glucose gel anyway-he needs it
- c) Apply the glucose gel topically-it will absorb
- d) Give the glucose gel rectally

**Questions?**
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Updates Please

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Email updated name, address and email to:
Jackie Williams – williajd@inhs.org

EMS Live @ Nite will return in September.
Have a great summer!