



# Reducing Inappropriate Medication Use by “De-prescribing”

**Amy Linsky, MD, MSc**  
**May 24, 2016**



---

**Center for Healthcare Organization  
and Implementation Research**

# Research Team

- **Mentors**
  - 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
  - Haider AlSara
  - Tom Marcello
  - Justice Clark

# Funding and Conflicts of Interest

- **Funding**

- **Dr. Linsky was supported by a Department of Veterans Affairs (VA), Veterans Health Administration, Health Services Research and Development Career Development Award (CDA12-166).**
- **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

# Completed Work:

## PPI discontinuation in long-term care

### Proton Pump Inhibitor Discontinuation in Long-Term Care

*Amy Linsky, MD, MSc,<sup>\*†</sup> John A. Hermos, MD,<sup>\*‡</sup> Elizabeth V. Lawler, DSc,<sup>‡§</sup> and James L. Rudolph, MD, SM<sup>||§</sup>*

---

**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

*Linsky A, Hermos JA, Lawler EV, Rudolph JL. Proton pump inhibitor discontinuation in long-term care. Journal of the American Geriatrics Society. 2011;59:1658-1664*

# **PPI discontinuation in long-term care: 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**



# Personal Pathways & Discoveries

- **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

ORIGINAL RESEARCH

### Medication discrepancies in integrated electronic health records

Amy Linsky,<sup>1,2,3,4,5</sup> Steven R Simon<sup>1,2,3,4,5</sup>

► Additional data are published online only. To view this file please visit the journal online (<http://dx.doi.org/10.1136/bmjqs-2012-001301>)

#### ABSTRACT

**Introduction** Medication discrepancies are associated with adverse drug events. Electronic health records (EHRs) may reduce discrepancies,

#### INTRODUCTION

With care that is fractured among various sites and healthcare providers, medical information is subject to incomplete

*Linsky A, Simon SR. Medication discrepancies in integrated electronic health records. BMJ Quality and Safety. 2013;22:103-109.*

# 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

Linsky and Simon *BMC Research Notes* 2012, 5:619  
<http://www.biomedcentral.com/1756-0500/5/619>



SHORT REPORT

Open Access

### Patients' perceptions of their "most" and "least" important medications: a retrospective cohort study

Amy Linsky<sup>1,2,3,4,5\*</sup> and Steven R Simon<sup>1,2,3,4,5</sup>

#### Abstract

**Background:** Despite benefits of adherence, little is known about the degree to which patients will express their

*Linsky A, Simon SR. Patients' perceptions of their "most" and "least" important medications: a retrospective cohort study. BMC Research Notes. 2012;5:619.*

# 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

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



# 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**

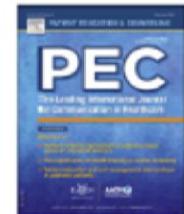
# Completed work: Patient Perceptions of Proactive Medication Discontinuation



Contents lists available at ScienceDirect

Patient Education and Counseling

journal homepage: [www.elsevier.com/locate/pateducou](http://www.elsevier.com/locate/pateducou)



Patient Perception, Preference and Participation

Patient perceptions of proactive medication discontinuation

Amy Linsky<sup>a,b,c,d,\*</sup>, Steven R. Simon<sup>a,b,c,d</sup>, Barbara Bokhour<sup>b,e</sup>



<sup>a</sup> Section of General Internal Medicine, VA Boston Healthcare System, Boston, USA

<sup>b</sup> Center for Healthcare Organization and Implementation Research, VA Boston Healthcare System and ENRM Veterans Affairs Medical Center, Boston and Bedford, MA, USA

<sup>c</sup> Section of General Internal Medicine, Boston Medical Center, Boston, USA

<sup>d</sup> Division of General Internal Medicine and Primary Care, Brigham and Women's Hospital, Boston, USA

<sup>e</sup> Department of Health Policy & Management, Boston University School of Public Health, Boston, USA

## ARTICLE INFO

Article history:

## ABSTRACT

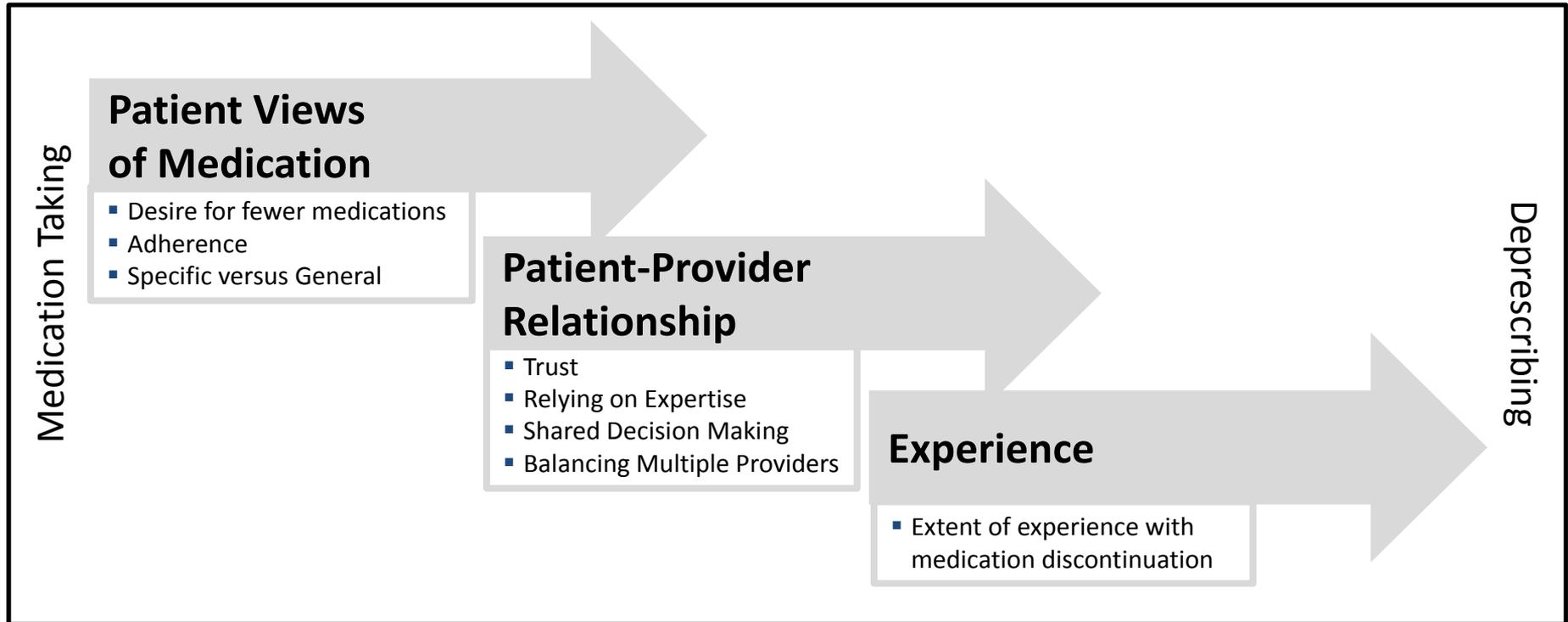
*Objective:* While many patients prefer fewer medications, decisions about medication discontinuation

Linsky A, Simon SR, Bokhour B. Patient Perceptions of Proactive Medication Discontinuation. *Patient Education and Counseling*. 2015 Feb;98(2):220-5.

# **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



# Completed work:

## Clinical Provider Perceptions of Proactive Medication Discontinuation



---

CLINICAL

### Clinical Provider Perceptions of Proactive Medication Discontinuation

---

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

**P**olypharmacy, often defined as a patient taking 5 or more medications,<sup>1</sup> is common. Roughly 40% of adults 65 years or older experience polypharmacy.

#### ABSTRACT

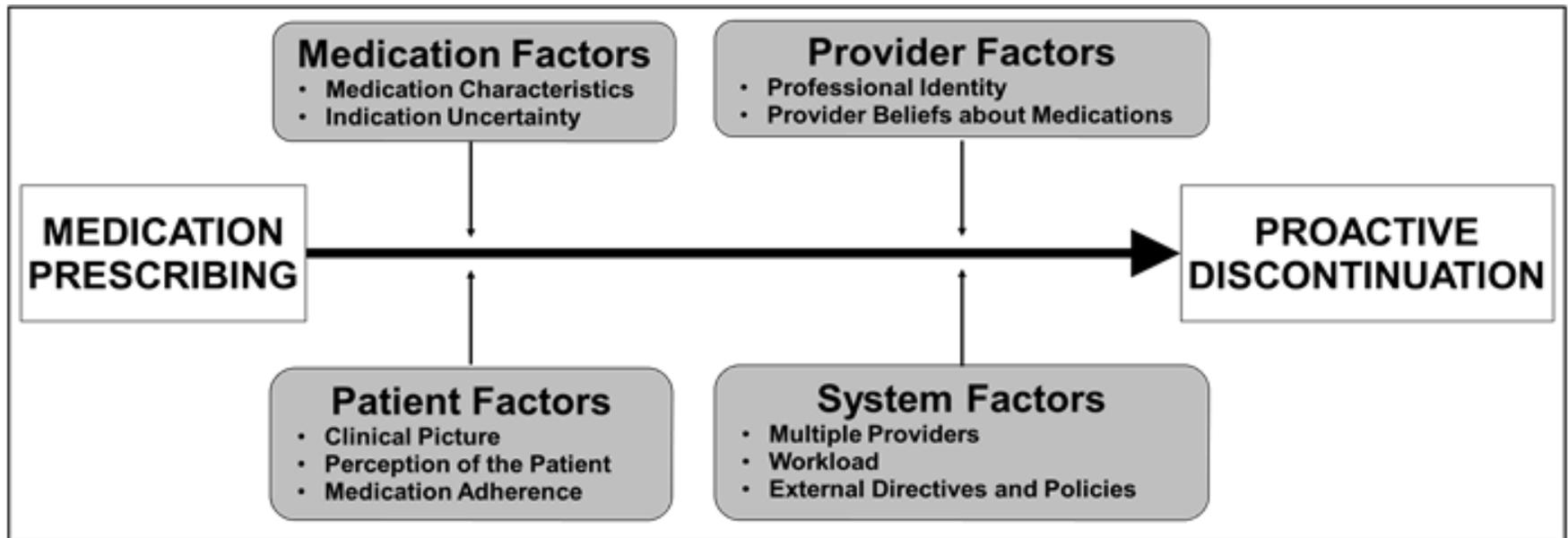
**Objectives:** Polypharmacy and adverse drug events lead to considerable healthcare costs and morbidity, yet there is little to

*Linsky A, Simon SR, Marcello TB, Bokhour B. Clinical Provider Perceptions of Proactive Medication Discontinuation. American Journal of Managed Care. Am J Manag Care. 2015;21(4):277-283.*

# 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<sup>nd</sup> objective --> HSR&D 1<sup>st</sup> 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

**Linsky A, Simon SR, Stolzmann K, Bokhour B, Meterko M. Prescribers' Perceptions of Medication Discontinuation: Survey Instrument Development and Validation. *American Journal of Managed Care (in press)***

# **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)

	Med Characteristics	Current Clinical	Future Health	Patients Ability	Education & Experience
Med Characteristics	(0.33)				
Current Clinical	0.16	(0.75)			
Future Health	0.25	0.44	(0.81)		
Patients' Ability	0.09	0.30	0.43	(0.82)	
Education and Experience	0.03	0.11	0.12	0.10	(0.77)

*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

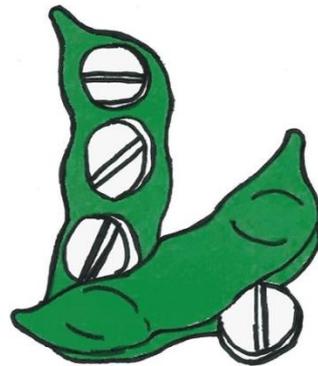
- **326 respondents provided rankings**
- **Three most highly ranked interventions were**
  - **Requiring all medication prescriptions to have an associated ‘indication for use.’**
  - **Assistance with follow-up of patients as they taper or discontinue medications is performed by another member of the 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

**Linsky A, Simon SR, Stolzmann K, Meterko M.  
Patient Perceptions of Deprescribing (PPoD):  
Survey Development and Psychometric  
Assessment. *Medical Care (under review).***



Patient  
Perceptions  
of  
Deprescribing

# 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

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

# Patient Survey Development: Inter-scale Correlations

	Concerns	Knowledge	Interest	Involvement	Unimportance
<b>Medication Concerns</b>	(0.82)				
<b>Provider Knowledge</b>	-0.27	(0.86)			
<b>Interest in Stopping Medicines</b>	0.57	-0.11	(0.77)		
<b>Patient Involvement in Decision-Making</b>	0.17	-0.26	0.12	(0.61)	
<b>Unimportance of Medicines</b>	0.53	-0.29	0.51	0.08	(0.70)

# 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

**Patel CH, Zimmerman KM, Fonda JR, Linsky A.  
Medication Complexity, Medication Number,  
and Their Relationships to Medication  
Discrepancies. *Annals of Pharmacotherapy*.  
2016 (in press).**

# 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

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

*\*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 3<sup>rd</sup> 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

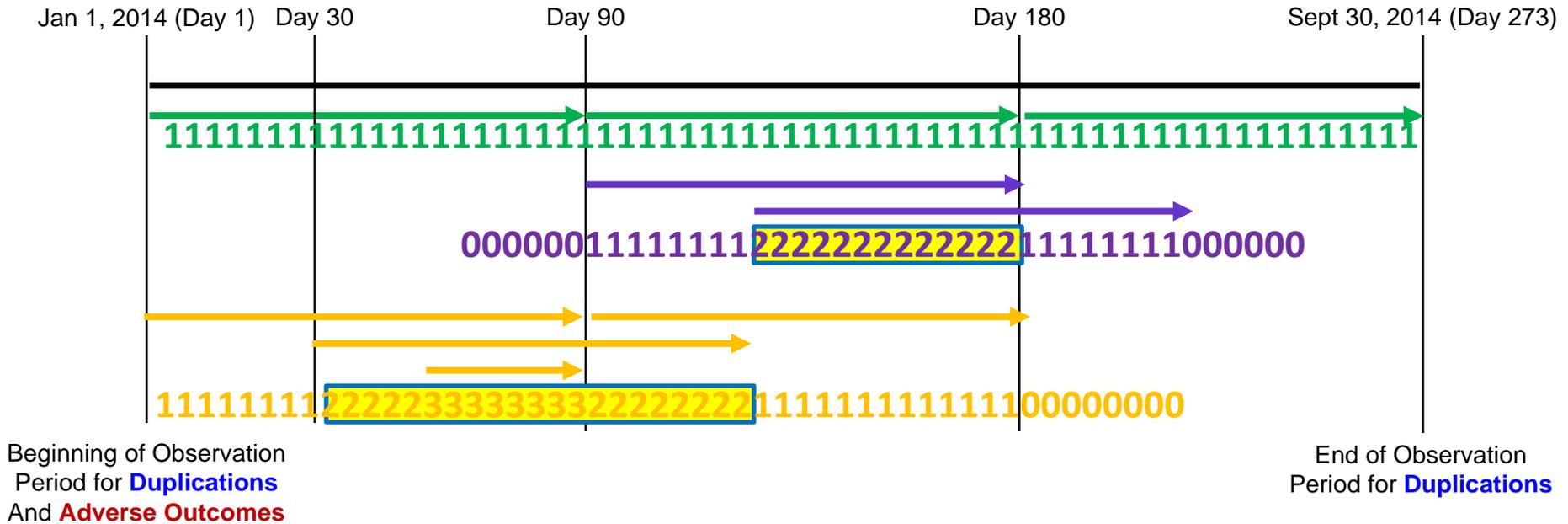
- **Population**
  - All Veterans
- **Medications**
  - All except supplies and other meds that would not be taken at home



# Duplications: Methods

- **Primary outcome**
  - **Number of days worth of excess pills available**
    - **Across all meds**
    - **Across all episodes**

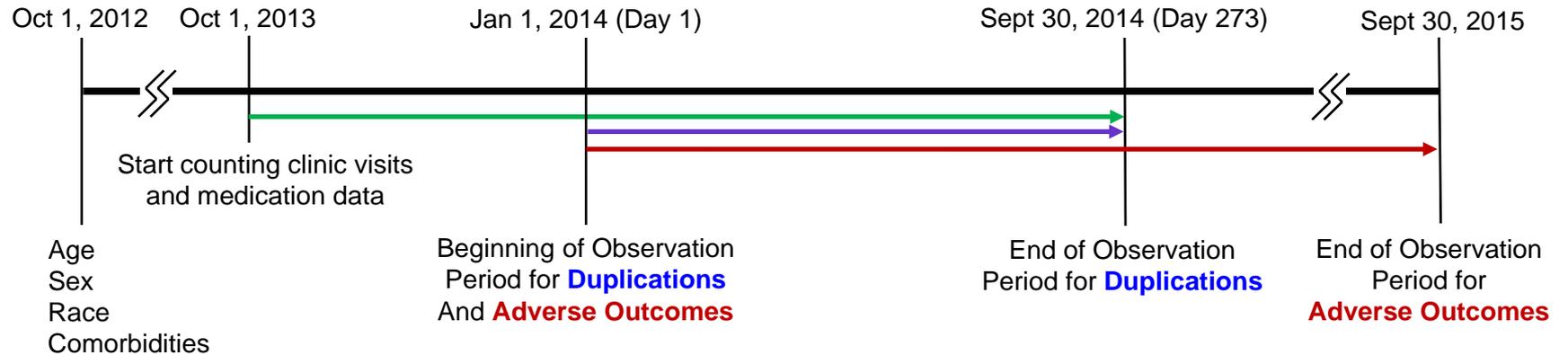
# Duplications: Methods



Purple = 13 days. Excess pills = 13

Orange = 21 days. Excess pills =  $8 \times 2 + 13 = 29$

# Duplications: Methods



# 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 3<sup>rd</sup> 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

**Amy Linsky, MD, MSc  
General Internal Medicine  
VA Boston Healthcare System  
150 S. Huntington Ave  
Building 9, Room 425E (152G)  
Boston, MA 02130  
617-506-9732  
amy.linsky@va.gov**