

# Using Nudges to Improve the Delivery of Health Care

*Mitesh Patel, MD, MBA, MS*

February 2020

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Perelman School of Medicine and The Wharton School, University of Pennsylvania;  
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# Disclosures

- Research funding
  - NIH, VA, Donaghue Foundation, Doris Duke Charitable Foundation, Deloitte Consulting
- Advisory Board Member
  - Life.io, Healthmine Services, Holistic Industries
- Consulting
  - Catalyst Health
  - [www.miteshspatel.com](http://www.miteshspatel.com)

# Human behavior is the final common pathway

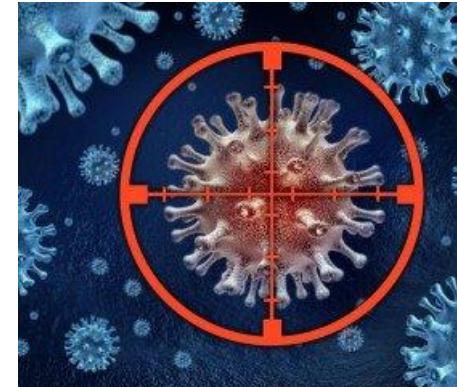
# Human behavior is the final common pathway



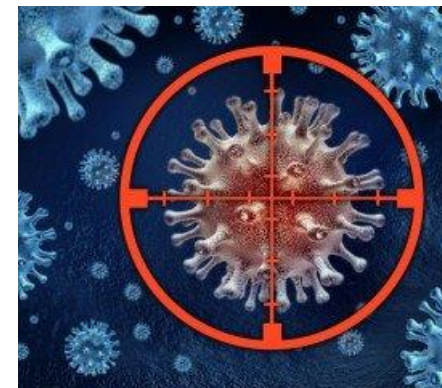
# Human behavior is the final common pathway



# Human behavior is the final common pathway



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*90% of clinicians*



*80% of US adults*

# Using nudges to improve our decisions


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- Subtle changes in design that can have an outsized impact on our behavior
- Remind, guide, or motivate decisions
- Examples
  - Setting the default to the preferred option
  - Prompting an active choice now rather than delaying the decision
  - Framing information through increased transparency or social comparisons

# Nudges are prevalent in other industries

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 **RECOMMENDED: ADD TRIP INSURANCE** \*REQUIRED: PLEASE SELECT YES OR NO TO CONTINUE

Protect your trip to New York for \$51.25 total. ✔ Highly Recommended

Several reasons to upgrade your trip to include protection:

- ✔ Reimbursement of cancelled trip costs due to covered injury, illness, or other covered reasons
- ✔ Up to 150% trip interruption protection of ticket costs
- ✔ Travel delay protection
- ✔ Benefits for pre-existing medical conditions

"Buy travel insurance. It can protect you against trip cancellation costs." - USA Today, May 2016

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Terms, conditions and exclusions [apply](#). Benefits underwritten by BCS Insurance Company or Jefferson Insurance Company, depending on your state of residence. Recommended by AGA Service Company, the licensed producer and administrator of this plan.

YES

- OR -

NO

Amount Due \$788<sup>USD</sup>

By selecting Complete Purchase, you agree to all the Terms and Conditions and the Hazardous Materials policy outlined below. Federal law forbids the carriage of hazardous materials including explosives, compressed gases, flammable liquids and solids, oxidizers, poison, corrosives and radioactive materials aboard the aircraft, in your luggage, or on your person.

[CURRENCY CALCULATOR](#)

COMPLETE PURCHASE



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USD

- OR -

**Frequently bought together**



Total price: **\$49.98**

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[CURRENCY CALCULATOR](#) [COMPLETE PURCHASE](#)

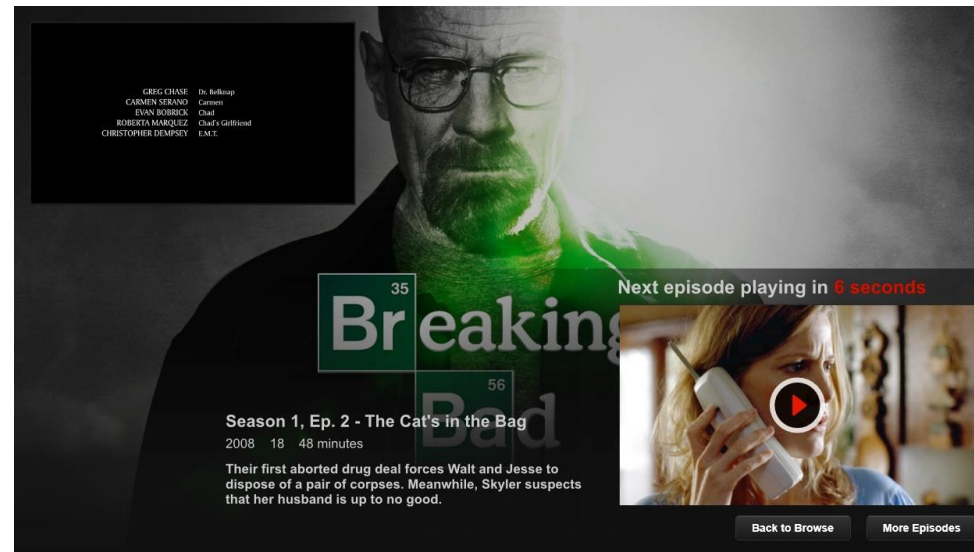
## Frequently bought together



Total price: **\$49.98**

[Add both to Cart](#)

[Add both to List](#)



CREG CHASE Dr. Ballmer  
CARMEN SERANO Carmen  
EVAN BOHRICK Chad  
ROBERTA MARQUESE Chela Gaffield  
CHRISTOPHER DEMPSEY E.M.T.

35

# Breaking Bad

56

## Season 1, Ep. 2 - The Cat's in the Bag

2008 18 48 minutes

Their first aborted drug deal forces Walt and Jesse to dispose of a pair of corpses. Meanwhile, Skyler suspects that her husband is up to no good.

Next episode playing in **6 seconds**

[Back to Browse](#) [More Episodes](#)

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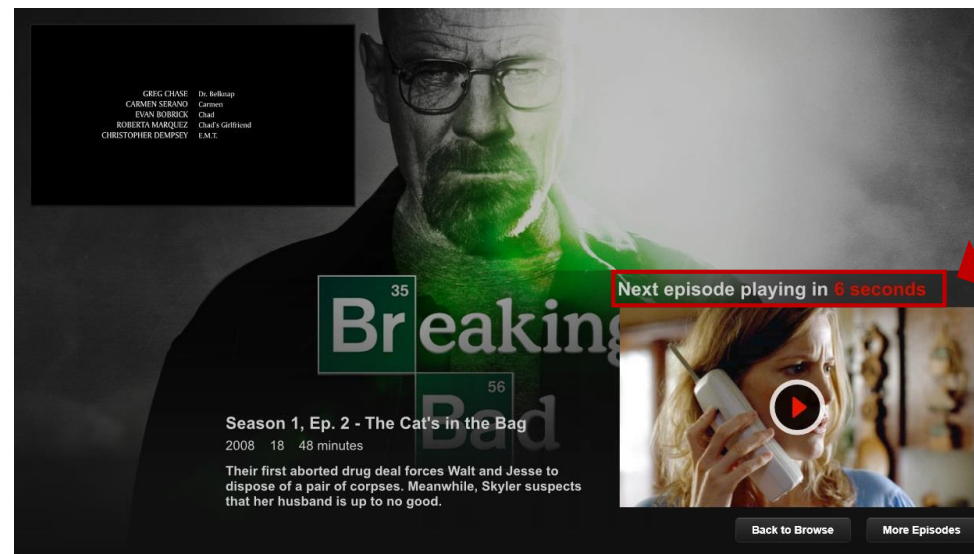
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**Breaking Bad**

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# Nudge units are behavioral design teams

- Systematically test ways to improve decisions and change behavior

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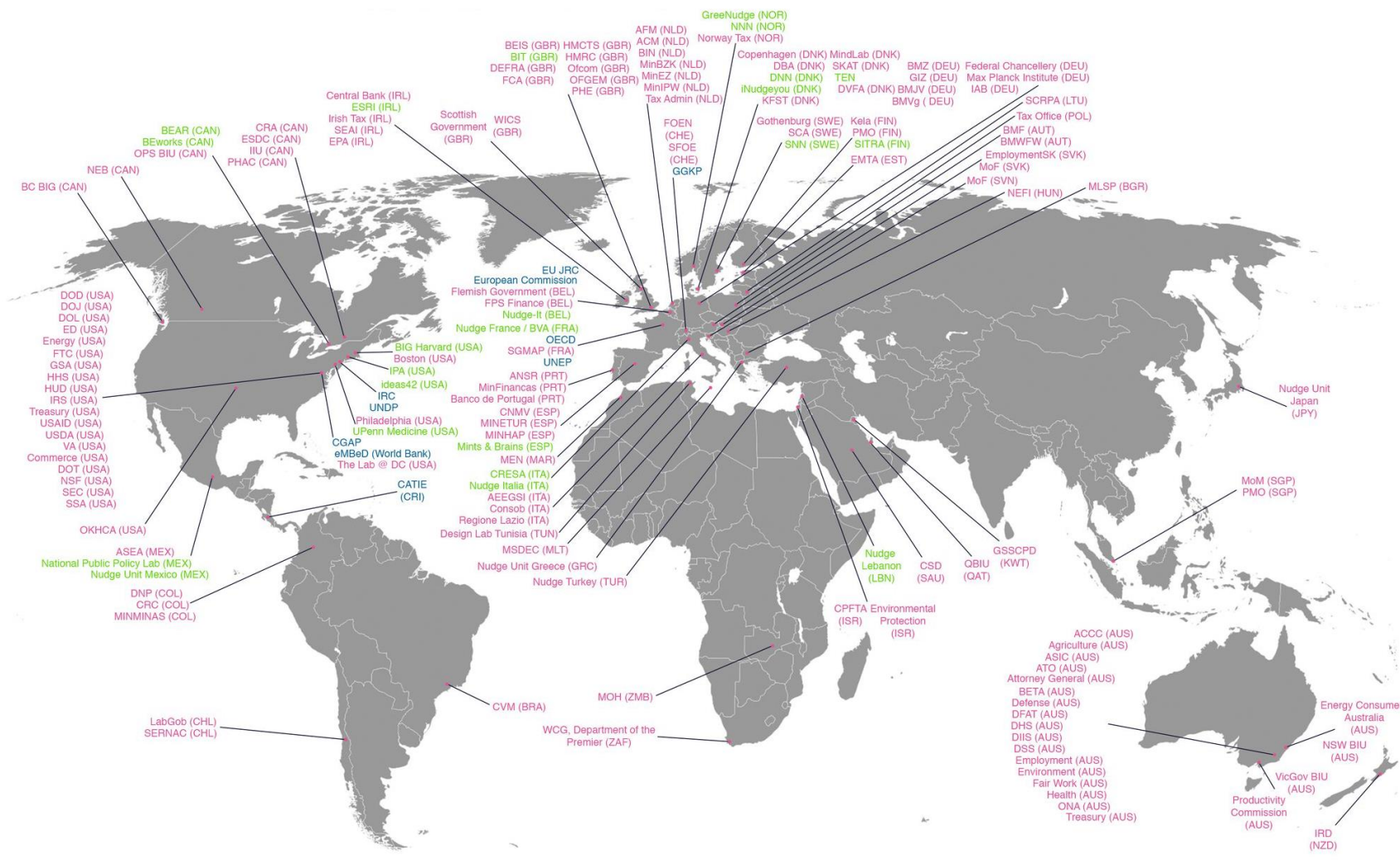
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- UK Behavioral Insights Team
  - Launched in 2010 by the United Kingdom's Government

# Nudge units are behavioral design teams

- Systematically test ways to improve decisions and change behavior
- UK Behavioral Insights Team
  - Launched in 2010 by the United Kingdom's Government
  - Quickly demonstrated that small changes could lead to significant impact
    - Efficiency: tax payments
    - Health: organ donor consent rates
    - Social good: charitable contributions



# Nudge units have spread around the world within governments

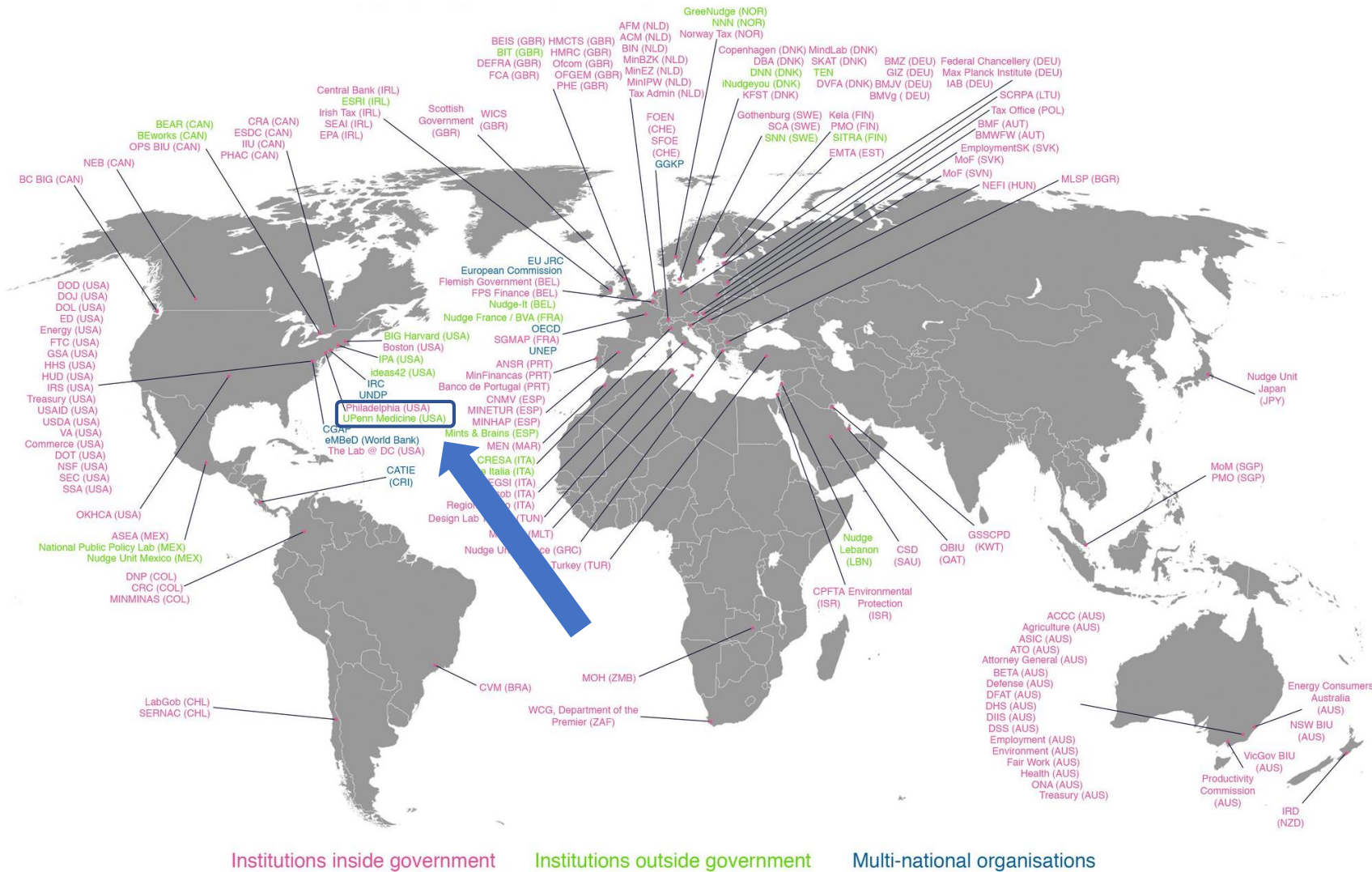


Institutions inside government

Institutions outside government

Multi-national organisations

# Nudge units have spread around the world within governments





# World's first behavioral design team embedded in a health system

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## Mission

To leverage insights from behavioral economics and psychology to design and test approaches to steer medical decision-making toward higher value and improved patient outcomes

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**CENTER FOR HEALTH CARE INNOVATION**  
Accelerating Ideas to Transform Health Care

# Our role

## Advise

Provide guidance on the design and implementation of interventions to improve the delivery of health care.

## Implement

Engage frontline clinicians, health system leadership, and patients to test pragmatic interventions.

## Evaluate

Rigorously assess impact of interventions to inform larger scale deployment and optimize future efforts.

## Disseminate

Share insights from our work in peer-reviewed publications, on social media, and in-person at conferences or our annual Nudges in Health Care Symposium.



## Our Work

### Nudge Clinicians

The design of practice environments heavily influences medical decision-making. We test and implement nudges to improve workflow and steer decisions towards evidence-based care.

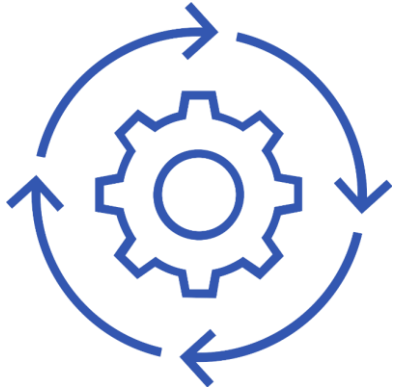


### Nudge Patients

Health behaviors have a significant impact on longer-term patient outcomes. We design and study interventions that increase engagement and significantly change behaviors.



# Impact



**50+**  
projects

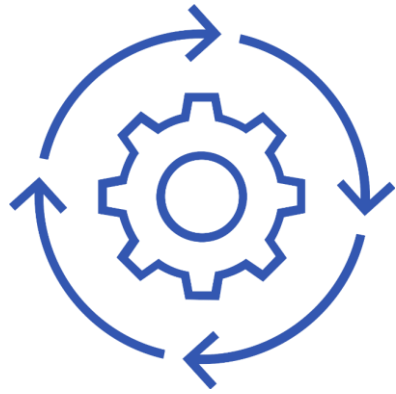


**12+**  
specialties



**20+**  
team  
members

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**50+**  
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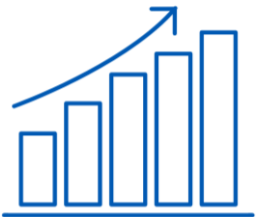
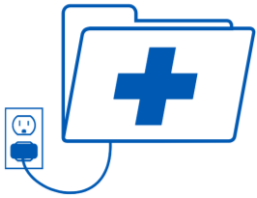
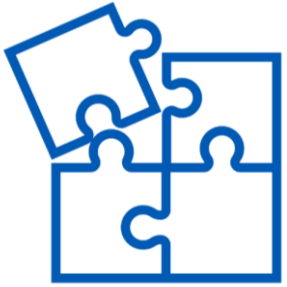
Oncology  
Cardiology  
Pediatrics  
Endocrine  
Sleep Medicine  
Internal Medicine  
Family Medicine  
Infectious Disease  
Hospital Medicine  
Radiation Oncology  
Emergency Medicine

**12+**  
specialties

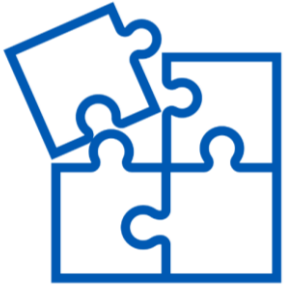


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# Prioritizing opportunities

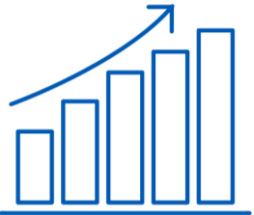


# Prioritizing opportunities



Right fit for a nudge

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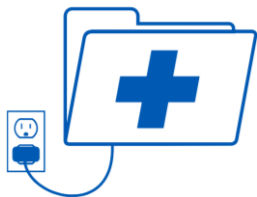


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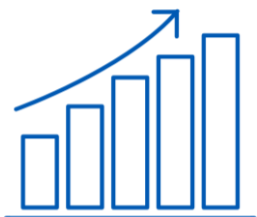
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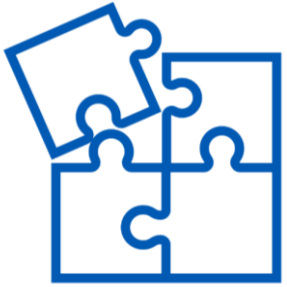


**Leverages scalable  
technology**

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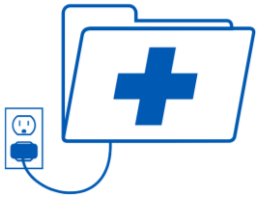


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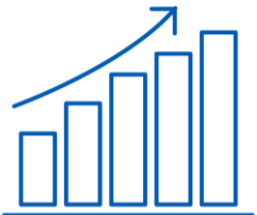
**Right fit for a nudge**

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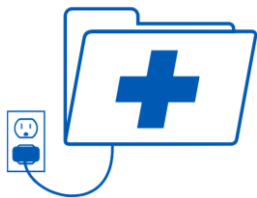


**Potential for  
significant impact**

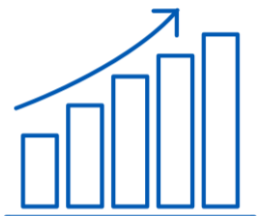
# Prioritizing opportunities



**Right fit for a nudge**



**Leverages scalable technology**



**Potential for significant impact**



**David Asch, MD, MBA**

Executive Director, Penn Medicine Center for Health Care Innovation



**Patrick Brennan, MD**

Chief Medical Officer and Senior Vice President, University of Pennsylvania Health System



**Susan Day, MD, MPH**

Associate Chief Informatics Officer, University of Pennsylvania Health System



**C. William Hanson, MD**

Chief Medical Information Officer, University of Pennsylvania Health System



**Judd Kessler, PhD, MPhil**

Assistant Professor of Business Economics and Public Policy, The Wharton School of the University of Pennsylvania



**Roy Rosin, MBA**

Chief Innovation Officer, Penn Medicine



**Christine VanZandbergen, MPH, MS PA-C**

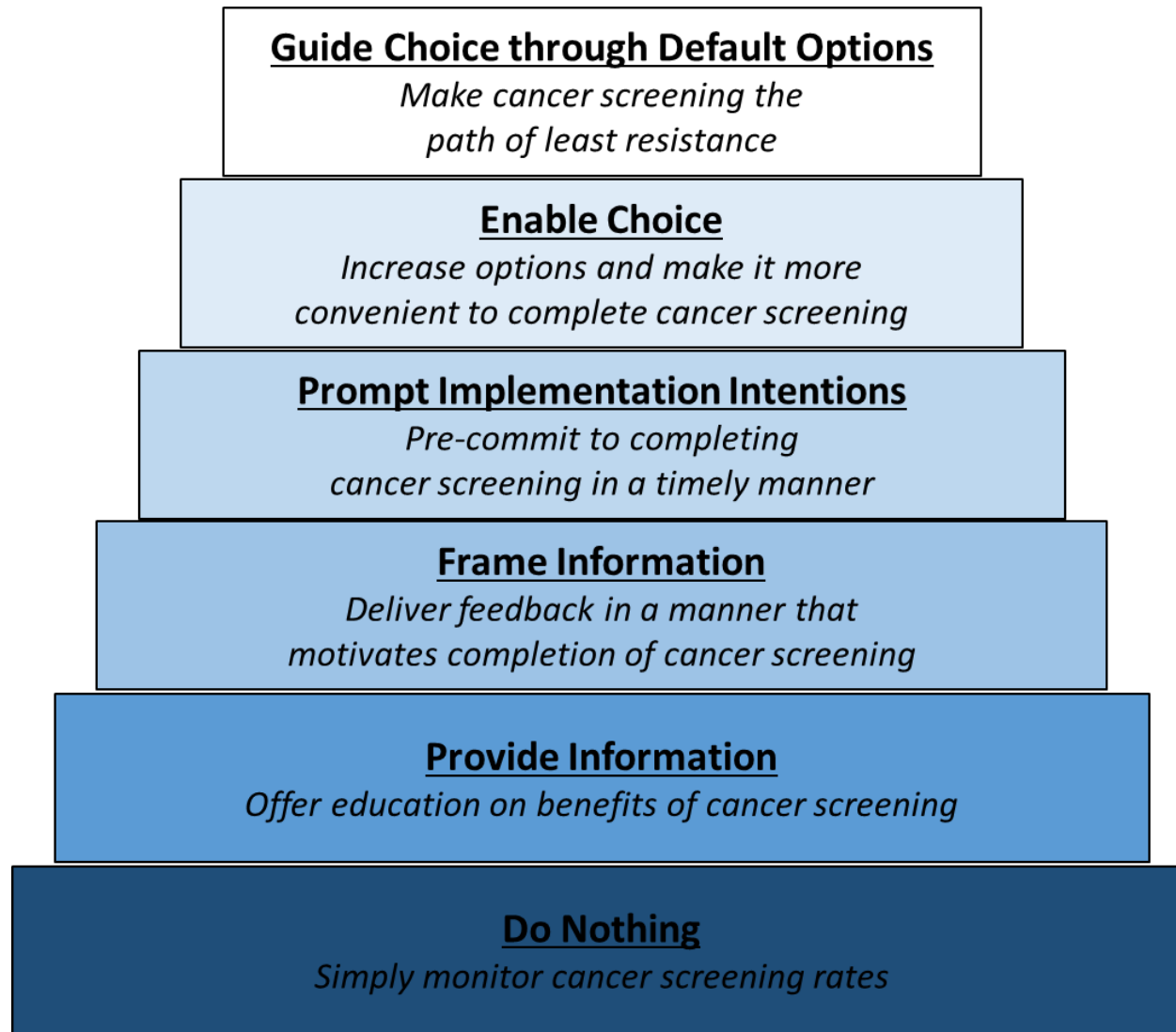
Associate CIO of Clinical Applications, University of Pennsylvania Health System



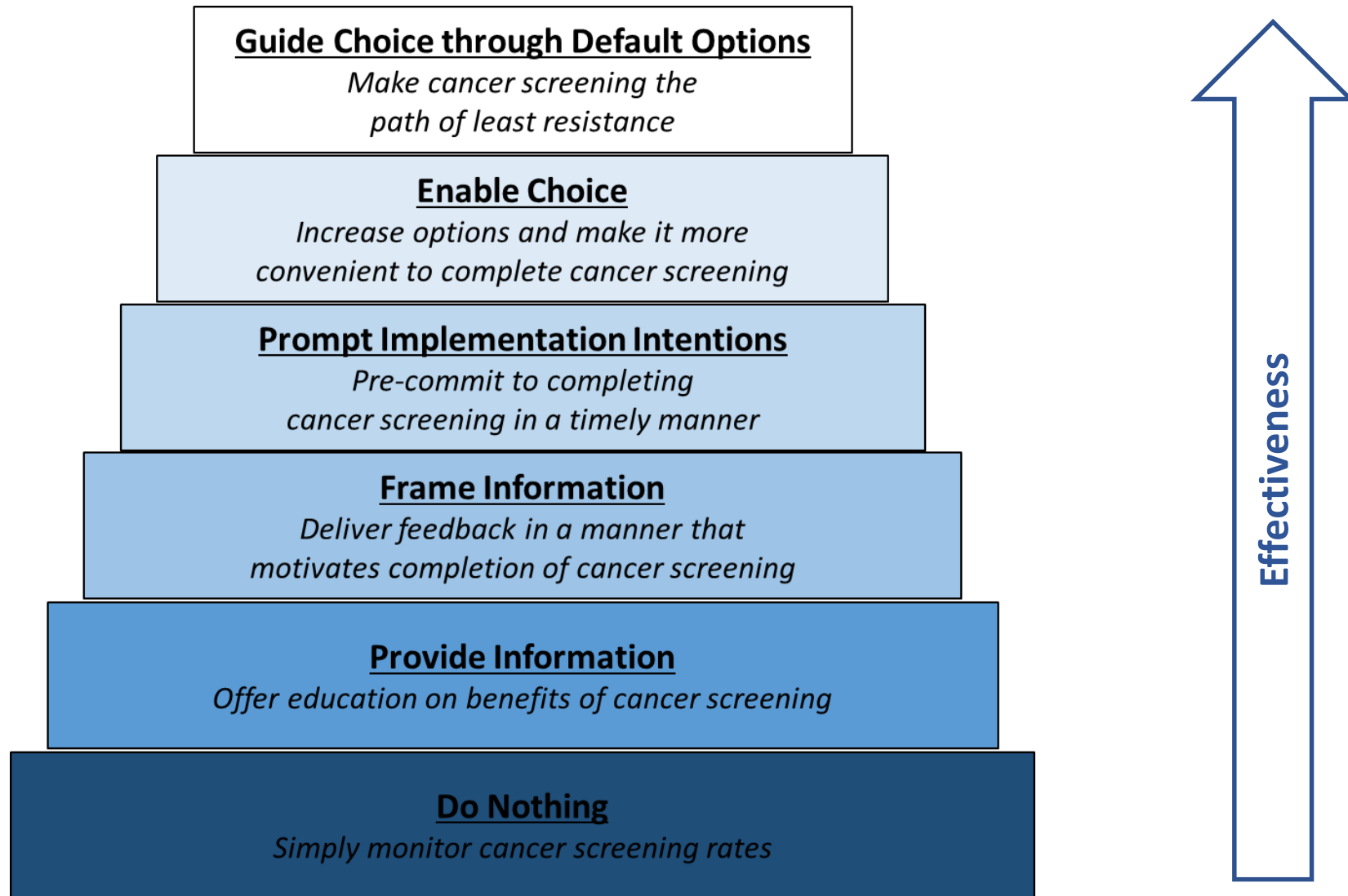
**Kevin Volpp, MD, PhD**

Janet and John Haas President's Distinguished Professor of Medicine, Medical Ethics and Health Policy, and Health Care Management Perelman School of Medicine and the Wharton School, University of Pennsylvania  
Director, Center for Health Incentives and Behavioral Economics (CHIBE)

# Nudges vary in their approach and effectiveness



# Nudges vary in their approach and effectiveness



# Lessons from the Penn Medicine Nudge Unit

# We are already being nudged whether we know it or not

# We are already being nudged whether we know it or not

The screenshot shows the EpicCare interface for a patient named Zzz-Epic, Test (ID: 440057859). A database search for 'COREG' is displayed, showing a list of search results. The results are organized into columns: Name, Sig, Rx Type, Code, Type, Pref List, Qty, Unit, Formulary, and Coverage. The first row is highlighted in blue.

Name	Sig	Rx Type	Code	Type	Pref List	Qty	Unit	Formulary	Coverage
COREG 12.5 MG PO TABS		Brand R:							
COREG 25 MG PO TABS		Brand R:							
COREG 3.125 MG PO TABS		Brand R:							
COREG 6.25 MG PO TABS		Brand R:							
COREG CR 10 MG PO CP24		Brand R:							
COREG CR 20 MG PO CP24		Brand R:							
COREG CR 40 MG PO CP24		Brand R:							
COREG CR 80 MG PO CP24		Brand R:							
COREG 12.5 MG OR TABS (aka CARVED		Generic							
COREG 25 MG OR TABS (aka CARVEDIL		Generic							
COREG 3.125 MG OR TABS (aka CARVE		Generic							
COREG 6.25 MG OR TABS (aka CARVED		Generic							
COREG CR 10 MG OR CP24 (aka CARVE		Generic							
COREG CR 20 MG OR CP24 (aka CARVE		Generic							
COREG CR 40 MG OR CP24 (aka CARVE		Generic							
COREG CR 80 MG OR CP24 (aka CARVE		Generic							



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The screenshot shows the EpicCare interface for a patient named 'Zzz-Epic, Test' with ID '440057859'. A 'Database Search - Zzz-Epic, Test' window is open, with the search term 'COREG' entered in the search box. The search results are displayed in a table with columns: Name, Sig, Rx Type, Code, Type, Pref List, Qty, Unit, Formulary, and Coverage. The results list various formulations of COREG, including 12.5 MG PO TABS, 25 MG PO TABS, 3.125 MG PO TABS, 6.25 MG PO TABS, and 10 MG, 20 MG, 40 MG, and 80 MG PO CP24. The 'Rx Type' column indicates 'Brand R' for the first seven entries and 'Generic' for the remaining five entries.

Name	Sig	Rx Type	Code	Type	Pref List	Qty	Unit	Formulary	Coverage
COREG 12.5 MG PO TABS		Brand R:							
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COREG CR 80 MG OR CP24 (aka CARVE		Generic							

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The screenshot shows the EpicCare interface for a patient named 'Zzz-Epic, Test' with ID '440057859'. A search for 'COREG' is performed, resulting in a list of medications. The search input field is highlighted with a red box. The results are categorized into 'Brand' and 'Generic' by red brackets.

Name	Sig	Rx Type	Code	Type	Pref List	Qty	Unit	Formulary	Coverage
COREG 12.5 MG PO TABS				Brand R:					
COREG 25 MG PO TABS				Brand R:					
COREG 3.125 MG PO TABS				Brand R:					
COREG 6.25 MG PO TABS				Brand R:					
COREG CR 10 MG PO CP24				Brand R:					
COREG CR 20 MG PO CP24				Brand R:					
COREG CR 40 MG PO CP24				Brand R:					
COREG CR 80 MG PO CP24				Brand R:					
COREG 12.5 MG OR TABS (aka CARVED				Generic					
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# Generic prescription rates: opt-in versus opt-out

# Generic prescription rates: opt-in versus opt-out

carvedilol (COREG) 12.5 MG tablet Accept Cancel Remove

Product: **CARVEDILOL 12.5 MG PO TABS** [View Available Strengths](#)

Sig Method: [Specify Dose, Route, Frequency](#) [Use Free Text](#)

Dose:  mg [12.5 mg](#)

Prescribed Dose: **12.5 mg**  
Prescribed Amount: **1 tablet**

Route:  [oral](#)

Frequency:  [BID](#) [Q12H](#)

Duration:   Doses  Days

Starting:  Ending:

Mark long-term:  CARVEDILOL

Patient Sig: **Take 1 tablet by mouth 2 times a day.**

[abc](#) [undo](#) [redo](#) [help](#) [insert](#)  [print](#) [undo](#) [redo](#) [list](#)

Dispense:  tablet Refill:  Days/Fill: [Full \(0 Days\)](#) [30 Days](#) [90 Days](#)

Total Days Supplied: **90 Days**

Dispense As Written

Class: [E-Prescribe](#) [Manual Fax](#) [Print](#) [E-Fax](#) [Phone Med](#) [Historical Med](#) [Adjust Sig](#) [Dispensed](#) [OTC](#)

**This medication will not be e-prescribed. Invalid items: Pharmacy Details**

Notes to Pharmacy (F6): [Click to add text](#)  
(300 char max.)

[Additional Order Details](#)

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Notes to Pharmacy (F6): [Click to add text](#)  
(300 char max.)

[Additional Order Details](#)

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Sig Method: [Specify Dose, Route, Frequency](#) [Use Free Text](#)

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Prescribed Dose: **12.5 mg**  
Prescribed Amount: **1 tablet**

Route:  [oral](#)

Frequency:  [BID](#) [Q12H](#)

Duration:   Doses  Days

Starting:  Ending:

Mark long-term:  CARVEDILOL

Patient Sig: **Take 1 tablet by mouth 2 times a day.**

[Insert SmartText](#) [Undo](#) [Redo](#) [Print](#) [Copy](#) [Paste](#)

Dispense:  tablet Refill:  Days/Fill: [Full \(0 Days\)](#) [30 Days](#) [90 Days](#)

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**This medication will not be e-prescribed. Invalid items: Pharmacy** [Details](#)

Notes to Pharmacy (F6): [Click to add text](#)  
(300 char max.)

[Additional Order Details](#)

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**carvedilol (COREG) 12.5 MG tablet** Accept Cancel Remove

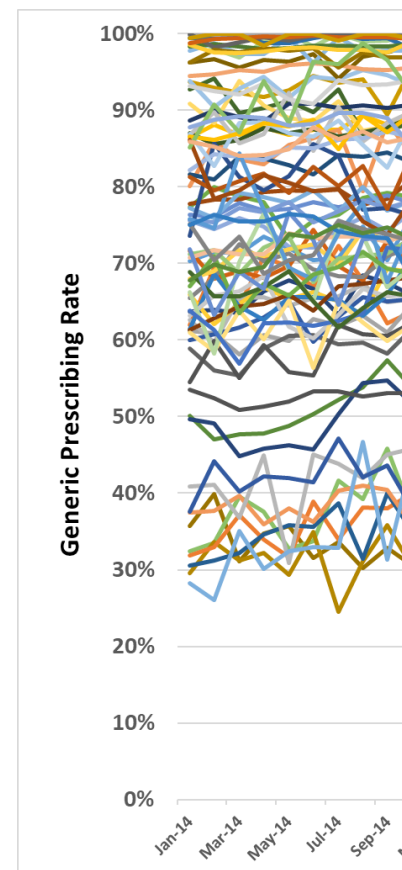
Product: **CARVEDILOL 12.5 MG PO TABS** [View Available Strengths](#)  
Sig Method: **Specify Dose, Route, Frequency** [Use Free Text](#)  
Dose:  mg [12.5 mg](#)  
Prescribed Dose: **12.5 mg**  
Prescribed Amount: **1 tablet**  
Route:  [oral](#)  
Frequency:  [BID](#) [Q12H](#)  
Duration:  Doses  Days  
Starting:  Ending:   
Mark long-term:  CARVEDILOL

Patient Sig: **Take 1 tablet by mouth 2 times a day.**  
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Dispense:  tablet Refill:  Days/Fill: [Full \(0 Days\)](#) [30 Days](#) [90 Days](#)  
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(300 char max.)  
[Additional Order Details](#)





# Generic prescription rates: opt-in versus opt-out

**carvedilol (COREG) 12.5 MG tablet** Accept Cancel Remove

Product: **CARVEDILOL 12.5 MG PO TABS** [View Available Strengths](#)

Sig Method: [Specify Dose, Route, Frequency](#) [Use Free Text](#)

Dose: 12.5 mg [12.5 mg](#)

Prescribed Dose: 12.5 mg  
Prescribed Amount: 1 tablet

Route: oral [oral](#)

Frequency: 2 times daily [BID](#) [Q12H](#)

Duration:  Doses  Days

Starting: 8/19/2015 Ending:

Mark long-term:  CARVEDILOL

Patient Sig: **Take 1 tablet by mouth 2 times a day.**

Dispense: 60 tablet Refill: 2 Days/Fill: [Full \(0 Days\)](#) [30 Days](#) [90 Days](#)

Total Days Supplied: 90 Days

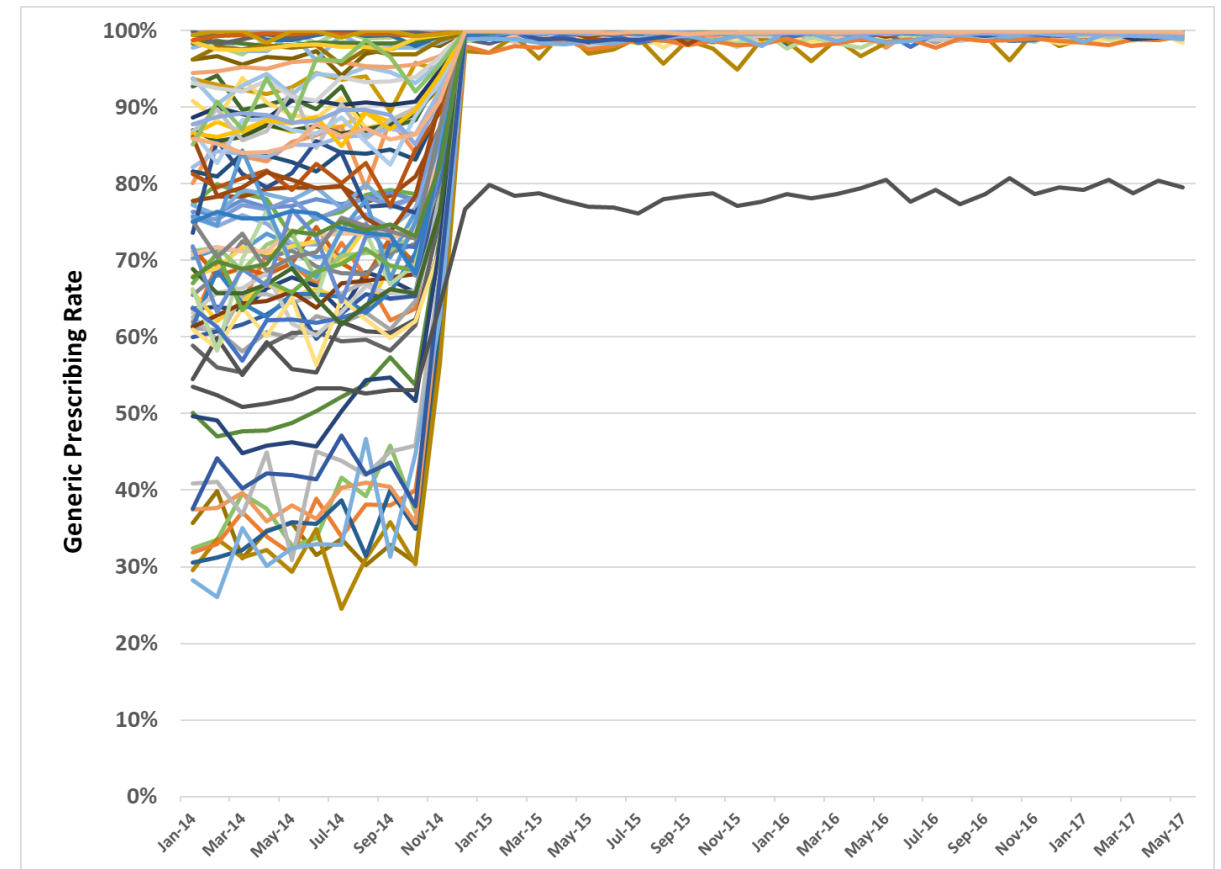
**Dispense As Written**

Class: [E-Prescribe](#) [Manual Fax](#) [Print](#) [E-Fax](#) [Phone Med](#) [Historical Med](#) [Adjust Sig](#) [Dispensed](#) [OTC](#)

This medication will not be e-prescribed. Invalid items: Pharmacy [Details](#)

Notes to Pharmacy (F6): [Click to add text](#)  
(300 char max.)

[Additional Order Details](#)





# Generic prescription rates: opt-in versus opt-out

**carvedilol (COREG) 12.5 MG tablet** Accept Cancel Remove

Product: **CARVEDILOL 12.5 MG PO TABS** [View Available Strengths](#)

Sig Method: **Specify Dose, Route, Frequency** [Use Free Text](#)

Dose:  mg **12.5 mg**

Prescribed Dose: **12.5 mg**  
Prescribed Amount: **1 tablet**

Route:  **oral**

Frequency:  **BID Q12H**

Duration:   Doses  Days

Starting:  Ending:

Mark long-term:  CARVEDILOL

Patient Sig: **Take 1 tablet by mouth 2 times a day.**

Dispense:  tablet Refill:  Days/Fill:

Total Days Supplied: **90 Days**

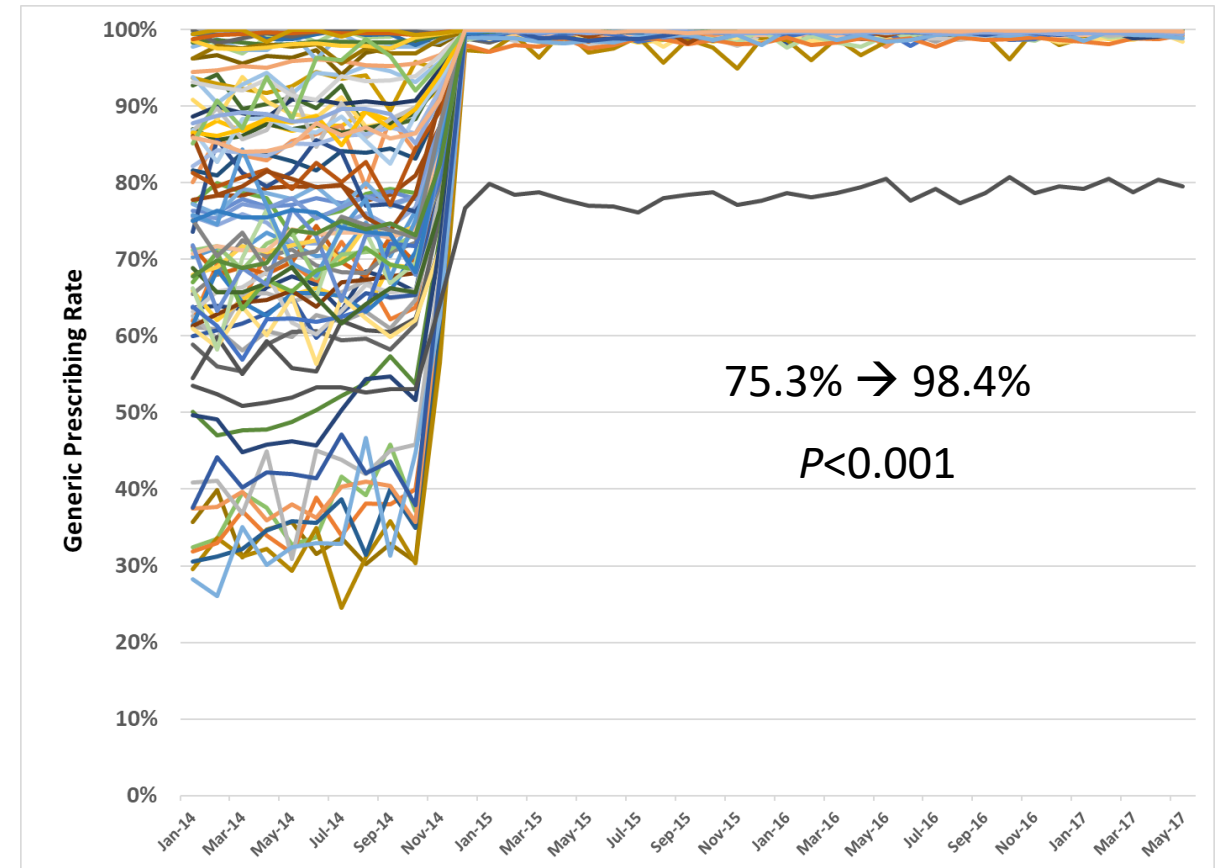
**Dispense As Written**

Class:  E-Prescribe  Manual Fax  Print  E-Fax  Phone Med  Historical Med  Adjust Sig  Dispensed  OTC

This medication will not be e-prescribed. Invalid items: Pharmacy [Details](#)

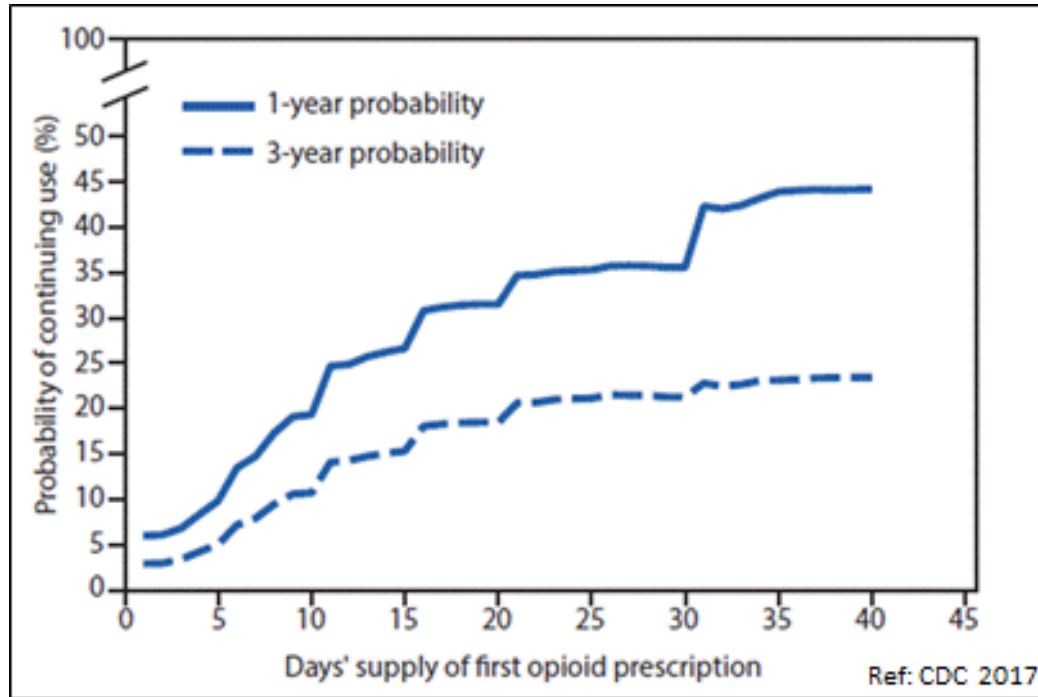
Notes to Pharmacy (F6): [Click to add text](#)  
(300 char max.)

[Additional Order Details](#)

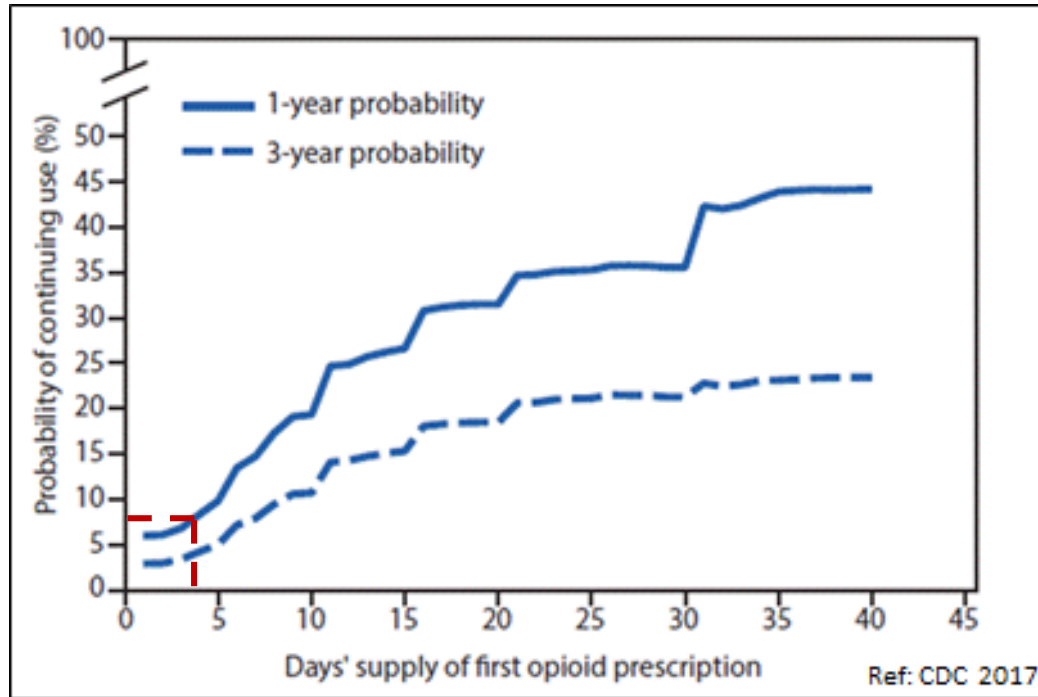


# Opioid addiction is linked to the size of the initial prescription

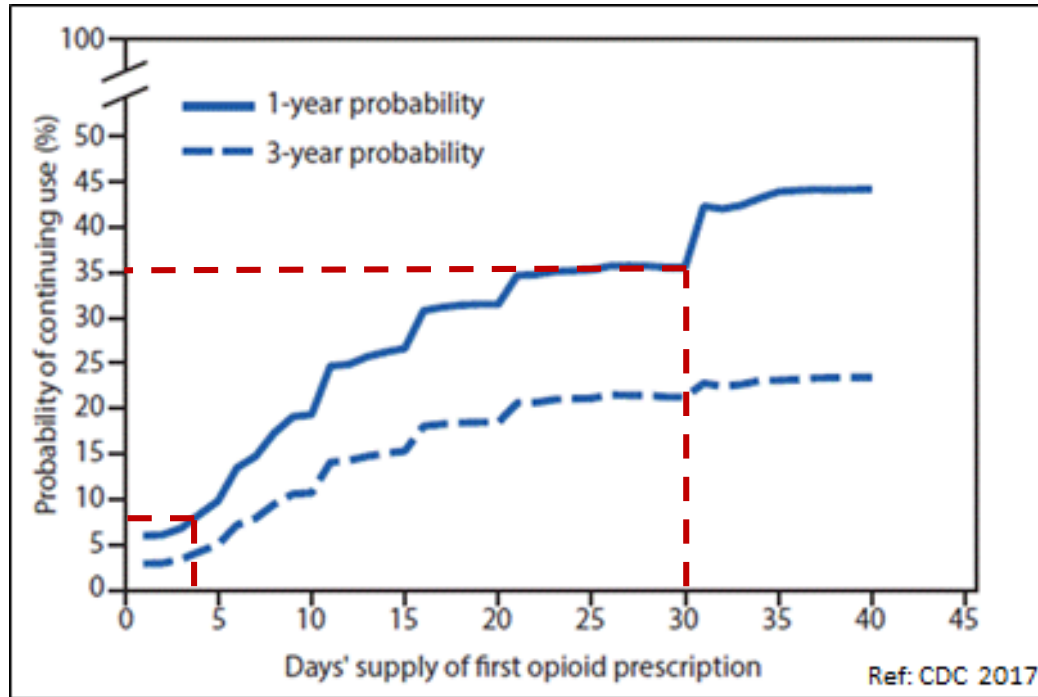
# Opioid addiction is linked to the size of the initial prescription



# Opioid addiction is linked to the size of the initial prescription

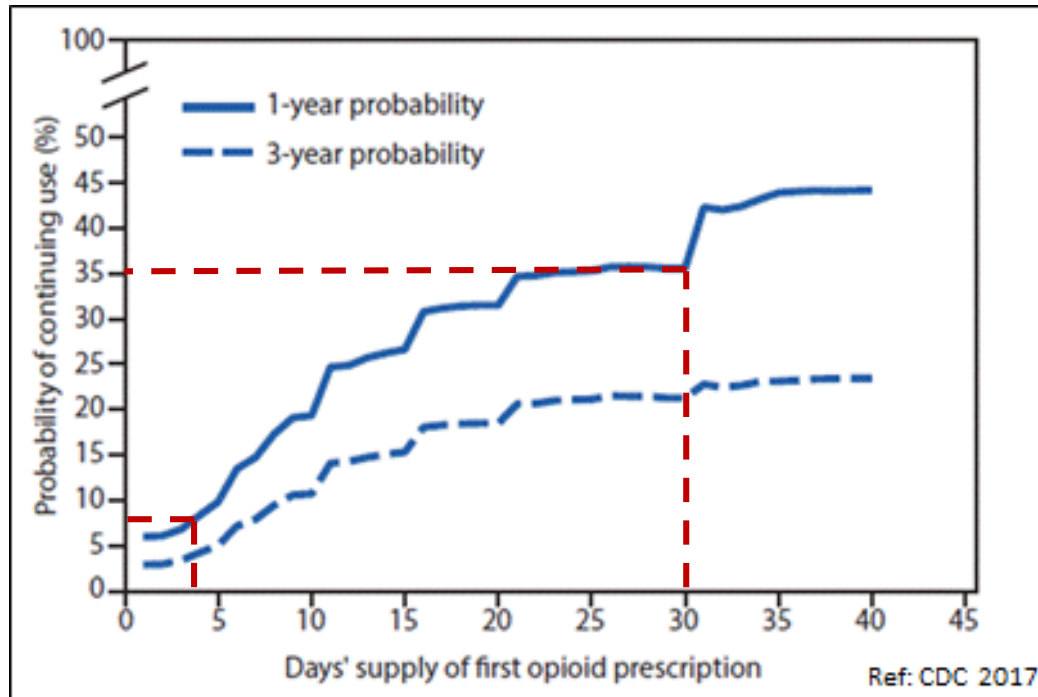


# Opioid addiction is linked to the size of the initial prescription

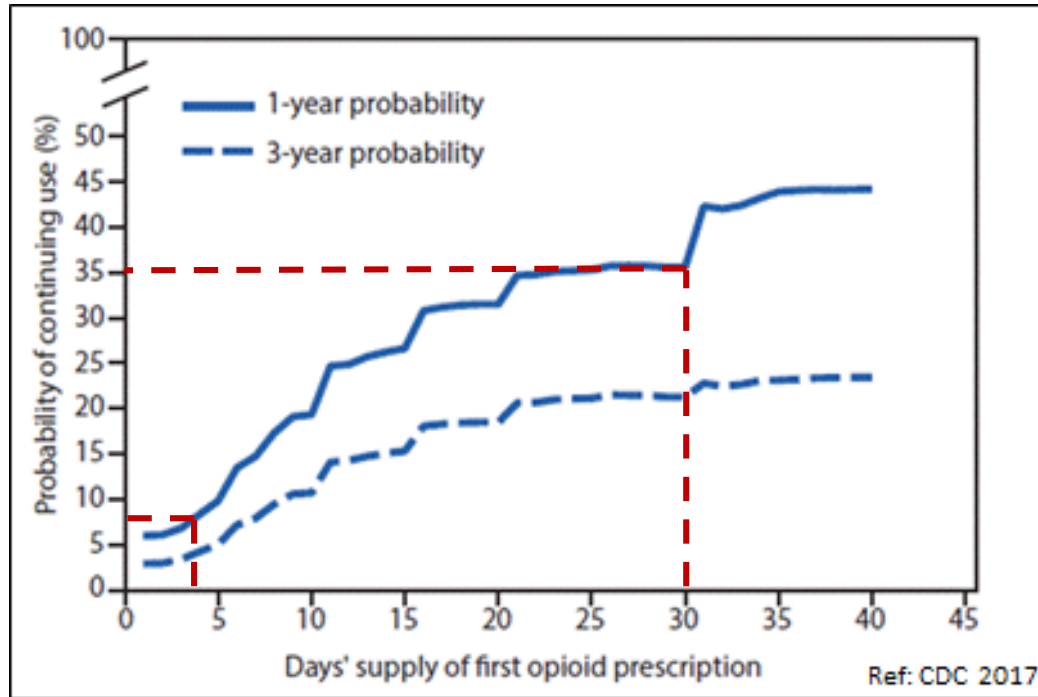


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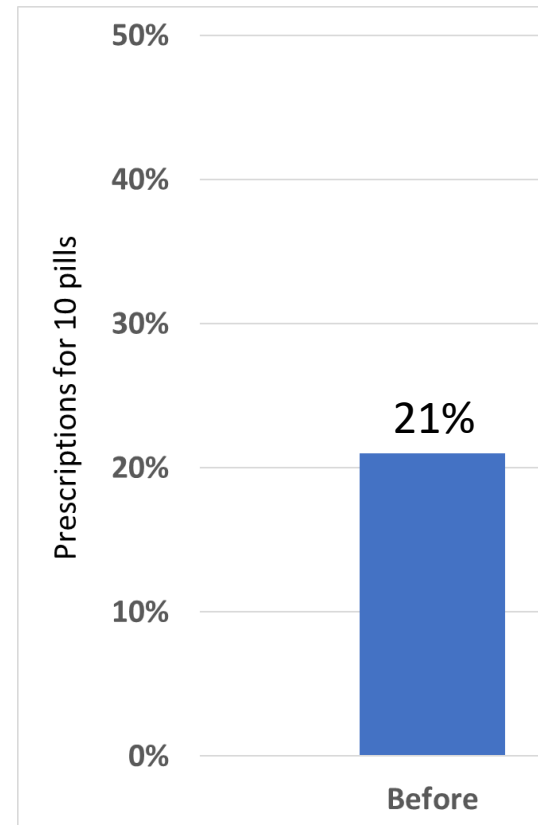
## Implemented Opioid Prescription Defaults in the ED



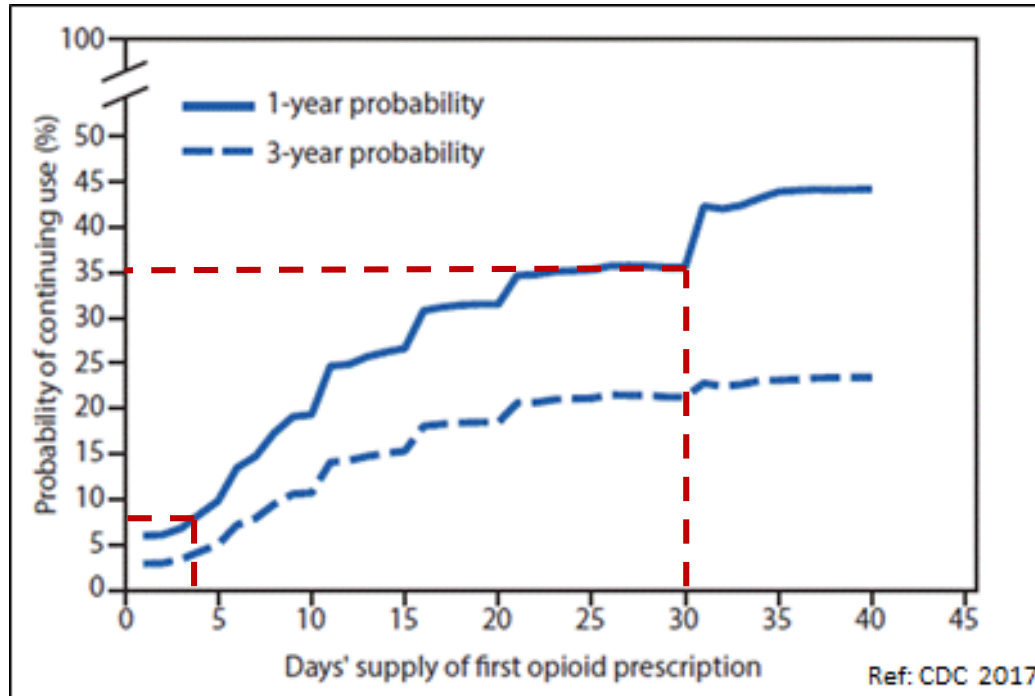
# Opioid addiction is linked to the size of the initial prescription



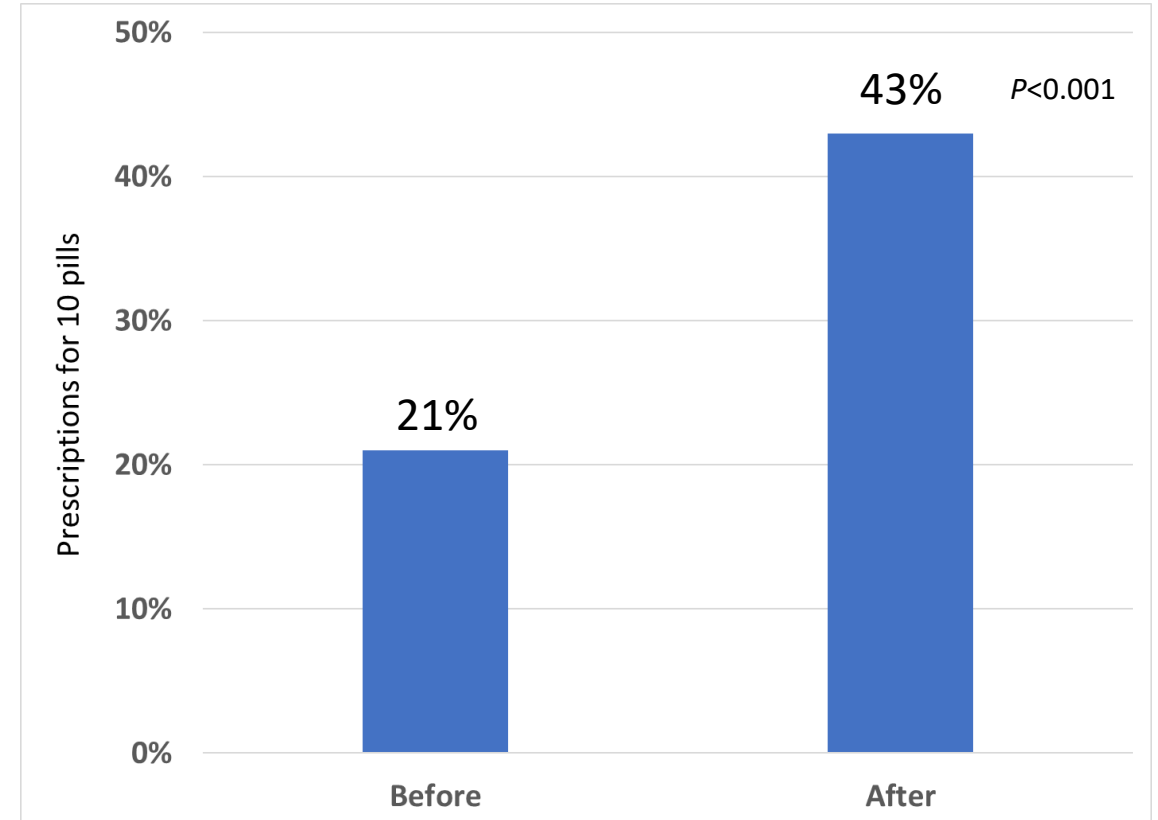
## Implemented Opioid Prescription Defaults in the ED



# Opioid addiction is linked to the size of the initial prescription



## Implemented Opioid Prescription Defaults in the ED





# Reducing Unnecessary Imaging

# Reducing Unnecessary Imaging

*National guidelines recommend that palliative cancer patients do not have imaging to align radiation therapy*


# Reducing Unnecessary Imaging

*National guidelines recommend that palliative cancer patients do not have imaging to align radiation therapy*

*80% of these patients at Penn Medicine received daily imaging  
(e.g. 14 CT scans for a 2-week course of radiation)*

# Selecting a nudge intervention


# Selecting a nudge intervention

 Penn Medicine	Perelman Center for Advanced Medicine Department of Radiation Oncology
<b>Patient Name:</b> <Full Name>	<b>MRN:</b> <Patient Id 1>
<b>DOB:</b> <Date of Birth>	<b>Oncologist:</b> <Primary Care Physician-Name (Default)>
<b>Treatment Instructions: General</b>	



INSTRUCTIONS FOR:	
Course: <Course-Elapsed Days of Treatment (Default)> <input type="checkbox"/> x All Plans OR <input type="checkbox"/> Specific Plans: <input type="text"/>	
IGRT-LOCALIZATION INSTRUCTIONS:	
PRIMARY (Match for Treatment)	SECONDARY (EVAL)
Modality: <input type="text" value="CBCTNone"/>	Modality: <input type="text" value="-Select-"/>
Frequency: <input type="text" value="DailyNone"/>	Frequency: <input type="text" value="-Select-"/>
Match Instructions: Set up with attention to immobilization, tattoo markers, and weekly MV portal films	Additional / Special Instructions: <input type="text"/>
Additional / Special Instructions: do not take KV-KV image	


# Selecting a nudge intervention

 Penn Medicine	Perelman Center for Advanced Medicine Department of Radiation Oncology
<b>Patient Name:</b> <Full Name>	<b>MRN:</b> <Patient Id 1>
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INSTRUCTIONS FOR:	
Course: <Course-Elapsed Days of Treatment (Default)> <input type="checkbox"/> x All Plans OR <input type="checkbox"/> Specific Plans: <input type="text"/>	
IGRT-LOCALIZATION INSTRUCTIONS:	
PRIMARY (Match for Treatment)	SECONDARY (EVAL)
Modality: <input type="text" value="CBCTNone"/>	Modality: <input type="text" value="-Select-"/>
Frequency: <input type="text" value="DailyNone"/>	Frequency: <input type="text" value="-Select-"/>
Match Instructions: Set up with attention to immobilization, tattoo markers, and weekly MV portal films	Additional / Special Instructions: <input type="text"/>
Additional / Special Instructions: do not take KV-KV image	

# Selecting a nudge intervention

 Penn Medicine	Perelman Center for Advanced Medicine Department of Radiation Oncology
Patient Name: <Full Name>	MRN: <Patient Id 1>
DOB: <Date of Birth>	Oncologist: <Primary Care Physician-Name (Default)>
<b>Treatment Instructions: General</b>	
<b>INSTRUCTIONS FOR:</b>	
Course: <Course-Elapsed Days of Treatment (Default)> <input type="checkbox"/> x All Plans OR <input type="checkbox"/> Specific Plans: _____	
<b>IGRT-LOCALIZATION INSTRUCTIONS:</b>	
<b>PRIMARY (Match for Treatment)</b>	<b>SECONDARY (EVAL)</b>
Modality: <b>CBCT</b> None	Modality: -Select-
Frequency: <b>Daily</b> None	Frequency: -Select-
Match Instructions: Set up with attention to immobilization, tattoo markers, and weekly MV portal films	Additional / Special Instructions: _____
Additional / Special Instructions: do not take KV-KV image	

Drop-Down Form Field Options

Drop-down item:

Items in drop-down list:

- CBCT
- Select-
- None
- KV-KV Imaging (OBI OR MEDCOM)
- MV Imaging

Run macro on

Entry:  Exit:

Field settings


Bookmark:

Drop-down enabled

Calculate on exit

Add Help Text... OK Cancel

# Selecting a nudge intervention

 <b>Penn Medicine</b>		<b>Perelman Center for Advanced Medicine Department of Radiation Oncology</b>	
<b>Patient Name:</b> <Full Name>		<b>MRN:</b> <Patient Id 1>	
<b>DOB:</b> <Date of Birth>		<b>Oncologist:</b> <Primary Care Physician-Name (Default)>	
<b>Treatment Instructions: General</b>			
<b>INSTRUCTIONS FOR:</b>			
Course: <Course-Elapsed Days of Treatment (Default)> <input type="checkbox"/> x All Plans OR <input type="checkbox"/> Specific Plans: <input type="text"/>			
<b>IGRT-LOCALIZATION INSTRUCTIONS:</b>			
<b>PRIMARY (Match for Treatment)</b>		<b>SECONDARY (EVAL)</b>	
Modality: <b>CBCT</b> None		Modality: -Select-	
Frequency: <b>Daily</b> None		Frequency: -Select-	
Match Instructions: Set up with attention to immobilization, tattoo markers, and weekly MV portal films		Additional / Special Instructions: <input type="text"/>	
Additional / Special Instructions: do not take KV-KV image			

**Drop-Down Form Field Options**

Drop-down item:  Add >> Remove

Items in drop-down list:

- CBCT
- Select-
- None
- KV-KV Imaging (OBI OR MEDCOM)
- MV Imaging

Run macro on

Entry:  Exit:

Field settings

Bookmark:

Drop-down enabled

Calculate on exit

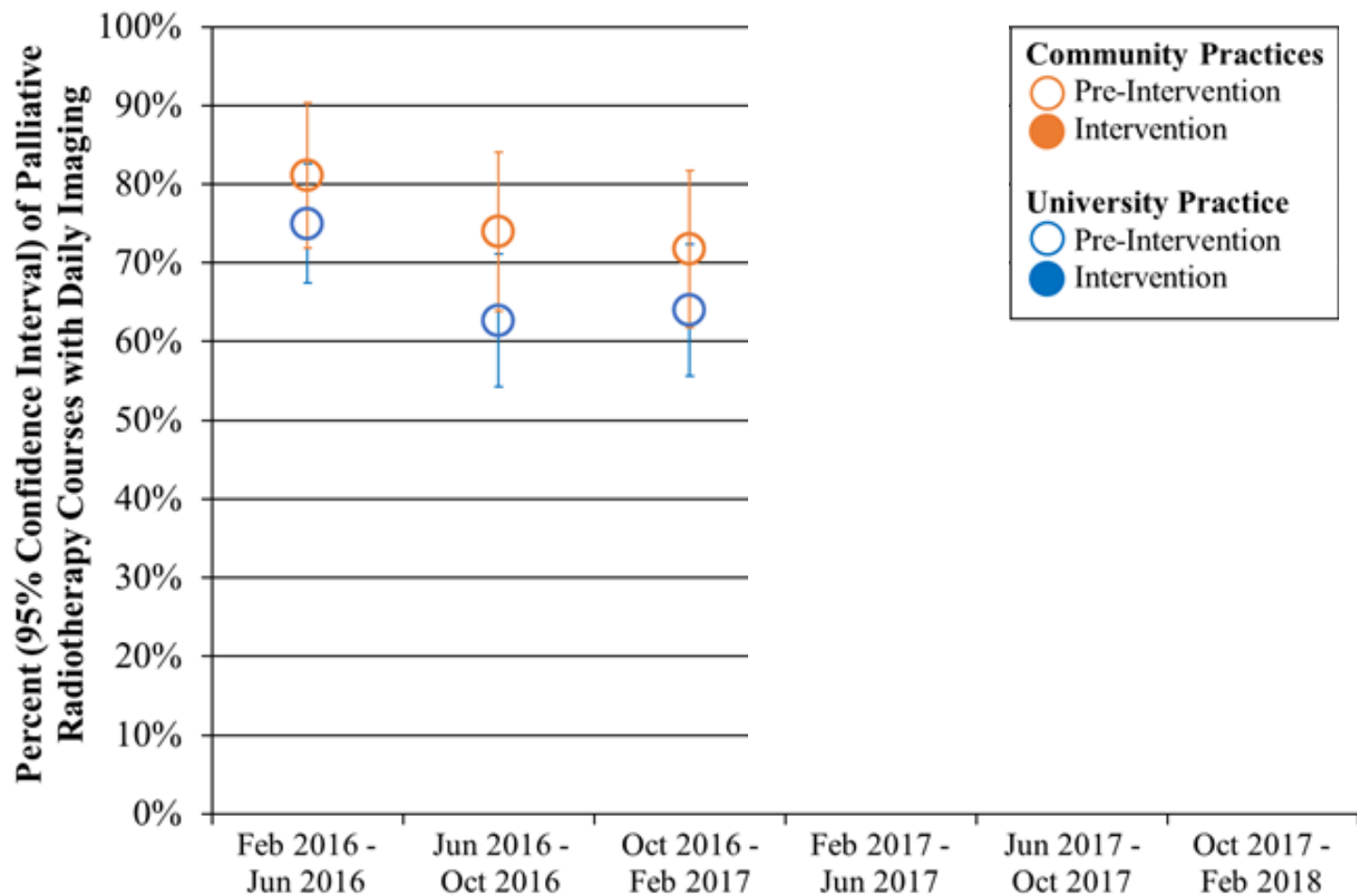
Add Help Text... OK Cancel



# Imaging for Palliative Cancer Patients

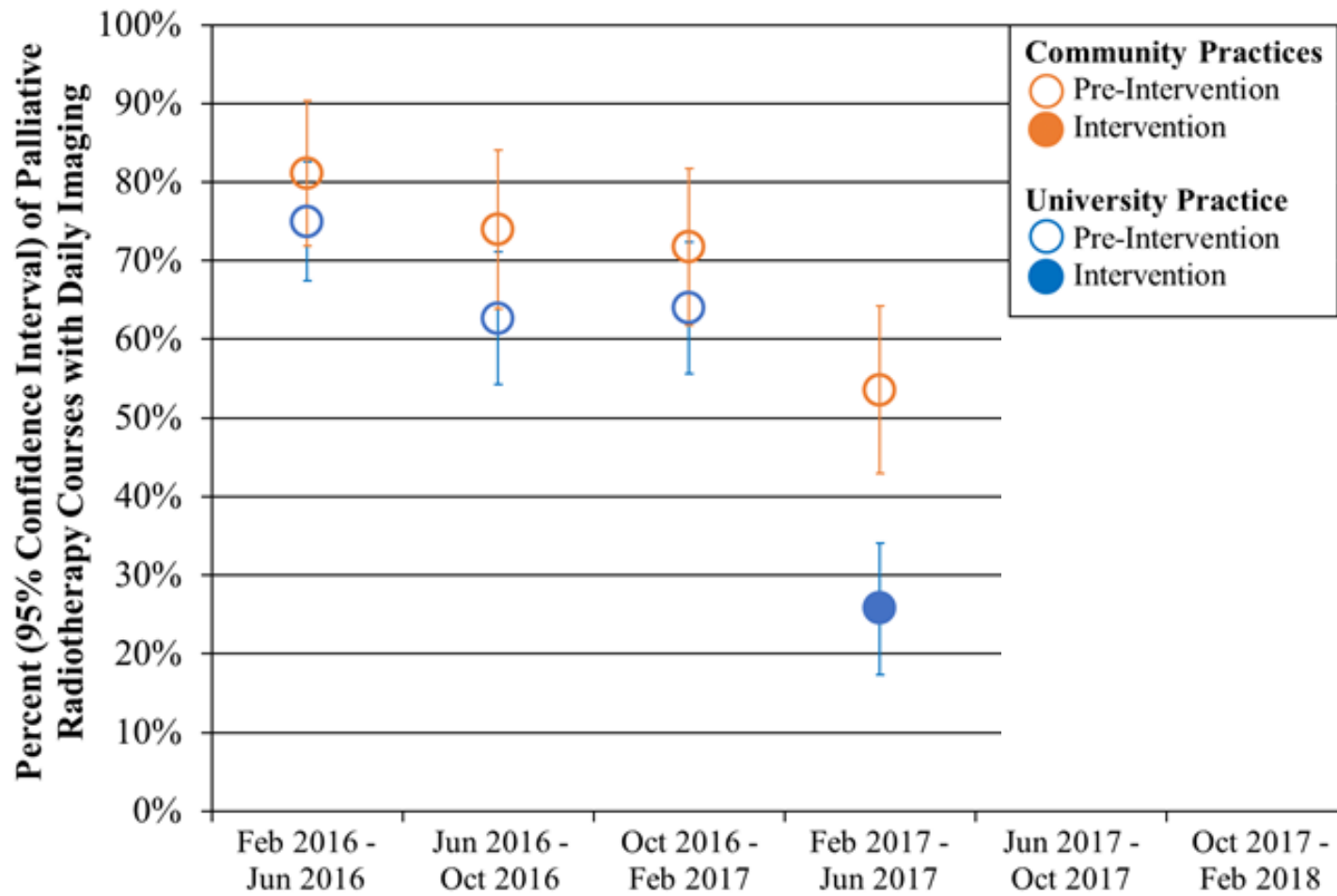
# Imaging for Palliative Cancer Patients

**Figure. Unadjusted Trends in Daily Imaging During Palliative Radiotherapy**



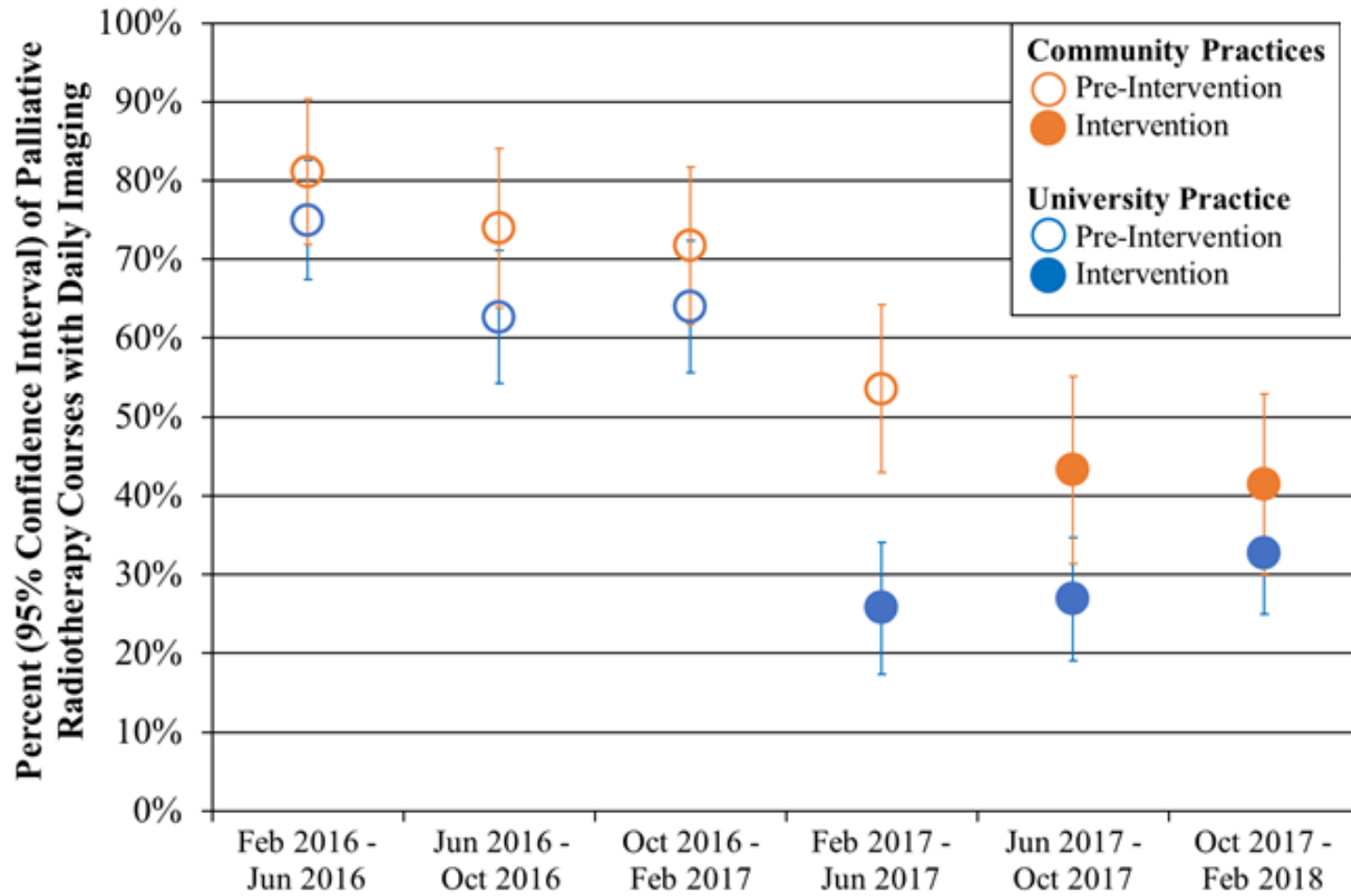
# Imaging for Palliative Cancer Patients

**Figure.** Unadjusted Trends in Daily Imaging During Palliative Radiotherapy



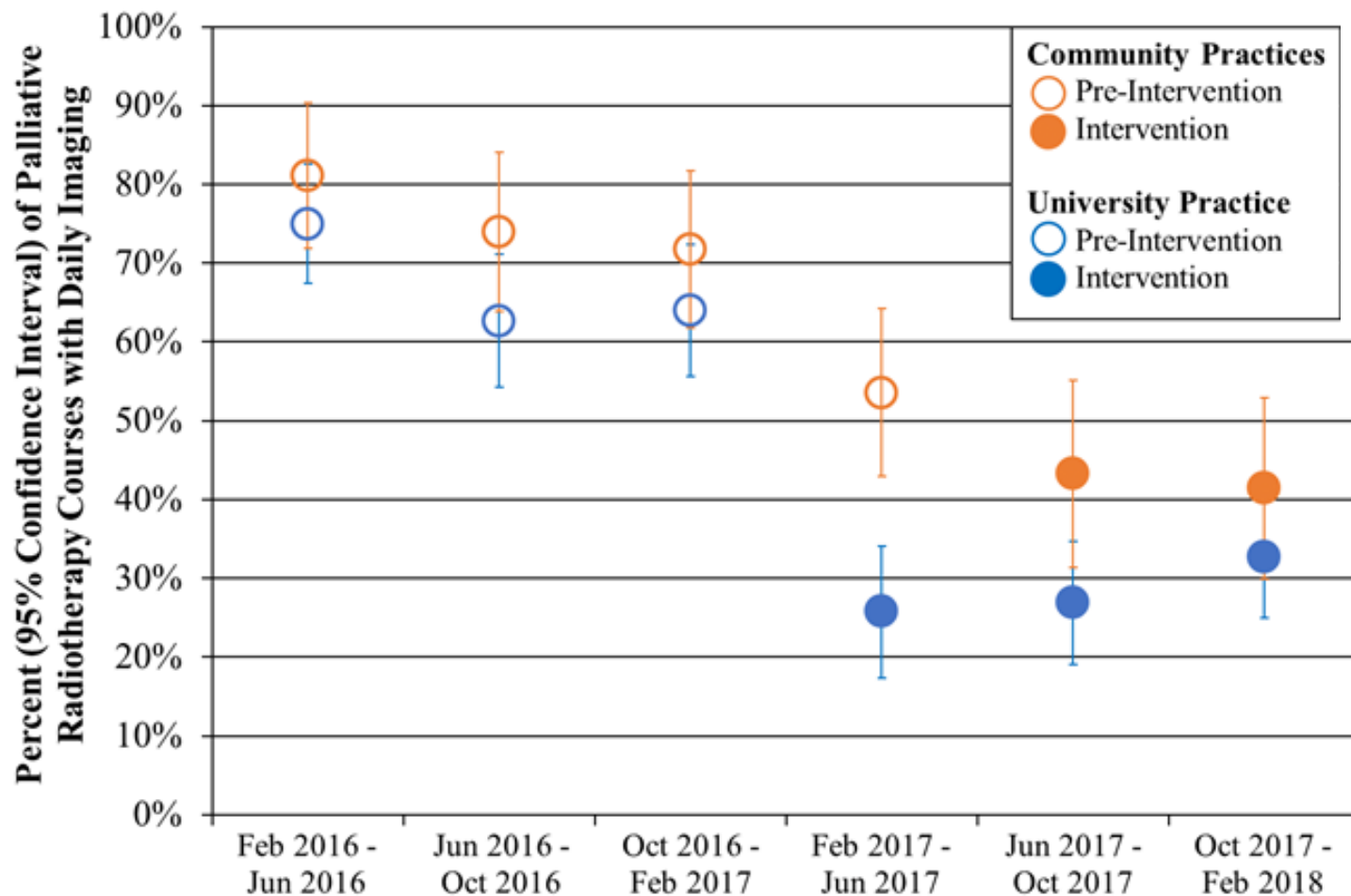
# Imaging for Palliative Cancer Patients

**Figure. Unadjusted Trends in Daily Imaging During Palliative Radiotherapy**



# Imaging for Palliative Cancer Patients

**Figure.** Unadjusted Trends in Daily Imaging During Palliative Radiotherapy

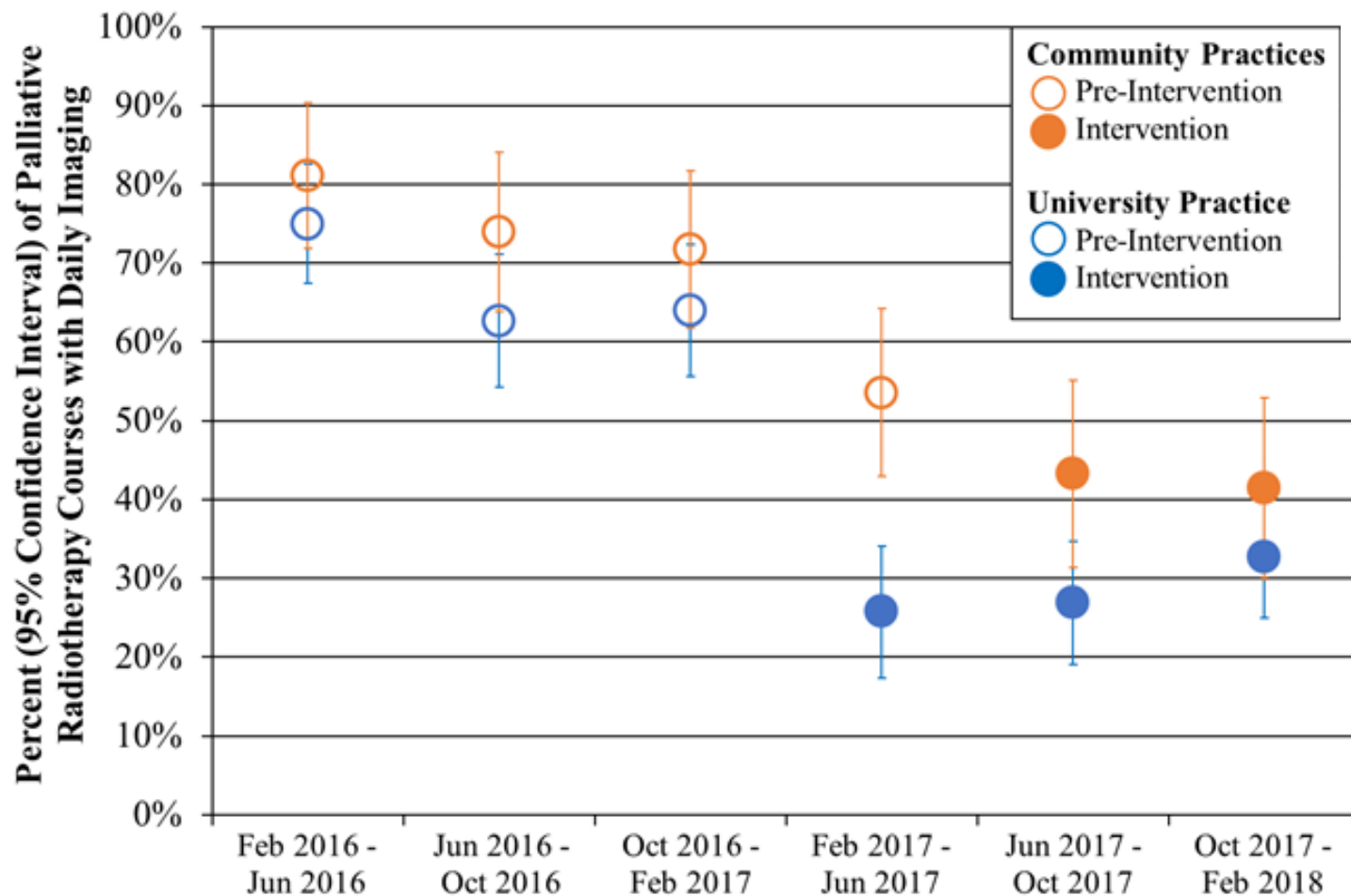


68.2% → 32.4%

$P < 0.01$

# Imaging for Palliative Cancer Patients

**Figure.** Unadjusted Trends in Daily Imaging During Palliative Radiotherapy



**68.2% → 32.4%**

**$P < 0.01$**

***3000 less imaging tests per year***

# Complex Decision Pathways

# Cardiac rehab referral



# Cardiac rehab referral

- Evidence-based pathway
  - Demonstrated to reduce mortality and readmissions by up to 30%

# Cardiac rehab referral

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  - Demonstrated to reduce mortality and readmissions by up to 30%
- Referral rates are low
  - Only 15% of patients at Penn were referred at the time of hospital discharge
  - More than 25% of hospitals in the US refer less than 20% of their patients

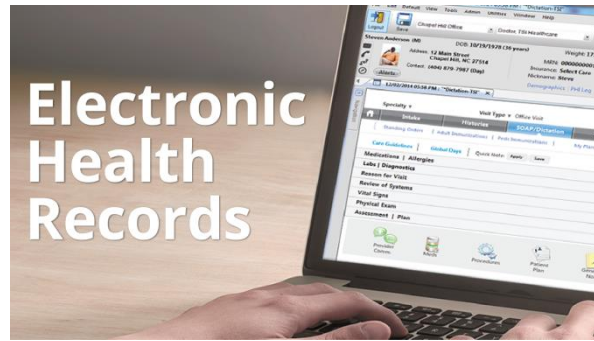
# Cardiac rehab referral

- Evidence-based pathway
  - Demonstrated to reduce mortality and readmissions by up to 30%
- Referral rates are low
  - Only 15% of patients at Penn were referred at the time of hospital discharge
  - More than 25% of hospitals in the US refer less than 20% of their patients
- Manual opt-in process
  - Cardiologists had to complete paper form with 12+ fields while on rounds
  - Patients had to identify a rehab center on their own and check insurance coverage

# Redesigned as an opt-out decision pathway

# Redesigned as an opt-out decision pathway

Automate identification and notification



# Redesigned as an opt-out decision pathway

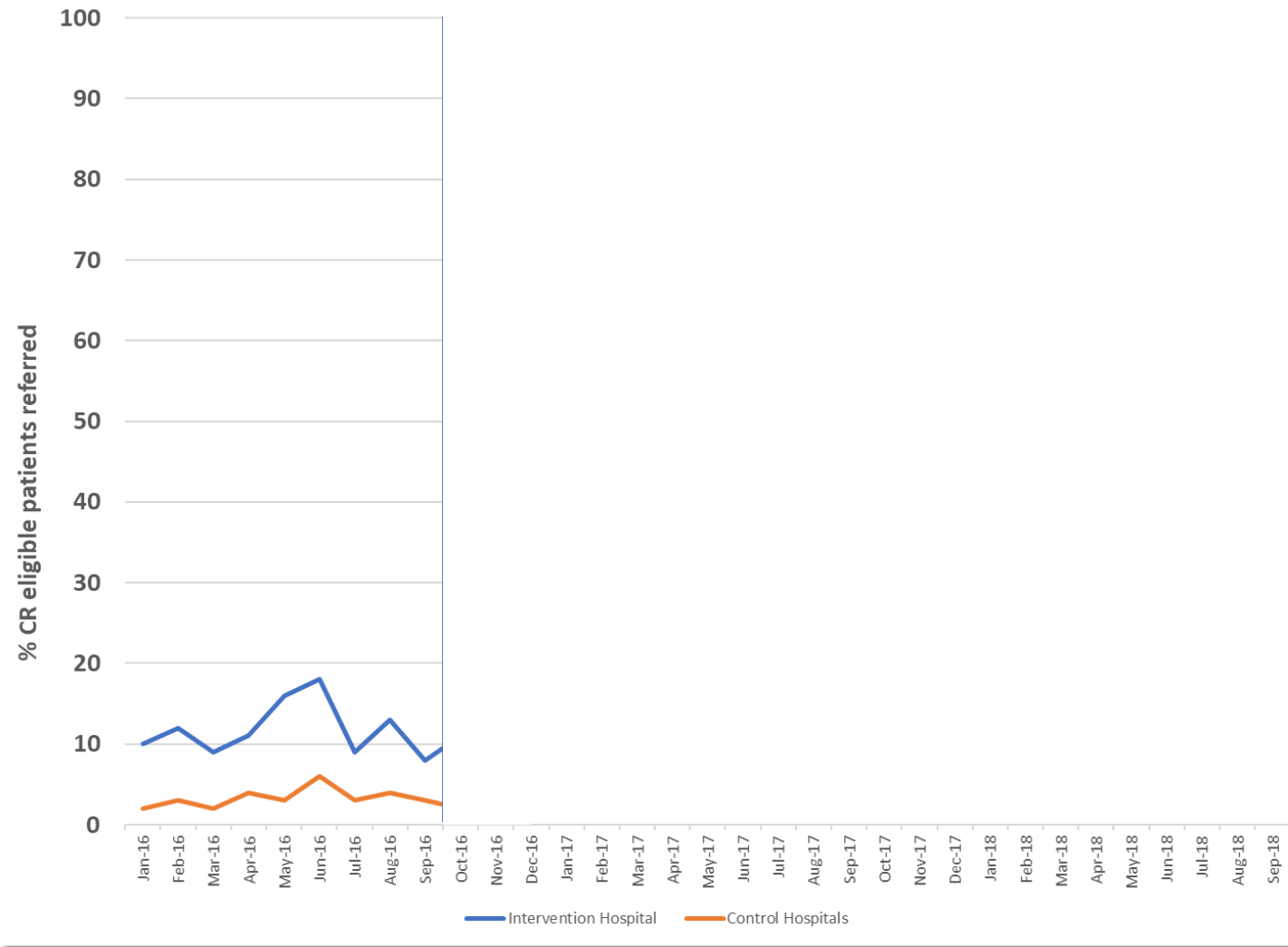
Automate identification and notification



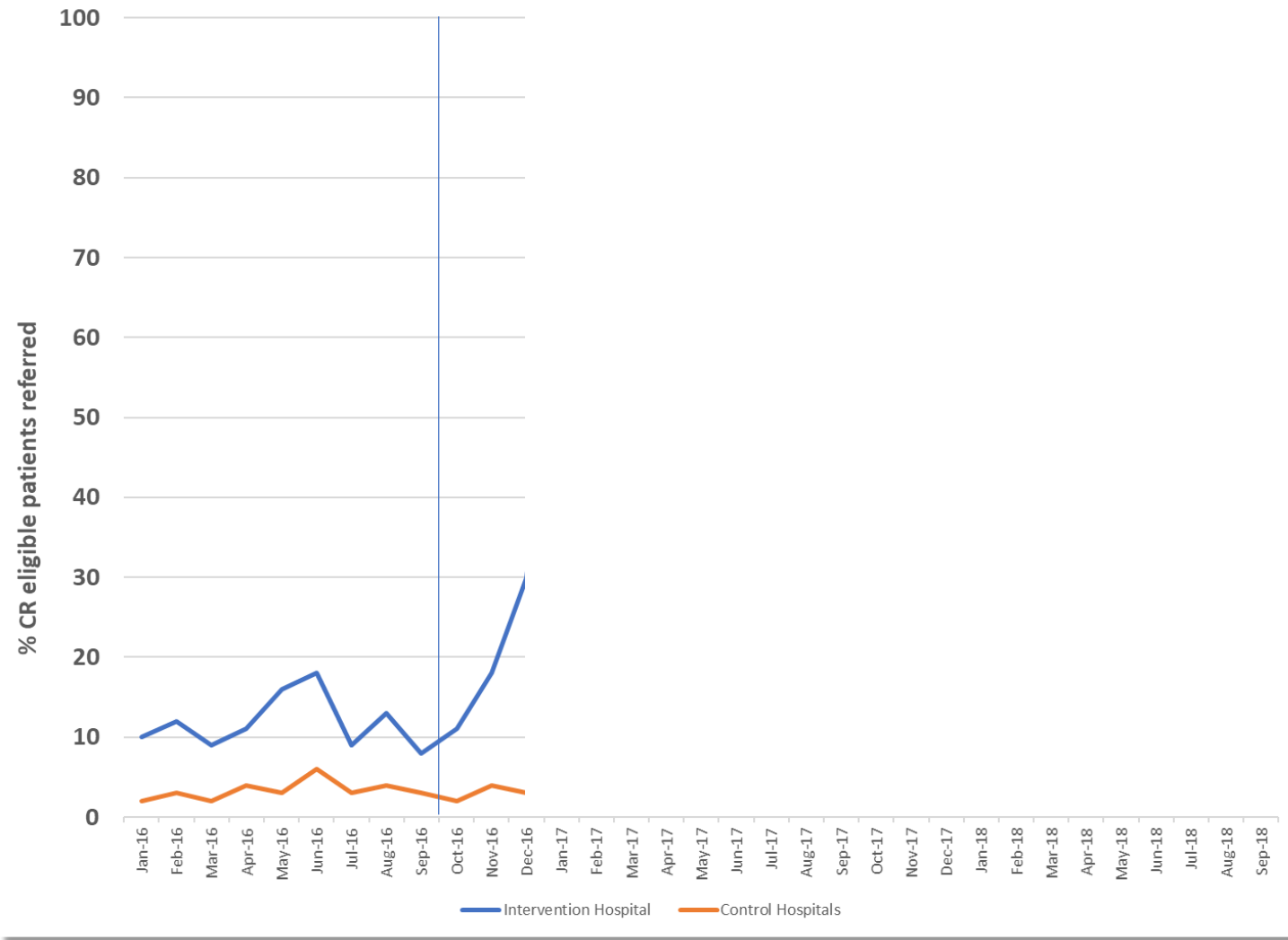
Restructure rounding and discharge process



# Cardiac Rehab Referral Rates Over Time

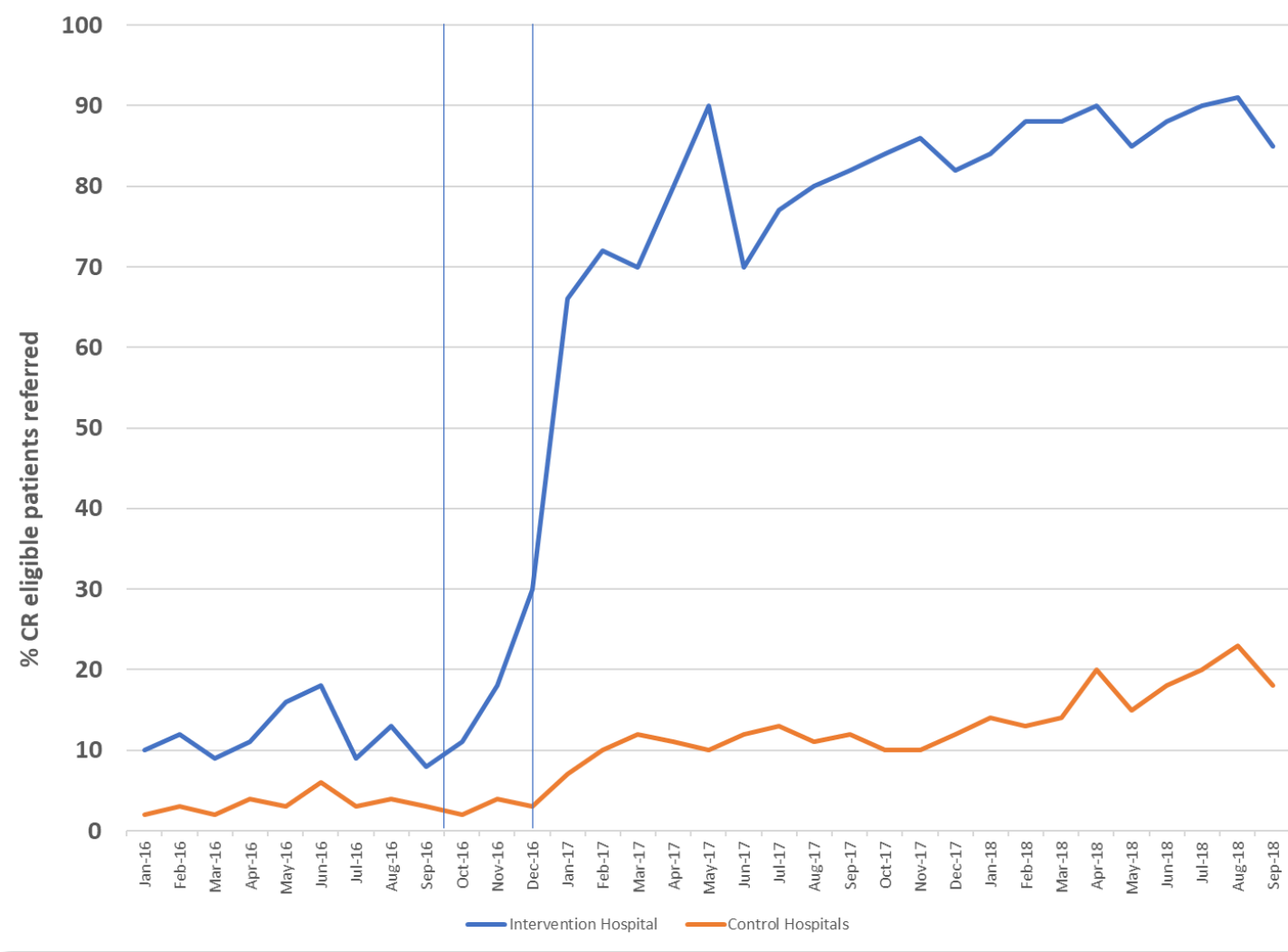


# Cardiac Rehab Referral Rates Over Time





# Cardiac Rehab Referral Rates Over Time



# Active Choice Framing

# Active choice to prompt decision-making

- Alternative to relying on the individual to make a decision

# Active choice to prompt decision-making

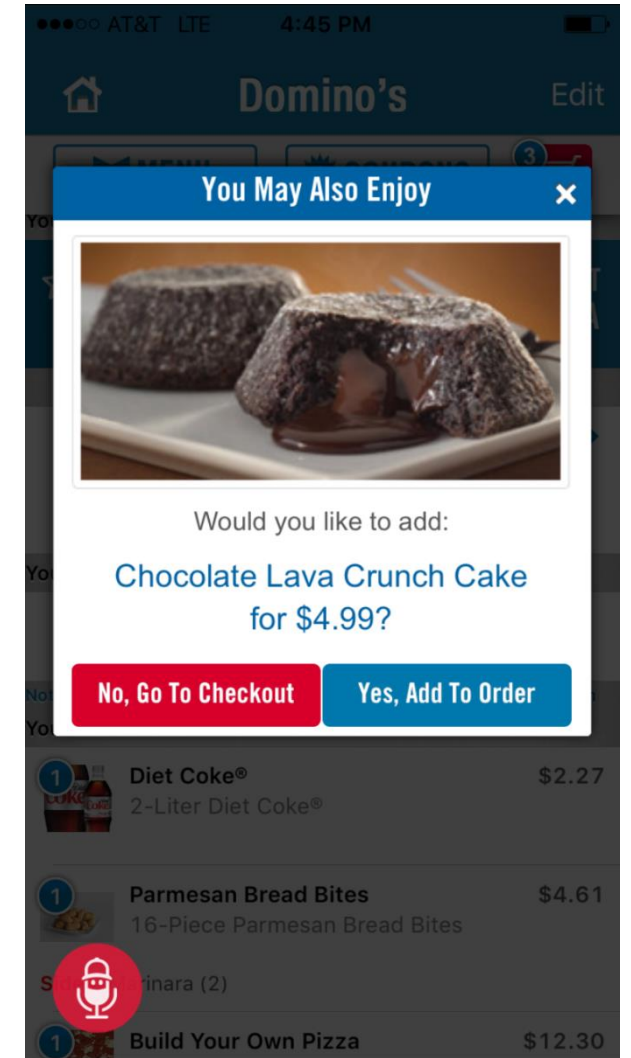
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- Individual is stopped from proceeding unless they make a choice between options (Yes or No)

# Active choice to prompt decision-making

- Alternative to relying on the individual to make a decision
- Individual is stopped from proceeding unless they make a choice between options (Yes or No)
- Design
  - Prompt decision when you have the physician's attention
  - Increase saliency of advantages and disadvantages for each option
  - Make it easy to say yes

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- Individual is stopped from proceeding unless they make a choice between options (Yes or No)
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  - Make it easy to say yes



# Influenza vaccination rates

# Influenza vaccination rates

**BestPractice Advisories**

ⓘ This patient is due for a FLU SHOT. Please click "ACCEPT" to open SmartSet or update Health Maintenance activity.

[Open SmartSet](#) [Do Not Open](#) **FLU VACCINE (SINGLE DOSE VIAL)** [Preview](#)

Health Maintenance [↗](#)

[✓ Accept \(1\)](#)

[⌵ Restore](#) [✓ Close](#)



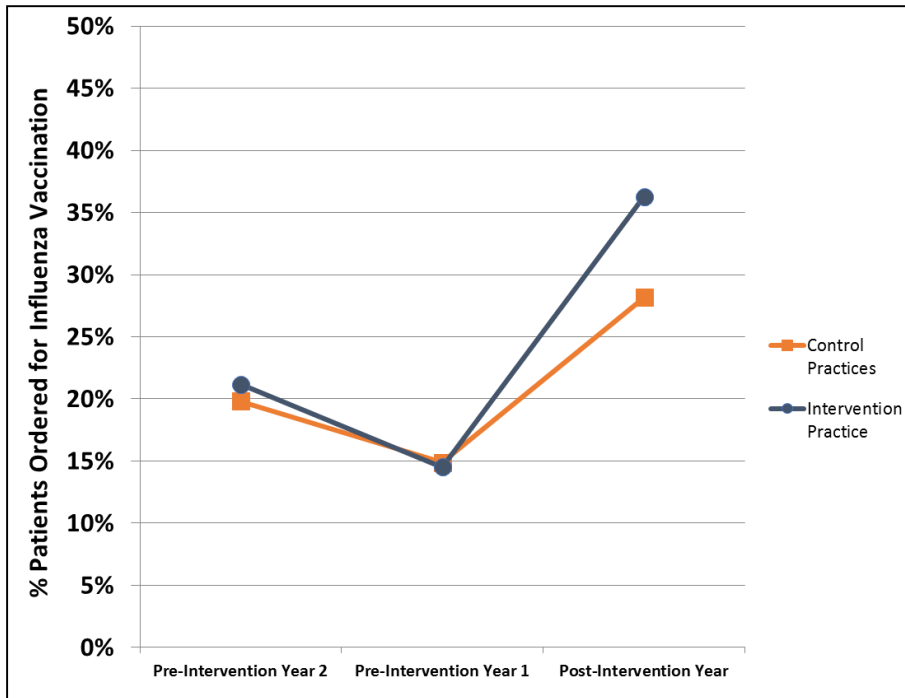
# Influenza vaccination rates

**BestPractice Advisories**

⚠ This patient is due for a FLU SHOT. Please click "ACCEPT" to open SmartSet or update Health Maintenance activity.

**FLU VACCINE (SINGLE DOSE VIAL)**

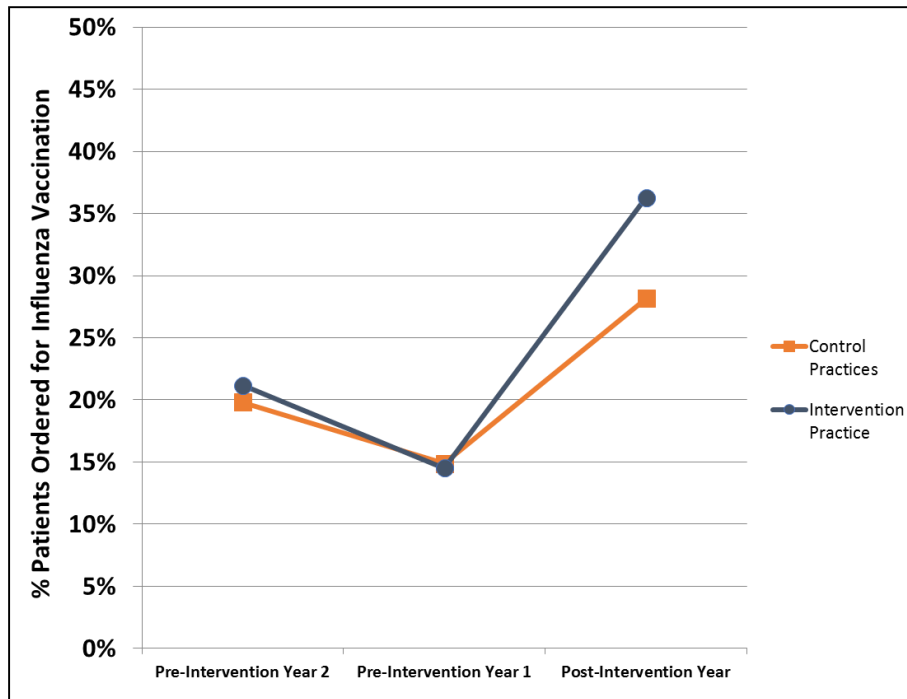
Health Maintenance



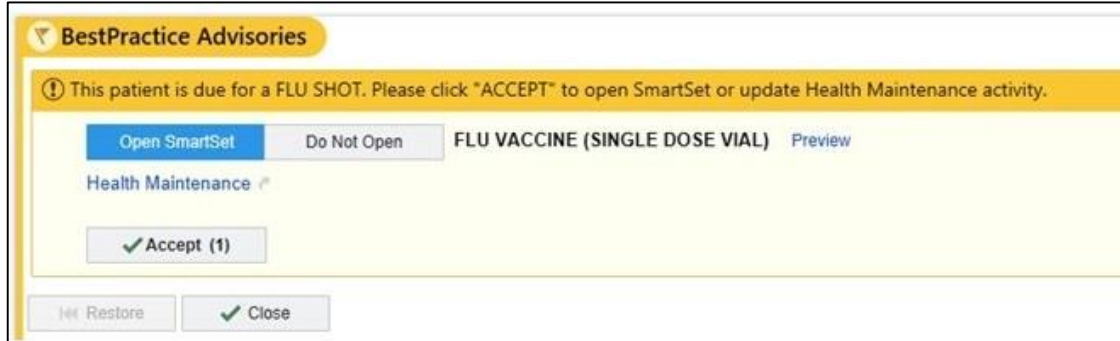
# Influenza vaccination rates



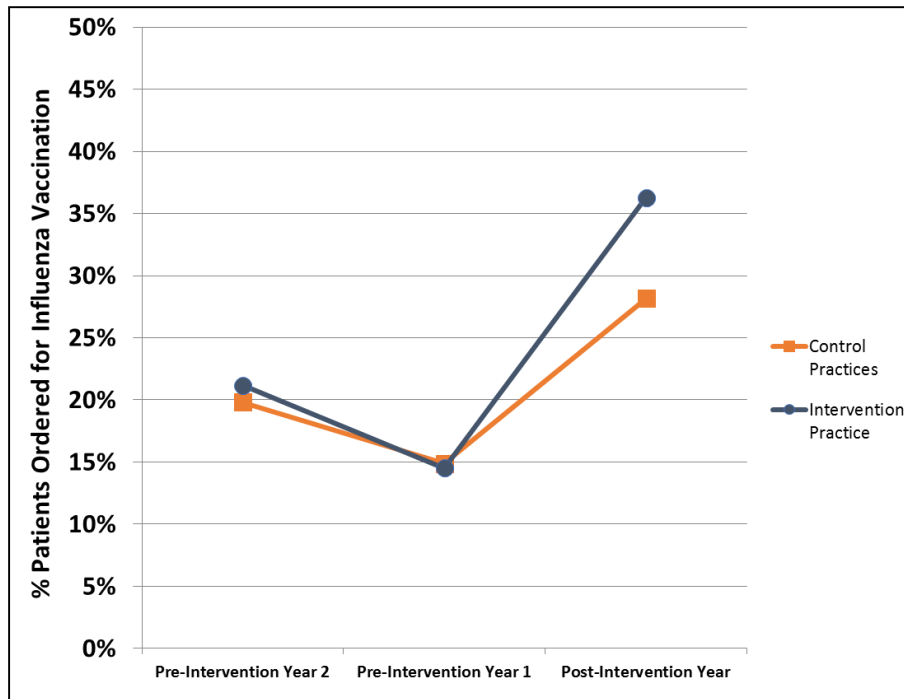
- Active choice prompt targeted to physicians and medical assistants



# Influenza vaccination rates



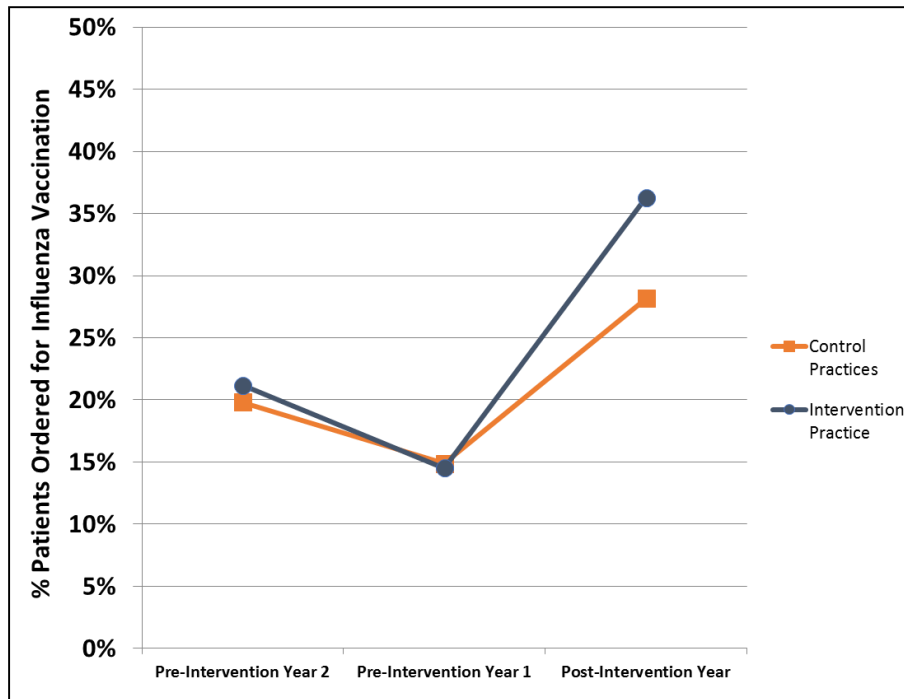
- Active choice prompt targeted to physicians and medical assistants
- Difference-in-difference analysis
  - 6.6 percentage point increase ( $P < .001$ )
  - 37.3% relative increase in vaccination rates



# Influenza vaccination rates



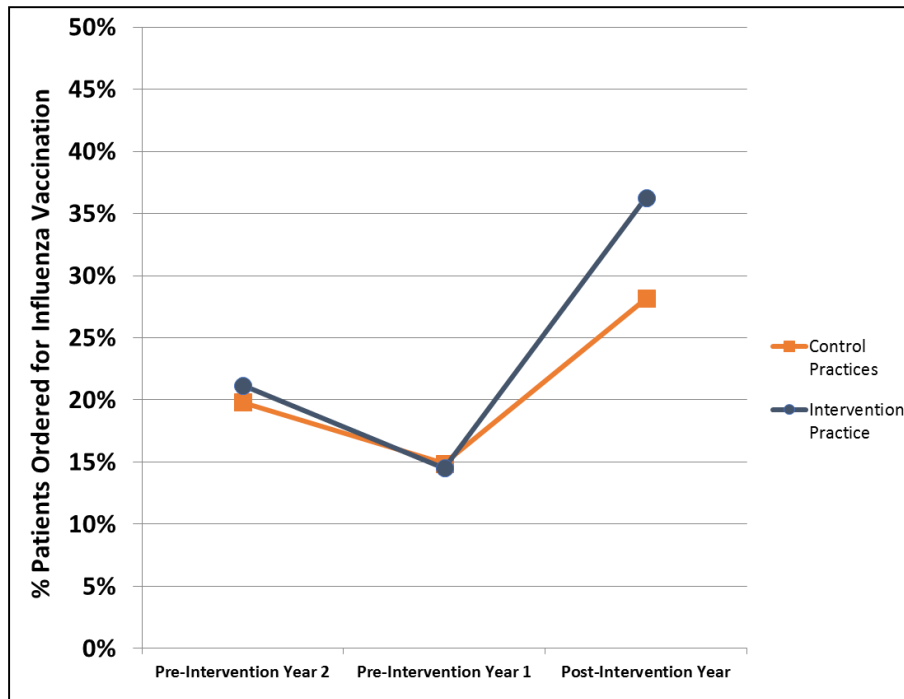
- Active choice prompt targeted to physicians and medical assistants
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- Expanded to other primary care practices at Penn Medicine



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  - Number of notifications reduced



# Influenza vaccination rates

BestPractice Advisories

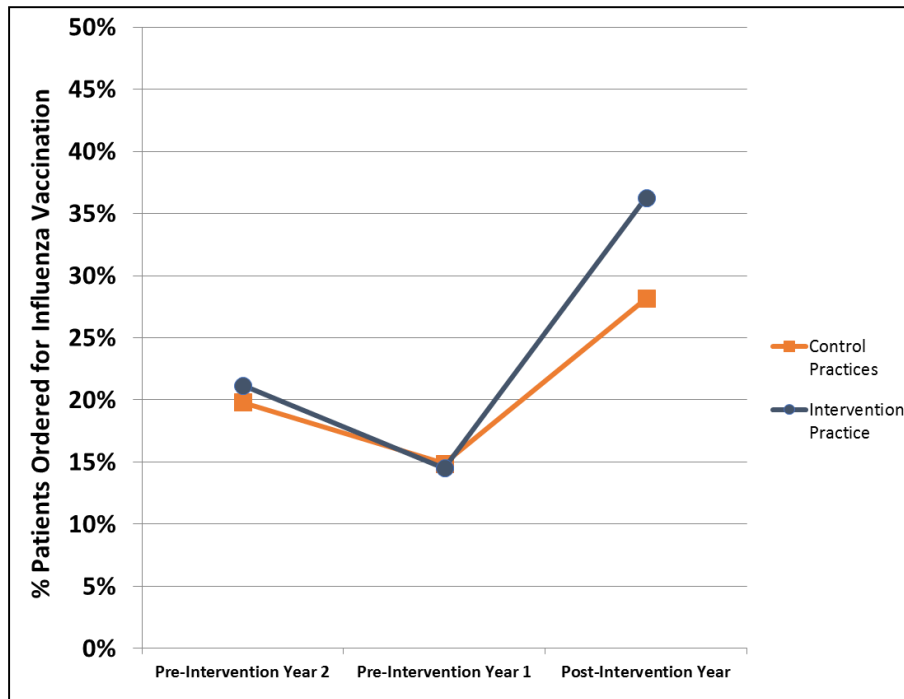
ⓘ This patient is due for a FLU SHOT. Please click "ACCEPT" to open SmartSet or update Health Maintenance activity.

Open SmartSet Do Not Open FLU VACCINE (SINGLE DOSE VIAL) Preview

Health Maintenance ↗

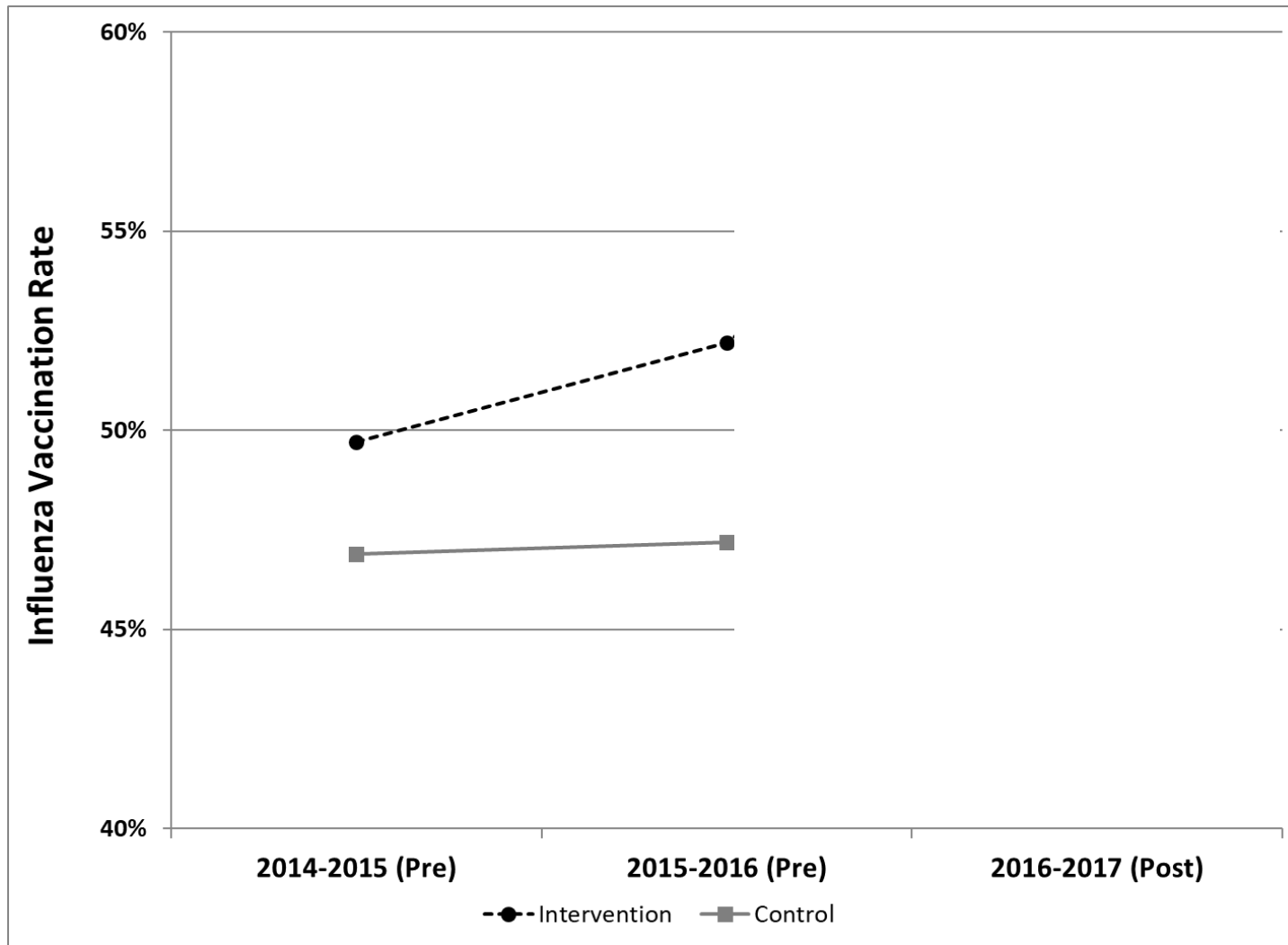
✓ Accept (1)

Restore Close

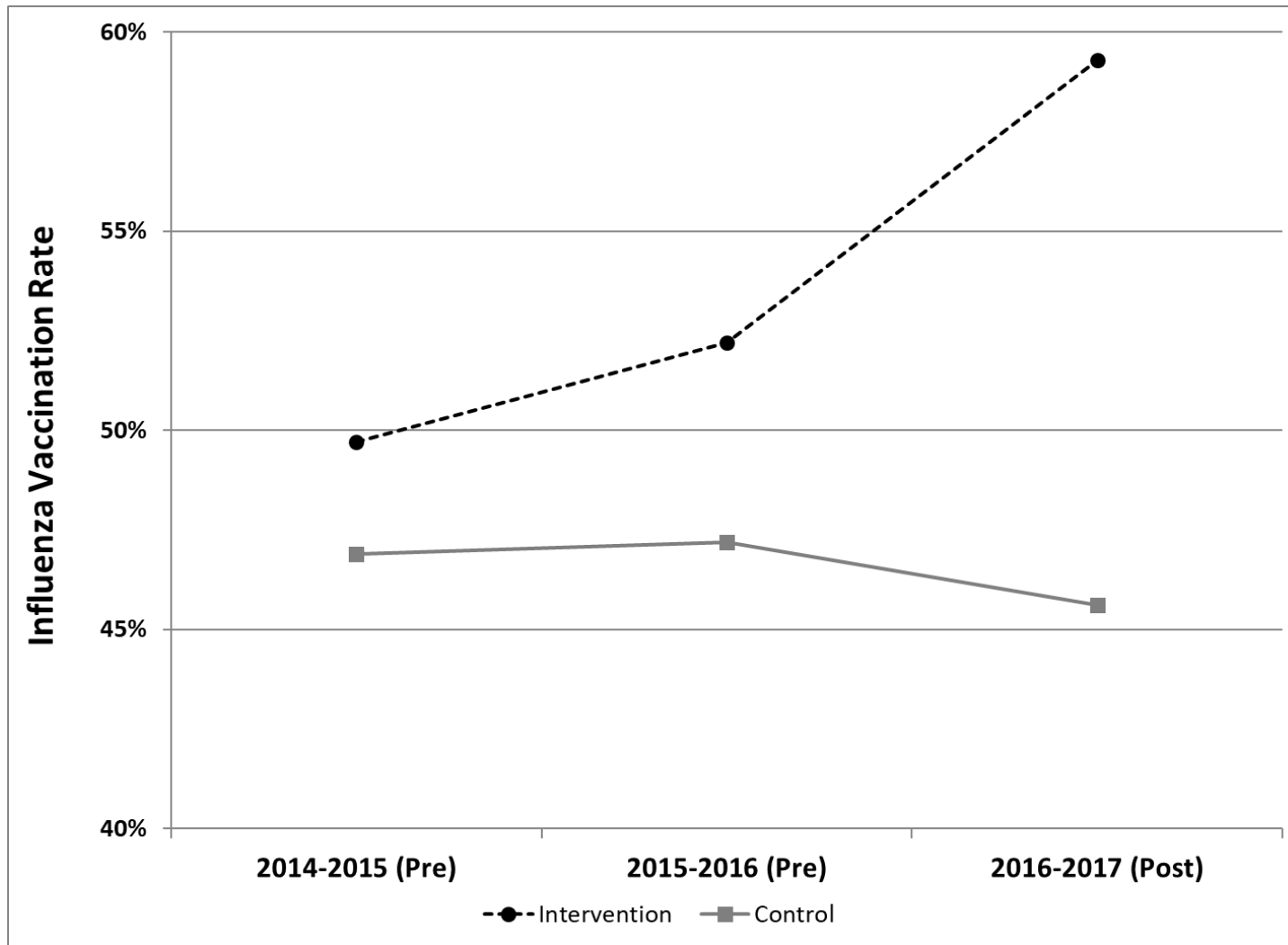


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- Difference-in-difference analysis
  - 6.6 percentage point increase ( $P < .001$ )
  - 37.3% relative increase in vaccination rates
- Expanded to other primary care practices at Penn Medicine
  - Number of notifications reduced
  - Redirected to medical assistants to template orders for physicians

# Influenza vaccination rates after an active choice intervention

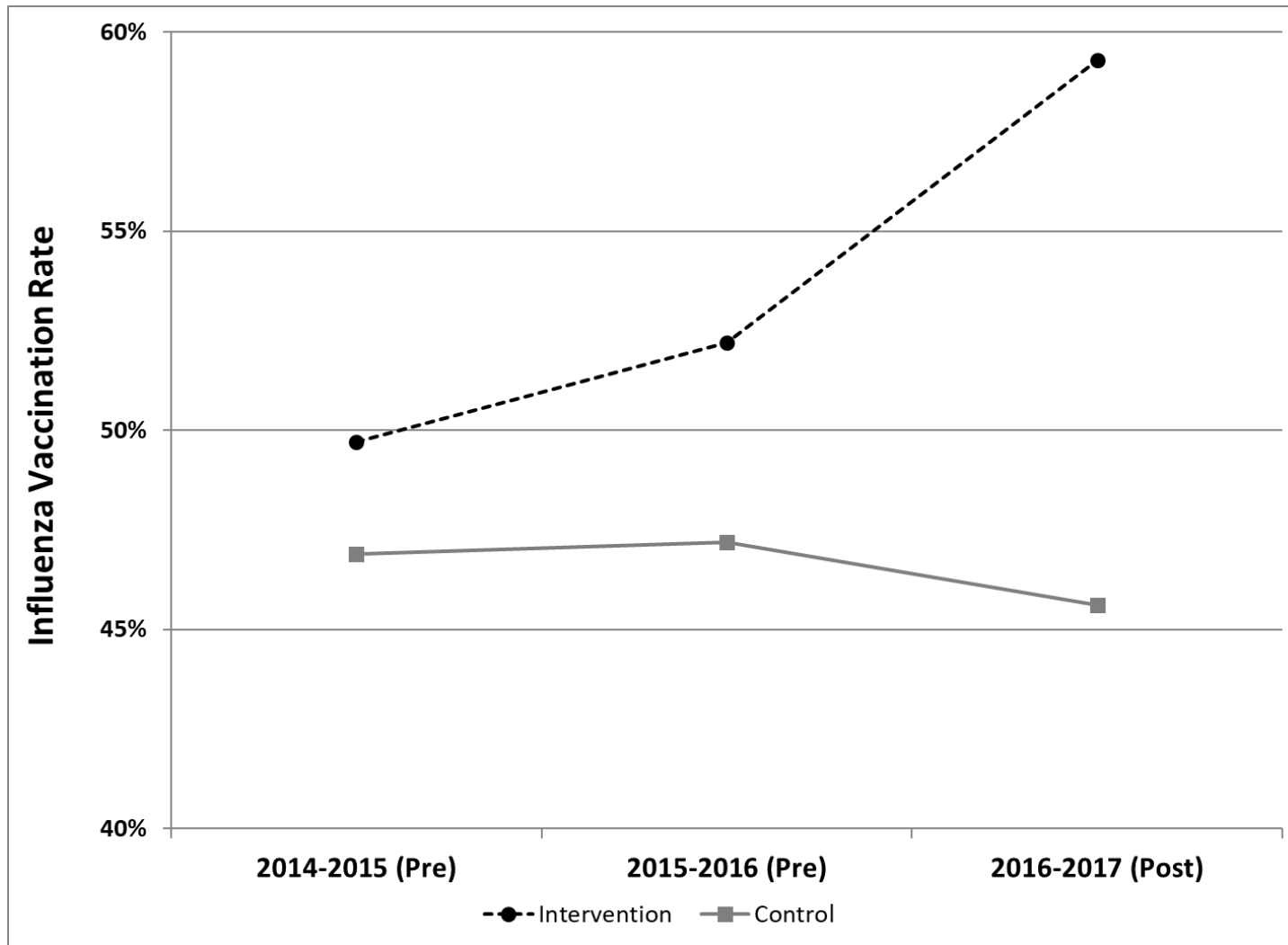


# Influenza vaccination rates after an active choice intervention





# Influenza vaccination rates after an active choice intervention



Compared to Control

Adjusted difference

**9.5 percentage points**

95% CI: 4.1 – 14.3

*P* < 0.001

# Nudges for Population Health

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*40,000 patients at Penn Medicine  
meet national guidelines for statin therapy*

# Nudges for Population Health

*40,000 patients at Penn Medicine  
meet national guidelines for statin therapy*

*Only about 50% have ever been prescribed a statin*

# Study design

- Sample
  - 96 PCPs from 32 practice sites comprising 4774 patients eligible but never prescribed a statin
- Randomized, controlled trial
  - Usual care
  - Active choice dashboard
  - Active choice dashboard + peer comparison feedback delivered once by email

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  - 96 PCPs from 32 practice sites comprising 4774 patients eligible but never prescribed a statin
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  - Usual care
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  - Active choice dashboard + peer comparison feedback delivered once by email
    - Below median: compared to the median
    - Above median: compared to 90% percentile
    - >90<sup>th</sup> percentile: recognized as top performer

# Study design

- **Sample**
  - 96 PCPs from 32 practice sites comprising 4774 patients eligible but never prescribed a statin
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  - Active choice dashboard + peer comparison feedback delivered once by email
    - Below median: compared to the median
    - Above median: compared to 90% percentile
    - >90<sup>th</sup> percentile: recognized as top performer

## Fake Backend

- Data from clinical warehouse
- Study team sent email to PCP
- PCP uses secure website to submit orders
- Study team templates orders in EHR
- PCP logs into EHR and signs orders
- Prescription sent to pharmacy electronically
- Study team sends letter to patient

# Description of health system initiative



# Description of health system initiative

Proactive Gregory.Kurtzman@uphs.upenn.edu [Sign Out](#)

**4 patients** eligible for but not prescribed a statin

Penn Medicine is working on new ways to reduce the risk of cardiovascular disease. Your patients listed below, meet AHA/ACC guidelines for a statin therapy and do NOT have an allergy or adverse reaction listed in EPIC. **These patients are currently not on a statin.** Atorvastatin 20mg daily is the recommended starting dose, however you may choose among the options. You may save your selections and return later, or submit and finalize. MRN is provided if you want to review the EPIC record. Once submitted, an order will be **pending in EPIC for your review within 2-3 days.** Once the medication is prescribed, a letter will be generated and sent to the patient with the medication and pharmacy information. Please complete and submit this form within one week of receiving the email notification. Also see the [statin guidelines from the ACC/AHA.](#)

We recommend that you prescribe Atorvastatin 20mg to all these patients. Please either do that or run the following list of patients to set them individually.

[Set all to Atorvastatin 20mg](#)

# Description of health system initiative

Proactive Gregory.Kurtzman@uphs.upenn.edu [Sign Out](#)

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We recommend that you prescribe Atorvastatin 20mg to all these patients. Please either do that or run the following list of patients to set them individually.

[Set all to Atorvastatin 20mg](#)

# Automated patient dashboard

# Automated patient dashboard

Patient	Prescribe Atorvastatin 20 mg	Prescribe Atorvastatin at Another Dose	Prescribe Another Statin	Do Not Prescribe a Statin
<p><b>Atorvastatin 20 mg</b></p> <p><b>HOLMES, SHERLOCK</b> 59yo Male</p> <p>ASCVD Score: 16.3 (high) LDL: 138 from 4/7/1907 Other Lipids: Tchol 138, HDL 233, Trig 62 BMI: 21.2 HISTORY: Myocardial Infarction, Smoking LFT: Slightly elevated (1906-05-11) MRN: 1</p>	Atorvastatin 20mg	Other Atorvastatin Dose	Prescribe Another Statin	Don't Prescribe
<p><b>Atorvastatin 40 mg</b></p> <p><b>MORSTAN, MARY</b> 45yo Female</p> <p>ASCVD Score: 5.4 LDL: 123 from 6/9/1895 Other Lipids: Tchol 123, HDL 206, Trig 65 BMI: 30.1 LFT: No LFTs MRN: 2</p>	Atorvastatin 20mg	Other Atorvastatin Dose 10mg 40mg 80mg	Prescribe Another Statin	Don't Prescribe
<p><b>Requires Action</b></p> <p><b>MORIARTY, JAMES</b> 62yo Male</p> <p>ASCVD Score: 7.5 (high) LDL: 101 from NULL Other Lipids: Tchol 101, HDL 166, Trig 46 BMI: 20.5 LFT: No LFTs MRN: 3</p>	Atorvastatin 20mg	Other Atorvastatin Dose	Prescribe Another Statin Simvastatin Pravastatin Rosuvastatin 20mg 40mg	Don't Prescribe
<p><b>Requires Action</b></p> <p><b>ADLER, IRENE</b> 54yo Female</p>				

# Automated patient dashboard

Patient	Prescribe Atorvastatin 20 mg	Prescribe Atorvastatin at Another Dose	Prescribe Another Statin	Do Not Prescribe a Statin
<p><b>Atorvastatin 20 mg</b></p> <p><b>HOLMES, SHERLOCK</b> 59yo Male</p> <p>ASCVD Score: 16.3 (high) LDL: 138 from 4/7/1907 Other Lipids: Tchol 138, HDL 233, Trig 62 BMI: 21.2 HISTORY: Myocardial Infarction, Smoking LFT: Slightly elevated (1906-05-11) MRN: 1</p>	<input checked="" type="button" value="Atorvastatin 20mg"/>	<input type="button" value="Other Atorvastatin Dose"/>	<input type="button" value="Prescribe Another Statin"/>	<input type="button" value="Don't Prescribe"/>
<p><b>Atorvastatin 40 mg</b></p> <p><b>MORSTAN, MARY</b> 45yo Female</p> <p>ASCVD Score: 5.4 LDL: 123 from 6/9/1895 Other Lipids: Tchol 123, HDL 206, Trig 65 BMI: 30.1 LFT: No LFTs MRN: 2</p>	<input type="button" value="Atorvastatin 20mg"/>	<input checked="" type="button" value="Other Atorvastatin Dose"/> 10mg 40mg 80mg	<input type="button" value="Prescribe Another Statin"/>	<input type="button" value="Don't Prescribe"/>
<p><b>Requires Action</b></p> <p><b>MORIARTY, JAMES</b> 62yo Male</p> <p>ASCVD Score: 7.5 (high) LDL: 101 from NULL Other Lipids: Tchol 101, HDL 166, Trig 46 BMI: 20.5 LFT: No LFTs MRN: 3</p>	<input type="button" value="Atorvastatin 20mg"/>	<input type="button" value="Other Atorvastatin Dose"/>	<input checked="" type="button" value="Prescribe Another Statin"/> Simvastatin Pravastatin Rosuvastatin 20mg 40mg	<input type="button" value="Don't Prescribe"/>
<p><b>Requires Action</b></p> <p><b>ADLER, IRENE</b> 54yo Female</p>				

# Automated patient dashboard

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# Dashboard Utilization

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	Active Choice (N=32)	Active Choice w/Peer Comparisons (N=32)
Accessed Dashboard	16/32 (50.0%)	12/32 (37.5%)
Submitted Decisions	4/32 (12.5%)	8/32 (25.0%)
Signed Prescription Orders	2/32 (6.3%)	8/32 (25.0%)

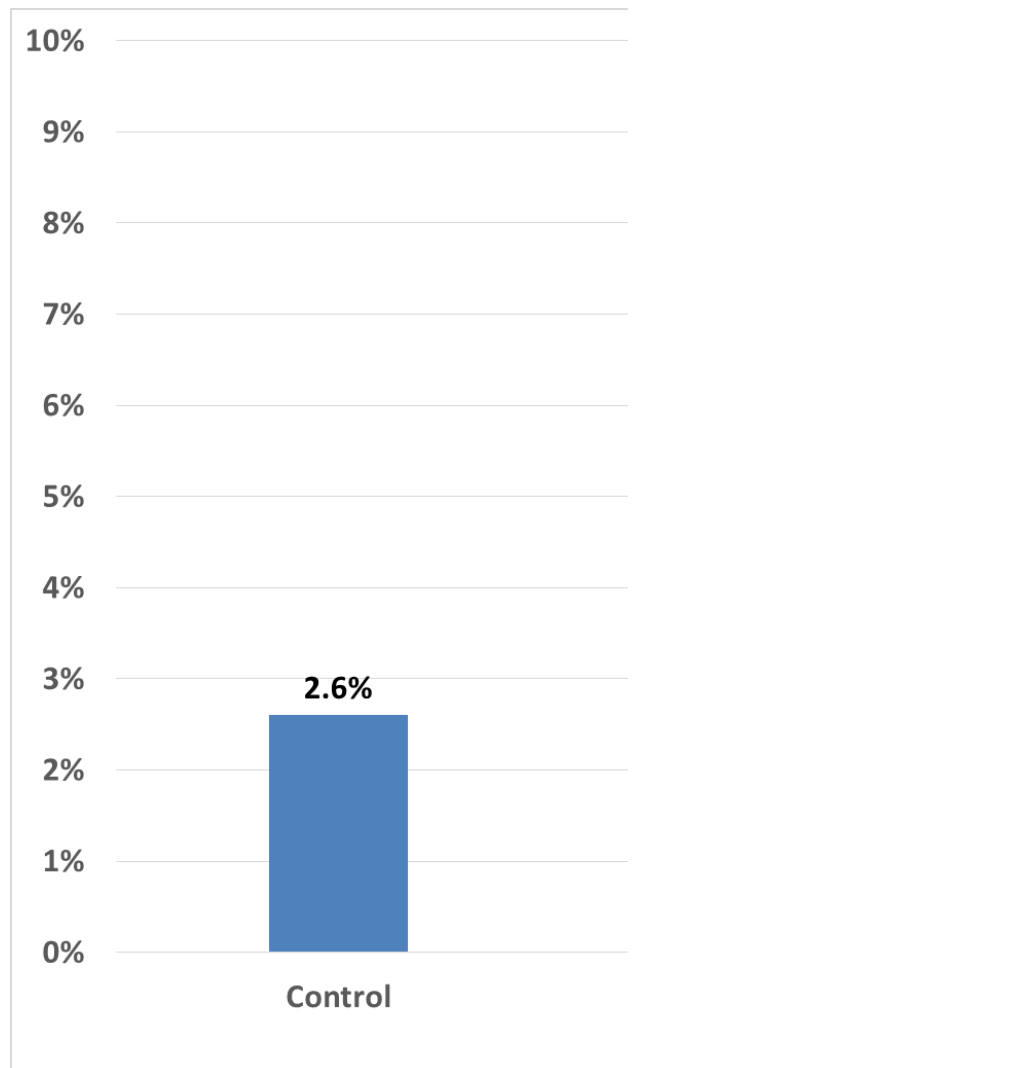
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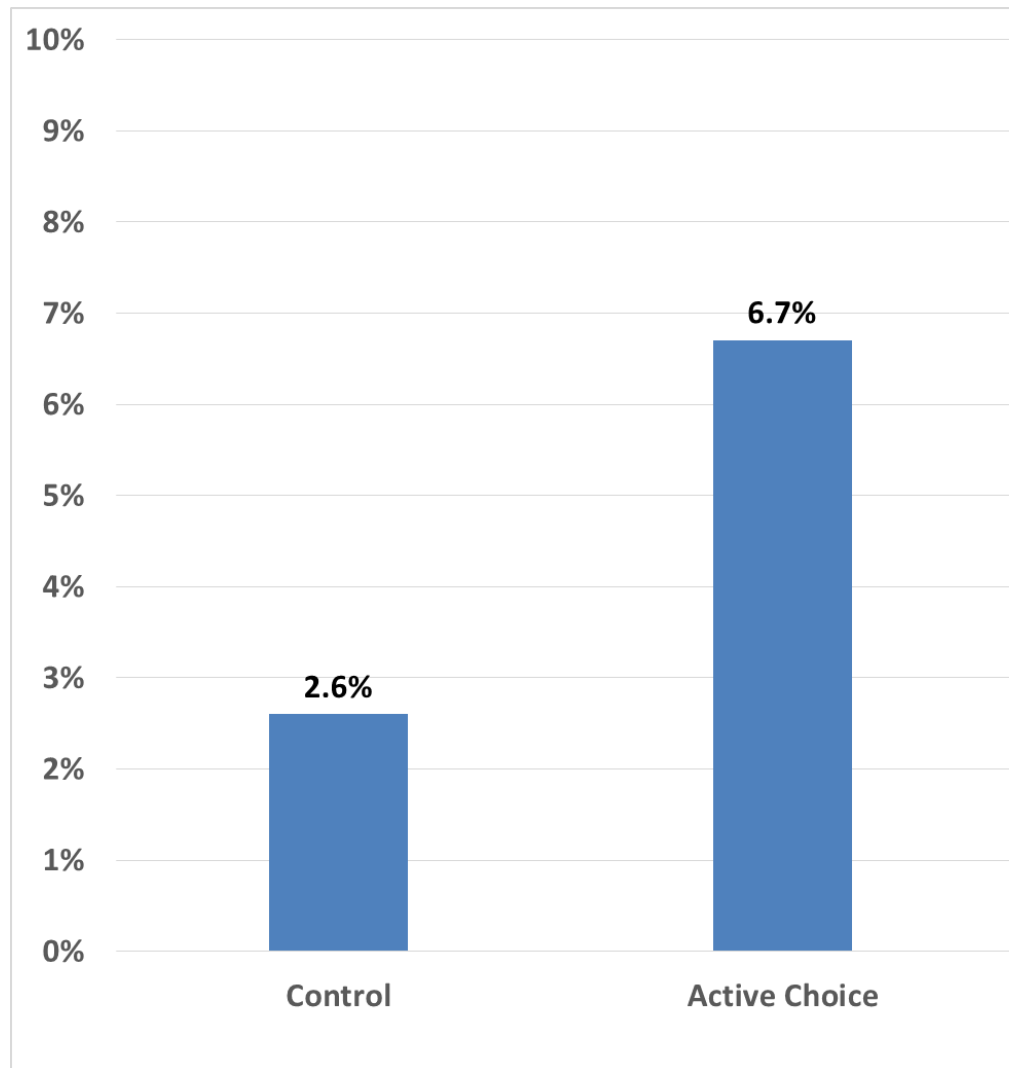
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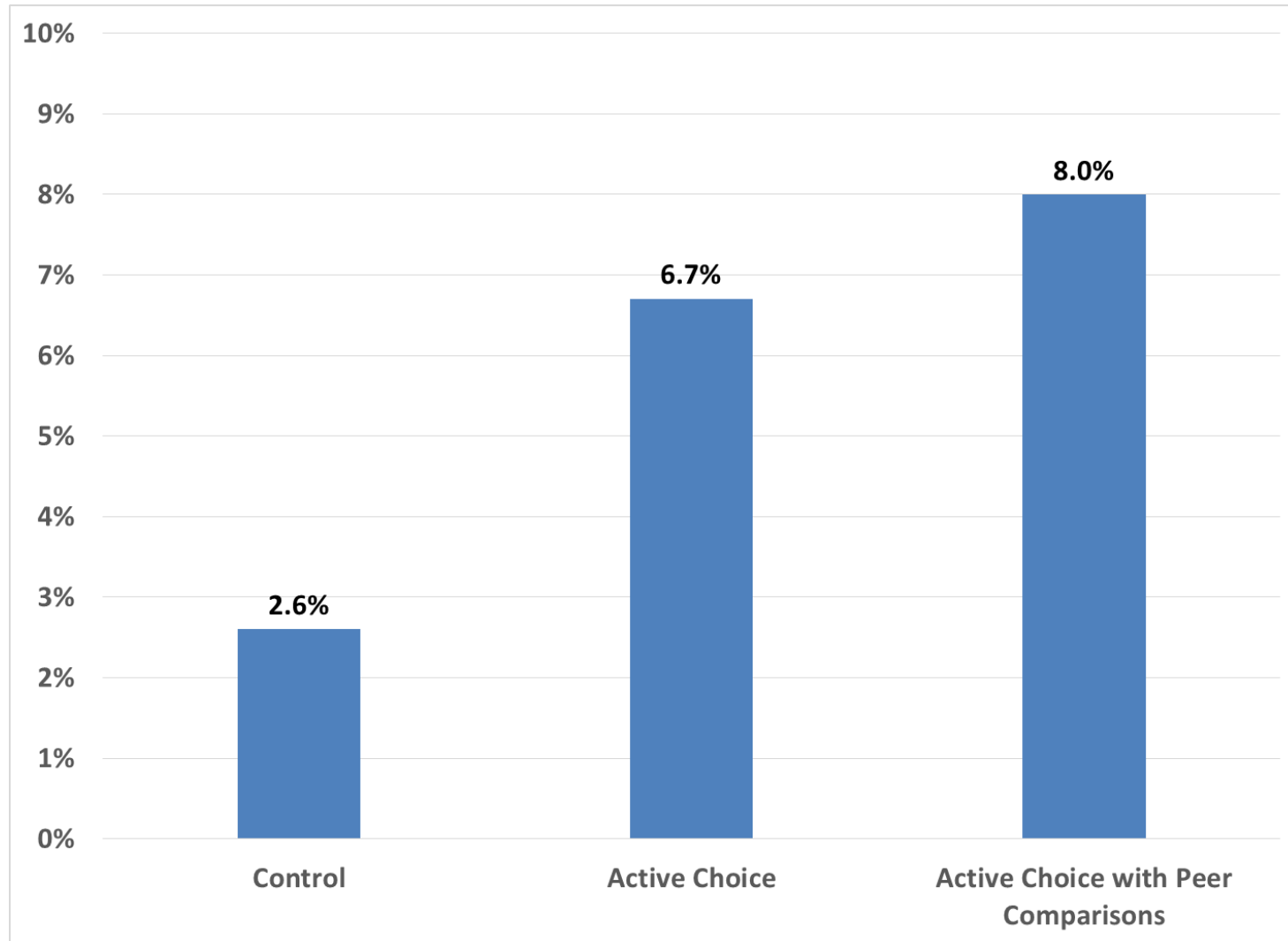
# Active Choice Dashboards to Increase Statin Prescribing



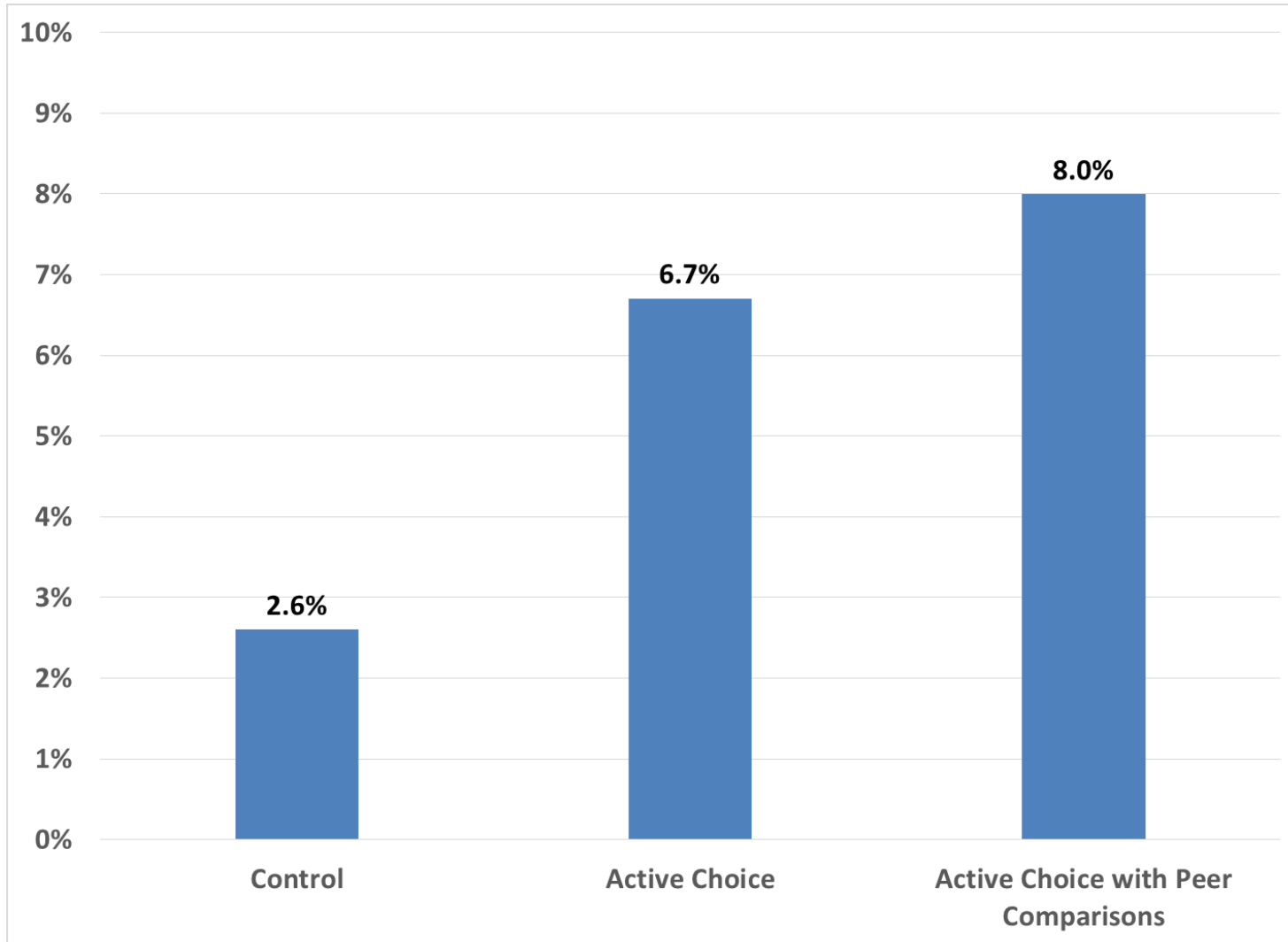
# Active Choice Dashboards to Increase Statin Prescribing



# Active Choice Dashboards to Increase Statin Prescribing



# Active Choice Dashboards to Increase Statin Prescribing



## Active choice and peer comparisons

**5.8 percentage points**

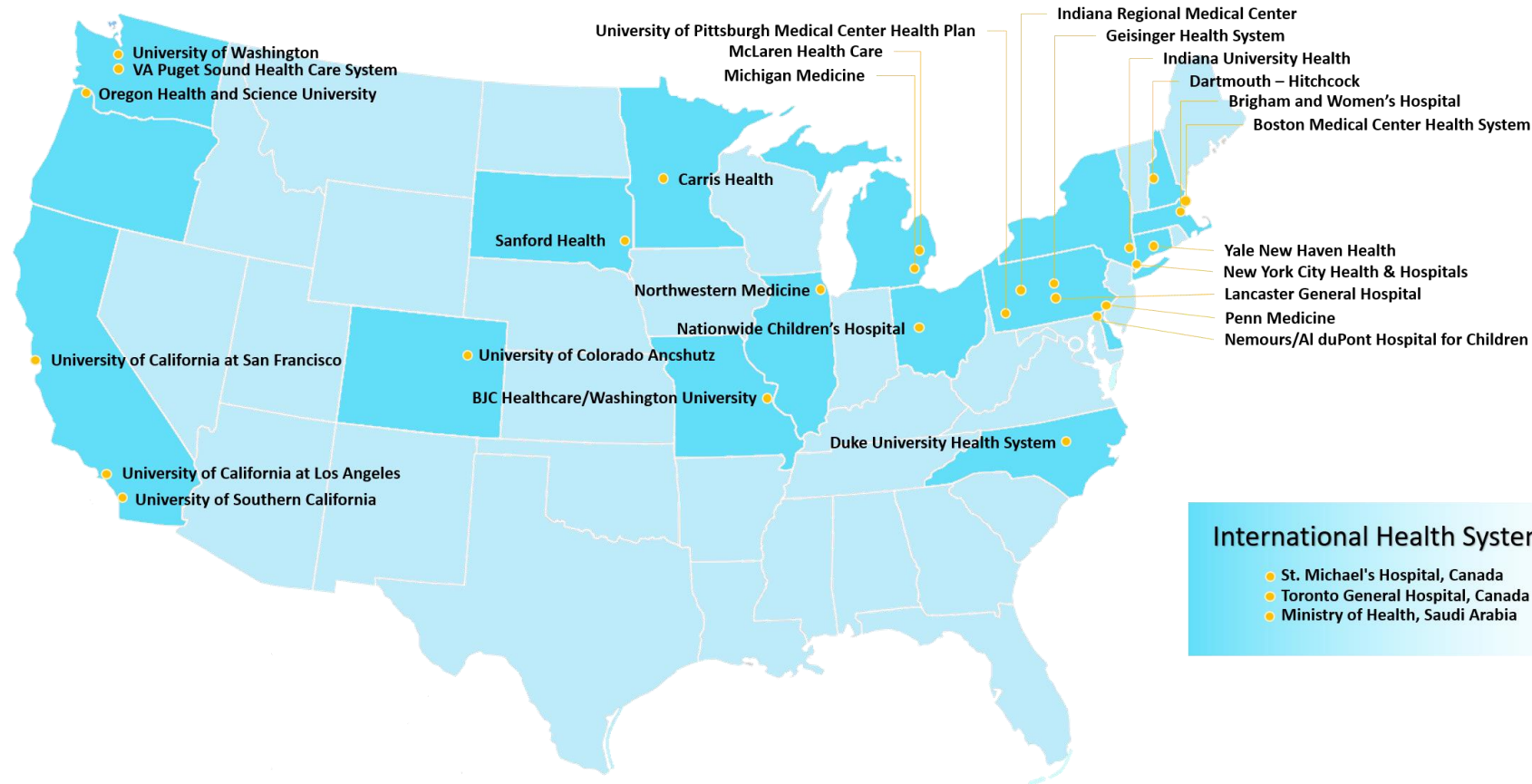
95% CI: 0.9 to 13.0

*P*<0.01



# Growing interest in implementing nudge units in health care

## Nudges in Health Care Symposium Attendees 2018-2019



# Summary: Nudging Medical Decision-Making

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  - We are already being nudged but are often unaware of it
  - Strategic attention to align design with our goals

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- Medical decision-making is often suboptimal
- Design of choice environments influences our behavior
  - We are already being nudged but are often unaware of it
  - Strategic attention to align design with our goals
- Nudge units can improve the delivery of health care
  - Systematic approach to design, implement, and test interventions
  - Steer decisions towards higher value and better patient outcomes

# Using Nudges to Improve the Delivery of Health Care

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