

WHEN AN APPLE A DAY DIDN'T KEEP THE DOCTOR AWAY: MEDICATIONS FOR CHRONIC DISEASE STATE MANAGEMENT



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Objectives

- To identify common disease states requiring chronic medical management
- To differentiate between the medications used for various chronic diseases
- To identify unique features of a given medication for its respective disease state(s)

Self Assessment Questions

- Which of the following is not used for blood pressure?
 - Amlodipine
 - Glipizide
 - Lisinopril
- Which of the following is a potential side effect of the statins?
 - Muscle aches
 - Hypokalemia
 - Edema
- If a patient has diabetic nephropathy and hypertension, which of the following drug might he/she be on?
 - Niacin
 - Atenolol
 - Lisinopril

What is a chronic disease?

Chronic Diseases

- Definition¹
 - "a disease that is long lasting or recurrent"
- Common examples:
 - Hypertension
 - Diabetes
 - Hypercholesterolemia
 - Hypothyroidism
 - Chronic kidney disease
 - Heart failure
 - Glaucoma
 - Pain

How does pharmacy fit into chronic disease state management?



Chronic Disease State Management

- Contributes to polypharmacy
 - 12% of women ≥ 65 years old taking ≥ 10 medications²
 - 12.5% of US population is ≥ 65 years old³
 - Consume 32% of prescription meds
 - Account for 25% of drug expenditure
- Large contributor to high demand of pharmacists and pharmacy technicians

HYPERTENSION (High Blood Pressure)



Hypertension

- Multiple different types of medications for hypertension
- Selection dependent upon multiple factors, including co-morbid disease states
- Each class of medications works differently, is dosed differently, and has different potential side effects

Uncontrolled Hypertension

- Often called the “silent killer”
- What are the risks⁴?
 - Heart attack
 - Stroke
 - Heart failure
 - Kidney diseases

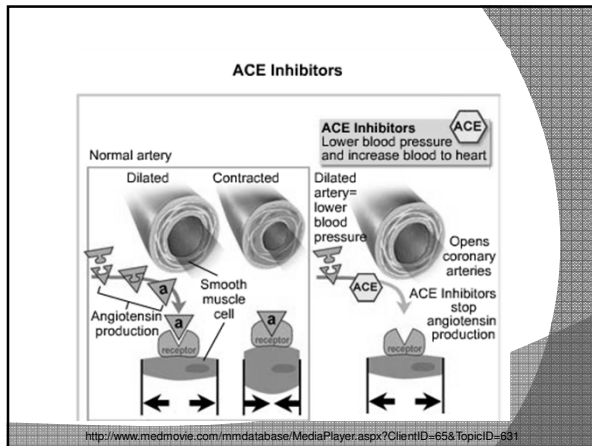
Hypertension

- Angiotensin Converting Enzyme (ACE) Inhibitors
- Angiotensin Receptor Blockers (ARBs)
- Beta Blockers
- Calcium Channel Blockers (CCBs)
- Diuretics
 - Thiazides
 - Loop diuretics



Hypertension: ACE Inhibitors

- Lisinopril Prinivil[®], Zestril[®]
- Benazepril Lotensin[®]
- Captopril Capoten[®]
- Enalapril Vasotec[®]
- Fosinopril Monopril[®]
- Perindopril Aceon[®]
- Quinapril Accupril[®]
- Ramipril Altace[®]
- Trandolapril Mavik[®]



Hypertension: ACE Inhibitors

- ◎ FDA approved uses:
 - Hypertension
 - Acute Myocardial Infarction
 - Heart Failure
 - Cardiovascular Event Risk Reduction
 - Diabetic nephropathy
- ◎ Common off-label uses:
 - Non-diabetic kidney disease

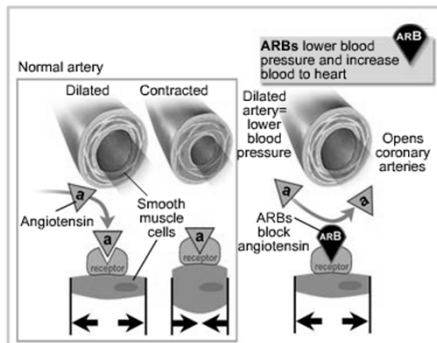
Hypertension: ACE Inhibitors

- ◎ Common side effects:
 - Cough
 - Hyperkalemia (high potassium)
 - Low blood pressure
 - Dizziness

Hypertension: ARBs

- ⊙ Valsartan Diovan®
- ⊙ Losartan Cozaar®
- ⊙ Irbesartan Avapro®
- ⊙ Telmisartan Micardis®
- ⊙ Eprosartan Teveten®
- ⊙ Candesartan Atacand®
- ⊙ Olmesartan Benicar®

Angiotensin II Receptor Blockers (ARBs)



<http://www.medmovie.com/mmdatabase/MediaPlayer.aspx?ClientID=65&TopicID=634>

Hypertension: ARBs

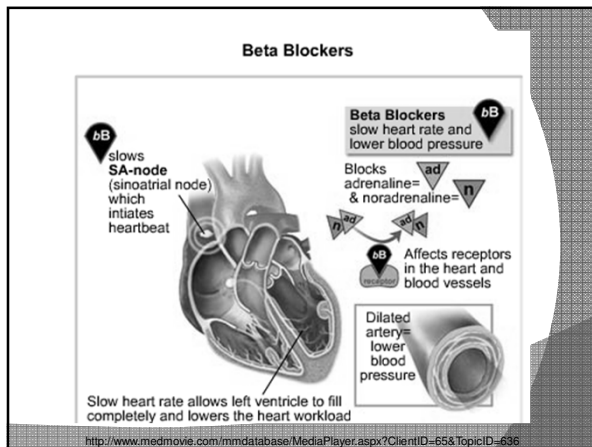
- ⊙ FDA approved uses:
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 - Heart Failure
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- ⊙ Common off-label uses:
 - Non-diabetic kidney disease

Hypertension: ARBs

- Common side effects:
 - Hyperkalemia
 - Low blood pressure
 - Dizziness

Hypertension: Beta Blockers

- Carvedilol Coreg®
- Metoprolol Lopressor®, Toprol XL®
- Atenolol Tenormin®
- Propranolol Inderal®
- Acebutolol Sectral®
- Timolol Blocadren®
- Nadolol Corgard®
- Bisoprolol Zabeta®
- Pindolol
- Penbutolol



Hypertension: Beta Blockers

- ◎ FDA approved uses:
 - Hypertension
 - Angina
 - Heart failure
 - Acute myocardial infarction
 - Tremor
 - Migraine prevention
- ◎ Common off-label uses:
 - Anxiety
 - Irregular heart rhythm

Hypertension: Beta Blockers

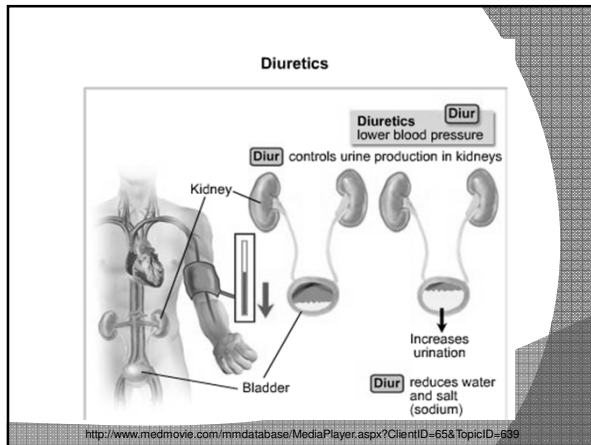
- ◎ Common side effects:
 - Slow heart rate
 - Low blood pressure
 - Dizziness
 - Fatigue
 - Depression

Hypertension: Calcium Channel Blockers

Amlodipine	Norvasc®, Lotrel®
Felodipine	Plendil®
Diltiazem	Cardizem CD®, Cardizem SR®, Dilacor XR®, Tiazac®
Isradipine	Dynacirc®, Dynacirc CR®
Nifedapine	Adalat CC®, Procardia XL®
Verapamil HCl	Calan SR®, Covera HS®, Isoptin SR®, Verelan®

Hypertension: Diuretics

- ◎ Thiazides
 - Chlorthalidone Hygroton®
 - Hydrochlorothiazide Hydrodiuril®, Microzide®
 - Metolazone Mykrox®, Zaroxolyn®
- ◎ Loop Diuretics
 - Furosemide Lasix®
 - Bumetanide Bumex®
 - Ethacrynic acid Edecrin®
 - Torsemide Demadex®



Hypertension: Diuretics

- ◎ FDA approved uses:
 - Hypertension
 - Edema
 - Congestive heart failure- edema
- ◎ Off-label uses:
 - High calcium in the urine
 - Shortness of breath

Hypertension: Diuretics

- ◎ Common Side Effects:
 - Hypotension
 - Headache
 - High calcium, uric acid in the blood
 - Low potassium

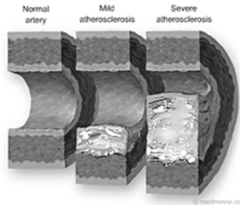
Hypertension: Other Medications

- ◎ Clonidine
- ◎ Hydralazine
- ◎ Modafinil
- ◎ Terazosin
- ◎ Methyldopa



Case #1

- ◎ A patient comes into the pharmacy requesting refills on his hydrochlorothiazide and his lisinopril. You look in the system and he has no refills left for either. He has no pills left at home. What do you do?

HYPERCHOLESTEROLEMIA (High Cholesterol)



Cholesterol: The good, the bad, the ugly...

- ◎ LDL- Bad cholesterol 
 - Primary target of drug therapy
- ◎ HDL- Good Cholesterol 
- ◎ Total Cholesterol
 - Not primary target of drug therapy
- ◎ Triglycerides (TGs)
 - Only primary target if drastically elevated

Cholesterol: Why do we care?

- ◎ Elevated LDL has been associated with increase risk of coronary heart disease⁵
 - Heart attack
 - Stable and unstable angina
 - Coronary artery procedures

Cholesterol Treatment Options

- Statins
- Niacin
- Fibrates
- Bile Acid Sequestrants
- Fish oil

Statins

- | | |
|----------------|------------|
| ● Atorvastatin | Lipitor® |
| ● Fluvastatin | Lescol® |
| ● Lovastatin | Mevacor® |
| ● Pravastatin | Pravachol® |
| ● Rosuvastatin | Crestor® |
| ● Simvastatin | Zocor® |

Hypercholesterolemia: Statins

- Common FDA Approved Uses:
 - Stroke (CVA)
 - Diabetes
 - High cholesterol
 - High triglycerides
 - Generalized atherosclerosis
- Common Off-label Uses
 - Cardiovascular risk reduction
 - Heart failure
 - Percutaneous coronary intervention

Hypercholesterolemia: Statins

- ◎ Common side effects:
 - Nausea/diarrhea
 - Muscle aches
 - Abnormal liver enzymes
- ◎ Effect on cholesterol
 - Decrease LDL
 - Can increase HDL
 - Decrease TGs

Hypercholesterolemia: Niacin

- ◎ Common FDA Approved Uses:
 - Dyslipidemia
 - Coronary arteriosclerosis
 - Myocardial Infarction
- ◎ Effect on cholesterol
 - Decrease LDL
 - Can increase HDL
 - Decrease TGs

Hypercholesterolemia: Niacin

- ◎ Common side effects:
 - Flushing
 - Nausea/vomiting
- ◎ Use of aspirin or ibuprofen 30-60 minutes prior to niaspan may help prevent flushing

**Hypercholesterolemia:
Fibrates**

- Gemfibrozil Lopid®
- Fenofibrate Tricor®
- Fenobric acid Trilipix®

**Hypercholesterolemia:
Fibrates**

- Common FDA Approved Uses:
 - Prevention of coronary arteriosclerosis
 - Familial hyperlipoproteinemia
- Common Off-label Uses
 - Stroke prevention
 - High cholesterol
 - Treatment of coronary arteriosclerosis

**Hypercholesterolemia:
Fibrates**

- Common side effects:
 - Abdominal pain
 - Indigestion
- Effect on cholesterol
 - Decrease TGs
 - Increase HDL
 - May increase or decrease LDL



Case #2

- You are working in the inpatient pharmacy and are slammed with things to do. All of a sudden a "STAT" order for niacin prints out to be filled. What should you do?

DIABETES

What is diabetes?

Defining Diabetes

The Role of Insulin

insulin

receptor

red blood cell

glucose

bloodstream

<http://clearlyexplained.com/culture/health/hormones/diabetes.html>

Diabetes: Metformin

- Metformin (Glucophage®)
 - Mechanism of action
 - Decrease sugar production from liver
 - Decrease absorption of glucose in stomach
 - Increase insulin sensitivity
 - FDA approved use:
 - Diabetes mellitus Type II
 - Off label use
 - Polycystic ovarian syndrome
 - Non-alcoholic fatty liver disease

Diabetes: Metformin

- Role in DM management
 - Often used as first line agent
 - Provides basal control
- Common Side Effects:
 - Nausea/vomiting
 - Diarrhea
 - Indigestion
 - Low blood sugar
 - Weight loss

Diabetes: Sulfonyureas

- ◎ Sulfonylureas
 - Glipizide Glucotrol®, Glucotrol XL®
 - Glyburide Diabeta®, Micronase®, Glynase®
 - Glimepiride Amaryl®
- ◎ Mechanism of Action
 - Stimulate insulin production from the pancreas
- ◎ FDA approved uses
 - Diabetes Mellitus Type 2

Diabetes: Sulfonyureas

- ◎ Role in DM management
 - Provide meal time control
 - Also provide some basal control
 - Can be used alone or in combination with other agents
- ◎ Side effects
 - Low blood sugar
 - Weight gain
 - Dizziness
 - Headache

Other Common Diabetes Treatments

- ◎ Insulin
 - Basal and bolus
- ◎ Thiazolidinediones
 - Pioglitazone (Actos®)
 - Rosiglitazone (Avandia®)
- ◎ Exenatide (Byetta®)
- ◎ Sitagliptan (Januvia®)

Take Home Points

- ◎ Chronic disease state management is responsible for a large portion of the medications used both inpatient and outpatient settings
 - Multiple drugs are available for each given disease state
 - Each medication has its own unique features
- ◎ Pharmacists and pharmacy technicians play a vital role in chronic disease state management

Questions?



Self Assessment Questions

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References

- 1- "Chronic disease." Obtained from Wikipedia (23 August 2010). Site updated (20 August 2010). [http://en.wikipedia.org/wiki/Chronic_\(medicine\)](http://en.wikipedia.org/wiki/Chronic_(medicine))
- 2- Kaufman DW, Kelly JP, Rosenberg L, et al. Recent patterns of medication use in the ambulatory adult population of the United States: the Slone Survey. *JAMA* 2002;287:337.
- 3- Masoodi NA. Polypharmacy: to err is human, to correct divine. *BJMP* 2008;1:6-9.
- 4- Chobanian AV, Bakris GL, Black HR, et al. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension* 2003;42:1206-52.
- 5- National Cholesterol Education Program Expert Panel. Detection, evaluation, and treatment of high blood cholesterol in adults (Adult treatment panel III). *National Heart, Lung, and Blood Institute: National Institutes of Health*. 2002; pp 1-284.

JEOPARDY TIME!!!!

Say my name, Say my name	Gobble-d-gook	Cause and effect	What's the use?
\$100	\$100	\$100	\$100
\$200	\$200	\$200	\$200
\$300	\$300	\$300	\$300
\$400	\$400	\$400	\$400
