

Inappropriate Medications in the Elderly: What to Stop and Start

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Learning Objectives

- Understand the prevalence of inappropriate medication use in the elderly
- Review the physical changes of aging that impact the effect of a drug on the body
- List potentially inappropriate medication classes in the elderly
- Identify medications to stop and start for disease state management
- Identify medications to stop and start for optimized therapy in the nursing home setting

**UNDERSTAND THE PREVALENCE OF
INAPPROPRIATE MEDICATION USE IN
THE ELDERLY**

Definition

- Potentially inappropriate medication (PIM): any drug whose potential risks outweigh its potential benefits or that does not agree with accepted medical standards



Medication Use in the Elderly

- Seniors represent around 13% of the population, but consume 40% of prescription drugs and 35% of all over the counter drugs
- On average, 8.1 routine and 3.2 PRN medications are used per nursing facility resident
- 15% to 25% of drug use in seniors is considered inappropriate or unnecessary

Administration on Aging, 2012; Center for Disease Control and Prevention, 2012; National Council on Aging, 2014; Institute for safe medication practices: Protecting US Citizens from inappropriate Medication Use, 2007

Why should we care about potentially inappropriate medication use?

- Approximately 1/3 of hospital admissions in the elderly may be related to inappropriate medication use
- Drug related problems cost approximately \$4 billion/year in nursing home patients
- Adverse drug reactions would rank in the top 5 leading causes of death in the elderly

ASCP fact sheet. <https://www.ascp.com/articles/about-ascp/ascp-fact-sheet>

Adverse drug reactions in the Elderly

- Adverse drug reaction: any response to a drug that is noxious and unintended that occurs at human doses for prevention, diagnosis, or therapy
- Risk factors:
 - ↑# of meds
 - ↑# of conditions
 - ↑Age
 - ↓Creatinine clearance
 - ↓BMI

Adverse Drug Events

Adverse Drug Event: any injury due to the medical use of a drug

Serious Manifestation	Hospital Admission	Causes of Death
Falls	Antithrombotic med	GI Bleed
Orthostatic hypotension	Antidiabetic meds	Intracranial Bleed
Heart Failure	Diuretics	Renal Failure
Delirium	NSAIDs	

Pretorius, Gataric, Swedlund et al. Reducing the Risk of Adverse Drug Events in Older Adults. Am Fam Physician. 2013;87(5):331-336.

Estimates of the prevalence of adverse drug reactions in the elderly

- Community-dwelling: 10-20%
- **Long-term care residents: 10-25%**
- Leading to hospitalization: up to 30%
- During hospitalization: up to 45%

Hanlon JT, Schmadt KE, Koronkowski MJ, Weinberger M, Landsman PB, Samsa GP, Lewis IK: Adverse drug events in high risk older outpatients. J Am Geriatr Soc 1997; 45:943-948.
Onler G, Pedone C, Landi F, Cesari M, Della Vedova C, Bernabei R, Gambassi G: Adverse drug reactions as a cause of hospital admissions. J Am Geriatr Soc 2002; 50:1962.

Adverse Events Identified Among Medicare SNF Residents ~ 22% nationwide

Types of Adverse Events	Percentage
Events Related to Medication	37%
• Medication-induced delirium or other change in mental status	12%
• Excessive bleeding due to medication	5%
• Fall or other trauma with injury secondary to effects of medication	4%
• Constipation related to medication	4%
• Other medication events	14%
Events Related to Resident Care	37%
Events Related to Infections	26%
Total	100%

Levinson, D. Adverse Events in Skilled Nursing Facilities: National Incidence Among Medicare Beneficiaries. Department of Health and Human Services, February 2014.

Temporary Harm Events Identified Among SNF Residents ~ 11% nationwide

Types of Temporary Harm Events	Percentage
Events Related to Medication	43%
• Hypoglycemic episodes	16%
• Fall or other trauma with injury associated with medication	9%
• Medication-induced delirium or other change in mental status	7%
• Thrush and other non-surgical infections related to medication	4%
• Allergic reactions to medications	3%
• Other medication events	3%
Events Related to Resident Care	40%
Events Related to Infections	17%
Total	100%

Levinson, D. Adverse Events in Skilled Nursing Facilities: National Incidence Among Medicare Beneficiaries. Department of Health and Human Services, February 2014.

Percentage of Preventable Adverse and Temporary Harm Events

Types of Adverse Events	Percentage
Events Related to Medication	66%
Events Related to Resident Care	57%
Events Related to Infections	52%
Total	100%

Levinson, D. Adverse Events in Skilled Nursing Facilities: National Incidence Among Medicare Beneficiaries. Department of Health and Human Services, February 2014.

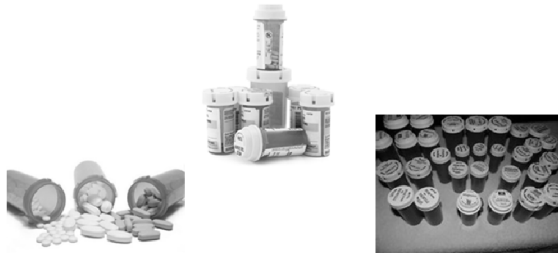
Geriatric Medication Mantra

"Any symptom in an elderly patient should be considered a drug side effect until proven otherwise."

- J. Gurwitz et al. Brown University
Long-Term Care Quality Letter, 1995.

Overutilization

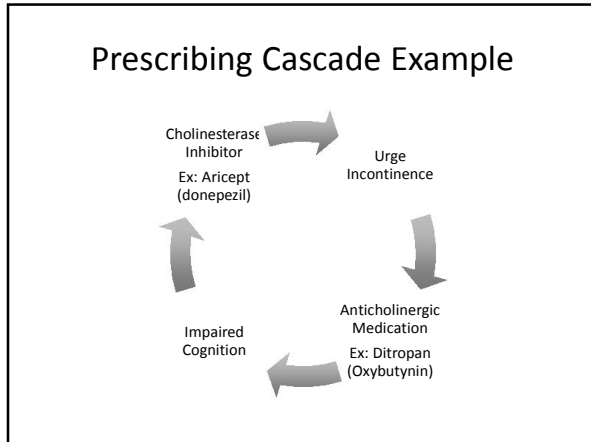
- Polypharmacy : use of many medications or any unnecessary medications



Prescribing Cascade

- Misinterpretation of an adverse drug reaction as a symptom of another condition leads to prescribing of another drug





- ### What tools are available?
- **Beers Criteria**
 - **STOPP/START**
 - MAI- Medication Appropriateness Index
 - IPET – Improved Prescribing in the Elderly Tool
 - Zhan – AHRQ
 - ACOVE – Assessing Care of Vulnerable Elderly
 - MRCI – Medication Regimen Complexity Index
 - NCQA-HEDIS
 - IMAP – Individual Medication Assessment and Planning Tool
 - GPGPA – Good Palliative Geriatric Practice Algorithm
 - SMOG – Screening Medications in the Older Drug User
 - ARMOR – Assess, Review, Minimize, Optimize, Reassess
 - TIMER – Tool to Improve Medications in the Elderly via Review
 - AOU - Assessment of Underutilization

- ### Beers Criteria
- Explicit criteria that defines potentially inappropriate medications for elderly patients
 - Designed to predict when risks outweigh benefits
 - Identifies 53 medications/classes to avoid in adults > age 65, as well as drugs to avoid with certain disease/syndromes
- American Geriatrics Society 2012 Beers Criteria Update Expert Panel. American Geriatrics Society updated Beers criteria for potentially inappropriate medication use in older adults. *J Am Geriatr Soc.* 2012;60(4):616–631.

**Prevalence of Beers list medication use
in the elderly**

- Community dwelling: 15-25%
- Long-term care residents: 40%
- During hospitalization: 35%

Willcox SM, Himmelstein DU, Woolhandler S: Inappropriate drug prescribing for the community-dwelling elderly. *JAMA* 1994, **272**:292-296.
Dhall J, Larrat EP, Laplane KL: Use of potentially inappropriate drugs in nursing homes. *Pharmacotherapy* 2002, **22**:88-96.

STOPP CRITERIA

- **S**creening **T**ool of **O**lder persons' **P**otentially inappropriate **P**rescriptions
- Arranged by physiological system
- Highlight drug class duplication, drug-drug interactions, and drug-disease interactions

Gallagher P, Ryan C, Byrne S, Kennedy J, O'Mahony D: STOPP (Screening Tool of Older Persons' Prescriptions) and START (Screening Tool to Alert Doctors to Right Treatment): Consensus Validation. *Int J Clin Pharmacol Ther* 2008, **46**(2):72-83.

START Criteria

- **S**creening **T**ool to **A**lert doctors to the **R**ight **T**reatment
- Highlight under-prescription or omission of clinically indicated, evidence-based medicine

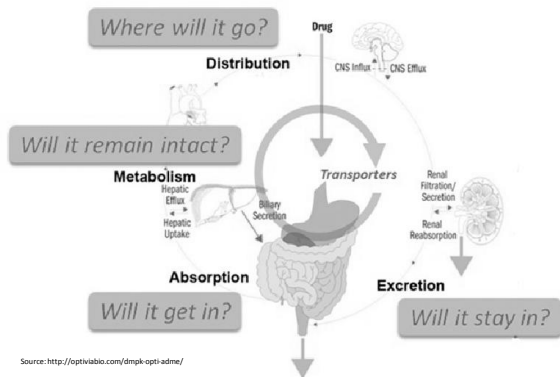
Barry PJ, Gallagher P, Ryan C, O'Mahony D: START (Screening Tool to Alert doctors to the Right Treatment) – an evidence-based screening tool to detect prescribing omissions in elderly patients. *Age Ageing* 2007, **36**:628-631.

Always consider the individual patient

- No criteria is universally applicable to all people
- Evaluate predicted harm vs. actual harm
- Use potentially inappropriate medication identification criteria as a starting point to educate health care providers and raise awareness

REVIEW THE PHYSICAL CHANGES OF AGING THAT IMPACT THE EFFECT OF A DRUG ON THE BODY

Normal Medication Physiology



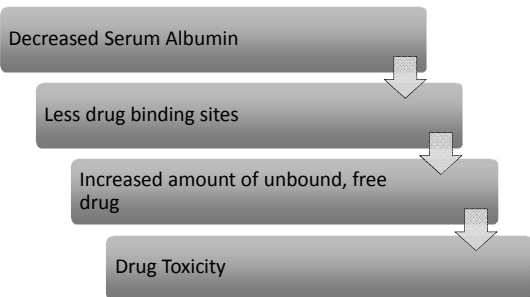
Absorption

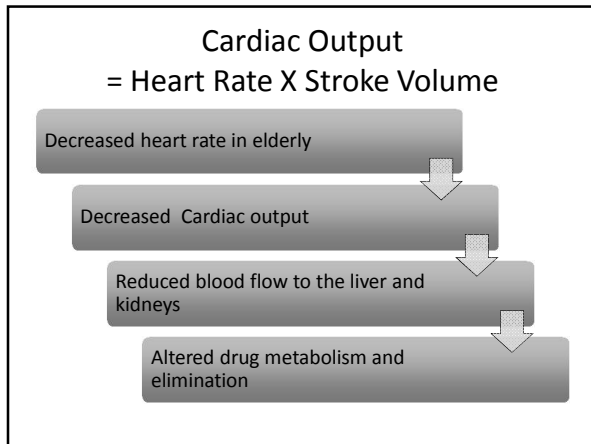
- Reduced intestinal blood flow
- Decreased rate of gastric emptying
- Decreased number of absorptive cells
- Alterations in gastric acidity

Body Composition

- **Decreased** body water
 - Decreases 10-15%
 - Water soluble medications require lower doses, due to higher concentration
 - Ex: Digoxin, lithium, theophylline, morphine
- **Increased** adipose (fat) tissue
 - Increases 35-45%
 - Fat soluble medications require lower doses, due to larger distribution in the body
 - Ex: Phenytoin, valproic acid, diazepam, lidocaine

Protein Binding





Liver & Kidney Function

- Liver (Hepatic system)
 - Decreased liver blood flow
 - Decreased liver size

Medications with significant hepatic metabolism:

- Diazepam
- Imipramine
- Meperidine
- Morphine
- Propranolol
- Theophylline

Metabolism

- Breakdown of drugs metabolized by Phase I reactions is reduced with aging
 - Medication examples: diazepam, theophylline, imipramine
- Reduced cytochrome P450 enzyme function

Liver & Kidney Function

- Kidneys
 - Decreased renal blood flow
 - Decreased renal mass
 - Decreased glomerular filtration rate and tubular secretory function

Medications with significant renal elimination:

- Allopurinol
- Amantadine
- Aminoglycosides
- Atenolol
- Cimetidine
- Ciprofloxacin
- Digoxin
- Famotidine
- Lisinopril
- Lithium
- Namenda
- Nizatadine
- Ranitidine
- Vancomycin

Elimination

- Normal glomerular filtration rate (GFR) is >90mL/min
- Starting around age 30-40, GFR decreases by ~1mL/min per year (~10mL/decade)
- Medication concerns begin at GFR <60mL/min
- Cockcroft-Gault Equation for estimating clearance:

$$\text{CrCl} = \frac{(140 - \text{age}) \times \text{Weight in Kg}}{\text{Creatinine}^* \times 72} \quad (\times 0.85 \text{ for females})$$

* Round serum creatinine to 1.0 if <1.0 in the elderly to avoid overestimation of clearance

Homeostasis

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graph TD; A[Baroreceptor function maintains blood pressure and perfusion] --> B[Baroreceptor function is blunted in the elderly]; B --> C[Postural hypotension]; C --> D[Dizziness, lightheadedness, falls];
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Organ Pathology

- Pathology of organ systems can enhance adverse effects of drugs
- Example:
 - The CNS adverse effects of anticholinergic agents may be worse in residents with underlying dementia than in a resident without confusion

Be watchful for not only new drugs, but also long-standing medications started at a younger age that have never been adjusted for patient aging or changes in renal and hepatic function.

**LIST POTENTIALLY INAPPROPRIATE
MEDICATION CLASSES IN THE ELDERLY**

Pain Medications

Avoid:

- NSAID use for longer than 3 months
- Chronic-use of opioids for mild to moderate pain
- Meperidine

Alternatives:

- Acetaminophen
- Topical Analgesics
- Treat the underlying cause

American Geriatrics Society 2012 Beers Criteria Update Expert Panel. American Geriatrics Society updated Beers criteria for potentially inappropriate medication use in older adults. *J Am Geriatr Soc*. 2012;60(6):616-631.
Gallagher P, Ryan C, Byrne S, Kennedy J, O'Mahony D. STOPP (Screening Tool of Older Persons' Prescriptions) and START (Screening Tool to Alert Doctors to Right Treatment): Consensus Validation. *Int J Clin Pharmacol Ther* 2008; 46(2):72-83.

Benzodiazepines

Avoid:

- Long-acting Benzodiazepine use for >1 month – Clonazepam, Diazepam, Flurazepam
- Benzodiazepine use in patients who have had one or more falls in the past 3 months

Risks: Sedation, confusion, falls

American Geriatrics Society 2012 Beers Criteria Update Expert Panel. American Geriatrics Society updated Beers criteria for potentially inappropriate medication use in older adults. *J Am Geriatr Soc*. 2012;60(6):616-631.
Gallagher P, Ryan C, Byrne S, Kennedy J, O'Mahony D. STOPP (Screening Tool of Older Persons' Prescriptions) and START (Screening Tool to Alert Doctors to Right Treatment): Consensus Validation. *Int J Clin Pharmacol Ther* 2008; 46(2):72-83.

Acid Suppression Therapy

Proton pump inhibitor use for longer than eight weeks

Risks of Long-term PPI therapy:

- Clostridium *difficile* associated diarrhea
- Vitamin B12 deficiency
- Magnesium deficiency
- Acute Interstitial nephritis
- Decreased absorption of drugs requiring acidic environment

Gallagher P, Ryan C, Byrne S, Kennedy J, O'Mahony D. STOPP (Screening Tool of Older Persons' Prescriptions) and START (Screening Tool to Alert Doctors to Right Treatment): Consensus Validation. *Int J Clin Pharmacol Ther* 2008; 46(2):72-83.

Select Anticholinergic Medications

- First-generation Anti-histamines
 - Diphenhydramine
 - Hydroxyzine
 - Promethazine
- Antiparkinsonian Agents
 - Benztropine
- Antispasmodics
 - Scopalamine
- Hyosyamine
- Tricyclic Anti-depressants
 - Amitriptyline
 - Imipramine
 - Nortriptyline
 - Desipramine
 - Doxepin

Anticholinergic Adverse Effects

- Dry Mouth
- Blurred Vision
- Constipation
- Drowsiness
- Sedation
- Hallucinations
- Memory Impairment
- Difficulty Urinating
- Confusion
- Delirium

Appetite Stimulant

Avoid Megestrol: Minimal effect on weight; increases risk of thrombotic events and possibly death in older adults

Non-pharm Approaches to Appetite:

- Enhancing the taste and presentation of food
- Assisting the resident to eat
- Addressing food preferences
- Increasing finger foods and snacks

American Geriatrics Society 2012 Beers Criteria Update Expert Panel. American Geriatrics Society updated Beers criteria for potentially inappropriate medication use in older adults. J Am Geriatr Soc. 2012;60(6):616-631.

Using potentially inappropriate medications thoughtfully

- Not all potentially inappropriate medications can be avoided
- Individualize prescribing decisions by taking into account:
 - Medical conditions
 - Functional conditions
 - Social conditions
 - Quality of Life
 - Prognosis

IDENTIFY MEDICATIONS TO STOP AND START FOR DISEASE STATE MANAGEMENT

Diabetes

- 25.9% of Americans age 65 and older have diabetes (11.8 million seniors)
- Approximately 1 in 5 nursing home residents has diabetes
- In 2010, 110,000 elderly adults entered the hospital because of diabetes

J Am Med Dir Assoc. 2004 Sep-Oct; 5(5):253-5
<http://www.diabetes.org/diabetes-basics/statistics/>
<http://www.cdc.gov/diabetes/statistics/hosp/adulttable1.htm>

**Diabetes Treatment Goals:
HgbA1c in the elderly**

Organization	A1c Goal
American Diabetes Association (ADA)	<7%
American Association of Clinical Endocrinologists (AACE)	≤6.5%
American Medical Directors Association (AMDA)	<7%
American Geriatric Society (AGS)	≤7% or <8% if life expectancy is <5 years

Diabetes- Drug Therapy to Stop

- Beta-Blocker in patients with 1 or more hypoglycemic episodes per month (STOPP)
- Sliding Scale Insulin (Beers)
- Glyburide: long duration sulfonylurea (STOPP and Beers)

Diabetes- Drug Therapy to Start

- ACEI or ARB*
- Aspirin*
- Statin*
- If a beta-blocker is necessary, select a cardioselective agent (atenolol, bisoprolol, nebivolol)

*For patients expected to live >5 years

Barry PJ, Gallagher P, Ryan C, O'Mahony D: START (Screening Tool to Alert doctors to the Right Treatment) – an evidence-based screening tool to detect prescribing omissions in elderly patients. Age Ageing 2007, 36:628-631.

COPD

- The prevalence of COPD in individuals 65 years of age and older is approximately 14.2%
- COPD accounts for one fifth of all hospitalizations in individuals aged 75 years and older

Halbert RJ, Natoli JL, Gano A, Badamgarav E, Buist AS, Mannino DM. Global burden of COPD: systematic review and meta-analysis. Eur Respir J 2006;28:523-532
Mannino DM. COPD: epidemiology, prevalence, morbidity and mortality, and disease heterogeneity. Chest 2002;121(5, Suppl):1215-1265

COPD- Drug Therapy to Stop

- Systemic corticosteroids for COPD maintenance (STOPP)
- Non-selective beta-blockers (STOPP)
- Theophylline (STOPP)

Adverse Effects of Long-term Systemic Corticosteroid Therapy

- Brittle bones
- Muscle weakness
- Diabetes
- Eye problems
- Weight gain
- Increased risk of infection
- Fluid retention
- Behavior changes
- Trouble sleeping
- Irritability
- Elevated blood pressure
- Poor wound healing

COPD- Drug therapy to Start

- Inhaled corticosteroid
- Inhaled beta-2-agonist
- Inhaled anticholinergic
- Oxygen therapy
- If a beta-blocker is necessary, use a cardioselective agent (atenolol, bisoprolol, nebivolol)

Barry PJ, Gallagher P, Ryan C, O'Mahony D. START (Screening Tool to Alert doctors to the Right Treatment) – an evidence-based screening tool to detect prescribing omissions in elderly patients. *Age Ageing* 2007; 36:628-631.

Heart Failure

- In 2009, 751,000 adults over 65 entered the hospital for heart failure
- About half of people who develop heart failure die within 5 years of diagnosis

http://www.hcup-us.ahrq.gov/reports/factsandfigures/2009/TOC_2009.jsp

Heart Failure-Drugs to Stop

- Diltiazem or Verapamil (STOPP and Beers)
 - Worsen heart failure
 - Risk of heart block
- Digoxin at dose >0.125mg/day (STOPP and Beers)
 - Toxicity, especially with GFR<50mL/min

Heart Failure-Drugs to Start

- Diuretic
- ACE inhibitor/ ARB
- Beta-blocker
 - Bisoprolol, Carvedilol, Metoprolol Succinate
- Titrate to goal maximum dose(s)

Barry PJ, Gallagher P, Ryan C, O'Mahony D: START (Screening Tool to Alert doctors to the Right Treatment) – an evidence-based screening tool to detect prescribing omissions in elderly patients. Age Ageing 2007, 36:628-631.

Medications Associated with Cognitive Impairment

- Anticholinergics
- Antiarrhythmics
- Anticonvulsants
- Antihistamines
- Antihypertensives
- Benzodiazepines
- Digoxin
- H2 Blockers
- NSAIDs
- Opioids

Medications that May Cause or Worsen Urinary Incontinence

- Alpha Blockers
- Anticonvulsants
- Anticholinergics
- Acetylcholinesterase Inhibitors
- Benzodiazepines
- Diuretics
- Estrogens
- Lithium
- NSAIDs
- Opioids
- Tricyclic antidepressants

Don't go cold turkey

- Some medications may cause very serious side effects if quit abruptly
 - Ex: seizures, hallucinations, muscle pain, flu-like symptoms, tachycardia, insomnia
- Always consider if a medication needs to be tapered to discontinuation



Selected Drugs that should be tapered to avoid adverse drug withdrawal events

- Alpha-antagonists
- Antihypertensives
- Anticonvulsants
- Antidepressants
- Antiparkinsonian agents
- Antipsychotics
- Baclofen
- Benzodiazepines
- Corticosteroids
- Digoxin
- Diuretics
- Histamine-2 blockers
- NSAIDs
- Opioids
- Sedative/hypnotics
- Statins

IDENTIFY MEDICATIONS TO STOP AND START FOR OPTIMIZED THERAPY IN THE NURSING HOME SETTING

F-Tag 329 – Unnecessary Drugs

§483.25(l) Unnecessary drugs

The intent of this requirement is that each resident's entire drug/medication regimen be managed and monitored to achieve the following goals:

- The medication regimen helps promote or maintain the resident's highest practicable mental, physical, and psychosocial well-being, as identified by the resident and/or representative(s) in collaboration with the attending physician and facility staff;
- Each resident receives only those medications, in doses and for the duration clinically indicated to treat the resident's assessed condition(s);

**F-Tag 329 – Unnecessary Drugs
Continued**

- Non-pharmacological interventions (such as behavioral interventions) are considered and used when indicated, instead of, or in addition to, medication;
- Clinically significant adverse consequences are minimized; and
- The potential contribution of the medication regimen to an unanticipated decline or newly emerging or worsening symptom is recognized and evaluated, and the regimen is modified when appropriate.

**Basic components of Drug Therapy
Evaluation in the Elderly**

- Why is the drug being use?
 - Diagnosis/indication
- Is the drug being given correctly?
 - Dosage form, dose, route, frequency
- Are any symptoms/complaints related to drug therapy?
- Is monitoring of treatment ongoing?
- What is the endpoint of therapy?

Taking a medication history

- Get a complete medication history from discharging hospital, patient, family, friend, caregiver, out-patient pharmacy, etc. (this includes any previously discontinued meds)
- Match problem list with drug list
- Assess the appropriateness of all current medications

Evaluating Drug Therapy in Older Adults

- Consider all medications (not just the most likely to cause issues)
- Consider length of therapy
- Consider that lack of response to treatment may be related to drug therapy interactions

Falls

- Drugs that adversely affect those prone to falls (STOPP):
 - Benzodiazepines
 - Neuroleptic drugs
 - First generation anti-histamines
 - Antihypertensives
 - Long-term opiates

Constipation

- Individualized Bowel Regimen or Bowel Protocol
 - Good options: polyethylene glycol, fiber
 - Avoid: Sodium Phosphate Enemas
- Non-pharm approaches:
 - Increasing the amount of resident exercise/movement
 - Increase intake of liquids and dietary fiber in conjunction

Arch Intern Med. 2012;172(3):263-265

Transition of Care

- Analgesics
 - Pain medications prescribed in hospital not necessarily for chronic/maintenance use
- Antibiotics/Steroids/ Other Acute Care Medications
 - Discontinue or taper to lowest possible maintenance dose
- Restart home medications, if appropriate

Transitions of Care Continued

- Evaluate indication and use in post-acute setting for possible discontinuation of the following medication classes:
 - Breathing treatments
 - Anti-emetic therapy
 - Sleep medication
 - Acid suppression therapy
 - Clot prevention therapy

Medication Regimen Clean-up

- Match each medication with its diagnosis, and eliminate those without a clear indication
- Eliminate medications that are providing no benefit
- Discontinue all PRN medications that have not been used in >1 month
- Ensure time-limited prescriptions

Clinical Pearls

- Consider whether drug therapy is necessary
- Adjust doses for medications
- Establish therapeutic endpoints and monitor for desired outcome
- Monitor for adverse drug reactions (“Until proven otherwise, always blame the meds!”)
- Regularly review the need for chronic medications
