Reducing Inappropriate Medication Use by “De-prescribing”

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Research Team

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  • Steven Simon, MD, MPH
  • Barbara Bokhour, PhD
  • Mark Meterko, PhD
  • Amy Rosen, PhD

• CDA Advisory Panel
  • David Bates, MD, MPH
  • Joseph Hanlon, PharmD
  • Lewis Kazis, PhD

• CDAie Mentor
  • Timothy Wilt, MD, MPH

• Team
  • Kelly Stolzmann, MS
  • Rachel Lippin-Foster
  • Kate Yeksigian
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  • Tom Marcello
  • Justice Clark
Funding and Conflicts of Interest

• Funding
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  • The views expressed in this presentation are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs.
  • The funding organization had no role in the design and conduct of the study, collection, management, analysis, and interpretation of the data.

• Conflicts of Interest – none
Cyberseminar Overview

• Experience of CDA
  • Personal Pathway and Discoveries
  • Mentorship

• Research
  • Completed work
  • Work in progress
Background

- Adverse outcomes from polypharmacy and inappropriate medication use are pervasive
- Occur even within an integrated health care system such as the VA
- Medication adherence and medication reconciliation receive considerable attention
- Less focus on improving intentional, proactive discontinuation of medications
Background: Deprescribing

- Discontinuation of medications when potential harms > potential benefits
- In context of goals of care and patient preferences
- Part of the good prescribing continuum
- Distinct from:
  - Patient non-adherence
  - Reactive discontinuation
Background: Deprescribing

- Often considered a provider decision
- Essential to understand the patient perspective of discontinuation
- Including patients in deprescribing activities increases likelihood of successful discontinuation
Personal Pathways & Discoveries

• Internal Medicine residency
  • Proton pump inhibitors (PPIs) were ubiquitous

• General Internal Medicine fellowship
  • Specific patient - unclear if any indication for warfarin – should I continue it?

• Master of Science in Health Services Research
  • Thesis work on discontinuation of PPIs
Proton Pump Inhibitor Discontinuation in Long-Term Care

Amy Linsky, MD, MSc,*† John A. Hermos, MD,*† Elizabeth V. Lawler, DSc, ‡§ and James L. Rudolph, MD, SM ‡§

OBJECTIVES: To determine factors associated with proton pump inhibitor (PPI) discontinuation in long-term care.
DESIGN: Retrospective cohort analysis.
SETTING: Veterans Affairs (VA) long-term care facilities.
PARTICIPANTS: Veterans admitted for nonhospice care in 2005 with a length of stay of 7 days or more who were prescribed a PPI within 7 days of admission (N = 10,371).
MEASUREMENTS: Prescribed medications and comorbidities were determined from VA pharmacy and administrative databases and functional status from Minimum

CONCLUSION: Although there may be clinical uncertainty regarding PPI discontinuation, more than one-quarter of participants prescribed a PPI upon admission to long-term care had it discontinued within 180 days. Targeting individuals prescribed PPIs for medication appropriateness review may reduce prescribing of potentially nonindicated medications. J Am Geriatr Soc 59:1658–1664, 2011.

Key words: long-term care; polypharmacy; proton pump inhibitors; prescriptions

Objective

In a cohort of patients admitted to Veterans Affairs (VA) long-term care and prescribed PPIs within 7 days of admission:

• To characterize the discontinuation of PPIs
• To identify factors associated with discontinuation
PPI discontinuation in long-term care: Results

• Within 180 days of long-term care admission
  • 27% baseline PPI users had discontinuation
  • More likely to have discontinuation early in admission
  • PPI more likely to be discontinued early if
    • Prior PPI use (not initiated in long-term care)
    • Pre-admission hospitalizations
    • Worse physical functional status

• PPI less likely to be discontinued early if
  • Gastric acid-related disorders
  • Diabetes
  • 6 or more other medications
• Third year of fellowship (aka “Find a job”)  
• Begin collaboration with future primary CDA mentor (Steven Simon, MD, MPH)  
• Fellowship project with students to teach about medication reconciliation
Background

• Medication reconciliation aims to reduce the occurrence of drug errors
• Many medication reconciliation efforts occur at transitions of care
• Majority of prescribing occurs in ambulatory care settings
Background: Types of Discrepancies

• Medication discrepancies are often used as a proxy for errors
  • Commission – presence of medication that patient reports *not* taking
  • Omission – absence of medication that patient reports taking
  • Duplication – medication occurs on list 2+ times
  • Alteration in dose or frequency – patient taking medication differently than prescribed
Completed Work:
Med discrepancies in integrated EHRs

Med discrepancies in integrated EHRs: Objectives

1. Determine the prevalence of *any* and *specific types* of medication discrepancies

2. Characterize the medications involved in each type of discrepancy

3. Assess factors associated with discrepancies
Med discrepancies in integrated EHRs: Results

• Medication discrepancies occurred in 60% of patients visiting ambulatory clinics.
• The medication classes involved differed for each type of error.
• Greater number of medications associated with *increased* errors of commission and duplication and with *decreased* errors of omission.
• Age $\geq$ 65 years associated with *increased* errors of omission.
Completed Work:
Patients' perceptions of their "most" and "least" important medications

Patients' "most" and "least" important: Objectives

• To determine the frequency with which Veteran patients would explicitly identify one of their medications as “most important” or “least important”

• To characterize the medications selected as “most” or “least” important
Patients' "most" and "least" important: Results

<table>
<thead>
<tr>
<th>Response category</th>
<th>Most important n (%)</th>
<th>Least important n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One specific medication</td>
<td>41 (39)</td>
<td>31 (30)</td>
</tr>
<tr>
<td>More than one medication*</td>
<td>26 (25)</td>
<td>2 (2)</td>
</tr>
<tr>
<td>More than one medication</td>
<td>5 (5)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Chose medications for a condition (did not name a specific medication)</td>
<td>11 (11)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>More than one medication and chose it by condition</td>
<td>3 (3)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Wrote “all”</td>
<td>7 (7)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Wrote “None”</td>
<td>21 (20)</td>
<td>51 (49)</td>
</tr>
<tr>
<td>Did not answer the question*</td>
<td>16 (15)</td>
<td>20 (19)</td>
</tr>
<tr>
<td>Wrote “n/a”</td>
<td>4 (4)</td>
<td>5 (5)</td>
</tr>
<tr>
<td>Left it blank</td>
<td>10 (10)</td>
<td>11 (11)</td>
</tr>
<tr>
<td>Wrote “don’t know,” “uncertain,” or “not sure”</td>
<td>1 (1)</td>
<td>4 (4)</td>
</tr>
<tr>
<td>Wrote something undecipherable</td>
<td>1 (1)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>
Personal Pathways & Discoveries

- First year as faculty
- Applied and awarded VISN1 CDA
  - 2-year grant
    - Primary mentor – Steven Simon, MD, MPH
    - Secondary mentors – Barbara Bokhour, PhD and Mark Meterko, PhD
- Delayed application for HSR&D CDA
Patient Perceptions (Qualitative): Research Objectives

- To use qualitative methods to identify
  - Patient perspectives on intentional medication discontinuation
  - How patients discuss their preferences so as to optimize appropriate medication use.
Patient Perceptions (Qualitative): Results

- Patient Views of Medication
  - Desire for fewer medications
  - Adherence
  - Specific versus General

- Patient-Provider Relationship
  - Trust
  - Relying on Expertise
  - Shared Decision Making
  - Balancing Multiple Providers

- Experience
  - Extent of experience with medication discontinuation
Clinical Provider Perceptions of Proactive Medication Discontinuation

Amy Linsky, MD, MSc; Steven R. Simon, MD, MPH; Thomas B. Marcello, BA; and Barbara Bokhour, PhD

Polypharmacy, often defined as a patient taking 5 or more medications,1 is common. Roughly 40% of adults 65 years or older experience polypharmacy, ABSTRACT

Objectives: Polypharmacy and adverse drug events lead to considerable healthcare costs and morbidity, yet there is little to

Provider Perceptions (Qualitative): Objectives

• To use qualitative methods to understand providers’ beliefs and attitudes about
  • Polypharmacy
  • Medication discontinuation
Provider Perceptions (Qualitative): Results
Personal Pathways & Discoveries

- Transitioned from VISN1 CDA to HSR&D CDA
  - 5 years funding
  - VISN1 2\textsuperscript{nd} objective --> HSR&D 1\textsuperscript{st} objective
- Continued to build relationships with mentors
  - Additional secondary mentor – Amy Rosen, PhD
  - New advisory panel – Bates, Hanlon, Kazis
  - CDAie mentor – Timothy Wilt, MD, MPH
Completed work: Provider Survey Development

Provider Survey Development: Objective

- To develop a survey instrument that assesses primary care providers’ and pharmacists’ experiences, attitudes, and beliefs toward medication discontinuation
Provider Survey Development: Methods

• Developed instrument based on conceptual model derived in our prior qualitative study
  • 4 domains, 10 dimensions
  • 56 items, plus 8 demographic items

• Web-based survey

• Sample of 2500 primary care prescribers
  • Physicians (MD/DO), Nurse practitioners (NPs), Physicians assistants (PAs), and clinical pharmacy specialists

• Multitrait analysis

• Multiple linear regression
Provider Survey Development: Results

• Eight iterations of multitrait analysis resulted in a model with five scales:
  • Medication Characteristics
  • Current Patient Clinical Factors
  • Predictions of Future Health States
  • Patients’ Ability to Manage their Own Health
  • Education and Experience
## Provider Survey Development: Results

Correlations among Scales (Internal Consistency Reliability Estimates in Diagonal)

<table>
<thead>
<tr>
<th></th>
<th>Med Characteristics</th>
<th>Current Clinical</th>
<th>Future Health</th>
<th>Patients Ability</th>
<th>Education &amp; Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Med Characteristics</td>
<td>(0.33)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Clinical</td>
<td>0.16</td>
<td>(0.75)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Future Health</td>
<td>0.25</td>
<td>0.44</td>
<td>(0.81)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients’ Ability</td>
<td>0.09</td>
<td>0.30</td>
<td>0.43</td>
<td>(0.82)</td>
<td></td>
</tr>
<tr>
<td>Education and Experience</td>
<td>0.03</td>
<td>0.11</td>
<td>0.12</td>
<td>0.10</td>
<td>(0.77)</td>
</tr>
</tbody>
</table>

*Med Characteristics: Medication Characteristics; Current Clinical: Current Patient Clinical Factors; Future Health: Predictions of Future Health States; Patients’ Ability: Patients’ Ability to Manage their Own Health; Education and Experience*
Provider Survey Development: Results

- Multiple linear regression with outcome of self-rated comfort with deciding to discontinue a medication (0-10 scale).
  - Statistically significant model (p<0.0001)
  - Explained 27.6% of the variation
  - Age, race, provider type, region, prior experience, and three of the new provider attitude scales (Current Patient Clinical Factors, Predictions of Future Health States, and Education and Experience).
Provider Survey Development: Conclusions

- Replicable and psychometrically sound scales
- Represent dimensions that contribute to primary care prescribers making medication discontinuation decisions
- Survey instrument can identify factors that are associated with reluctance to discontinue
Completed Work:
Provider Preferences for Interventions

Linsky A, Meterko M, Stolzmann K, Simon SR. Supporting Medication Discontinuation: Provider Preferences for Interventions to Facilitate Deprescribing. *BMC Health Services Research (under review)*
Provider Preferences: Objective

• To determine clinicians’ preferences for interventions that would improve their ability to discontinue medications appropriately.
Provider Preferences: Methods

- One survey question presented 15 potential changes to medication-related practices.
- Respondents ranked their top three choices for changes that would “most improve [their] ability to discontinue medications.”
- Data Analysis
  - We assigned weights of 3 for first-choice, 2 for second-choice, and 1 for third-choice selections.
  - Preferences were determined for all respondents and within subgroups defined by:
    - Demographic and background characteristics
    - Medication-relevant experience
    - Medication-related beliefs and attitudes
Provider Preferences: Results

- 326 respondents provided rankings
- Three most highly ranked interventions were
  - Requiring all medication prescriptions to have an associated ‘indication for use.’
  - Assistance with follow-up of patients as they taper or discontinue medications is performed by another member of the Patient Aligned Care Team (PACT)
  - Increased patient involvement in prescribing decisions
Provider Preferences: Results

• 250 (77%) of respondents who answered the question included at least one of these items in their three highest ranked choices
  • Regardless of prescriber demographics, experience, or beliefs.
  • Varied rank order
Completed work:
Patient Survey Development

Patient Survey Development: Objective

- To develop a survey instrument to assess patients’ experiences with, attitudes toward, and beliefs about medication discontinuation
Patient Survey Development: Methods

- Instrument content based on conceptual model
  - Used items and scales from existing instruments
    - Beliefs about Medications Questionnaire (BMQ)
    - CollaboRATE
    - Trust in Provider
    - Patient Attitudes Toward Deprescribing (PATD)
    - Autonomy Preference Index (API)
  - 27 additional items
- Modified Delphi panel, then cognitive interviews
- Final instrument
  - 43 items related to medication discontinuation
  - 14 demographic/background items
Patient Survey Development: Methods

- National mail-based survey of 1600 Veterans
  - Prescribed 5 or more concurrent medications in prior 90 days
  - Two or more visits to VA Primary Care in prior year
  - Oversampled women
- Exploratory Factor Analysis (EFA) in derivation subgroup
  - Percent variance accounted for
  - Scree plot
  - Conceptual coherence
- Confirmatory Factor Analysis (CFA) in validation subgroup
  - Absolute fit (standardized root mean square residual)
  - Parsimony-corrected fit (root mean square error of approximation)
  - Comparative fit (comparative fit index)
Patient Survey Development: Results

- 790/1600 respondents
  - 53 unreachable
  - Adjusted response rate = 51%
Patient Survey Development: Results

5 Scales

1. Medication Concerns
2. Provider Knowledge
3. Interest in Stopping Medicines
4. Patient Involvement in Decision-Making
5. Unimportance of Medicines
# Patient Survey Development: Scale Properties

<table>
<thead>
<tr>
<th>Scale</th>
<th>Items (k)</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Skew</th>
<th>% at Floor</th>
<th>% at Ceiling</th>
<th>Cronbach Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication Concerns</td>
<td>6</td>
<td>3.01</td>
<td>0.85</td>
<td>-0.03</td>
<td>0.76</td>
<td>0.63</td>
<td>0.82</td>
</tr>
<tr>
<td>Provider Knowledge</td>
<td>3</td>
<td>3.75</td>
<td>0.82</td>
<td>-0.61</td>
<td>1.0</td>
<td>12.5</td>
<td>0.86</td>
</tr>
<tr>
<td>Interest in Stopping Medicines</td>
<td>3</td>
<td>3.42</td>
<td>0.84</td>
<td>-0.42</td>
<td>1.3</td>
<td>4.1</td>
<td>0.77</td>
</tr>
<tr>
<td>Patient Involvement in Decision-Making</td>
<td>3</td>
<td>3.25</td>
<td>0.79</td>
<td>0.01</td>
<td>0.38</td>
<td>2.3</td>
<td>0.61</td>
</tr>
<tr>
<td>Unimportance of Medicines</td>
<td>3</td>
<td>2.39</td>
<td>0.75</td>
<td>0.19</td>
<td>6.8</td>
<td>0.0</td>
<td>0.70</td>
</tr>
</tbody>
</table>
Patient Survey Development: Inter-scale Correlations

<table>
<thead>
<tr>
<th></th>
<th>Concerns</th>
<th>Knowledge</th>
<th>Interest</th>
<th>Involvement</th>
<th>Unimportance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication Concerns</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.82)</td>
</tr>
<tr>
<td>Provider Knowledge</td>
<td>-0.27</td>
<td></td>
<td></td>
<td></td>
<td>(0.86)</td>
</tr>
<tr>
<td>Interest in Stopping Medicines</td>
<td>0.57</td>
<td>-0.11</td>
<td></td>
<td></td>
<td>(0.77)</td>
</tr>
<tr>
<td>Patient Involvement in Decision-Making</td>
<td>0.17</td>
<td>-0.26</td>
<td>0.12</td>
<td></td>
<td>(0.61)</td>
</tr>
<tr>
<td>Unimportance of Medicines</td>
<td>0.53</td>
<td>-0.29</td>
<td>0.51</td>
<td>0.08</td>
<td>(0.70)</td>
</tr>
</tbody>
</table>
Patient Survey Development: Conclusion

• Study data support the reliability and validity of the newly developed Patient Perceptions of Deprescribing (PPoD) instrument.

• PPoD assesses 8 dimensions of patients’ attitudes, knowledge and experience related to medication discontinuation
  • 5 original scales
  • 3 established, validated measures
    • Beliefs about Medications Questionnaire – Overuse
    • Trust in Provider
    • CollaboRATE

• Can be used in future research to determine how best to involve patients in decisions about deprescribing
Personal Pathways & Discoveries

- 4th year as faculty → become a mentor
  - Pharmacy student – his honors thesis project
  - His primary mentor – clinical pharmacist
- Returned to data on medication discrepancies in health records
Completed Work: Medication Complexity

Complexity: Background

- Multiple contributing components
  - Medication number
  - Dosing frequency
  - Administration routes
  - Additional directions (e.g., “take with food”)
  - Medication storage

- Potential consequences include non-adherence and increased adverse health outcomes

- Can be measured with the Medication Regimen Complexity Index (MRCI)
  - Range of scores 1.5 (1 tablet daily prn) to infinity
  - No defined threshold for high scores
Complexity: Objectives

1. Evaluate the association of EHR-generated MRCI scores with discrepancies
   a) Any discrepancy
   b) Commissions

2. Compare predictive ability of MRCI with medication number to identify discrepancies
## Complexity: Results

<table>
<thead>
<tr>
<th></th>
<th>Threshold</th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Any Discrepancy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># of meds on list</td>
<td>8</td>
<td>1.61</td>
<td>0.69-3.77</td>
</tr>
<tr>
<td>MRCI score</td>
<td>25</td>
<td>1.63</td>
<td>0.68-3.88</td>
</tr>
<tr>
<td><strong>Commissions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># of meds on list</td>
<td>8</td>
<td>4.51</td>
<td>1.73-11.73</td>
</tr>
<tr>
<td>MRCI score</td>
<td>25</td>
<td>3.64</td>
<td>1.41-9.41</td>
</tr>
</tbody>
</table>

*Four separate models. Each model adjusted for age, care at remote VA, non-local meds*
Complexity: Implications

• Given the ease of medication number compared to calculation of MRCI, med number may be sufficient to identify patients at risk of discrepancies.

• Can identify patients who may benefit from intensive medication reviews in order to discover medication-related issues.

• MRCI may be supplementary to identify individual medications that increase the regimen complexity.
Personal Pathways & Discoveries

- **Beginning of 3rd year of CDA**
  - Research continues
  - Planning for future grants begins
- **Mentored and mentoring**
  - Primary CDA mentor
  - Secondary CDA mentors
  - CDAie mentor
  - Advisory panel
  - Informal mentoring
Work in Progress:
Patient Discontinuation Experience
Discontinuation Experience: Methods

- Multivariable models with stepwise selection to predict whether a patient had ever discontinued a medication
  1. Demographic variables only
  2. Demographic variables + attitudinal scales
  3. Demographic variables + attitudinal scales + experiential items
Discontinuation Experience: Results

- Significant variables
  - Demographics
    - Age
    - Education
    - Number of prescriptions
  - Attitudinal scales
    - Interest in Deprescribing
    - Trust in Provider
    - CollaboRATE
  - Experiences
    - Asking to stop a medicine
    - Having a provider tell you to stop a medicine
Work in Progress:
Patients’ Balancing of Providers
Patients’ Balancing of Providers: Objective

• To determine how patient’s view deprescribing authority and jurisdiction of clinical pharmacy specialists, primary care providers, and subspecialists
Patients’ Balancing of Providers: Methods

• Four outcome groups based on responses:
  
  1. Imagine that a specialist (like a heart doctor, kidney doctor or psychiatrist) prescribed a medicine for you. Would you be comfortable if your PCP told you to stop taking it? (yes/no)

  2. Imagine that your VA PCP prescribed a medicine for you. Would you be comfortable if a VA clinical pharmacist told you to stop taking it? (yes/no)

• Multinomial logistic regression to predict patient’s preferences for who discontinues
Work in Progress:
Therapeutic Duplications
Duplications: Objective

- To determine the frequency and correlates of therapeutic duplications to identify potential intervention targets
Duplications: Methods

• Population
  • All Veterans

• Medications
  • All except supplies and other meds that would not be taken at home
Duplications: Methods

- Primary outcome
  - Number of days worth of excess pills available
    - Across all meds
    - Across all episodes
Duplications: Methods

Beginning of Observation
Period for Duplications
And Adverse Outcomes

End of Observation
Period for Duplications

Purple = 13 days. Excess pills = 13
Orange = 21 days. Excess pills = 8×2+13=29
Duplications: Methods

- **Oct 1, 2012** to **Oct 1, 2013**: Start counting clinic visits and medication data.
- **Jan 1, 2014** (Day 1): 
  - Age
  - Sex
  - Race
  - Comorbidities
  - Beginning of Observation Period for **Duplications** and **Adverse Outcomes**
- **Sept 30, 2014** (Day 273): 
  - End of Observation Period for **Duplications**
- **Sept 30, 2015**: End of Observation Period for **Adverse Outcomes**
Duplications: Methods

• Planned Analyses
  • Cluster analysis
  • Correlates of duplications
  • Chart review to validate findings and explore etiologies
  • Consequence of duplications
Personal Pathways & Discoveries

• Beginning of 3rd year of CDA
  • Research in progress
  • Planning for future grants

• Mentored and mentoring
  • Primary CDA mentor
  • Secondary CDA mentors
  • CDAie mentor
  • Advisory panel
  • Informal mentoring
Thank you

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