Pharmacology – CME Version

Aaron J. Katz, AEMT-P, CIC
www.es26medic.net

Pharmacology

- The study of drugs
  - Sources, characteristics and effects
- Always refer to drugs as ***medications***

- ***Why bother to study medications?***

EMTs can ***deliver*** some medications and can ***assist*** the patient in delivering some other medications

Meds EMTs can deliver

- Oxygen
- Oral Glucose
- Epinephrine injectors (“EpiPen”)
- Albuterol

Meds that EMTs can assist

- Prescribed inhalers
- Nitroglycerin

Drug Names

- Chemical – "***tert***-Butylamino)methyl]-4-hydroxy-***m***-xylene-α,α´diol sulfate (2:1) (salt)"
- Generic
  - E.g. Ibuprofin, Nitroglycerin, Albuterol Sulfate
- Trade
  - E.g. Advil, Nitrostat, Proventil

Important terms

- Action
  - The therapeutic effect that a drug is **expected** to have on the body
- Indications
  - Signs/Symptoms/Conditions for which a particular medication **should** be used
- Contraindications
  - Signs/Symptoms/Conditions **or patient** for which a particular medication **should NOT** be used
- Side effects
  - Any actions of a medication ***other than*** the desired ones

Drug Administration

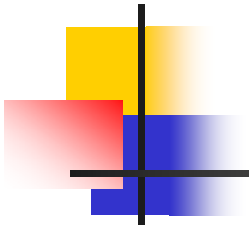
- Before administering any drug, know the “four rights”
  - Right patient
  - Right medication
  - Right dose
  - Right “route”

Medication Routes

- Intravenous (“IV”)
- Oral (“PO”)
- Sublingual (“SL”)
- Intramuscular (“IM”)
- Intraosseous (“IO”)
- Subcutaneous (“SC”)
- Transcutaneous
- Inhalation
- Rectal (“PR”)

References

- PDR
- USP
- Merck Manual
- The Pill Book
  - Not an “official” guide, but a very good source



Survey of commonly used drugs

Anti-hypertensives

Accupril	Cozaar	Isoptin (Verapamil)
Lotensin	Monopril	Norvasc
Lopressor (Metoprolol)	Toprol XL	Tenormin (Atenalol)
Vasotec	Zestril	Calan (verapamil)
Prinivil		

Nerve Receptors

- Almost all drug administration is aimed at either stimulating or blocking ("de-stimulating") specific nerve receptors.
- The important ones for our discussion are:
  - Beta-1 nerve receptors – found mostly in the heart
  - Beta-2 nerve receptors – found mostly in the lower airways
- There are others (as you will learn when you are a medic student)

Beta-1 Receptor stimulation

- When stimulated do the following:
  - Increase heart rate
  - Increase hearts force of contractility – thus increasing blood pressure
  - Typical drugs that stimulate Beta-1 receptors are:
    - Epinephrine – Epi pen, for example
    - Albuterol – to a lesser degree
  - Typical normal body activities that produce this effect are **fear**, for example

Beta-1 Blocking

- When we block a Beta-1 receptor, we do not allow it to be stimulated.
- This results in:
  - Reduced heart rate
  - Reduced contractility – and thus **reduced BP**
- Typical drugs that block beta-1 receptors are known as "beta blockers"
- Beta blockers include the following well known drugs
  - **Inderal**
  - Lopressor (metoprolol)
  - Tenormin (Atenalol)
- **There are no body activities that can produce this effect**

Beta-2 receptor stimulation

- When stimulated, they help expand the lower airways
- **Beta-2 stimulation drugs – called "bronchodilators" are the mainstay of asthma and COPD treatment**
- Typical bronchodilator drugs:
  - Albuterol (Proventil, Ventolin)
  - Alupent (minimal use currently)
  - Xopenex (Levalbuterol)
  - **Epinephrine**

Beta-2 receptor blocking

- When beta-2 receptors are blocked, they **constrict the lower airways!**
- **WHY ON EARTH WOULD WE EVER WANT TO DO THAT???**

Inderal

- The first beta blocker
- Known as a "non-selective" beta blocker
- **Blocks both beta-1 (good!) AND beta-2 receptors (disaster!!!)**
- **CANNOT BE TAKEN BY ANYONE WITH AN ASTHMA/COPD HISTORY**
- Modern beta blockers are "selective for beta-1 blocking"
- Inderal is still used, for HTN and other noncardiac uses

Diuretics

- Lasix (Furosemide)
- **Bumex**
- Diazide
- HCTZ
- Hydrodiuril

Combination HTN, diuretics

- Zestoretic
- Prinzide
- Vasaretic

Potassium supplements

- K-Dur
- K-Tab
- Slo-K

Cholesterol Lowering

- Lipitor
- Mevacor
- Lopid
- Pravachol
- Zocor – Simvastatin
  - All are what are known as “statins”

Antianginals

Procardia XL (Nifedipine)	Nitrostat (nitroglycerin)
Cardizem (Diltiazam)	Isordil (Isosorbide Dinitrate)
Inderal (propranalol)	Imdur (Isosorbide Mononitrate)
Capoten	Corgard

Oral Anti-hyperglycemics

Diabeta (Glyburide)	**Diabenase**
Glucotrol (Glipizide)	Glucophage
Glynase (Glyburide)	**Micronase (Glyburide)**
Avandia	

Injected Anti-hyperglycemics

- Humulin (”Regular”)
- Humalog
- Lente
- **Lantus**
- And many others

Anti-epilepsy

- Dilantin
- Phenobarbitol
- Depakote
- Tegratol
- Neurontin

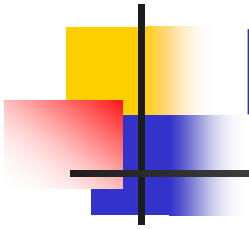
Some cardiac meds

- Lanoxin
  - Digoxin
- Coumadin
  - Warfarin

- Many of the anti-hypertensives and anti-anginals are used for cardiac conditions

Assorted respiratory inhalers

- **Atrovent**
- Combivent
- Alupent
- **Proventil, Ventolin (Albuterol)**
- Intal
- Serevant
- Beclovent
- Azmacort
- Aerobid
- **Duoneb**



Let’s Do Some Scenarios!

Scenario #1

Your 74 year old patient is taking the following list of medications: **What is his likely medical history?**

- Accupril
- Lopressor
- Bumex

Scenario #2

Your 4 year old patient is taking the following list of medications: **What is his likely medical history?**

- Albuterol
- Lopressor
- Lantus

Scenario #3

Your 54 year old patient is taking the following list of medications: **What is his likely medical history?**

- Verapamil
- Lasix
- K-Dur
- Simvastatin
- Nitrostat
- Inderal
  - ***Why is this patient taking K-Dur?***

Scenario #4

Your 102 year old patient is taking the following list of medications: **What is his likely medical history?**

- Dilantin
- Neurontin
- Albuterol (for the last week)
- Amioderone
  - ***What else might you find in this patient's history?***

Scenario #5

Your 55 year old patient with chronic shaking of his hands is taking the following list of medications: **What is his likely medical history? What is likely <u>not</u> in his medical history?**

- Inderal

➔ *For which non-cardiac condition might Inderal be prescribed?*