Diabetes; Introduction

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

Diabetes; The Medications

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
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?
Hypertension

- ACE OR ARB
- CCB
- Thiazide

Table 1. Statin Therapy

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Definition</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Daily dose lowers LDL-C by &lt;30%, on average</td>
<td>Simvastatin 10 mg, Pravastatin 10-20 mg, Losartan 20 mg, Fluvastatin 20-40 mg, Pitavastatin 1 mg</td>
</tr>
<tr>
<td>Moderate</td>
<td>Daily dose lowers LDL-C by approximately 30% to &lt;55%, on average</td>
<td>Atorvastatin 10-20 mg, Rosuvastatin 5-10 mg, Simvastatin 20-40 mg, Pravastatin 40-80 mg, Losartan 40 mg, Fluvastatin XL 80 mg, Fluviol 40 mg bid, Pitavastatin 2-4 mg</td>
</tr>
<tr>
<td>High</td>
<td>Daily dose lowers LDL-C by approximately &gt;55%, on average</td>
<td>Atorvastatin 40-80 mg, Rosuvastatin 20-40 mg</td>
</tr>
</tbody>
</table>

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

Meded101.com
Causes of Hyponatremia

- Diuretics
- SIADH
- Heart Failure
- Cirrhosis
- Polydipsia

Symptoms of Hyponatremia

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

SIADH

- Overescretion 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

Meded101.com
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
  • Colestyramine
  • Sucralfate
  • Iron

Hyperthyroidism

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

Anemia

Meded101.com
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

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
- 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

- 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
  - Antibiotics
    - Sulfas
    - Penicillins
    - Macrolides
- SJS risk
  - Antiepileptic (i.e. carbamazepine, lamotrigine)
  - Allopurinol
  - Penicillins
- **Timing, Timing, Timing
Yeast Infection
- Candida albicans
- Risks
  - Diabetes
  - Antibiotics
  - Immunosupression
- 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 Risks
- Clots
- CHD
- Breast Cancer
- Endometrial Cancer

Estrogen Replacement
Meded101.com
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)

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

Oncology

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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
  - Leuprolide

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

- 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

TDap

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

Eye Disorders

- Macular Degeneration
- Glaucoma
- Diabetic Retinopathy

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
Meded101.com

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

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

- Meded101.com

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

- ≤ 2 times/week – use of albuterol
- ≤ 2 nighttime awakenings/mo
- > 2 refills per year on rescue

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
- S
- 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
Meded101.com
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 ½ life
• Naproxen
  • OTC
  • Longer ½ 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
  • OTC
  • Conversion sucks
  • Sometime seen in hospice

Topical Medications

• Good option for elderly if only a few locations of pain
• Capsaicin
  • Avoid prn use
  • Substances 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)
NSAIDs – Risk in the Elderly

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• HTN

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Rheumatoid Arthritis

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

DMARDs

• Methotrexate
• Sulfasalazine
• Hydroxychloroquine

DMARDs - Biologics

• Injection site reaction
• Infection risk

Medications

• Steroids
• NSAIDs
Delirium

**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
  - Benzodiazepines
  - 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

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

- 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

- Weight Loss
- Malnutrition
- Poor intake
- Inactivity
- “Frail”

Failure to Thrive - Associations

- Cancer
- Stroke
- GI Surgery
- Depression
- Frequent UTIs/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
  - TCAs
  - 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
  - Medicine
  - Antiemetic
  - Anxiety
Dizziness Follow Up
- Timing of Falls
- Medication changes
- Vitals
- Diagnosis

Orthostasis

Causes of Orthostasis
- Medications
- Dialysis
- Medical
  - Parkinson’s
  - Dehydration

Treatment of orthostasis
- Remove offending medication
- Fludrocortisone
- Midodrine

Physiological Changes in the Elderly

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

<table>
<thead>
<tr>
<th>Stage</th>
<th>Qualitative Description</th>
<th>Renal Function (ml/min/1.73 m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kidney damage-normal GFR</td>
<td>≥90</td>
</tr>
<tr>
<td>2</td>
<td>Kidney damage-mild ↓ GFR</td>
<td>60-89</td>
</tr>
<tr>
<td>3</td>
<td>Moderate ↓ GFR</td>
<td>30-59</td>
</tr>
<tr>
<td>4</td>
<td>Severe ↓ GFR</td>
<td>15-29</td>
</tr>
<tr>
<td>5</td>
<td>End-stage renal disease</td>
<td>&lt;15 (or dialysis)</td>
</tr>
</tbody>
</table>

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 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

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)
  - Estragen

Overflow

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

Changes in Regularity

- Diet
- Exercise
- Fluid intake
- Drugs
- Disease

Diarrhea and Constipation

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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
- 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
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 SSRIs
  • Remember which symptoms you're 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
<table>
<thead>
<tr>
<th>Medications for Nausea/Vomiting</th>
<th>Dopamine Antagonists</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ondansetron</td>
<td>• Meclizine</td>
</tr>
<tr>
<td>• Serotonin activity (5-HT3)</td>
<td>• Prochlorperazine</td>
</tr>
<tr>
<td>• Rare issue, but look out for other serotonergic meds</td>
<td>• Metoclopramide</td>
</tr>
<tr>
<td>• Be cautious with other QTc Prolonging agents</td>
<td>• May have serotonin activity as well</td>
</tr>
<tr>
<td></td>
<td>• *Movement disorders</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Corticosteroids</th>
<th>Classic Medication Causes of Nausea/Vomiting</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Dexamethasone</td>
<td>• Antibiotics</td>
</tr>
<tr>
<td>• Chemo</td>
<td>• Acetylcholinesterase inhibitors</td>
</tr>
<tr>
<td>• Risks</td>
<td>• GLP-1</td>
</tr>
<tr>
<td>• GI Upset</td>
<td>• Digoxin toxicity</td>
</tr>
<tr>
<td>• OR Cushing’s, etc.</td>
<td>• Opioids</td>
</tr>
<tr>
<td></td>
<td>• Metformin</td>
</tr>
<tr>
<td></td>
<td>• NSAIDs</td>
</tr>
<tr>
<td></td>
<td>• Iron</td>
</tr>
<tr>
<td></td>
<td>• Antidepressants</td>
</tr>
<tr>
<td></td>
<td>• Alcohol</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pancreatitis</th>
<th>Pancreas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Major roles</td>
</tr>
<tr>
<td></td>
<td>• Digestive enzymes</td>
</tr>
<tr>
<td></td>
<td>• Insulin</td>
</tr>
</tbody>
</table>

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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)
  - Fibates
  - 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, Sulf/Amp
  - 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 (if 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

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

Infections

- **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 (Prevpac 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

• 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 (Pencillin)
- 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, prostatic)
  - Vancomycin (inpatient, empiric gram positive)
  - Linezolid
    - MRSA/ MSSA
  - Quinolones (gram negative)

Pneumonia

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

- Polysaccaride-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 fluoroquinolone

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
  - Sulf/TMP
  - Tetracycline

Animal/Insect Bites

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

Tuberculosis

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

Tuberculosis

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

Opportunistic Infections
- PCP (Pneumocystis pneumonia)
  - SulfamethoxazoleTMP
  - 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: >10^3 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/macrocrystals
  - 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 SSRIs
  - Not a controlled substance

Bipolar Disorder/Schizophrenia

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
- SSRIs
  - Can induce mania
  - Often used with mood stabilizer (i.e. Lithium, VPA, Carbamezapine)
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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- 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

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

Insomnia Concerns
• Common Complaint
• Troubles
  • Getting to sleep
  • Staying asleep
• Quality of Life
• Motivation
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

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
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
- MAOI’s
  - Noradrenergic

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

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### 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
- Meded101.com

### Types of Stroke
- Hemorrhagic
- TIA
- Ischemic
  - Local (Atherosderotic)
  - 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/Dypiridimole)
- Clopidogrel
  - Ticlopidine - neutropenia
- Aspirin

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
  - Phenytoin is metabolite
  - Sedation
  - Confusion
  - Fall risk

Drug Induced Tremor

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

Acute Coronary Syndromes

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
- 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 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

• 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

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

Complications/Risks

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

Goals

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

Drug Induced Hypertension

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

Hypertension Medications

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 (CrCl <30)
- Timing near night
- Hyperglycemia
Calcium Channel Blockers

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

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

Caution
- Heart failure

Beta-Blockers

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

Compelling Indications
- CHF
- MI
- Angina
- Afib

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

Factor 10A Inhibitors

• Gaining popularity
• Drug interactions
• Less monitoring
  • Is that good or bad?
• When might you not choose them
  • Prosthetic valves
  • Adherence issues (1½ 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

NOACs

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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

- 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

Activities of Daily Living and Instrumental Activities of Daily Living

Activities of Daily living (ADL’s)

- Feeding
- Dressing
- Grooming
- Toileting
  - *necessary for survival
Instrumental Activities of Daily Living (IADL’s)

- Financial management
- Following directions/medication management
- Meal preparation and planning
- *not necessarily required for survival, but necessary to be able to function independently in society

Disease Progression

- IADL’s will typically become more challenging before ADL’s
- Inability to perform IADL’s can lead patients to be very vulnerable to financial elder abuse
- ADL’s will typically become more challenging with nearing end stage of the disease process
- IADL and ADL will help determine level of care needed
  - Home care
  - Assisted living
  - Nursing home care

Advance Directives

- Patient wishes for their healthcare
- Will outline certain situations and how much and what type of care the individual will want
- Written document
- Designates an “agent”

Medical Requests

- Must be reasonable medical practice
- Usually preference regarding common things are spelled out
  - Types and extent of medical treatment desired
  - CPR
  - Ventilation
  - Tube feedings
  - Medication use
  - Hydration

Advance Directive

- Agent – person who carries out wishes of patient
  - MUST FOLLOW THEIR DESIRES
- In the event of an unforeseen scenario
  - Agent must follow wishes to the best of their ability as to what the patient would want
- Agent
  - Needs to be 18 years old
  - Not mandatory to have advance directives
Beer’s List

Cardiology
- Alpha Blockers
  - Non-selective
  - Avoid for just hypertension
  - Possible role in BPH
- Central acting
  - Clonidine
- Digoxin – dose limit
- Antiarrhythmics
  - Flecaïnide
  - Propafenone
  - Amiodarone

Anticholinergics
- TCA’s
- 1st Generation antihistamines
- Parkinson’s disease

Analgesics/Antispasmodics
- Skeletal Muscle relaxants
  - Methocarbamol
  - Cyclobenzaprine
- NSAIDs
- Meperidine

CNS Medications
- Antipsychotics
- Sleepers
  - Z-drugs
  - Anticholinergics
- Benzo’s
- Barbituates

Endocrine/Women’s Health
- Endocrine
  - Sliding Scale
- Sulfonylureas
  - Chlorpropamide
  - Glyburide
- Women’s health
  - Estrogen replacement
Gastrointestinal

• Metoclopramide
• Mineral oil
• Megestrol

Basic Biostatistics 1

Types Of Data

• Nominal
• Ordinal
• Continuous

Hypothesis Testing

• P-value – probability that what you found in your study is not true in reality
• Ho – Null hypothesis
• Ha – Alternative hypothesis

Example P-value

• Dementia drug improves activities of daily living scores
  • Compared against placebo
  • Ho = no difference
  • Ha = there is a difference
  • P = 0.03
  • 3% chance that your study is wrong
  • P-value is less than 0.05, so Ha is accepted

Type 1 and Type 2 error

• Alpha
  • Detecting a difference in your study when one doesn’t exist (Type 1 error)
• Power
  • 1-beta
  • Beta is usually set at 0.2 or studies are usually powered at the 80% level
  • How likely are you able to detect a difference
• Type 2 error – you didn’t find a difference but one exists
Biostatistics 2

Clinical Literature outline

- Abstract – nutshell summary
- Intro – What are you investigating, what is the problem you are concerned with
- Methods/Materials – How did you look at trying to solve the problem
- Results – What happened, what did you learn
- Discussion – Interpretation of what your results mean

Risk

- Absolute Risk Reduction
  - Difference in percentage reduction from each group
  - Patient on Ranitidine – 2/100 got esophageal cancer
  - Patient on placebo – 5/100 got esophageal cancer
- Relative Risk Reduction
  - 2/100 divided by 5/100
  - Or 0.02/0.05 = 0.4 or 40% relative risk reduction

Number Needed to Treat and Harm

- Number needed to treat = NNT
- NNT = 1/ARR
- NNH = 1/AIR
- The higher the NNT, the less “effective” a treatment is
- The higher the NNH, the safer the medication is

Need More on Biostatistics?

- Practice questions
- Sample scenarios

Caregiver Stress and Burnout
### Caregiver education
- Understand what the patient is going through
- Expectations
  - Based upon disease progression
- Caregiver support
- Burnout

### Caregiver Burnout
- Significant Stress
- Insomnia
- Frustration/anger
- Anxiety
- Guilt
- Risk for abuse

### Ways to Improve/minimize burnout
- Accept help/recommend help
- Identify realistic goals
  - Identify things that the caregiver can actually do
- Support groups
- Take breaks and continue to do activities that bring the caregiver enjoyment

### Elder Abuse
- Neglect
  - Social isolation
  - Ignoring needs
  - Most common
- Physical abuse
  - Includes over medicating
  - Blunt trauma/injuries
  - Restraints
- Financial scheming
  - Often done by family or caregivers
    - They often rationalize
  - Outside schemes possible
- Verbal (threats, intimidation)
  - Fear
  - Scared to speak with others
  - Isolating
What to do if suspect elder abuse

• Call 911 if IMMEDIATE risk of harm
• Contact social services
  • Adult protective services
  • May have different name depending upon state/country/region
• If concerned in a long term care facility or assisted living
  • Contact ombudsman
• Healthcare professionals are generally considered mandated reports
  • Report if you suspect that abuse is happening

Hospice Care

Hospice

• Life expectancy less than 6 months
  • Determined by usual progression of disease
  • Physician/hospice may work together to make determination
• Possible indicators that hospice care may be warranted
  • Clear disease progression (NYHA stage 4)
  • Frequent healthcare visits (particularly ER, hospitalization)
  • Weight loss
  • CHF, COPD, Dementia, Parkinson's, Renal failure, cancer, AIDS, ALS, liver disease

Medications to Discontinue

• Statins
• Osteoporosis medications
• Herbs/supplements/vitamins
• Dementia medications
• Look at goals
  • A1C
  • Blood pressure

Careful with Abrupt Discontinuation

• Beta-blockers
• Clonidine
• Seizure meds
• Long term corticosteroids
• Benzos
• Opioids – likely not going to discontinue

Patient/Team/Family Decisions

• Listen to patient/family
  • What do they want?
  • Ask open ended questions?
• Listen to nursing/caregivers
• Relax goals, minimize meds, simplify life
• Administration challenges
  • Oral intake
Long Term Care Players

Structure

- Administration
- Nurse leadership (Director of Nursing – DON or DNS)
  - Nurse managers/unit managers
- Medical Director (in smaller facilities may not be that engaged)

Administration

- Pays your wages
- Important to stay on their good side
- Demonstrate your value
- Attend meetings
- Offer solutions and education
- Concern with medical director (possibly will address this with director of nursing)

Director of Nursing

- Likely going to be the place you go first when a problem is identified
  - Exceptions
    - Immediate clinical concern that needs an order change
    - Elder abuse
    - Concern with the director of nursing

Medical Director

- The leader of the provider team
- Ultimately makes clinical decisions for the patients/residents within the facility
  - Which influenza vaccine to give
  - How to handle our high fall rate
- Go to person if having challenges with another provider

Geriatric Teaching
Identifying Problems

- Care Centers (LTC/AL)
  - Report problems to nurse leadership, education leaders
- Tons of opportunities
  - Look for trends
  - Survey results
  - Community needs
  - Tabulate data if able, necessary
- Work with nursing, administration, providers, or community

Setting Up education

- What are your objectives
- Audience
- How to show improvement, retention of knowledge

Common Topics

- Medication errors
- Medication administration
- Psych/Dementia
- Infection/antibiotics
- Major disease states
  - Diabetes
  - Parkinson's