

Diabetes; Introduction

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Complications

- Neuropathy
 - Falls risk
- Retinopathy
 - Falls risk
- Nephropathy
 - Drug accumulation
- CVD
 - MI/Stroke
- Infection

Diabetes Monitoring

- A1C
- Blood sugars
- Goals in the elderly
 - 6.5-8
 - Trend toward less strict control

Life Expectancy

- Decrease Accucheks
- Higher Goal
- Increase Quality of life
- Reduce injections/pill burden

Diabetes; The Medications

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Metformin

- First line
- Kidney function
- GI side effects
- Low risk hypoglycemia
- B12

Sulfonylurea's

- Hypoglycemia
- Weight gain
- Glipizide preferred
- Chlorpropamide (rarely used) SIADH risk

DPP-4 Inhibitors

- Well tolerated
- Increases incretin
- Weight neutral
- \$\$\$
- Generally low hypoglycemia when used alone

TZD's

- Weight Gain
- Edema
- CHF risk

SGLT-2 Inhibitors

- Glucose loss through the urine
- Low hypoglycemia when used alone
- UTI/genital infections
- Hyperkalemia
- Kidney function
- \$\$\$

GLP-1

- Incretin
- GI SE's
- Injection
- \$\$\$

Insulin

- Avoidance of Sliding Scale
- Long Acting
- Rapid Acting
- Diet Changes

Diabetes; Hypoglycemia

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Hypoglycemia Challenges in the Elderly

- Emphasis on checking blood sugar if sudden changes
- Symptoms may be blunted
 - Falls
 - Dizziness
 - Confusion
 - Weak
 - Sleepy

Treatment of Hypoglycemia

- Glucagon
 - Alertness compromised
- Sugar replacement
 - Aspiration
 - Choking

Changes That Can Impact Diabetes

- Steroids
- Beta-blockers
- Infections
- Dementia
- Medications that suppress or stimulate appetite

Diabetes; Compelling Indications

Statin Use

- Recommended for majority of elderly
- Many patients at high risk
- Drug Interactions
- Factors to discontinue?
 - End of life
 - Quality of life
 - If they had a heart attack, would you start one?

Table 1. Statin Therapy

Intensity	Definition	Dosage
Low	Daily dose lowers LDL-C by <30%, on average	Simvastatin 10 mg Pravastatin 10-20 mg Lovastatin 20 mg Fluvastatin 20-40 mg Pitavastatin 1 mg
Moderate	Daily dose lowers LDL-C by approximately 30% to <50%, on average	Atorvastatin 10-20 mg Rosuvastatin 5-10 mg Simvastatin 20-40 mg Pravastatin 40-80 mg Lorvastatin 40 mg Fluvastatin XL 80 mg Fluvastatin 40 mg bid Pitavastatin 2-4 mg
High	Daily dose lowers LDL-C by approximately ≥50%, on average	Atorvastatin 40-80 mg Rosuvastatin 20-40 mg

Courtesy:
uspharmacist.com

Hypertension

- ACE OR ARB
- CCB
- Thiazide

Aspirin

- Yes, but
 - Consider risk with other medications (i.e. Warfarin, NSAIDs, etc.)
 - Past history
 - Bleeding

Diabetic Neuropathy

- Gabapentin/pregabalin
- SNRI's
- Topical Lidoderm
- TCA's

Gastroparesis

- Cause of GI nausea/upset in diabetes patients
- Metoclopramide
 - Parkinson's disease risk
- Erythromycin
 - Drug interaction risk

Hyponatremia and SIADH

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Causes of Hyponatremia

- Diuretics
- SIADH
- Heart Failure
- Cirrhosis
- Polydipsia

Symptoms of Hyponatremia

- Fatigue
- Cramps
- Confusion
- Dizzy
- Seizures (rare, usually with acute changes)

SIADH

- Oversecretion of ADH
- Water retention
- Dilutes Na⁺
- Resulting Hyponatremia

Causes of SIADH

- CNS changes
 - Trauma
 - Stroke
- Cancer
- Drugs

Medication Induced SIADH

- Carbamazepine/oxcarbazepine
- SSRI's
- Chlorpropamide

Thyroid Disorders

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Hypothyroidism - Diagnosis

- Usually elevated TSH and low T4
- Symptoms
 - Lethargy
 - Cold
 - Weight Gain
 - Constipation
 - Hair loss/Skin Dryness
 - Lack of energy

Levothyroxine

- Usual starting dose 25-50 mcg/day
- Binding interactions
 - Consistency with administration
- Follow up – 6 weeks to 3 months

Drugs That Can Impact the Thyroid

- Amiodarone
- Lithium

Levothyroxine Interactions

- Enzyme Inducers
 - Phenobarbital
 - Carbamazepine
- Binding interactions
 - Calcium
 - Colestiprolamine
 - Sucralfate
 - Iron

Hyperthyroidism

- PTU
- Methimazole
- Risk
 - Weight Loss
 - Tachycardia
 - Insomnia
 - Nervousness
 - Osteoporosis

Anemia

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Symptoms of Anemia

- Fatigue
- Low Hemoglobin/Hematocrit
 - Elderly often can feel normal despite levels below normal
 - WHO (men<14, women <12.3)
- Dizziness/Falls
- Skin pallor
- Weak
- Confusion

Classic Causes of Anemia

- Blood loss
- Iron
- B12
- Folic Acid
- Chronic Disease (esp. CKD)

B12 Deficiency Causes

- PPI
- Metformin
- ETOH
- Intrinsic Factor

Drug Causes – Folic Acid Deficiency

- Methotrexate
- Trimethoprim
- Phenytoin

Treatment of Anemia

- Transfusion
- ESA (i.e. darbepoetin)
- B12
- Iron
- Folic Acid
- No treatment (if asymptomatic)

Megaloblastic Versus Microcytic

- B12/FA
 - Megaloblastic
 - MCV>100
 - Homocysteine
 - MMA
 - Iron
 - Microcytic
 - MCV <80
 - Ferritin
- *Elderly often present with mixed type of anemias and normal MCV

Pernicious Anemia

- Lack of intrinsic factor
- Poor oral B12 absorption
- B12 toxicity rare
- B12 shots

ESA Pearls

- Kidney produces erythropoietin
- Hold orders based on hemoglobin
- Iron shortage causes failure
- Risk of CV Event/Hypertension

Blood Disorders

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Factor V Leiden

- Mutation in gene
- Thrombophilia (clot formation likely)
- Anticoagulation (warfarin chronic, heparin type product for acute treatment)

Von Willebrand Disease

- Von Willebrand Factor
 - Required for platelet aggregation
 - Bleed risk increased
- Treatment
 - DDAVP (desmopressin)
 - Stimulates release of VW factor

Thrombocytopenia

- Low platelets
- Increased bleed risk
- Symptoms
 - Bruising
 - Bleeding
 - Anemia

Medication Causes of Thrombocytopenia

- Aspirin
 - (NSAIDs)
- Clopidogrel
- Heparin
- Seizure medications
- Sulfonamides
- PCN antibiotics
- Chemo

When to Worry - Thrombocytopenia

- 150-450k = normal
- <150k = "thrombocytopenia"
- Trends are important
- <50k severe

Cirrhosis

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Cirrhosis – Major Complications

- Edema
- Ascites
- Esophageal Varices
- Hepatic encephalopathy

Common Medications

- Spironolactone
- Loop diuretics
- Propranolol
- Lactulose

Edema/Ascites

- Diuretic Combo
 - Furosemide 40mg
 - Spironolactone 100mg
- Close electrolyte monitoring
- Gynecomastia

Hepatic Encephalopathy

- Accumulation of toxins due to poor liver function
 - Toxins impact the brain
 - Cognitive symptoms (i.e. confusion, lethargy)
- Ammonia (NH₃)
- Lactulose
- Neomycin, rifaximin

Portal Hypertension

- Increased pressure in portal venous system
- Veins can swell and increase
 - Leading to rupture and possible bleed
- Non-selective beta-blocker used to treat
 - Propranolol

Dermatologic Disorders

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Dermatitis

- Contact, Atopic (Eczema)
 - Inflamed skin
 - Redness
 - Itchy
- Treatment
 - Topical Steroids
 - Calcineurin Inhibitors (i.e. tacrolimus)

Common Steroids

- Determinants of potency
 - Drug
 - Percentage
- Table
 - <https://www.psoriasis.org/about-psoriasis/treatments/topicals/steroids/potency-chart>

Medication Causes of Skin Disorders

- Rash
 - Anitbitoics
 - Sulfa
 - Penicillins
 - Macrolides
- SJS risk
 - Antiepileptic (i.e. carbamazepine, lamotrigine)
 - Allopurinol
 - Penicillins
- **Timing, Timing, Timing

Yeast Infection

- Candida albicans
- Risks
 - Diabetes
 - Antibiotics
 - Immunosuppression
- Treatment
 - Topical nystatin, clotrimazole
 - Systemic, fluconazole

Pressure Ulcer

- Staging:
 - 1 – red, no breaks in skin, potentially pain
 - 2 – skin broken open
 - 3 – deeper into the skin, fat potentially showing
 - 4 – deepest, possible visual presence of bone, tendon, or muscle
- Risk of osteomyelitis or sepsis with deeper stages (3 or 4 typically)

Dry Skin

- Xerosis
 - Common in the elderly
 - Cracks/infection risk
 - Itching
- Common treatment
 - Moisturizers

Electrolytes, Dehydration, and Malnutrition

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Dehydration

- Changes in the older adult
 - CHF
 - Fluid restrictions
 - Urinary frequency
 - Scared to drink much
 - Reduced thirst
 - Physical disabilities
 - Challenging to drink or feed themselves

Dehydration – Medication Risk

- Development of Kidney Failure is a big concern
 - Diuretics
 - ACE Inhibitors
 - NSAIDs

Malnutrition Concerns

- Weight Loss
- Deficiency
 - I.e. B12
- Low Albumin
 - Phenytoin
- Frailty

Contributors to Malnutrition

- Dental Issues
- Restricted diets
- Finances
- Depression
- Taste/smell alterations
- Socially eating

Electrolytes

- Potassium
- Sodium
- Magnesium
- Calcium

Weight Loss – Medication Causes

- Digoxin
- Stimulants
- Acetylcholinesterase Inhibitors
- Diuretics
- *Be aware of timing of medication changes

Estrogen Replacement

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Estrogen Risks

- Clots
- CHD
- Breast Cancer
- Endometrial Cancer

Benefits of Estrogen

- Osteoporosis
- Colorectal Cancer
- Improve menopausal symptoms

Goals of Estrogen Therapy

- Treat symptoms
- Limit length of use
- Minimum Effective Dose
- Avoid use
- Discontinue

Alternatives for Menopausal Symptoms

- SSRI
- SNRI
- Gabapentin
- Clonidine
- Topical Estrogen (vaginal atrophy/dryness)

Oncology

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Breast Cancer

- Facts
 - Approximately 1/8 women will be diagnosed in lifetime
 - Most common cancer worldwide
- Recent reduction
 - Possibly due to stronger avoidance of hormone replacement therapy

Leukemias

- Bone marrow
- Dysfunctional or abnormal blood cells
- Labs can differentiate
 - WBC (abnormal high/low)
 - Hgb/hct (anemia, RBC's)
 - Platelets

Prostate Cancer

- Symptoms of prostate dysfunction
 - Urinary troubles
- Prostate Specific Antigen (PSA)
 - Quick increases can signal more aggressive cancer
- Prostate cancer
 - Often very slow growth
- Drugs
 - Bicalutamide
 - Leuprorelin

Skin Cancer

- 1 in 5 Americans will develop skin cancer
- Much more common than other cancers
- 5.4 million cases annually
- Melanoma
 - Life threatening

Chemotherapy in the Elderly

- Mouth Sores
- Nausea/Vomiting
 - Weight loss
- Fatigue
- Blood disorders
 - Low WBC
 - Low Platelets
 - Anemia
- Pain
- Neuropathy

Vaccines

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Common Vaccines in the Elderly

- Pneumococcal
- Influenza
- Zostavax
- Tetanus, diphtheria, pertussis

Zostavax pearls

- Same virus as chicken pox
- Live vaccine
 - Immunosuppressed
- Storage in freezer (fridge for 72 hours)
- Age 60-69 best benefit

Pneumococcal (Strep Pneumonae)

- PCV13
 - Give in elderly once
 - Aim for one year between PCV13 and PPSV23
 - Do not co-administer
- PPSV23
 - Give twice if given before age 65
 - Give 5 years apart if given twice

Influenza

- Annually
- Inactivated injection for elderly
 - Flumist not indicated and now pulled from use
- High dose available
 - Somewhat more expensive
 - CDC not recommending high dose yet
 - Some clinicians will target high risk patients
 - i.e. COPD/Asthma
 - Probably more effective
 - http://www.cdc.gov/flu/protect/vaccine/qa_fluzone.htm

TDap

- Tetanus, Diphtheria, Pertussis (whooping cough)
- Revaccination
 - Every 10 years
- Inactivated
 - Immunosuppressed patients ok

Eye Disorders

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Common Eye Disorders in the Elderly

- Macular Degeneration
- Glaucoma
- Diabetic Retinopathy

Macular Degeneration

- Clinical Pearls
 - Central vision loss
 - Reading
 - Driving
 - Use of VEGF inhibitors (Bevacizumab)
 - Smoking can increase risk
 - Dry can progress to Wet (wet is worse)

Glaucoma Pearls

- Leading cause of blindness worldwide
- Peripheral loss
- Borderline Pressure 18-25
 - Assessment for damage
 - If damage, treatment
 - Some may argue >22
- Greater than 25 - treatment

Drugs

- Prostaglandins
- Beta-blockers
- Adrenergic agonists
- Carbonic Anhydrase Inhibits
 - Rarely oral use (acetazolamide)

Preventing Diabetic Retinopathy

- Blood sugar control
- Hypertension
- Regular Exams

Ophthalmic Infections

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Symptoms

- Redness
- Itching
- Discharge
- Foreign Body Sensation

Bugs

- Staphylococcus
- Streptococcus
 - Classic gunky, yellow, mucous like discharge
- Viral infections
 - Watery discharge

Common Antibiotics

- Erythromycin
- Ofloxacin
- Ciprofloxacin
- Trimethoprim/polymixin

Shingles

- Reactivation of "Chicken Pox"
- Risk of vision loss
- Acute retinal necrosis
- Treatment
 - Acyclovir
 - Steroids

Eye Drop Administration Pearls

- Don't touch tip to eye
- Avoid contact lenses
- Recommendation 5 minutes between drops
- Drops before ointment
- For more info
 - http://www.cc.nih.gov/ccc/patient_education/pepubs/eyedrops.pdf

Allergic Rhinitis

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Allergic Rhinitis

- Make sure not from acute illness
- Reassess treatment throughout the year

Treatment

- Nasal Steroid
 - i.e. Fluticasone
 - May take some time for max effect
- Antihistamine nasal spray
 - i.e. Azelastine
- If cognitively intact, many patients will know what works best for them

Antihistamines

- 1st Generation
 - i.e. diphenhydramine
 - Avoid, highly anticholinergic
- 2nd Generation
 - Loratadine
 - Cetirizine

Other Therapies

- Oxymetazoline
 - Nasal
 - Use only short term
 - Rebound congestion risk
- Pseudoephedrine/phenylephrine
 - Avoid if possible
 - Raise BP
 - BPH
 - Insomnia risk

Asthma

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Asthma Versus COPD

- Reactive
- Younger
- Reversible
- Triggers
- Wheeze
- Inflammation

Drug Selection

- SABA
- Steroids (inhaled)
- Dose escalation
- Addition of LABA
- Singulair

Nebulizers in the Elderly

- Albuterol
- Ipratropium
- LABA
- Budesonide

Rule of 2 in Asthma

- < or equal to 2 times/week – use of albuterol
- < or equal to 2 nighttime awakenings/mo
- > 2 refills per year on rescue

COPD

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GOLD Classification

- 1 – mild (FEV >80)
- 2 – moderate (FEV 50-80)
- 3 – Severe (FEV 30-50)
- 4 – Very Severe (FEV <30)

General Medication Flow

- SABA/Short Acting Anticholinergic
 - Or Combo
- Long Acting Anticholinergic
- Long Acting Beta Agonist (LABA)
- Corticosteroids
- Roflumilast
- Theophylline

Adverse Effects Beta Agonists, Anticholinergics

- Beta Agonists (i.e. albuterol, salmeterol)
 - Tachycardia
 - Tremor
- Anticholinergic (i.e. ipratropium, tiotropium)
 - Dry mouth

Inhaled Corticosteroids

- Reduces Exacerbations
- Not used as monotherapy in COPD
- Systemic Corticosteroids
 - Avoid long term if possible
 - OP, GERD, HPA suppression, Diabetes

Roflumilast

- Reduces exacerbations
- \$
- SE risks
 - Weight loss
 - Psychiatric concerns

Theophylline

- Drug levels
- Drug interactions
- Systemic effects

Classic Medication Causes of Respiratory Issues

- Amiodarone
- Nitrofurantoin
- Beta-blockers
 - Can blunt response to medications (beta-agonists)

Other Considerations

- Oxygen
- Vaccination
- Smoking

Palliative Dyspnea

- Morphine
- Benzo's

Gout

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Signs/Symptoms

- Uric Acid Elevation
- Pain
- Redness
- Swelling
- Usually singular joint

Classic Risk Factors

- Obese
- Alcohol (excessive)
- Meats/Seafood
- Drugs

Classic Drugs That Increase Uric Acid

- Diuretic (thiazides)
- Niacin
- Cyclosporine

Acute Treatment Options

- NSAIDs
- Steroids
- Colchicine

Chronic Management

- Xanthine Oxidase Inhibitors
 - Allopurinol
 - Febuxostat
- Colchicine
- Probenecid

Headache

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Types of Headache

- Tension
- Migraine
- Cluster
- Medication Overuse/Rebound

Management of Tension Headache

- Non-pharmacologic
 - Reduce stress
 - Avoid triggers
 - Rest
- Pharmacologic
 - Acetaminophen
 - NSAIDs
 - Combination with Caffeine
 - Triptans
 - Opioids

Medication Overuse/Rebound

- Often precipitate by initial onset of headache
- Repeated use of medication over time to relieve headache
- Drug Causes
 - NSAIDs
 - Acetaminophen
 - Triptans
 - Opioids

Migraine Treatment

- Triptans
- NSAIDs/APAP in Combo
- Dihydroergotamine
- Antiemetics
 - Prochlorperazine
 - Metoclopramide
- Dexamethasone

Migraine Prophylaxis

- Propranolol
- Valproic Acid
- Topiramate
- Tri-cyclics
 - Avoidance of amitriptyline/imipramine

Cluster Headaches

- Acute
 - Oxygen
 - Triptans
- Prophylaxis
 - Verapamil

Osteoarthritis

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Osteoarthritis Symptoms

- Pain after longer periods of use
- Stiffness after resting
- Potential change in the shape of ends of fingers (DIP)

Pain Impact

- Quality of life
- Sleep
- Function/ability
- Work/Volunteerism
- Appetite
- Exercise
- Mood

Treatment for OA

- Trial of hot/cold
- Massage
- Acetaminophen
- NSAIDs
- Opioids
- Steroid injections
- Topicals

NSAIDs – Risk in the Elderly

- GI
- CKD
- CHF
- HTN

NSAID Pearls

- Ibuprofen
 - OTC
 - Short $\frac{1}{2}$ life
- Naproxen
 - OTC
 - Longer $\frac{1}{2}$ life
- Ketorolac
 - 5 days or less (boxed warning)
- Indomethacin
 - gout

COX-2 Inhibitor

- Celecoxib
 - Same issues as NSAIDs
 - Exception: GI bleed is less
 - Remember that elderly patients are usually on antiplatelet/anticoagulant therapy

Opioids

- Tramadol
- Tylenol #3
- Morphine
- Oxycodone
- Fentanyl
- Hydrocodone
- Methadone

Important Approximate Conversions

- Morphine (oral) 30 mg
- Oxycodone 20 mg
- Tramadol 300 mg
- Fentanyl (patch) 12 mcg
- Hydrocodone 30 mg

Opioid Adverse Effects

- GI
- Constipation
- Sedation
- Cough suppression
- CNS
- Itching
- Tolerance/Dependence/Addiction risk

Opioid Pearls

- Oxycodone
 - In combo with APAP or alone
 - Very commonly used
- Hydrocodone
 - Combo with APAP

Opioid Pearls

- Tramadol
 - Seizure
 - Serotonin
- Morphine
 - Kidney disease
 - Gold standard
 - Hospice
- Codeine
 - Prodrug
 - Acetaminophen

Opioid Pearls

- Fentanyl patch
 - Very potent
 - Disposal concerns
 - Slow onset/offset
 - Potential absorption issues
 - Convenient
- Methadone
 - QTc
 - Conversion sucks
 - Sometime seen in hospice

Topical Medications

- Good option for elderly if only a few locations of pain
- Capsaicin
 - Avoid prn use
 - Substance P
- IcyHot, BenGay etc.
- Lidoderm patch
 - \$\$\$

Steroids

- Acute inflammation
- Injection to site of pain
 - Still has systemic effects

Glucosamine/Chondroitin

- Potential option for OA
- Takes time to work
- Be sure dose is adequate
- If beneficial continue...if not, DC

Osteoarthritis - Medications

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Acetaminophen

- Combination products
- Liver risk
- 4 gram max (possibly 3 gram max in elderly)

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Rheumatoid Arthritis

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Rheumatoid Arthritis

- Inflammation
- Painful
- Joint Swelling (big difference with OA)
- Typically symmetrical

Characteristic	Rheumatoid arthritis	Osteoarthritis
Age at which the condition starts	It may begin any time in life.	It usually begins later in life.
Speed of onset	Relatively rapid, over weeks to months.	Slow, over years
Joint symptoms	Joints are painful, swollen, and stiff.	Joints ache and may be tender but have little or no swelling.
Pattern of joints that are affected	It often affects small and large joints on both sides of the body (symmetrical), such as both hands, both wrists or elbows, or the balls of both feet.	Symptoms often begin on one side of the body and may spread to the other side. Symptoms begin gradually and are often limited to one or two joints, usually the small joints closest to the fingernails or the thumbs, large weight-bearing joints (hips, knees), or the spine.
Duration of morning stiffness	Morning stiffness lasts longer than 1 hour.	Morning stiffness lasts less than 1 hour. Stiffness returns at the end of the day or after periods of activity.
Presence of symptoms affecting the whole body (systemic)	Frequent fatigue and a general feeling of being ill are present.	Whole-body symptoms are not present.

Courtesy WebMD

DMARDs

- Methotrexate
- Sulfasalazine
- Hydroxychloroquine

DMARDs - Biologics

- Injection site reaction
- Infection risk

Medications

- Steroids
- NSAIDs

Delirium

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Definition

- Delirium – “an **acutely** disturbed state of mind that occurs in fever, intoxication, and other disorders and is characterized by restlessness, illusions, and incoherence of thought and speech”

Causes

- Medical
 - Infection
 - Pain
 - Electrolyte imbalances
- Prescription Drugs
- Drugs of abuse
 - Opioids
 - Alcohol
 - Methamphetamines
 - LSD

Drug Causes

- Anything that acts on the CNS
- Classic Examples
 - Benzo's
 - Opioids
 - Anticholinergics
 - Antispasmodics
 - Z-drugs
 - Sinemet
 - Drug levels (Digoxin, phenytoin, lithium)
 - Drug interactions

1st Line Therapy

- Identify and solve existing problem
- Redirect Patient
- Enlist patient in an activity
- Offer snacks and beverages to patient.
- Go to the bathroom

When Drugs Are Necessary

- Haldol
 - Most experience
 - Higher incidence of AE's
- Newer AP's
 - Risperidone
 - Quetiapine
 - Less EPS
 - Less experience

Treatment of Delirium - Avoid

- Benzo's
 - Can aggravate
- Opioid
 - Pain can be cause of delirium
 - Use non-opioid if possible to treat delirium suspected to be caused by pain

Dementia

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Major Types of Dementia

- Alzheimer's
- Vascular
- Lewy Body

MMSE

- *Higher = Better
 - 24-30 Normal
 - 20-23 Mild
 - 10-19 Moderate
 - <10 Severe

Medications

- Acetylcholinesterase Inhibitors
 - Donepezil, Rivastigmine, Galantamine, Tacrine
 - NMDA Receptor Antagonists
 - Memantine
- *Do NOT Reverse Dementia

NMDA Antagonists - Memantine

- Moderate to Severe
- XR and Immediate release
- 28 mg to 20 mg conversion
- CrCl
- Usually well tolerated
 - CNS Changes

Acetylcholinesterase Inhibitors

- All oral except rivastigmine patch option
 - Less GI (\$\$)
- Tacrine – liver toxicity
- GI (NVD)
- Weight Loss
- Low risk of bradycardia (think about Atropine)
- Mild-moderate

The One Million Dollar Question

- When to DC?
- Questions to think about
 - Adverse Effects?
 - Function Left?
 - Family opinions?
 - What would the patient think?
 - Another problem identified?
- Risk of DC?
 - Deterioration
 - Increase in behaviors

Dementia Related Behavioral Disturbances

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Behaviors

- Wandering
- Restless
- Agitation
- Physical Aggression
 - Hit, bite, kick
- Hallucinations
- Delusions

Behavior Identification

- Contributing factors
 - Individual person
 - Time of day
- Rule Out Causes
 - Pain
 - Infection
 - Medication changes

Solutions

- Non-drug approaches
- Solve underlying problem
- Creativity
- Make sure problem is distressing to patient before treating
- Medications last resort
 - Drugs don't often "treat" behaviors effectively

Common Psych Medications Tried

- Antipsychotics
- Benzodiazepines
- Mood Stabilizers
- Antidepressants

Failure to Thrive

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Failure to Thrive

- Weight Loss
- Malnutrition
- Poor intake
- Inactivity
- "Frail"

Failure to Thrive - Associations

- Cancer
- Stroke
- GI Surgery
- Depression
- Frequent UTI's/pneumonia
- Respiratory failure

Medication Associations

- Anticholinergics
- Opioids
- Diuretics
- More than 4 Rx's
- Antipsychotics
- Benzo's

Falls in the Elderly

Why do we Care About Falls?

- Mortality
- Injury
 - Fracture
 - Head injury
- Bleeding risk
- Fear of falling

Risk Factors

- Cognition
- Balance
- Dizziness
- Orthostatic BP
- Anemia
- Medications
- Stroke

Body Systems

- Muscle weakness/pain
- Accumulation of medications and risk of toxicity due to reduced metabolism and clearance
- Visual changes
- Disease
 - Parkinson's
 - MS
- Stiffening vessels, less responsive to body's adaptations (i.e. orthostasis)
- Loss of feeling (PVD or neuropathy)

Common Medications Implicated with Falls

- Psych medications
 - Benzodiazepines
 - Antipsychotics
 - TCA's
 - Antidepressants
- Blood pressure medications
- Parkinson's medications
 - Dopamine agonists
 - Carbidopa/levodopa

Environmental Considerations

- Steps
- Walking areas
 - Clutter
- Footwear

Vertigo

- Difficult diagnosis to make for physicians
- Medications
 - Meclizine
 - Antiemetic
 - Anxiety

Dizziness Follow Up

- Timing of Falls
 - Medication changes
- Vitals
- Diagnosis

Orthostasis

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Causes of Orthostasis

- Medications
- Dialysis
- Medical
 - Parkinson's
 - Dehydration

Treatment of orthostasis

- Remove offending medication
- Fludrocortisone
- Midodrine

Physiological Changes in the Elderly

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GI Tract

- Decreased GI Motility
- Decreased Gastric Acid Secretion
- Higher PH

Distribution

- Increase in body fat
 - Increased volume of distribution for lipophilic drugs
 - Example Diazepam
- Reduction in Muscle
 - Fall risk

Kidney

- Reduced elimination of medications
- Remember muscle mass decreases
 - If creatinine stays the same, it doesn't mean kidney function does change
- Increased half-life of kidney cleared meds
 - Digoxin
 - Allopurinol

Liver Changes

- Decrease in metabolic activity
 - CYP enzyme system
- Reduced hepatic blood flow
- Changes are complex
- Need to reduce doses, but no standard

Albumin

- Protein in the blood
- Drugs frequently bind to it
- Less found in the elderly/malnourished
- Higher free fraction of certain medications
 - Phenytoin
 - Warfarin

Infection Risk

- Reduced immune response
 - Example: fever
- Skin thinning
- Urinary changes
- Natural flora
- Immunosuppressant medications
- Nutrition
- Antibiotic use

Osteoporosis

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WHO Classification

- Normal; T-score greater than or equal to -1.0
- Osteopenia; -1.0 to -2.5
- Osteoporosis; -2.5 or below

Risk Factors

- Female
- Age
- Low BMI
- T-score
- Steroid use
- Smoking
- ETOH
- Hyperthyroidism (chronic)
- Prior Fracture
- RA

Treatment

- Bisphosphonates
- Miacalcin
- SERM
- Estrogen
- Forteo
- Prolia

Other Considerations

- Vitamin D
- Calcium
- Exercise, strength building, weight bearing
- Fall risk

Classic Medication Contribution

- Anticonvulsants
- Thyroid supplements
- Steroids
- PPI's
- TZD's

Acute and Chronic Kidney Disease

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Acute Kidney (Injury) Disease

- Common causes
 - Reduced blood flow to kidney
 - Caused by
 - Dehydration
 - Significant acute blood loss
 - Severe N/V/D
 - Medication

Classic Medication Causes

- ACE/ARB
- NSAIDs
- Diuretics
- AG's
- Vancomycin
- Chemo (i.e. cisplatin)
- Lithium

Stages of Chronic Kidney Disease of all Types

Stage	Qualitative Description	Renal Function (mL/min/1.73 m ²)
1	Kidney damage-normal GFR	≥90
2	Kidney damage-mild ↓ GFR	60-89
3	Moderate ↓ GFR	30-59
4	Severe ↓ GFR	15-29
5	End-stage renal disease	<15 (or dialysis)

Problem: Dosing Medications

- Many drugs are dosed by CrCl
- Lab reports GFR

Incredible # of Medications Dose Adjusted

- Chronic medications
 - Use common sense
 - Start low go slow
 - Should you change dose if no side effects
 - Memantine
 - Ranitidine
 - Allopurinol

Electrolytes

- Hyperkalemia
- Phosphorus
- Magnesium

BPH

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BPH Characteristics

- Enlargement of the prostate
- Impairs urination
 - Frequency
 - Incomplete bladder emptying
 - Low flow
 - Incontinence

BPH Treatment

- Alpha Blockers
- 5-Alpha Reductase Inhibitors
- Surgery (TURP)

Alpha-Blockers

- Tamsulosin
 - Not used for hypertension
 - Works quickly
- Non-selective agents
 - Terazosin
 - Doxazosin
- Risks
 - Orthostasis

5-Alpha Reductase Inhibitors

- Finasteride, Dutasteride
- Takes weeks/months to begin to work
- Actually shrink prostate
- Decreased libido
- Pregnancy risk

Drugs That Exacerbate Frequency

- Diuretics
- Caffeine
- ETOH

Drugs That Exacerbate Retention

- Anticholinergics
- Alpha agonists (Midodrine)
- Pseudoephedrine

Sexual Dysfunction

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Antidepressants

- SSRI's
 - Notorious cause of sexual dysfunction
- Better options
 - Bupropion
 - Mirtazapine

BPH Medications

- Finasteride
- Dutasteride

Antihypertensives

- Beta-blockers
- Thiazide Diuretics

Use of PDE-5 Inhibitors

- SE's
 - Dizzy
 - Headache
 - Visual changes
 - Flushing
- Nitrate Interaction

Urinary Incontinence

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Definitions

- Incontinence
 - Go when you don't want to (can't control)
 - Weakness or loss of voluntary control of urinary sphincter
- Frequency
 - Feeling of having to go all the time
- Retention
 - "retaining" – incomplete emptying of the bladder
 - Most common cause (males) - BPH

Types of urinary incontinence

- Stress
 - Physical exertion (i.e. sneeze, cough)
- Urge
 - Over Active Bladder (OAB)
 - Feel the need to go, but maybe don't make it in time
 - Immobility
 - MS, Parkinson's, Diabetes
- Overflow
 - Blockage (BPH)
 - May dribble urine
- Functional
 - Patient who has dementia

Stress Incontinence Treatment

- Kegel Exercises
- Alpha agonists
- Anticholinergics tried, but may not be that effective
 - Could be mixed incontinence if beneficial

Urge Incontinence

- Treatment
 - Anticholinergics
 - Beta agonist (mirabegron)
 - Estrogen

Overflow

- Medication Treatment
 - Alpha-blockers
 - 5 alpha reductase inhibitors (BPH)

Cholelithiasis

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Cholelithiasis

- Gallstones
 - Located in the gall bladder
 - Possibly biliary tract

Symptoms

- Pain
 - Upper right region of abdomen
- Treatment of pain
 - NSAIDs
 - Opioids
 - Acetaminophen

Ursodeoxycholic acid

- Acts on cholesterol components of stones
- Dissolving action
- May not be that effective if low cholesterol composition

Frequent Problems

- Pain Management
- Surgery
 - Removal of gall bladder

Crohn's and Ulcerative Colitis

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Symptoms

- Diarrhea
- Cramping
- Pain
- Possible blood

Crohn's Versus Ulcerative Colitis

Major Difference

- Crohn's located "patches" throughout intestinal system
 - Can impact all the way through the intestine
- Ulcerative colitis – continuous area in the colon and typically just the inner lining

Crohn's Major Options

- 5-Asa Compounds
 - Sulfasalazine, mesalamine
 - Maybe not so great if large small intestine component
- Corticosteroids
 - Budesonide (Entocort EC)
 - Short term
- Immunosuppressive
 - I.e. Azathioprine
- Biologics
 - I.e. Infliximab, adalimumab

Ulcerative Colitis Major Options

- 5-Asa based compounds
 - Sulfasalazine
 - Mesalamine
- Steroids

Diarrhea and Constipation

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Changes in Regularity

- Diet
- Exercise
- Fluid intake
- Drugs
- Disease

Medical Causes of Diarrhea

- C. Diff
- Viral
- Rare bacteria (giardia etc.)
- IBS

Medical Causes of Constipation

- Hypothyroid
- IBS
- Parkinson's
- MS
- Colon Cancer

Medications that Cause Diarrhea

- Metformin
- Acetylcholinesterase Inhibitors
- Antibiotics
- PPI's
- GLP-1
- Laxatives

Medications that Cause Constipation

- Opioids
- Anticholinergics
- CCB's
- Bile Acid Sequestran
- Calcium/Iron

Diarrhea Treatment

- Identify Cause
 - Medical?
 - Drug?
- Loperamide
- Diphenoxylate/atropine
- Bile acid sequestrans

Constipation Treatment

- Non-drug (fluid, fiber, exercise)
- Docusate (prevention)
- Stimulants
- PEG
- Lubiprostone
- Lactulose
- Enemas
- Mineral Oil
 - **Avoid

Dysphagia

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Dysphagia

- Difficulty swallowing
- Regurgitation
- Cough/Gag
- Choking/vomiting
- Weight loss

Causes of Dysphagia

- Weakening of esophageal muscles
- Narrowing (stricture) of esophagus
- GERD
- Foreign Body

Neurological Disorders Causing Dysphagia

- Neuro Disorders
 - Parkinson's
 - MS
- Aspiration pneumonia risk

Management

- Treat GERD
- Liquid diet
- Feeding Tube

GERD, PUD, and Dyspepsia

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GI Risk Considerations

- GI Diagnosis
 - PUD (Don't forget about H. Pylori)
 - GERD
 - Heartburn
 - Barrett's
- Length of medication use
- Reason for initiation

Proton Pump Inhibitors

- Incredibly common medication
- Often used for prophylaxis
- Often never reassessed
- Sometimes necessary long term

PPI Risks

- Fracture
- C. Diff
- Low Magnesium
- Pneumonia
- B12

H2 blockers

- Kidney disease
 - Dose adjustments
- Confusion/CNS effects with accumulation
- Cimetidine – bad idea

Antacids

- Calcium containing products
 - Constipation
 - Binding interactions
 - Work quickly
 - Don't last long
 - Rare accumulation of calcium if frequent use
 - Combination with HCTZ

Classic Medication Causes of GI Issues

- Steroids
- Bisphosphonates
- Digoxin toxicity
- NSAIDs
- Metformin
- Acetylcholinesterase inhibitors
- GLP-1
- Antibiotics

Irritable Bowel Syndrome (IBS)

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IBS versus IBD

- Irritable Bowel Syndrome
 - Similar symptoms
 - Diarrhea
 - Cramping
 - Pain
 - Constipation
- Irritable Bowel Disease
 - Marked by inflammation/damage
 - I.e. Crohn's or UC

Treatment of IBS

- Antidiarrheal (if diarrhea)
- Fiber/fluids
- Osmotics (i.e. PEG)
- Anticholinergics
 - Dicyclomine, hyoscamine
- TCA's or SSRI
 - Remember which symptoms your treating (i.e. diarrhea or constipation)

Nausea and Vomiting

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Causes of Nausea and Vomiting

- Chemo
- Gastroparesis
- Motion Sickness
- Drugs
- Infection
- Severe Pain
- Migraine

Challenges in Geriatrics

- Huge diagnostic differential
- Polypharmacy
- Easy to treat symptoms and hard to identify cause

Medications for Nausea/Vomiting

- Ondansetron
 - Serotonin activity (5-HT3)
 - Rare issues, but look out for other serotonergic meds
 - Be cautious with other QTc Prolonging agents

Dopamine Antagonists

- Meclizine
- Prochlorperazine
- Metoclopramide
 - May have serotonin activity as well
- *Movement disorders

Corticosteroids

- Dexamethasone
 - Chemo
 - Risks
 - GI Upset
 - OP, Cushing's, etc.

Classic Medication Causes of Nausea/Vomiting

- Antibiotics
- Acetylcholinesterase inhibitors
- GLP-1
- Digoxin toxicity
- Opioids
- Metformin
- NSAIDs
- Iron
- Antidepressants
- Alcohol

Pancreatitis

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Pancrease

- Major roles
 - Digestive enzymes
 - Insulin

Causes of Pancreatitis

- Gall stones
- Alcohol
- Infection
- High Triglycerides
- Medications

Labs

- Elevation
 - Amylase
 - Lipase

Medication Causes (Acute)

- Azathioprine
- Thiazides
- VPA
- Sulfasalazine
- Bactrim
- Tetracycline

Treatment

- Treat the cause
 - Gallstone removal
 - Hypertriglycerides (500 or greater)
 - Fibrates
 - Niacin
 - Fish Oil
 - Digestive enzymes
 - ETOH treatment

Common Drug Resistant Bacteria

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MRSA

- Methicillin Resistant Staphylococcus Aureus
 - Community acquired
 - Resistant to Penicillins, cephalosporins
 - Oral options: Doxycycline, Clindamycin, Sulfa/tmp
 - Hospital medications
 - Vancomycin
 - Linezolid
 - Daptomycin (non-pneumonia)

Other Gram Positives

- Strep Pneumo.
 - Gram Positive
 - Resistance to penicillins, cephalosporins
 - Alternatives: Levofloxacin or moxifloxacin (avoid ciprofloxacin), clindamycin, vancomycin (IV only)
- Vancomycin Resistant Enterococcus (VRE)
 - Linezolid, daptomycin alternatives

Pseudomonas Aeruginosa

- Gram negative
 - Resistant to 1st, 2nd, 3rd generation cephalosporin's (exception ceftazidime), non antipseudomonal penicillins
 - Common Treatment
 - Quinolones (oral)
 - Pip/tazo
 - Meropenem
 - Colistin
 - Polymixin B

Extended Spectrum Beta Lactamases

- Klebsiella
 - Resistance to 2nd/3rd generation cephalosporins
 - Alternatives:
 - Imipenem
 - Colistin
- E Coli.
 - Resistance to Bactrim, cephalosporins, quinolones
 - Nitrofurantoin, penems

GI Infections

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Infections

- 2 Classic Infections you need to know
 - Clostridium Difficile (C. Diff)
 - Helicobacter Pylori (H. Pylori)

C. Diff

- Watery diarrhea
- Cramping
- Pain
- Blood (severe)
- Spores can last for weeks to months
 - Horrible for healthcare facilities with possible frail, at risk patients

Medication Risks

- Antibiotics
 - Minimize duration
 - Minimize spectrum
- PPI's
 - Assess diagnosis for use
 - Risk/Benefit

Treatment

- Metronidazole
- Vancomycin
 - Oral ok
- Fidaxomicin

H. Pylori

- Major cause of GI ulcers
- Able to tolerate acid environment of stomach
- Symptoms
 - N/V
 - Abdominal pain
 - Weight loss
 - Burping

Treatment

- Typically 10-14 days
- Different regimens (see next slide for combo's)
 - Amoxicillin
 - Clarithromycin
 - Metronidazole
 - Bismuth
 - Tetracycline

Treatment

- OAC (Prevac contains lansoprazole instead of omeprazole)
- MOC
- BMT

Influenza

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Influenza Pearls

- Very contagious
- Institutionalized patient at high risk of transmission
- Vaccination
- Prophylaxis in an outbreak
- Mutations
- Elderly at higher risk for complications
 - Secondary pneumonia

Medications

- Antiviral – Neuraminidase Inhibitor
 - Prevents replication
- Oseltamivir
 - Drug of choice for treatment and prevention
 - Sooner the better with treatment (less than 48 hours)
 - Expensive
 - Watch kidney function/dose adjustments
 - Lower dose for prophylaxis
 - GI, psych changes as most common AE's

Osteomyelitis

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Osteomyelitis

- Infection of the bone
- Redness/swelling/pain at site
- Fever
- Long length of treatment

Risk Factors

- Diabetes
- Immunosuppressed
 - Chemo
 - Corticosteroids
 - Biologics
- Illicit drug use
 - I.e. dirty needles
- Recent trauma or surgery

Procedures

- Debridement
- Improving blood flow
- Amputation

Bacteria

- Most common: **Staphylococcus**
 - Need to be aware of MRSA (vancomycin, linezolid)
 - MSSA (Penicillins)
- Gram negatives possible
 - Quinolones
- Tough infections to treat
 - Likely at least 4-6 weeks on initial infection
 - Recurrent infections might require life long prophylaxis

Effective antibiotics

- **Orals**
 - Pencillin(s) - MSSA
 - Clindamycin
 - Sulfamethoxazole/trimethoprim
 - Rifampin (used to prevent reinfection, prosthetic)
 - Vancomycin (inpatient, empiric gram positive)
 - Linezolid
 - MRSA/VRE
 - Quinolones (gram negative)

Pneumonia

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Common Bugs

- Strep. Pneumoniae
- H. Flu
- Staph Aureus
- M. Cat
- Atypical
 - Legionella
 - Mycoplasma

Risk Calculator for Hospitalization

- CURB-65
 - Confusion
 - Urea>20
 - Respirations >20/min
 - BP <90 or diastolic <60
 - Age >65

Vaccination

- Polysaccharide-23 Vaccine
- Conjugate-13 Vaccine
- Influenza

Healthcare Associated

- Hospitalization
- Long term care
- Bugs to be fearful of
 - MRSA
 - Resistant gram negatives

Community Acquired Treatment

- Macrolide
- Macrolide +/- beta lactam
- Doxycycline
- Respiratory fluroquinolone

Risk Factors – Resistant Pathogens

- Previous antibiotic use
- Hospitalization
- Immunosuppressive deficiency
- Spreading in the community

Coverage for MDR Organisms

- Pseudomonas
 - Ceftazidime
 - Pip/Tazo
 - Cefepime
- MRSA
 - Vancomycin
 - Linezolid

Outpatient MDR Organisms

- MRSA
 - Bactrim
 - Clindamycin
 - Linezolid
- Pseudomonas
 - Quinolones

Skin and Soft Tissue Infections

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Important Bugs

- Staphylococcus
- Streptococcus
- Pseudomonas

Cellulitis

- Beta-hemolytic Streptococcus
- MSSA
 - Drugs
 - Cephalexin
 - Penicillin
 - Clindamycin

Pseudomonas and MRSA Empiric

- Pseudomonas
 - Quinolones
- MRSA
 - Clindamycin
 - Sulfa/TMP
 - Tetracycline

Animal/Insect Bites

- P. multocida
 - Amox/clav
 - Doxycycline
- Lymes
 - Doxycycline
 - Amoxicillin

Tuberculosis

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Tuberculosis

- Latent
 - No symptoms
 - Not contagious
- Active
 - Cough
 - Fever
 - Fatigue
 - Weight loss
 - Contagious

Immunosuppression and TB

- Most immune systems will suppress the infection
 - TB goes from latent to active in immunosuppressed
- HIV/AIDS
- Chemo
- Transplant
- Biologics
- Elderly

Drugs

- Isoniazid
- Rifampin
- Ethambutol
- Pyrazinamide

HIV/AIDS

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HIV/AIDS Pearls

- Drug resistance
 - Frequent mutations
 - Adherence CRITICAL
- Immune Deficiency
- Rare, opportunistic infections
- Monitoring
 - CD4 counts

Opportunistic Infections

- PCP (Pneumocystis pneumonia)
 - Sulfa/TMP
 - Glucocorticoids
- Kaposi Sarcoma
 - Chemo or radiation
- MAC
 - Macrolide
 - Ethambutol
 - Rifampin

CD4 Count

- CD4 Count
 - 500-1500 is normal
 - Following trend
 - Lower = higher risk for infection
- If less than 200
 - PCP prophylaxis
- If less than 50
 - MAC prophylaxis

Medications for HIV/AIDS

- NRTI (Nucleoside)
 - Abacavir, Emtricitabine, Lamivudine
 - Adverse Effects: Fat redistribution (lipodystrophy –i.e. buffalo hump), lactic acidosis, fatty liver
- NRTI (Nucleotide)
 - Tenofovir
 - Adverse Effects: lactic acidosis, fatty liver, may increase cholesterol and decrease bone mineral density

Protease Inhibitors

- Atazanavir, Darunavir, Fosamprenavir, Lopinavir/Ritonavir
 - Lipodystrophy (buffalo hump)
 - CYP3A4 interactions
 - Rash
 - Hyperglycemia
 - (Ritonavir is a booster – increases conc. Of lopinavir)

NNRTI's

- Efavirenz
 - Rash
 - CNS changes
 - Mood/Depression
 - Liver

Urinary Tract Infections

Definition

- UTIs in women are defined as at least 100,000 colony-forming units (CFU)/ml in a pure culture of voided clean catch urine
- In men, the presence of just 1,000 CFU/ml indicates a UTI

UTIs of Special Interest in the Elderly

- Asymptomatic bacteruria: $>10^5$ bacteria in the urine without symptoms
- Recurrent UTIs: culture confirmed UTIs with a frequency of >3 in 1 year or >2 in 6 months.
 - Relapse occurs within 2 weeks of treatment and is caused by the same pathogen
 - Reinfection occurs >4 weeks after an earlier UTI and usually involves a different pathogen
- Catheter-Associated UTIs

Common Pathogens

- *E. coli* (70-80%)
- *Proteus mirabilis*
- *Staphylococcus saprophyticus*
- *Klebsiella pneumoniae*

Pharmacologic Prophylaxis

- Regimens
 - Bactrim/Septra double strength 3x/week or single strength QD
 - Trimethoprim 100 mg QD
 - Macrobid (nitrofurantoin) 100mg QD

Non-Pharmacologic Prophylaxis

- Cranberry juice
 - 300 ml/day of standard juice or 60 ml/day of concentrated juice
 - 400 mg QD of cranberry extract
 - Common side effect: calcium oxalate kidney stones

Antibiotics

- Common treatment regimens include:
 - Trimethoprim/Sulfamethoxazole
 - Nitrofurantoin monohydrate/macrocystals
 - Ciprofloxacin and other fluoroquinolones
 - Third-generation cephalosporins

Treatment Regimens for Uncomplicated UTIs

- TMP-SMX 160/800mg BID for 3-14 days
- Trimethoprim 100 mg BID for 3-14 days
- Ciprofloxacin 250 mg BID for 3 days
- Levofloxacin 250 mg QD for 3 days
- Nitrofurantoin 100 mg BID for 7 days
- Fosfomycin 3 grams x 1 dose
- Cefpodoxime 100 mg BID for 3 days

Treatment of Complicated UTIs

- Usually a 7-14 day treatment for mild cases
- Symptomatic cases require hospitalization and IV antibiotics
- Fluoroquinolones are preferred choices:
 - Cipro 500mg BID for 7 to 14 days
 - Levaquin 250 mg for 10 days or 750mg QD for 5 days
- Extended-spectrum beta lactams:
 - Rocefin (ceftriaxone) 1-2 grams IV/IM q24h or in divided doses twice a day
 - Fortaz (ceftazidime) 500mg IV/IM q8-12h

Trimethoprim-Sulfamethoxazole (TMP-SMX)

- Considered 1st-line for uncomplicated UTIs
- Good activity against many pathogens (except *Enterococcus* species)
- Growing resistance to *E.coli* (20%)
- Common side effects: GI upset and rash
- Crystalluria may occur- take with a full glass of water
- Contraindicated in patients with sulfonamide allergies
- Syrup available

Fluoroquinolones (ciprofloxacin and levofloxacin)

- Effective against gram (-) organisms, but only fair coverage against gram (+)
- Administer antibiotics at least 2 to 4 hours before or 6 hours after antacids or other products containing calcium, iron, or zinc.
- Common side effects: N/V/D
- Rare side effect: tendonitis
- Avoid excessive exposure to sunlight
- Reduce the dose by half if CrCl < 30 ml/min
- Caution: may increase effects of warfarin

Nitrofurantoin (Macrobid)

- Provides good antibacterial coverage
- Common side effects: N/V/D
- Take with food- increases serum concentrations
- Avoid alcohol
- May discolor urine brown
- Notify physician if fever, chest pain, dyspnea, cough symptoms occur
- Contraindicated in patients with CrCl < 60ml/min

Fosfomycin

- Studies showed equally effective to nitrofurantoin and TMP-SMX
- Can be given as a single dose
- Expensive- not generally used

Reminder

- Warfarin does interact with antibiotics.
- Follow up with appropriate labs (INR) at least 3 to 7 days after discontinuation of antibiotic

Anxiety

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What is There to Worry About?

- Death
- Finances
- Family
- Social

Association of Anxiety

- PTSD
- Substance Abuse
- OCD

Assessment

- GAD-7
 - 7 questions
 - Example: Feeling afraid something awful might happen
 - Scored from 0-3 for each question
 - Not at all
 - Several days
 - More than half the days
 - Nearly every day
 - Higher the score the worse
 - Obviously might not work in our dementia type patients

Acute Treatment

- Identify underlying cause
 - Pain
 - Infection
 - Hyperthyroid
 - Medications

Medications

- SSRI's
- Benzo's
- Buspirone
- Other antidepressants

SSRI's

- Won't work quickly
- Preferred for long term maintenance over benzo's
- Selection based upon adverse effects

Benzodiazepines

- Work quickly
- Controlled substance
- Avoid Long Acting
- LOT
 - Less likely to accumulate
 - Inactive metabolites

Buspirone

- Usually well tolerated
- Takes time to work
 - Similar to SSRI's
- Not a controlled substance

Bipolar Disorder/Schizophrenia

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Acute Mania Treatment

- Antipsychotics
- Valproic Acid
- Lithium

Lithium

- Target Concentration
 - Acute 0.8-1.2
 - Maintenance 0.6-1.0
- AE's
 - GI
 - Tremor
 - Slurred Speech
 - TSH
 - Kidney function

Bipolar Depression

- Lamotrigine
- SSRI's
 - Can induce mania
 - Often used with mood stabilizer (i.e. Lithium, VPA, Carbamazepine)

Schizophrenia

- Elderly Adults
 - Likely tried numerous agents
 - May be able to or have to decrease doses
- Metabolic Syndrome
- TD risk

Antipsychotics

- Typical
 - Haloperidol
- Atypicals
 - Risperidone
 - Quetiapine
 - Aripiprazole
 - Clozapine
 - Olanzapine
 - Ziprasidone

Side Effect Profile, Clinical Considerations

- Sedation
- Weight Gain
- EPS
- Prolactin
- Anticholinergic
- Agranulocytosis
- QTC prolongation

Depression

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Depression – Kind of a Big Deal

- Suicide (males)
- Circumstances
 - Finances
 - Living alone
 - Aging
- Loss of Family/Friends

Common Diseases That Increase Risk of Depression

- MS
- Parkinson's
- Dementia
- Cancer
- Hypothyroid
- Nutritional factors
 - B12

Antidepressant Pearls

- Take time to work
- Selection
 - Adverse effects
 - Compelling indications
- Monitoring
 - PHQ-9

Common SSRI's

- Sertraline
- Escitalopram
- Citalopram
- Fluoxetine
- Paroxetine
- Fluvoxamine

Common SNRI's

- Duloxetine
- Venlafaxine

Trazodone/Nefazodone

- Nefazodone – rare use, hepatotoxic
- Trazodone
 - Low doses insomnia
 - Orthostasis
 - Dry mouth
 - Sedation

Mirtazapine

- Weight gain
- Sedation
 - Lower doses

Bupropion

- Smoking cessation
- Activating
- Caution - Seizure disorder

TCA's – lots of them!

- Nortriptyline
- Desipramine
- Amitriptyline
- Imipramine

Less Common Antidepressants

- Serotonin modulators and stimulators
 - i.e. vilazodone
- MAOI's
- Antipsychotic augmentation
- OTC's
 - St. John's Wort

Insomnia

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Insomnia Concerns

- Common Complaint
- Troubles
 - Getting to sleep
 - Staying asleep
- Quality of Life
- Motivation

Non-Drug Interventions

- 1st Line Therapy
- Sleep Hygiene
 - Regular schedule
 - Snacks/warm milk
 - Avoiding Caffeine near bedtime
 - Minimize stimulation before bed
 - Exercise earlier in the day
 - Pain
 - Avoiding other stimulants

Pharmacotherapy

- Z-drugs
- Anticholinergics
- Melatonin
- Trazodone
- Benzo's
- Ramelteon
- Mirtazapine
- Suvorexant

Z-Drugs

- Fall risk
- Confusion
- Risk of dependence

Anticholinergics

- Retention
- Dry eyes
- Dry mouth
- Constipation
- Fall risk
- Confusion (interacts with dementia meds)

Trazodone and Mirtazapine

- Trazodone
 - Usually higher doses required for antidepressant effect
 - Orthostasis
 - Dry mouth
- Mirtazapine
 - Low dose
 - Weight gain

Melatonin

- OTC
- Tends to regulate the sleep cycle
- Some patients use as needed

Antipsychotics for Sleep

- Can be sedating
- Always avoid unless compelling indication
 - Hallucinations unresolved by other methods
 - Schizophrenia

Substance Abuse

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Most Common Substance Abuse

- Alcohol
- Prescription Drugs
 - Opioids
 - Benzo's

Signs of Alcohol Abuse

- Higher tolerance
- Blackouts
- Concerns from friends/family
- Legal or financial issues
- Liver disease

Alcohol Addiction

- Loss of control
- Lack of other interests
- Withdrawal symptoms
 - Sweating, shaking, anxiety
- Guilt
- Worry
- Change in relationships

Prescription Drug Misuse

- Using for legitimate reason, but not under supervision of a healthcare provider
- Medication hoarding
- Opioids, Benzo's

Signs of Opioid Withdrawal

- Withdrawal when stopping use
 - Nausea
 - Sweating
 - Anxiety
 - Insomnia
 - Chills
 - Irritability

Benzodiazepine Withdrawal

- Anxiety
- Irritability
- Tremor
- Confusion
- Nausea
- *Seizures
- Psychosis

Multiple Sclerosis

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Interferon

- Disease modifying
- Adverse drug reactions
 - Injection site reaction
 - Flu-like symptoms
 - Fever
 - Pain

MS Complications

- Spasms/pain
 - Baclofen
 - Tizanidine
 - NSAIDs
 - Acetaminophen

Bladder/Bowel Issues

- Spasms/Incontinence
 - Anticholinergics
- Constipation

Other Associated Risks

- Mood disorders
 - Depression
- Epilepsy

Parkinson's Disorder

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Parkinson's Symptoms

- Tremor
- Rigidity
- Akinesia
- Postural instability
- Can be challenging to diagnose
 - Trial Sinemet

Drugs for Parkinsons

- Sinemet
- Dopamine Agonists
- MAOI's
- COMT's

Sinemet

- Gold Standard
- Frequent dosing
 - CR product available
- GI
- Psych AE's
- Orthostasis
- Drug/Food interaction - protein

Dopamine Agonists

- Ropinerol, pramipexole
- RLS treatment
- Orthostasis
- Edema

COMT's and MAOI's

- COMT's
 - Preserve levodopa
 - Need to be dosed with Sinemet
 - May need to reduce dose of Sinemet
 - Entacapone, tolcapone
 - Tolcapone – liver toxicity

Drug Induced

- Antipsychotics
 - Typicals – the worst
 - Quetiapine – the best
- Reglan
 - Used for GI problems, but DA blocking activity

Seizures

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Causes of Seizures

- CVD
- Dementia
- Trauma
- Cancer
- Withdrawal
 - Benzo's
 - Barbiturates
 - ETOH

Medications that Increase Seizure Risk

- Bupropion
- Tramadol
- Cancer medications
- Hypoglycemia
- Antipsychotics
- Stimulants

Common Seizure Medications

- Phenytoin
- Levetiracetam
- Carbamazepine
- Lamotrigine
- Valproic Acid
- Topiramate

Phenytoin

- Complex Kinetics
 - Dose depending increase in concentration
 - Small doses can lead to disproportionately large increases in drug levels
- Free versus total levels
 - 1-2, 10-20
- Vitamin D deficiency
- General toxicity symptoms similar to alcohol
 - Vertical nystagmus
- Enzyme inducer
- Gingival Hyperplasia

Carbamazepine

- Enzyme inducer
- Hyponatremia
- Bipolar and trigeminal neuralgia
- Bone loss
- Levels
 - 4-12
- Cousin *oxcarbazepine

Levetiracetam

- Watch kidney function
- Drug levels not routinely done
- Adjust dose based upon SE's/seizures
- Less drug interactions
- SE's; sedation, confusion, GI, behavioral changes, increase in BP

Lamotrigine

- Very slow dose titration
- Interaction with Valproic acid and enzyme induces
 - Quicker titration with enzyme inducers like phenytoin
 - Slower titration with VPA
- Drug induced rash (SJS)
 - Life threatening

Topiramate

- Cognitive slowing
- Weight loss
- Migraine indication

Valproic Acid

- Weight gain
- GI
- Hair loss
- Rare (ammonia elevations, LFTs, thrombocytopenia)
- Migraine, Bipolar indications, might also see off label for aggressive type behaviors versus use of antipsychotics

Shingles

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Shingles

- Caused by Varicella Zoster virus
 - Chicken pox
 - Reactivation
- Painful skin rash/reaction
 - Inflammation of nerve
 - Blisters

Treatment

- Vaccination (prevention)
- Antiviral treatment
 - Get started ASAP
 - Acyclovir
 - Valacyclovir

Antivirals

- Acyclovir dosed 5 times/day
- GI SE's
- CNS toxicity rare, but possible
 - More likely with poor kidney function

Pain Management

- Gabapentin
- Pregabalin
- TCA
- Topical
 - Capsaicin
 - Lidocaine

Stroke and TIA's

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Types of Stroke

- Hemorrhagic
- TIA
- Ischemic
 - Local (Atherosclerotic)
- Heart (Atrial Fibrillation)

Classic Signs

- Face drooping
- One sided arm weakness
- Slurred Speech
- Confusion
- Vision changes
- Fall

Classic Risk Factors

- Hypertension
- Smoking
- Atrial Fibrillation
- Diabetes
- Hyperlipidemia
- Age
- Genetics

Prevention of Stroke

- Manage modifiable risk factors
 - Hypertension
 - Smoking
 - Weight loss
 - Diabetes
 - Statins

Antiplatelet Versus Anticoagulant

- Avoid warfarin
 - *Major exception – Atrial Fibrillation
- Antiplatelet

Options for Non-Cardioembolic Stroke

- Aggrenox (Aspirin/Dipyridamole)
- Clopidogrel
 - Ticlopidine - neutropenia
- Aspirin

Tremor

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Essential Tremor

- Rhythmic, consistent movement of body part
 - Often hands
- Consistent frequency
- Severity can vary
- Interfere with life activities

Treatment

- Propranolol
 - Pulse
 - BP
 - Selectivity for beta receptors
- Primidone
 - Phenobarbital is metabolite
 - Sedation
 - Confusion
 - Fall risk

Drug Induced Tremor

- Lithium
- Beta-agonists
- Theophylline
- Hyperthyroidism (or over supplementation)
- VPA

Acute Coronary Syndromes

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ACS

- STEMI
 - S-T Elevation
 - Biomarkers
- Non-STEMI
 - No S-T Elevation
 - Biomarkers
- Unstable Angina
 - Chest pain at rest
 - New onset, limits activity
 - Increase or worsening in symptoms
 - No Biomarkers

Symptoms of MI

- Chest pain
- Pressure
- SOB
- N/V
- Fainting
- Women can present with atypical symptoms

Causes of MI

- CAD
- Plaque Buildup
- Spasm
- Coronary artery embolism

Classic Medications

- Aspirin
- P2Y12 inhibitors (i.e. clopidogrel)
- ACE or ARB
- Beta-blocker
- Statin
- Nitrates (used acutely)

Elderly Challenges

- Adherence
- Bleed Risk
- Hypotension/Falls
- When to DC statins

Atrial Fibrillation

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Symptoms of Atrial Fibrillation

- General fatigue
- Rapid and irregular heartbeat
- Fluttering or “thumping” in the chest
- Dizziness
- Shortness of breath and anxiety
- Weakness
- Faintness or confusion
- Fatigue when exercising

Classification of AFib

- Paroxysmal (<7 days)
- Persistent (>7 days and won't go back to normal on its own)
- Permanent (continuous Afib)

Controlling Rate

- Beta-blockers
- Calcium Channel Blockers
- Digoxin

Clinical Medication Pearls

- Beta-blockers
 - Usually first line
 - Generally avoid non-selective unless compelling indication
- Calcium Channel Blockers
 - Non-dihydropyridines
 - Heart failure risk
- Digoxin toxicity
 - GI symptoms, CNS, weight loss, bradycardia
 - Renal elimination
 - Target concentration <1ng/mL vs. CHF (0.5-0.8)

Rhythm Control

- Potassium Channel Blockers
 - Amiodarone
- Sodium Channel Blockers
 - Flecainide (Tambocor®)
 - Propafenone (Rythmol®)

Amiodarone Pearls

- Extremely long half life
- Liver toxicity
- Pulmonary toxicity
- Thyroid impact

Anticoagulation

- Clot formation is one of the major risks with atrial fibrillation
- To be discussed further – see anticoagulation section

CHF

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CHF Characteristics

- Inability to effectively pump blood
- Elevated BNP (or pro-BNP)
- SOB, cough
- Fatigue, weakness
- Edema

Medications Frequently Used in CHF

- Diuretics
 - Loops
 - K⁺ sparing
 - Thiazide Like
- ACE/ARBs
- Beta-blockers
- Digoxin

Loops

- Furosemide
- Mainstay of therapy
- Fluid loss
- Risks
 - Electrolyte depletion
 - Dehydration/Kidney Failure
 - Frequent urination

Aldosterone Antagonists

- Spironolactone, Eplerenone
- Hyperkalemia
- Gynecomastia
- 100mg spironolactone/40 mg furosemide

Thiazide Like

- Metolazone
 - Often used as needed
 - Used to augment furosemide
 - Significant hyperkalemia risk when used with furosemide
 - Sometimes only need to use once or twice/week
- True thiazides (i.e. HCTZ)
 - Generally not used for CHF/fluid loss
 - Likely not as beneficial with CrCl <30

Beta-blockers/ACE Inhibitors

- See Hypertension for more clinical breakdown
- Generally try to push the dose
 - Not that easy in the elderly
 - Falls
 - Weakness
 - Kidney function

Digoxin in CHF

- Increased mortality at higher levels
- Target 0.5-0.8
- Monitor closely
 - Changing renal function
 - Symptoms of toxicity

Classic Drugs that Exacerbate CHF

- NSAIDs
 - Sodium retention
 - Also risk of Kidney damage with ACE/Diuretics on board
- CCB's
 - Increase edema
- TZD's
 - Pioglitazone

Coronary Heart Disease

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Coronary Heart Disease

- Atherosclerosis
- Plaque formation
- Hardening of the arteries

Goal – Reduce Risk of MI/Stroke

- Platelet inhibitors
- Statins
- Smoking Cessation
- Weight loss
- Anti-angina medications
- Antihypertensives

Antiplatelet medications

- Aspirin
- ADP inhibitors
 - Clopidogrel
 - Prasugrel

Statin Consideration

- Adherence is critical
- Past history
- Some recommended to be dosed at night and some aren't
- Cost
- Life expectancy

Anti-Angina Medications

- Nitrates
 - Long acting
 - Short acting
- Beta-blockers
- CCB's

Antihypertensive Therapy

- ACE/ARB
- CCB
- Beta-blocker

DVT/PE

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Risk Factors for DVT/PE

- Patient history
- Hypercoagulable Disorders
- Immobility
- Atrial Fibrillation
- Medications
- Smoking
- Cancer

Medications – Increased Risk of DVT/PE

- Estrogen
- Megesterol
- SERM

Important Considerations DVT/PE Treatment

- Drug Selection
 - LMWH
 - Heparin
 - NOACs
 - Warfarin
- Acute phase versus maintenance
- Length of Therapy
 - First Episode (usually 3 months)
 - Known Cause
 - Risk Factors

Hypertension Pearls

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Complications/Risks

- MI
- Stroke
- Kidney
- Vision
- Heart Failure
- Aneurysm

Goals

- JNC-8
 - <150/90
 - Exception: 140/90
 - CKD
 - Diabetes

Drug Induced Hypertension

- NSAIDs
- Stimulants
- Corticosteroids
- Estrogen
- SNRI's
- ESA's

Hypertension Medications

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ACE Inhibitors

- Common Side Effects
 - Cough
 - kidney impairment
 - low blood pressure
 - hyperkalemia

Clinical Pearls

- ACE inhibitors can exacerbate CKD, but can also help be renal protective
- Lisinopril most commonly used
- Classic medication cause of angioedema (extremely rare)
- In some cases, African Americans may not respond to ACE Inhibitors as well as other ethnicities
- Avoid ACE/ARB combo

Compelling Indications

- Diabetes
- Stroke
- CAD
- CKD
- CHF

Angiotensin Receptor Blockers

- Losartan
- Valsartan
- Irbesartan

ARB Clinical Pearls

- Think ACE minus the cough
 - Hyperkalemia
 - Kidney function
 - Angioedema
 - Similar compelling indications

Thiazide Diuretics

- Memorable Side Effects
 - Increase urine output
 - Frequent urination
 - Electrolyte depletion
 - Low blood pressure
 - Hyperuricemia
 - Hypercalcemia
 - Increased risk of kidney failure

Use Caution

- Gout
- Poor kidney function ($\text{CrCl} < 30$)
- Timing near night
- Hyperglycemia

Calcium Channel Blockers

- Dihydropyridines – amlodipine, nifedipine, felodipine
- Non-dihydropyridines – verapamil, diltiazem
- Dose dependent edema
- Constipation
- Simvastatin interaction

Calcium Channel Blockers

- Compelling Indications
 - Angina
 - Atrial Fibrillation (diltiazem, verapamil)
 - CVD risk
- Caution
 - Heart failure

Beta-Blockers

- Cardioselective
 - Metoprolol
- Non-selective
 - Propranolol
- Alpha and Beta blockade
 - Carvedilol

Beta-blockers

- Compelling Indications
 - CHF
 - MI
 - Angina
 - Afib

Beta-blocker Pearls

- Asthma
- Pulse
- Hypoglycemia masking
- Non-selective uses
 - Tremor
 - Esophageal varices
 - Thyroid storm
 - Migraine

Alpha-Blockers (for hypertension)

- Doxazosin
- Prazosin
- Terazosin

Alpha-Blocker Pearls

- Orthostasis
- BPH compelling indication
- Typically dosed at night
- Prazosin off label for nightmares

NOACs

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Factor 10A Inhibitors

- Gaining popularity
- Drug interactions
- Less monitoring
 - Is that good or bad?
- When might you not choose them
 - Prosthetic valves
 - Adherence issues ($t_{1/2}$ longer for warfarin)
 - CKD

Factor 10A Inhibitors - Differences

- Rivaroxaban
 - Once daily
 - 3A4/P-glycoprotein interactions possible
 - <30mls/min avoid use
- Apixaban
 - Twice daily
 - Possible dose adjustments based upon age, creatinine, weight
- Edoxaban
 - >95 mls/min boxed warning (stroke)
 - Once daily

Dabigatran

- Direct Thrombin Inhibitor
- GI bleed risk >75 y/o
- Reversal agent available
- Dose adjustment in CKD
- Twice daily

Peripheral Vascular Disease

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Factors That Can Contribute to PVD

- Atherosclerosis
- Hypertension
- Clot formation
- Viscosity of the blood

Peripheral Vascular Disease

- Ischemia
- Sharp, stabbing pain
- Pedal pulses absent
- Intermittent claudication
- Risk Amputation

Medications

- Blood thinners
- Statins
- Pentoxifylline
- Cilostazol
- Antihypertensives

Warfarin

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Warfarin Common Indications

- Atrial Fibrillation (2-3)
- DVT/PE (2-3)
- Prosthetic Mechanical Mitral Valve
 - 2.5-3.5
- Lower goals
 - High bleed risk
 - High fall risk

Warfarin - Pharmacokinetics

- Metabolized by
 - S-warfarin: CYP 2C9 (potent)
 - R-warfarin: CYP 1A2, 2C19, 3A4
- Bound to albumin
- Half-life = 36-42 hours

Warfarin – Adverse Effects

- Bleeding
- Purple Toe Syndrome
- Don't load warfarin

Warfarin – How long does it take to work?

- Half-life of clotting factors
 - II 60 hrs
(prothrombin)
 - VII 6 hrs
 - IX 24 hrs
 - X 40 hrs
(reduction of II and X = prolongation of PT)
- Half-life of anticoagulants
 - Protein C 6 hrs
 - Protein S 72-96 hrs

Causes of INR Variation

- Adherence
- Diet
- Drug Interaction
- Changes in Disease States
 - Liver
 - CHF
 - Fever

Vitamin K

- Elevated INR and bleeding
- INR greater than 9
- Not going to work instantly
- Transfusion for acute, severe blood loss
- INR 5-9, no bleeding
 - May give vitamin K, don't have to