Objectives

- Identify when to complete medication reconciliation
- Understand the importance of accurate medication reconciliation
- Use critical thinking skills to compile admission and discharge medication lists via comparison of medication histories
- Use clinical tools to assess the appropriateness of each medication
- Summarize non-pharmaceutical items critical to address prior to discharge
Definitions

- **Transitions of care**: movement of a patient between health care practitioners and/or settings as their medical needs change during the course of an illness.

- **Medication reconciliation**: process of comparing medication lists at a point-of-care transitions to identify and resolve medication discrepancies.

Transitions of Care

- Step Down or Medical/Surgical Unit
  - Critical Care Unit
  - Emergency Room
- Short Term Rehab
- Independent Or Long term Living
Medication Reconciliation

- Should be completed at EACH point of care transition
  - Admission
  - Transfer
  - Discharge
  - Outpatient follow-up visit
- Identifies:
  - New medications
  - Discontinued medications
  - Medication dose or frequency changes

Medication Reconciliation Purpose

- Reduces risk of medication errors involving:
  - Omission
  - Duplication
  - Unjustified medications
  - Dosing Errors
  - Drug Interactions
- Medication errors → increased healthcare costs & patient safety risks
- Provides opportunity to ensure optimization of med list
- Provides opportunity for clinician to ensure patient understands medication regimen
Steps to Performing Medication Reconciliation

- Assemble the lists of medications
  - Pre-admission medication list
  - Inpatient medication list
  - Discharge list
  - Current list
- Review and compare lists
  - Ascertain accuracy
- Resolve discrepancies
  - Formulate decisions based on medical judgment with respect to the patient's conditions and medications
  - Optimize care to best meet the patient’s needs
- Document changes
- Check the patient’s understanding of their medications & counsel on changes
- Provide the patient a copy of the current medication list

Importance of Medication Reconciliation

- “Typical” hospitalized patient at risk for one medication error per day
  - 40% are thought to be due to inadequate medication reconciliation
- Out of 577 discharge drug summaries, 66% contained at least one inconsistency
  - 393 drug omissions
    - 32% of which were potentially harmful
  - 17% of all medications were unjustified
    - 16% of which were potentially harmful

Barriers to Medication Reconciliation

- Inability of patient to provide accurate medication list/history on admission
- Need for fast, immediate care
- Inpatient use of medication lists from previous hospital stays
- Multiple care providers in multiple settings
- Medication adherence not taken into consideration
- Failure to adjust formulary changes on discharge
- Continuation of medications for prophylaxis post acute care discharge
- Lack of patient understanding of medication changes on discharge

Overcoming barriers to medication reconciliation

- NEVER assume patient is on same medications as last visit
- Use family members/POAs, pharmacy refill records, outpatient records, inpatient progress notes/discharge summaries, MARs, PDMP
- ALWAYS ask about over the counter products, including herbals and vitamins
- Complete within 24 hours of admission if unable to accurately complete immediately
- Complete 1-3 days post discharge instead of at next outpatient visit
- Utilize interdisciplinary team
  - Pharmacy staff, nursing support
Optimization of Pharmacotherapy

- Critical thinking to ensure appropriateness of each medication while performing medication reconciliation
  - Not only HAS each medication been continued? But, SHOULD each medication be continued?
  - Opportunity for reduction of polypharmacy

Polypharmacy

- Concomitant use of multiple medications
- Can also be associated with quantity
  - LTC setting: 9 or more medications
  - 6 or more medications with 2 or more chronic conditions
- Associated with:
  - Adverse events
  - Non-compliance
  - Decreased functional status
  - Increased healthcare costs
- Contributed to by prescribing cascade
  - When one medication is prescribed to treat side effects of another medication
Polypharmacy & ADEs Can Cause:

- Confusion
- Delirium
- Depression
- Dizziness
- Falls
- Incontinence
- Insomnia
- Malnutrition
- Memory loss

Which can then cause:

- Decreased QOL
- ED visits
- Fractures
- Hospitalization
- Loss of function
- Loss of independence
- SNF placement
- Physician visits
- Death

Tools to Assess Pharmacotherapy

- Medication Appropriateness Index
- Beer’s Criteria
- STOPP
  - Screening Tool of Older Persons’ potentially inappropriate Prescriptions
- START
  - Screening Tool to Alert doctors to the Right Treatment
Medication Appropriateness Index

- Is there an indication for the medication?
- Is the medication effective for the condition?
- Is the dosage correct?
- Are the directions correct?
- Are the directions practical?
- Are there clinically significant drug interactions?
- Are there clinically significant drug-disease interactions?
- Is there duplication of therapy?
- Is the duration of therapy acceptable?
- Is the medication the least expensive alternative?

Beers Criteria

- Published by American Geriatric Society
- List of potentially inappropriate medications in older adults
  - Divided into 5 categories
- Widely used by geriatricians in clinical settings
- Originally published in 1997, revised multiple times, most recent in 2015
- Developed through expert consensus from literature review and questionnaire
- Used by CMS for nursing home regulation
2015 Beers Criteria Categories

- Potentially Inappropriate Medications (PIMS) in Older Adults
- PIMS in Older Adults due to Drug-disease Interactions that may Exacerbate the Disease or Syndrome
- Drugs to be Used with Caution in Older Adults
- Potentially Clinically Important Non-anti-infective Drug-drug Interactions that should be Avoided in Older Adults
- Potentially Clinically Important Non-anti-infective Drugs that Should be Avoided or Dose Reduced with Varying Levels of Kidney Function in Older Adults

START/STOPP (Version 2)

- Published by British Geriatrics Society
- List of inappropriate medications & potential prescribing omissions
- Divided by organ system
- Addresses drug-disease interactions, drug-drug interactions, duration, doses based on eGFR
- Criteria developed through expert consensus from literature review
**Beers, START/STOPP Strengths**

- **Strengths**
  - Evidence based!
  - Includes drug-drug interactions, drug-disease interactions, renal dosing
  - Updated regularly
  - **Effective tool for informing clinicians on which medications to evaluate for appropriate use and/or to avoid initially AND which medications to start**

**Beers, START/STOPP Limitations**

- Does not address duplication or ALL problems
- Older adults often under-represented in trials
- Search strategies may have missed unpublished reports
- Not applicable to hospice/palliative care
- Problems not prioritized
- **Does not replace clinical judgment!!!**
**Patient Case #1**

- Betty, a 93 year old female is being admitted to an acute care setting for pneumonia and acute kidney injury

- PMHx: DVT 3 years ago, dementia, GI bleed, hypertension, hypothyroidism, coronary artery disease, OA

- Patient resides at a skilled nursing facility

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**Compare Medication Lists**

<table>
<thead>
<tr>
<th>Home Medication List</th>
<th>Inpatient Medication List</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Aspirin 81mg PO daily</td>
<td>- Aspirin 81mg PO daily</td>
</tr>
<tr>
<td>- Donepezil 10mg PO daily</td>
<td>- Donepezil 10mg PO daily</td>
</tr>
<tr>
<td>- Memantine 10mg PO BID</td>
<td>- Memantine 10mg PO BID</td>
</tr>
<tr>
<td>- Lisinopril 10mg PO daily</td>
<td>- Metoprolol tartrate 50mg PO daily</td>
</tr>
<tr>
<td>- Metoprolol succinate 50mg daily</td>
<td>- Levothyroxine 100mcg PO daily</td>
</tr>
<tr>
<td>- Levothyroxine 100mcg PO daily</td>
<td>- Pantoprazole 40mg PO daily</td>
</tr>
<tr>
<td>- Lansoprazole 30mg PO daily</td>
<td>- Xarelto 15mg daily</td>
</tr>
<tr>
<td>- Calcium/vitamin D 600mg/400 units BID</td>
<td>- Normal Saline IV @ 100mL/hour</td>
</tr>
<tr>
<td></td>
<td>- Ceftriaxone 2G IV daily</td>
</tr>
<tr>
<td></td>
<td>- Azithromycin 250mg IV daily</td>
</tr>
</tbody>
</table>
Discrepancies

- Lansoprazole → pantoprazole
  - Formulary change
- Addition of sodium chloride
  - Added for dehydration/AKI
- Removal of lisinopril
  - Held due to AKI
- Addition of ceftriaxone & azithromycin
  - Added for pneumonia

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Discrepancies

- Metoprolol succinate 50mg daily → metoprolol tartrate 50mg daily
  - No rationale for change
  - Medication reconciliation error
- Addition of Xarelto 15mg daily
  - Patient previously on this medication for DVT but discontinued by PCP
  - Medication reconciliation error
  - Expensive
  - Potentially harmful
Patient Case #2

- Fred, a 75 year old female is being admitted to acute rehab setting. She is status post femur fracture fixation in an acute care setting.

- Past Medical History: diabetes mellitus type 2, falls, osteoporosis, arthritis, hypertension, hyperlipidemia, CAD, GERD

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Compare medication lists

<table>
<thead>
<tr>
<th>Home Medication List</th>
<th>Acute Care Medication List</th>
<th>Inpatient Rehab List</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin 81mg PO daily</td>
<td>Aspirin 81mg PO daily</td>
<td>Aspirin 81mg PO daily</td>
</tr>
<tr>
<td>Quinapril 20mg PO daily</td>
<td>Lisinopril 20mg PO daily</td>
<td>Quinapril 20mg PO daily</td>
</tr>
<tr>
<td>Ibuprofen 800mg PO q6h PRN</td>
<td>Hydrocodone/apap 5/325mg PO q4h PRN pain</td>
<td>Hydrocodone/apap 5/325mg PO q4h PRN pain</td>
</tr>
<tr>
<td>Omeprazole 20mg PO BID</td>
<td>Ibuprofen 800mg po q6h PRN</td>
<td>Ibuprofen 800mg po q6h PRN</td>
</tr>
<tr>
<td>Calcium/vitamin D 600mg/400 units BID</td>
<td>Pantoprazole 40mg PO BID</td>
<td>Omeprazole 40mg PO BID</td>
</tr>
<tr>
<td>Januvia 100mg PO daily</td>
<td>Calcium/vitamin D 600mg/400 units BID</td>
<td>Calcium/vitamin D 600mg/400 units BID</td>
</tr>
<tr>
<td></td>
<td>Xarelto 10mg daily</td>
<td>Xarelto 10mg daily</td>
</tr>
<tr>
<td></td>
<td>Tradjenta 4mg PO daily</td>
<td>Tradjenta 4mg PO daily</td>
</tr>
</tbody>
</table>

---
Discrepancies

- **Omeprazole 20mg BID → pantoprazole 40mg BID → omeprazole 40mg BID**
  - Formulary interchanges
  - Appropriately back to home medication when discharged from acute care; however, dosing error

- **Quinapril 20mg daily → lisinopril 20mg daily → quinapril 20mg daily**
  - Formulary interchange
  - Appropriately adjusted on discharge

- **Januvia 100mg daily → Tradjenta 4mg daily → BOTH Januvia 100mg daily & Tradjenta 4mg daily**
  - Formulary interchange not appropriately adjusted on discharge

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**Discrepancies**

- **Addition of Xarelto 10mg PO daily**
  - Added for DVT prophylaxis s/p surgery
  - BUT → no stop date!

- **Addition of hydrocodone/apap 5/325mg po q4h prn pain**
  - Added for pain due to fracture & surgery
  - Assess pain & use on discharge to determine need or amount to send home with patient
  - NEVER assume patient is using around the clock
  - Patient should follow-up with PCP regarding duration
  - Counsel patient on appropriate opioid disposal
Inappropriate Medications?

- Ibuprofen 800mg PO q6h PRN
  - Decreases fracture healing
  - Increased risk of side effects in elderly: nephrotoxicity, cardiotoxicity, bleeding
  - Consider discontinuation

- PPI twice daily
  - Increases risk of impaired calcium absorption
  - Increased risk of cdif
  - Consider dose reduction based on symptoms

Patient Case #3

- Mary, a 66 year old female following-up with outpatient primary care provider. Recently discharged from hospital. Treated in hospital for new onset atrial fibrillation

- Past medical history: hypertension, hyperlipidemia, obesity, depression, anxiety osteoarthritis, coronary artery disease
Compare medication lists

<table>
<thead>
<tr>
<th>Pre-admit Home Medication List</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Valsartan 160mg PO daily</td>
</tr>
<tr>
<td>□ Pravastatin 20mg PO QHS</td>
</tr>
<tr>
<td>□ Duloxetine 60mg PO daily</td>
</tr>
<tr>
<td>□ Lorazepam 0.5mg PO q6h PRN anxiety</td>
</tr>
<tr>
<td>□ Furosemide 20mg PO daily</td>
</tr>
<tr>
<td>□ Acetaminophen 650mg q6h PRN</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acute Care Medication List</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Losartan 100mg PO daily</td>
</tr>
<tr>
<td>□ Atorvastatin 40mg PO qhs</td>
</tr>
<tr>
<td>□ Lorazepam 0.5mg PO q6h PRN anxiety</td>
</tr>
<tr>
<td>□ Cardizem IV continuous infusion converted to dilitazem ER 120mg PO daily</td>
</tr>
<tr>
<td>□ Furosemide 40mg IV daily</td>
</tr>
<tr>
<td>□ Acetaminophen 650mg PO q6h</td>
</tr>
<tr>
<td>□ Apixaban 5mg PO q12h</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acute Care Discharge Medication List</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Losartan 100mg PO daily</td>
</tr>
<tr>
<td>□ Atorvastatin 40mg PO QHS</td>
</tr>
<tr>
<td>□ Lorazepam 0.5mg PO q6h PRN anxiety</td>
</tr>
<tr>
<td>□ Furosemide 40mg IV daily</td>
</tr>
<tr>
<td>□ Acetaminophen 650mg PO q6h</td>
</tr>
<tr>
<td>□ Apixaban 5mg PO q12h</td>
</tr>
</tbody>
</table>

Discrepancies

□ Valsartan 160mg at home → losartan 100mg on discharge
  □ Approximate equivalent doses
  □ Formulary interchange not changed back to home medication
  □ Determine which to continue based on patient’s current supply or preference
Discrepancies

- Duloxetine 60mg daily not continued during hospital or discharge
  - Rationale for discontinuation unclear
  - SNRI associated with withdrawal symptoms
  - Potentially harmful medication reconciliation error

- Pravastatin 20mg PO QHS → atorvastatin 40mg PO QHS
  - Not equivalent doses
  - Potentially therapeutic optimization
  - Monitor for new/worsening myalgia

- Addition of Eliquis
  - Therapeutic optimization for atrial fibrillation
Discrepancies

- Addition of IV furosemide in hospital & continuation of IV on discharge
  - Failure to convert IV to PO on discharge

- IV Cardizem → PO diltiazem in hospital, not continued on discharge
  - Erroneously discontinued?
  - Difficult to determine without review of hospital records
  - Clinical judgment based on patient specifics & hospital course
  - Potentially harmful medication reconciliation error

Patient Case #4

- An 93 year old patient presents to your outpatient clinic after a recent hospital stay due to a fall and complicated UTI.

- The patient is presenting with new dyskinesias of arms, shoulders, and heads

- The patient lives at home with daughter and visiting nurse services

- PMHx: frequent falls, Parkinson’s disease, mild dementia with behaviors, frequent diarrhea, osteoporosis, depression
Compare Medication Lists

<table>
<thead>
<tr>
<th>Pre-admit Home Medication List</th>
<th>Acute Care Medication List</th>
<th>Acute Care Discharge Medication List</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Donepezil 10mg PO qhs</td>
<td>□ Donepezil 10mg PO qhs</td>
<td>□ Donepezil 10mg PO qhs</td>
</tr>
<tr>
<td>□ Memantine 5mg PO BID</td>
<td>□ Memantine 5mg PO BID</td>
<td>□ Memantine 5mg PO BID</td>
</tr>
<tr>
<td>□ Quetiapine 50mg PO qhs</td>
<td>□ Quetiapine 50mg PO qhs</td>
<td>□ Quetiapine 50mg PO qhs</td>
</tr>
<tr>
<td>□ Escitalopram 10mg PO daily</td>
<td>□ Escitalopram 10mg PO daily</td>
<td>□ Escitalopram 10mg PO daily</td>
</tr>
<tr>
<td>□ Amlodipine 10mg PO daily</td>
<td>□ Amlodipine 10mg PO daily</td>
<td>□ Amlodipine 10mg PO daily</td>
</tr>
<tr>
<td>□ Furosemide 20mg PO daily</td>
<td>□ Furosemide 20mg daily</td>
<td>□ Furosemide 20mg daily</td>
</tr>
<tr>
<td>□ KCl 10mEq PO daily</td>
<td>□ KCl 10mEq daily</td>
<td>□ KCl 10mEq daily</td>
</tr>
<tr>
<td>□ Cholestyramine 4G PO TID</td>
<td>□ Cholestyramine 4G PO TID</td>
<td>□ Cholestyramine 4G PO TID</td>
</tr>
<tr>
<td>□ Alendronate 70mg PO once weekly</td>
<td>□ Alendronate 70mg PO once weekly</td>
<td>□ Alendronate 70mg PO once weekly</td>
</tr>
<tr>
<td>□ Calcium/vitamin D 600mg/500 units PO daily</td>
<td>□ Calcium/vitamin D 600mg/500 units PO daily</td>
<td>□ Calcium/vitamin D 600mg/500 units PO daily</td>
</tr>
<tr>
<td>□ Carbidopa/levodopa 25/100mg PO TID</td>
<td>□ Carbidopa/levodopa 50/200mg PO TID</td>
<td>□ Carbidopa/levodopa 50/200mg PO TID</td>
</tr>
<tr>
<td>□ Alendronate 70mg PO once weekly</td>
<td>□ Sulfamethoxazole/trimethoprim 400/80mg PO BID</td>
<td>□ Sulfamethoxazole/trimethoprim 400/80mg PO BID</td>
</tr>
<tr>
<td>□ Enoxaparin 30mg subcutaneous daily</td>
<td>□ Enoxaparin 30mg subcutaneous daily</td>
<td>□ Enoxaparin 30mg subcutaneous daily</td>
</tr>
</tbody>
</table>

Discrepancies

□ Addition of sulfamethoxazole/trimethoprim
  □ Added for UTI in hospital
  □ Extensive duration

□ Increase in carbidopa/levodopa dose
  □ Possible cause of new dyskinesias
  □ Patient not admitted for increase in Parkinson’s symptoms
  □ Patient/caregiver unaware of reason for dose change
  □ Likely medication reconciliation error
  □ Potential to cause harm
Prescribing Cascade

- Donepezil causing diarrhea → cholestyramine treating diarrhea
  - Evaluate start dates and onset of diarrhea
  - Benefits of donepezil outweigh risks/side effects?
- Amlodipine causing edema → furosemide treating edema → potassium supplement due to K+ depletion
  - Evaluate start dates and symptom onset
  - Consider alternate antihypertensive agent

Inappropriate Medications?

- Length of alendronate therapy
  - High affinity for bone, continued osteoclast suppression after discontinuation
  - Increased risk of atypical femur fracture and osteonecrosis of jaw with duration >5 years
- Quetiapine for behaviors in dementia
  - Blackbox warning for increased risk of CV death
  - Increased risk of falls, confusion, worsening of neurocognitive function, EPS, metabolic symptoms
  - Re-evaluate risk vs benefit
  - Consider gradual dose reduction
To Err is Human

- Errors are inevitable
- Complete medication reconciliation to identify errors
- Utilize reporting of medication errors to increase awareness
- Interdisciplinary approach when making clinical decisions to overcome errors
- Discharge medication counseling and check patients’ understanding

Non-Pharm Considerations on Transitions of Care

- Follow-up visits with PCP & specialists
- Follow-up labs
- Discharge medication counseling & provide updated, accurate medication lists
  - Encourage patient to show new list to all providers
- Provide prescriptions on discharge for new or changed medications
- New dietary considerations
- Change in weight tolerance or ADLs
- Ability to return to work or school
- Driving considerations
Questions?

References:
Barnsteiner et al. Patient safety and Quality. [https://www.jointcommission.org/assts/1/18](https://www.jointcommission.org/assts/1/18)
2015 Beers Criteria
2015 START/STOPP Criteria