

Medication Matters: Impact on Evaluation & Treatment of Adult Patients

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SLPs, OTs, PTs are all key team members

- Diagnose and treat
- Monitor intended effects, unintended effects, and adverse drug reactions
- Nearly all medications have not only desired effects but side effects as well (undesired effects)
- Some medication side effects may mimic cognitive impairment, impact compliance with directions, negatively impact alertness, impact emotional liability, etc. which will impact both diagnoses and treatment

Polypharmacy: many medications

- **4+ medications**
- Often prescribed by different providers
- *PCP*
- *Specialists*
- *Urgent Care Centers*
- Over the counter, prescribed, or supplement
- – *Herbal therapy*
- – *OTC drugs*
- – *Discontinued prescription drugs*
- **May Cause:**
 - – Confusion
 - – Falls
 - – Malnutrition
 - – Renal/liver dysfunction
 - – Nonadherence

Medication Desired Effect

- The goal of the medication
- What we hope to have happen
 - *A BP med reduces blood pressure*
 - *An antihistamine minimizes allergic reaction*

Undesired Effect/Side Effect of Medication

- Problems that occur when treatment goes beyond the desired effect
- Or problems that occur in addition to the desired therapeutic effect
- *EX: a hemorrhage from the use of an anticoagulant (such as heparin) is a side effect caused by treatment going beyond the desired effect*
- *EX: the common side effects of cancer treatment including fatigue, nausea, vomiting, decreased blood cell counts, hair loss, and mouth sores are instances of side effects that occur in addition to the desired therapeutic effect*

Allergic Reaction

Drug allergy → immune system mistakenly identifies the drug or medication as a harmful substance and attacks it (antibody response)

- Most often happens when your immune system has become sensitive to a drug or drug class

Anaphylaxis → specific allergic reaction

- Life threatening
- 2 or more systems- call 911 or activate code immediately

Sensitivity

- Non allergic reactions, not rooted in immune response

Medication Errors

- Error of execution- failure of a plan to be completed as intended
- Error of planning- use of the wrong plan to achieve a goal
- Any error occurring in the medication-use process
- Examples include:
 - *Wrong dosage prescribed*
 - *Wrong dosage administered for a prescribed medication*
 - *Failure to give (by the provider) or take (by the patient) a medication*
 - *Handwriting errors, issues with legibility are a factor*

Medication Nonadherence

- Few geriatric/ immigrant/ ELL pts. food **and** drugs ask questions
- Don't understand or follow regimen
- Misread dosage instructions
- Under or overdose
- More likely to have serious side effects
- Patient may not be able to afford
- Inadequate prescription coverage
- Delay purchase or not purchase
- Cut medications to make prescriptions last longer
 - *Cut pills in half*
 - *Skip doses*

Adverse Drug Event

- Any injury due to medication
- Include a wrong dosage leading to injury
- Rash, confusion, or loss of function
- An allergic or allergic like reaction occurring in a patient not previously known to be allergic to a given medication
- 25% or more of ADEs associated with a medication error are considered preventable
 - *At least 1.5 million preventable ADEs occur each year*

Adverse Drug Reactions

Increased risk with higher doses

More frequent in older patients

Patients with renal or liver dysfunction

Cognitive impairment increases with number of medications

Medications most associated with cognitive impairment as an ADR

- Alcohol
- Antipsychotics
- Anticholinergics
- Analgesics
- Seizure medications
- Changes activity of neurotransmitters that depress CNS function
- Histamine
- Serotonin
- Dopamine
- GABA
- Acetylcholine

Pharmacokinetics:

- How a body handles the drug or medication administered
 - *Drug absorption*
 - *Drug distribution*
 - *Drug metabolism: process of inactivating the medication*
 - *Drug excretion: process of filtering the drug from the blood and excreting it from the body*
- All aspects of pharmacokinetics are impacted by:
 - *Aging*
 - *Hydration status*
 - *Other medications*
 - *Medical conditions*
 - *Renal and other organ function*

Older and Sicker people

- Don't clear medications as quickly
- Often peak effect happens at a different time, sooner or later than expected
- Half life is different
- Narrower therapeutic indexes- where treatment is efficient and effective and not toxic
- Increased or decreased sensitivity to the medication

As the patient ages:

- Body composition changes- muscle, fat, skeletal mass (creatinine due to muscle breakdown and kidney reliance)
- Increased dehydration risk
- Decreased strength
- CNS: decreased number of dopamine receptors (control movement, emotion, cognition)
- Cells: increased DNA damage and decreased repair capacity
- Vascular: decreased vasodilation, increased hypertension
- Joints: degeneration of cartilage and loss of elasticity
- Kyphosis- osteoarthritis: struggle to protect the airway during swallow due to reduced movement speech and elasticity

Falls

- The use of sedatives and hypnotics, antidepressants, and benzodiazepines demonstrated a significant association with falls in elderly individuals
- Falling/fall related injuries lead to catastrophic disability
- – 20 to 40% of individuals age 65 years and older fall every year
- – 50% who fall repeatedly do so
- Risk factors
 - Muscle weakness, dizziness, disease related conditions
 - Medications
 - Decreased cognition

Cognition and Aging and Illness

- Difficulty:
 - – selectively attending to information
 - – inhibiting irrelevant information or stimuli
 - Frontal lobe atrophy with aging
 - Link between high blood pressure in midlife and increased risk of cognitive decline
- Risk factors
 - – Diabetes (impacts both cognition and swallow function)
 - – Physical inactivity
 - – High LDL cholesterol
 - – Obesity
 - – Cognitive abilities involving speed and problem solving decline w normal aging

GI Tract and Aging

- Changes in bolus timing begin at age 40 as it moves through esophagus/ peristalsis
- Decreased blood flow
- Constipation
- Decreased desire to eat, may see drooling

Internal organs and aging

- Liver: reduced blood flow, reduced mass results in poorer metabolized medications- changes in blood levels of medications
- Kidneys: changes in blood flow, decreased filtering, changes in blood levels of medications, impacted by dehydration (elderly lose the sensation of a need to drink)
- Dehydration leads to mental status changes and thickening of secretions
- Cardiac: decreased blood flow, issues with vessel elasticity and dilation, heart rate doesn't adjust with drop in BP → syncope

PNS and aging

- Difficulty maintaining blood pressure at constant level
- Decreased
 - – sensing and processing of stimuli
 - – fight or flight response
 - – responses of Heart, GI tract, lungs
- Clinical manifestations
 - – Syncope
 - – Exaggerated response to drugs for • depression • sleep disorders
 - – Decreased response to B blockers
- Meds that manage cardiac arrhythmias are often added

Pulmonary System and Aging

- Decreased
 - – Vital capacity: Maximum air expelled: Forced expiratory volume in one second
- Increased
 - – Residual volume: Air in lungs after maximal expiratory effort
 - – Ventilation/Q perfusion mismatch
- **Clinical manifestations**
 - – Increased SOB w vigorous exercise if normally sedentary or if done at high altitudes
 - – Increased risk of death from pneumonia (if huffing and puffing, vocal cords are open and airway is not protected)
 - – Increase risk of serious complications for points with pulmonary disorder

Sensation Changes with Age

- **Ears**
 - Loss of high frequency hearing
 - – Decreased ability to recognize speech
 - – Decreased perception of food texture: can't hear the Crunch- changes perception of texture
- **Eyes**
 - Decreased lens flexibility
 - Increased– time for pupillary constriction/dilation may lead to cataracts
 - Presbyopia: Difficulty focusing on close objects
 - Decreased visual acuity
 - Increased glare
 - Difficulty with depth perception (dropped food, spilled fluids, misplaced cups)
 - Difficulty adjusting to change in lighting

Senses and aging

- **Nose**
 - Decreased smell
 - Mistaken as loss of taste: Can't taste if you can't smell → Decreased taste and as a consequence decreased appetite
 - Increased risk of nosebleeds due to thinning of membrane
- **Taste**
 - Decreased stereognostic tongue function – ability to sense bolus size/shape during processing
 - Taste buds on tongue/epithelium of palate → saliva and dissolved tastants contact taste receptor cells → Impulse sent to parietal-temporal cortex of brain
 - Reduced taste sensitivity as individuals age ("everything tastes the same")
 - – Salt/sour sensitivity reduction in 80% of studies
 - – Sweet and bitter sensitivity reduction in 70% of studies
 - – Greater losses in sour/bitter tastes with aging

Taste and Smell

- Oral cares are essential to increase taste and enjoyment of p.o. intake
- Increased dependence on medications alters taste perception
- Drugs impacting taste:
 - – Lipid lowering drugs
 - – Antihistamines
 - – Antibiotics
 - – Anti-inflammatories
 - – Bronchodilators
 - – Asthma drugs
 - – Antihypertensives
 - – Parkinson's medications
 - – Antidepressants

Dentition

- **Dentures:**
 - Poor fit
 - Tooth and bone loss
 - *Toothless individuals tend to take larger bites putting them at risk due to decreased UES opening or esophageal motility OR lack of airway protection*
 - Dry mouth?
 - Bite force reduced by dentures
 - Poor stability for mastication
- Check for thrush, mouth sores, dry mouth
- Can all lead to dehydration or malnutrition (increases with length of time in a facility)

Dehydration

- **Causes:**
 - Fluid loss from vomiting/diarrhea
 - Elevated temp/fever, infection
 - Fluid restriction
 - Excess use of diuretics and laxatives
 - **Patient's room temperature (too hot)**
 - Large amounts of alcohol, caffeinated beverages
 - Dysphagia
 - **Nine or more medications**
- **May cause**
 - Thick ropey saliva
 - Confusion
 - Constipation
 - Skin breakdown
 - Renal insufficiency
 - Heartburn
 - Angina
 - Arthritis
 - Back pain
 - Cancer
 - Colitis
 - Cracked lips
 - Dark urine

Medication Administration

- **Oral: swallowed**
 - Slower absorption
- **Intravenous**
 - Instantaneous and complete absorption
- **Intramuscular**
 - Faster, more complete absorption than oral
- **Subcutaneous**
 - Slower absorption than intramuscular
- **Buccal and sublingual**
 - Direct absorption bypasses first pass metabolism
- **Rectal: suppository**
 - Partial avoidance of first pass effect
- **Inhalation**
 - Rapid absorption two degrees large thin alveolar surface area
- **Topical**
 - Usually slower absorption
- **Transdermal**
 - Very slow absorption: first pass effect avoided
- **Instillations**
 - to the eye, ear, nose: direct application

What Changes Absorption?

- Food
 - Slow emptying w solid, hot, fatty food
- pH levels
- Blood flow/poor circulation
- Exercise
 - Blood flow to GI tract decreased
 - Blood diverted to peripheral muscles
- Pain
 - Slows emptying
- Stress
 - Slows emptying
- Hunger/fasting
- IM (intramuscular) drugs
 - Absorbed faster in muscles w more blood vessels
 - Slower absorption in subcutaneous tissue fewer blood vessels

Pharmacokinetic Interactions

- **Absorption**
 - *When two or more drugs administered at same time*
- Absorption rate can change
- One drug blocks, decreases or increases absorption rate of another
- Decrease/increase gastric emptying time
- Change gastric pH
- Form drug complexes

Medications and Concerns

BEERS List

- Potentially inappropriate medications to avoid or use with caution in older adults
- [BEERS list 2015](#)
- Applicable to all older adults except those in palliative or hospice care

Impact of Medications

- **Motor function**
 - – Anticonvulsants
 - – Antipsychotics
 - – Antianxiety
 - – Impact
 - *Anticipatory, oral, and pharyngeal phase*
- **Lubrication**
 - – Dry mouth
 - – Impacts upper digestive tract
 - – Impacts
 - *Oral phase*
- **GI motility**
 - – Antipsychotics
 - – Antihistamines
 - – Impacts
 - *Motility, gastric emptying, and LES function*
 - May Create
 - – Chest pain
 - – Heartburn
 - – Gastroesophageal reflux
 - – Esophageal injury

Impact of Medications (cont.)

- **CNS impact**
 - – Anticonvulsants
 - – Benzodiazepines
 - – Narcotics
 - – *Impacts anticipatory phase*
 - Skeletal muscle relaxants
 - – *Impacts anticipatory phase*
 - Dysphagia from
 - – Decreased level of alertness
 - – Suppression of brain stem swallow function
- – Movement disorders
- – Decreased oropharyngeal sensation
- – Saliva production

• ASHA Guidelines for VFSS: first thing to consider if change in swallow is medications

Concerns with Medication Intake

- Ability to swallow medications without chewing
 - – *Some medications cannot be crushed, broken or chewed*
- Vallecular pooling of medications
 - – *Irregular absorption and lack of clinical response*
- Esophageal motility compromises absorption
- Increased risk when new drugs trialed or dosage adjustment made

Medication Pass: Crushing

- May alter effect
- Can't crush time release medications
- Applesauce/pudding with medication
 - – Valleculae/pyriform residue on MBS? That is where the med will sit
- Pill not marked for cutting?
 - – *Which half contains drug vs. excipient? (material used to hold drug)*
- Clean cutter/crusher after each use to prevent cross
 - *Contamination*
- **Mixing with Food?**
 - Yogurt best if clinically necessary to mix medications with food
 - *Better oral processing in dysphagic patients without severely limiting drug dissolution*
 - *Variability in composition and textural attributes between brands*

Medications: Drug-Food Interaction

- Dairy decreases absorption of multivitamin and antibiotics
- Green leafy vegetables?
 - – Coumadin bad mix
- Aged cheese? Wine? Beer?
 - – *Yeast causes blood pressure to spike if on antidepressants*
- Bananas: bad with ACE inhibitors
 - – *Too much potassium causes irregular heartbeat*
- No grapefruit juice/grapefruit

Medication Induced Dysphagia

- Impact motor function
 - – Anticonvulsants
 - – Antipsychotics
 - – Antianxiety agents
- Impact anticipatory phase, oral prep phase, oral phase and initiation of pharyngeal swallow
 - – Influence
 - CNS neurotransmitters
 - Dopamine
 - Serotonin
 - Gamma amino butyric acid (GABA)
 - Lubrication
 - – Inhibit neurotransmitter acetylcholine
 - – Results in xerostomia
 - – Affects lubrication of upper digestive tract and saliva secretion
 - – Impacts oral prep and oral phase

NSAIDs Potential Side Effects Impacting Therapy

- Advil, ibuprofen, aspirin, Celebrex, Aleve
 - – GI toxicity
- May exacerbate heart failure, promotes fluid retention, increased risk of GI bleed/bleeding ulcers in stomach so then people take PPI (proton pump inhibitors) to protect stomach
 - *Long term PPI use has negative side effects including bone loss and c-diff
- Hematologic
 - – Clotting (platelet aggregation)
- GI
 - – GI ulceration
 - – Severe GI bleed
 - – Indigestion
- Renal
 - – Sodium and water retention
 - – Decreased urine output (oliguria)
- CNS
 - – **Memory loss**
 - – **Confusion**
 - – Dizziness
 - – Headache
- Dysphagia
 - – **Aspirin associated xerostomia**
- Other
 - – Diarrhea
 - – Gas
 - – Cramps

Antipsychotic Potential Side Effects Impacting Therapy

- Sedation
- Impair mental or physical abilities
- Decrease appetite
- Decrease attention to eating
 - – Seen upon initiation of treatment or immediately after dose change
- Drowsiness
- – Inhibition of dopaminergic transmission over time
- – Potentially irreversible, involuntary dyskinesic movements
- – 14% of patients treated with antipsychotics
- TD movements impinge on
 - – **Oral prep hindering mastication**
 - – **Oral phase delaying onset of swallow**
- Antipsychotic Extrapyramidal Side Effects: Tardive dyskinesia

Chemotherapy Potential Side Effects Impacting Therapy

- Side effects
 - – Stomatitis
 - – Odynophagia: pain with mastication and swallowing
 - – Oral bleeding
 - – Dehydration
 - – Heartburn
 - – Nausea/vomiting
 - – Sensitivity to salty, spicy and hot/cold foods
- Begins seven to ten days after initiation of therapy and may continue up to 45 days after chemo
- Immunosuppression induced by chemo and radiation
- Dental caries w periodontal disease
- Xerostomia
- Hearing loss
- Cognitive decline

ACE-inhibitor Side Effects (antihypertensives)

- **Ace Cough**
 - 1/3 w ACE inhibitors develop ACE cough
 - Cough doesn't go away when med stopped
 - More women than men
 - More African Americans and Asians than others
 - Treated for sinusitis, bronchitis, sore throat, laryngitis, asthma, and other respiratory conditions as a **result of ACE-inhibitor therapy**
 - ACE inhibitors affect kidneys ability to filter impurities from blood
 - Meds less effective and toxic levels build up
 - Coughing is body's attempt to expel kinins from lungs: takes months to eliminate

Anticholinergic Potential Side Effects Impacting Therapy

- Side effects
 - Confusion, dry mouth, constipation, memory loss, increased risk of fall
- Antihistamines, Benadryl, Antidepressants, Antipsychotics
- Use could result in misinterpretation-
 - *is it Dementia? Delirium (medication side effect)? Or delirium on top of dementia?*
 - Pull back on the medication and see what changes

Antidepressants: Potential Side Effects Impacting Therapy

- Cough
- Anxiety
- CNS impact
- Diarrhea/constipation
- Falls
- Tremors
- Decreased appetite
- Xerostomia
- Dysphagia
- GI: decrease appetite/interest in eating
 - – Nausea/vomiting
 - – Diarrhea
 - – Impaired GI motility
- – constipation
- Sedation/ Fatigue
 - – Impair mental/physical abilities
 - – Decrease appetite and decrease attention to eating
- Anticholinergic
 - – Dry mouth
 - – Constipation
 - – Urinary retention
 - – Slowed GI motility
 - – Decreased gastric secretions
 - – Bradycardia
 - – Cognition impairments
 - – Blurred vision

Benzodiazepine: Xanax | Alprazolam

- Used to treat anxiety
- Many sick and geriatric patients have anxiety diagnoses or take medications intended for anxiety
- Due to chronic illness (ex: COPD), aging, etc.
- Side effects: cognitive impairment, delirium, falls
- Therapy adjustment: 2-3 hours post dose fall risk increases and cognition is most impaired- consider therapy times, meal times, when does patient walk in halls?

Benzodiazepines for Anxiety:

Potential Side Effects Impacting Therapy

- Dysphagia likely impacted by:
 - – Anorexia
 - – Taste alterations
 - Chronic use may lead to:
 - – Significant pharyngeal phase dysphagia
 - – Cricopharyngeal incoordination
 - – Hypopharyngeal incoordination
 - – Aspiration
- – Sedation
- – Coordination disorders
- – Decreased concentration
- – Heartburn
- – Nausea/vomiting
- – Diarrhea
- – Constipation
- – GI pain

Seizure Medications Potential Side Effects Impacting Therapy

- Sedation
 - – Tolerance develops after seven to ten days
- Weight Loss/gain
- GI distress
 - – Indigestion (dyspepsia)
 - – Nausea/vomiting,
 - – Loss of appetite
 - – Constipation
 - – Diarrhea
- Gingival hyperplasia (enlargement/overgrowth of gums)
 - Mucosal injury associated with hypersensitivity reactions
 - – Mucosal/skin rash
 - – Ulceration
 - Muscle dysfunction
 - Cerebellum atrophy resulting in
 - – Skeletal muscle dysfunction
 - – Ataxia (lack of voluntary muscle coordination)
 - – Pronounced oropharyngeal dysphagia

Bipolar Medications: Lithium

Potential Side Effects Impacting Therapy

- Dysphagia impacted by:
 - – GI disturbance
 - – Xerostomia
 - – Tremors
 - – Neuromuscular weakness
 - – Ataxia
 - – Sedation
 - – Deglutitive inhibition of esophageal striated or smooth muscle
 - – Abnormal peristalsis
 - – Impaired mental abilities

Alzheimer's Medications

Potential Side Effects Impacting Therapy

- Nausea/vomiting
- Diarrhea/constipation
- Fatigue
- Confusion/agitation
- Anorexia
- Tremor
- Pain
- **Cough**
- CNH impact
- Muscle cramps
- Weight loss

Parkinson's Medications Potential Side Effects Impacting Therapy

- Diminished bowel movement/obstruction
- Increased intraocular pressure
- Respiratory depression
- Confusion/disorientation/ agitation
- Poor concentration
- Wandering thoughts
- Incoherent speech
- Illogical thinking
- Visual disturbances
- Hallucinations

Summary of Potential Herbal Side Effects

- Black cohosh: nausea
- Echinacea: temporary numbness/tingling of tongue, GI upset
- Evening primrose: GI upset, nausea
- Feverfew: gastric distress, mouth sores, muscle stiffness
- Garlic: heartburn, gastric irritation
- Black cohosh: nausea
- Ginger: gastric discomfort if not taken with food, anorexia
- Ginkgo biloba: gastric distress, vomiting, diarrhea
- Hawthorn: fatigue, nausea/vomiting, anorexia
- Milk thistle: nausea/vomiting
- Sage: nausea, vomiting, anorexia, oral irritation
- St. John's Wort: GI upset, dry mouth, confusion

Drug: Herb Interaction Risks

- Chamomile
 - – Interferes with anticoagulants
 - – Increases effect of sedatives
- Echinacea
 - – Avoid with corticosteroids
- Garlic
 - – Caution with prescription anticoagulants
- Ginger
 - – Caution with prescription anticoagulants
- – Increases absorption of all PO medications
- Ginkgo biloba
 - – Avoid with MAOI's
- Ginseng
 - – May increase effects of caffeine
 - – Decrease/increase anticoagulants

Resources for use

- When doing a chart review or medication review:
- Medscape.com
- Drugs.com