Patient Safety in Older Adults

Scott Martin Vouri, PharmD, MSCI, BCPS, BCGP, FASCP
St. Louis College of Pharmacy

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Learning Objectives

At the conclusion of this application-based activity, participants should be able to:

1. Develop and apply systems for the following:
   a) Medication reconciliation during transitions of care
   b) Identification of risk factors for Adverse Drug Event (ADE) or medication incidents/ errors.
   c) Prevention of ADE or medication incidents/ errors.
2. Recognize iatrogenic conditions (e.g., healthcare associated infections, falls, pressure ulcers, medication-induced conditions).
3. Develop strategies to prevent or resolve iatrogenic conditions.

Medication Epidemiology in Older Adults

- >50% of community dwelling older adults take 5 or more prescription medications, OTC medications, and dietary supplements
- 30% take 5 or more prescriptions medications (similar in Canada)
- 13% take 5 or more dietary supplements

- Number of medications increases with age

- ~50% of long-term care residents take 9 or more medications

http://www.statcan.gc.ca/pub/82-003-x/1014006/article/14032/00/hb17-eng.htm
Medication Reconciliation

1. Develop and apply systems for the following
   • Medication reconciliation during transitions of care

Medication Reconciliation

• The process of comparing a patient's medication orders to all of the medications that the patient has been taking.
• This reconciliation is done to avoid medication errors such as omissions, duplications, dosing errors, or drug interactions.
• It should be done at every transition of care in which new medications are ordered or existing orders are rewritten.
• Transitions in care include changes in setting, service, practitioner, or level of care.
Why is a ‘Med Rec’ Important?

- A ‘typical’ hospitalized patient is at risk for one medication error per day
- 40% of medication errors are thought to be a result of inadequate reconciliation
  - During admission, transfer, and discharge
- 20% of “Med Rec” errors are believed to result in harm.
- 25% of medications found at home were not included at hospital admission
- 50 – 60% of medication errors (at an outpatient clinic) were a result of patients taking medications that were not prescribed
- Discrepancies in medications occur in upwards of 80% of patients
- 50% of medication error related deaths or major injuries could be avoided with proper implementation of medication reconciliation

Med Rec During Transitions of Care

- Rationale
  - Increased vulnerability to environment changes
    - Increased stress and unfamiliarity
  - Multiple care providers in multiple settings
    - Often operate independently
- Associated Risks
  - Medical errors, service duplication, inappropriate care, medication discrepancies, “falling through the cracks”
  - Medication adherence often not taken into consideration
Active Learning

• Four Cases
• Divide in groups at your table
• One case per group
• Take 5 minutes to perform medication reconciliation

What’s Missing?

• Error of Omission
  • Patients’ (n=312) medication bottles were compared to the physician’s chart and noted 76% of patients, accounting for 545 medications, had discrepancies.
    • Of these, 278 medications (51%) were omissions where patients were taking medications that the physician did not have documentation.
  • In an evaluation of an outpatient clinic records over 3 months, 250 medications discrepancies were identified.
    • Of these, 58.8% (n=147) discrepancies were patients taking medications that was not on their medication list.

## Review of Systems Subject

**MR. ROSS** (Medication Reconciliation - Review of Systems Subject)

<table>
<thead>
<tr>
<th>Medications</th>
<th>Brain: Headache / Migraine / Memory / Headache (OTC)</th>
<th>Hair: Medications / Shampoo</th>
<th>Nose: Nasal Sprays / PO allergy or discontinued</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stomach: Dyspepsia meds (OTC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastrointestinal: Constipation / Diarrhea meds / Suppositories (OTC)</td>
<td></td>
<td>Elbow: Creams (rash / dry skin)</td>
<td></td>
</tr>
<tr>
<td>Elbow: Pain creams / PO pain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foot: Antifungal athlete’s foot (OTC)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Usual Care</th>
<th>Post-Usual Care – using MR ROSS</th>
<th>Total Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Medications – n (%)</strong></td>
<td>424 (77.5)</td>
<td>123 (22.5)</td>
</tr>
<tr>
<td><strong>Medication Type – n (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prescription</td>
<td>308 (72.6)</td>
<td>33 (26.8)</td>
</tr>
<tr>
<td>Non – Prescription</td>
<td>116 (27.4)</td>
<td>90 (73.2)</td>
</tr>
<tr>
<td><strong>Medication Schedule – n (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scheduled</td>
<td>329 (77.6)</td>
<td>35 (28.5)</td>
</tr>
<tr>
<td>PRN</td>
<td>87 (20.5)</td>
<td>86 (69.9)</td>
</tr>
<tr>
<td>Short – Term</td>
<td>8 (1.9)</td>
<td>2 (1.5)</td>
</tr>
<tr>
<td><strong>Route of Administration – n (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral</td>
<td>364 (85.8)</td>
<td>70 (56.9)</td>
</tr>
<tr>
<td>Oral Inhaler</td>
<td>18 (4.2)</td>
<td>11 (8.6)</td>
</tr>
<tr>
<td>Nasal Inhaler</td>
<td>3 (0.7)</td>
<td>5 (4.1)</td>
</tr>
<tr>
<td>Topical</td>
<td>10 (2.4)</td>
<td>21 (17.1)</td>
</tr>
<tr>
<td>Topical Patch</td>
<td>5 (1.2)</td>
<td>2 (1.6)</td>
</tr>
<tr>
<td>Subcutaneous</td>
<td>9 (2.1)</td>
<td>1 (0.8)</td>
</tr>
<tr>
<td>Ophthalmic</td>
<td>14 (3.3)</td>
<td>9 (7.3)</td>
</tr>
<tr>
<td>Otic</td>
<td>0 (0)</td>
<td>1 (0.8)</td>
</tr>
<tr>
<td>Rectal</td>
<td>1 (0.2)</td>
<td>2 (1.6)</td>
</tr>
<tr>
<td>Other</td>
<td>0 (0)</td>
<td>1 (0.8)</td>
</tr>
</tbody>
</table>
Adverse Events

1. Develop and apply systems for the following
   • Identification of risk factors for Adverse Drug Event (ADE) or medication incidents/ errors.
   • Prevention of ADE or medication incidents/ errors.

Inappropriate Medications

• Identifying Inappropriate Medications → Drug-Induced Adverse Events (DIAE)

• Criteria
  • Drug Burden Index
  • Anticholinergic Scales
  • Beers’ Criteria
  • FORTA (Fit FOR The Age) Criteria
  • Screening Tool of Older Person’s Prescriptions (STOPP) Criteria
Inappropriate Medications and DIAE

- 47% of LTC residents had at least one inappropriate medication of which 13% had a documented adverse outcomes within one year
- Risk of adverse drug event was 2.3 times higher in residents with inappropriate medications
- Risk of hospitalization or death was 30% higher in residents with inappropriate medications
- In LTC, incidence of adverse drug events was 9.8 per 100 resident-months
- 42% deemed to be preventable
- Increase risk for adverse events, hospitalization, and death with inappropriate medications

Interventional Studies have assessed ways to improve medication prescribing in LTC setting
- Educational workshops for health-care team
- Educational sessions for caregivers
- Outreach advisory service
- Clinical decision support
- Medication feedback/review by pharmacists or multidisciplinary team

- Medication Appropriateness Index improved and number of medications reduced
- No improvements adverse events, hospitalizations, or mortality

References:
Rochon et al. UpToDate. 2014. Topic 3013.
Drug-Induced Adverse Events

- Adverse outcomes related to the utilization of a (prescription, OTC, or dietary supplement) medication
  - Outcomes most commonly related to mechanism of action of the medications
  - Outcomes may or may not be well-documented in the literature

- Factors which increases the risk for DIAE
  - Frailty
  - Coexisting Medical Problems
  - Memory Issues
  - Use of Multiple Prescribed and Non-Prescribed Medications

Limitations to Identifying DIAE

- Incomplete Medical Records
  - Thought process of a physician may not be in notes
  - Records may be filed away

- Patients’ inability to describe issues
  - Best way to identify DIAE is a patient complaint after starting a new medication
  - Complaints may not be documented / issues may lead to hospitalizations
Prescribing Cascade (PC)

- Occurs when a new (chronic) drug is prescribed to treat the symptoms arising from an unrecognized adverse drug event related to an existing medication
- To patients and providers, unrecognized adverse drug events thought to be due to ‘normal aging’ or misinterpreted as a new diagnosis common in older adults
- Factors which increases the risk for PC
  - Age
  - Multiple co-morbid conditions
  - Multiple drug therapies
DIAE – Prescribing Cascade

2. Recognize iatrogenic conditions (e.g., healthcare associated infections, falls, pressure ulcers, medication-induced conditions).
   - Understand the adverse effects of medications
   - Keep up with literature

PC Flow Diagram

New Medication ➔ New Symptom (not suspected to be DIAE) ➔ Notify Physician

Agrees New Symptom (not DIAE) ➔ Prescribes new medication to treat new symptom

Disagrees and identifies its DIAE ➔ Prescribes new medication for initial indication

Starts non-prescription medication
PC Flow Diagram Template

Drug A: ______________
Condition: ______________
Drug B: ______________

Other PC Considerations

- Acceptable PC
  - Standard of care dictates the treatment of one medication with another medication to prevent negative outcomes
  - (i.e., Furosemide → KCl)

- “Not quite” PC
  - Treatment of one medication (adverse outcomes) that requires short-term treatment or harms may occur (i.e., Broad Spectrum antibiotics causes C-Diff requiring vancomycin or metronidazole)
Confirmation of DIAE / PC

- Selected Bradford-Hill Criteria of Causation
  - Plausibility (DAIE or PC makes sense based on mechanism of action)
  - Temporal Relationship (Initial medication comes before DAIE or PC)
  - Dose-Response Relationship (higher dose = more DAIE or PC)
  - Consistency (confirmed in multiple previous trials)
  - Consideration of Alternative Explanations (Adverse outcome may be due to another cause)
  - Experiment (Reoccurs after withdrawal and re-challenge)

Examples of PC from Literature

- Prescription Sequence Symmetry Analysis (PSSA)
- Retrospective Medication Claims Cohort
PSSA Example

• ACEI-induced Cough
  • Assessing two medications claims (ACEI and antitussives) to identify DIAE or PC
  • Evaluates incident medication claims over a specific period of time
  • Assesses for symmetry of incident claims
  • Design controls for confounders like age, sex, disease, since it is within person acts like own control

PSSA Example

• Three possibilities
  • Antitussive after > Antitussive before
    • Prescribing Cascade / DIAE (ACEI claim → Cough → Antitussive claim)
  • Antitussive after = Antitussive before
    • No difference
  • Antitussive after < Antitussive before
    • Possible protective effect?
  • Claims for ACEI and Antitussive on same day are excluded
20% converted to ARB

Adherence (p<0.001)
  - Post ACEI anti-tussive – 52.4%
  - No Post ACEI antitussive – 75.5%

• Conclusion
  - Pts were 2.0 times more likely to have incident anti-tussive after ACEI compared to before ACEI
    - Adherence was poorer in anti-tussive after ACEI compared to anti-tussive before ACEI

• Limitations
  - OTC’s not included (under-reported use of cough-meds)
  - Does not include prevalent users
  - Unable to confirm symptoms from patients
Retrospective Medication Claims Cohort Example

A Prescribing Cascade Involving Cholinesterase Inhibitors and Anticholinergic Drugs

**Drug A:**
Cholinesterase Inhibitor (Treatment for Dementia)

**Condition:**
Increased Urination (thought to be related to aging or progression of dementia)

**Drug B:**
Anticholinergic Medication
(can block any potential benefit of cholinesterase inhibitors & contribute to worsening cognitive decline)


**Diagnosis of Dementia per ICD-9 Codes or other Billing Records**

- New-User Cholinesterase Inhibitor (Drug Cohort)
- Non-User Cholinesterase Inhibitor (Control Cohort)
- Time-to-Event

- Anticholinergic Medication
- No Anticholinergic Medication

Retrospective Medication Claims Cohort Example

<table>
<thead>
<tr>
<th></th>
<th>Cholinesterase Inhibitor Cohort HR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unadjusted HR</td>
<td>1.66 (1.55 – 1.83)</td>
</tr>
<tr>
<td>Adjusted HR*</td>
<td>1.55 (1.39 – 1.72)</td>
</tr>
<tr>
<td>Subgroup – Long-Term Care Dwelling</td>
<td>1.94 (1.45 – 2.60)</td>
</tr>
<tr>
<td>Subgroup Community Dwelling</td>
<td>1.47 (1.31 – 1.64)</td>
</tr>
</tbody>
</table>

*Adjusted for: Age, sex, low-income status, residence in long-term care, medical condition (stroke, diabetes), Charlson Comorbidity Index, medications which impact normal bladder function

Retrospective Medication Claims Cohort Example

- **Conclusions**
  - Providers should consider the prescribing cascade model when evaluating the elderly (especially the temporal initiations of certain medications)
    - This is especially true in increased urination / incontinence after initiating cholinesterase inhibitors

- **Limitations**
  - Baseline differences between users and non-users
  - Unable to differentiate based on severity
  - Claims data does not confirm outcomes (i.e., increased urination) caused by cholinesterase inhibitor
DIAE – PC

3. Develop strategies to prevent or resolve iatrogenic conditions.

Strategies to Identify DIAE and PC

- Need to think like a detective
- In charts or through patient interview
  - Drug-Induced Adverse Event
    - Assess Past Medical History (PMH), Past “Review of Symptoms” (ROS), Past “Complaints” against the current medications
  - Prescribing Cascade
    - Assess PMH, Past ROS, Past “Complaints” against the previous and current medications
    - Also assess using Medication Appropriateness Index
Active Learning

GD is a 81 year old female present for 6 month follow-up after starting donepezil
- PMH: Hypertension, TIA, Gout, Osteoarthritis, Dementia
- Current Medications: Lisinopril/HCTZ, aspirin, allopurinol, APAP, donepezil 10mg daily
- Pharmacists calls community pharmacy to confirm adherence to donepezil and any changes in medications
- Confirmed adherence to donepezil
  - Noted ipratropium nasal and loratadine initiated ~4 months ago

What is the prescribing cascade?
Active Learning

- Work in groups with others at your table
  - Left of me (work on Cases 1)
  - Right to me (work on Cases 2)

- Work on for 5 minutes
  - Each case will be reported out

Patient-Level Interventions

Consider Donepezil + Ipratropium Nasal Prescribing Cascade

1. Identify potential prescribing cascade
   - Put on your detective hat!

2. Determine prescribing cascade is plausible (based on Mechanism of Action)
   - Donepezil (cholinesterase inhibitor) increase systematic acetylcholine which can contribute to rhinorrhea and thus the prescribing of Ipratropium

3. Confirm temporal relationship of prescribing cascade
   - Determine if donepezil came prior to ipratropium (or previous notation of rhinitis)
   - Determine donepezil was not stopped then ipratropium started
   - Determine a ‘sensible’ duration between drugs
Patient-Level Interventions

Prescribing Cascade Recommendation – no ‘correct answer’

• Option 1: D/C Drug B; reduce Drug A
  • D/C Ipratropium (likely not beneficial); reduce donepezil to 5mg daily

• Option 2: D/C Drug B; D/C Drug A and replace with alternate
  • D/C Ipratropium (likely not beneficial); d/c donepezil; consider alternative like rivastigmine patch

• Option 3: Reduce or D/C Drug A; assess reduction in condition/need for Drug B then D/C or reduce
  • D/C or reduce donepezil; assess reduction in rhinorrhea then D/C Ipratropium

Patient-Level Intervention

Recommendation to Physician

• Per chart, it appears ipratropium nasal (initiated 6/18/2015) may have been prescribed for the cholinergic adverse effects of donepezil (initiated 5/18/2015). No notation of previous allergic rhinitis symptoms or treatment. No noted benefit of rhinorrhea after initiation of ipratropium nasal.

• Recommend D/C ipratropium (no noted benefit) and reduce donepezil to 5mg PO daily (therapeutic dose); will reassess next month
Active Learning

- How would you intervene?
  - (i.e., how would you recommend to change, initiate, discontinue medication)

- How would you document this intervention?
  - (i.e., what would your note say?)

- Work in groups with others at your table
  - Left of me (work on Cases 1)
  - Right to me (work on Cases 2)

- Work on for 5 minutes
  - Each case will be reported out

Conclusion

- Having a complete/up-to-date medication list will allow you to critically evaluate medications
- “Inappropriate medications” associated with poor outcomes
  - However, interventions in reducing these does not reduce poor outcomes
- Understand typical adverse events and temporal trends of medications can help identify DIAE and PC