Nothing to disclose.

Nudge Study

- Based at the University of Colorado Anschutz Medical Campus

- Partnership between:
    - University of Colorado
    - Denver Health Medical Center
    - Rocky Mountain Regional VA
    - UCHealth.

- Funded by the the National Institutes of Health (NIH) Health Care Systems Research Collaboratory.

Personalized Patient Data and Behavioral Nudges to Improve Adherence to Chronic Cardiovascular Medications

- Problem of Non-adherence

- What is a nudge?

- Nudge study design

- Pilot findings

- Next Steps

Medication Non-Adherence

- Up to 50% of patients do not take CV medications as prescribed

- Results in increased mortality, adverse events, healthcare costs

- Previous attempts to improve adherence are resource intensive, costly, time consuming and have inconsistent benefit

- Cell phones are ubiquitous, we can adapt the idea of a "Nudge" to the phone easily
    - Goal is to improve adherence with Nudge messages over the phone in a way that can specifically respond to patient needs

What is a nudge?
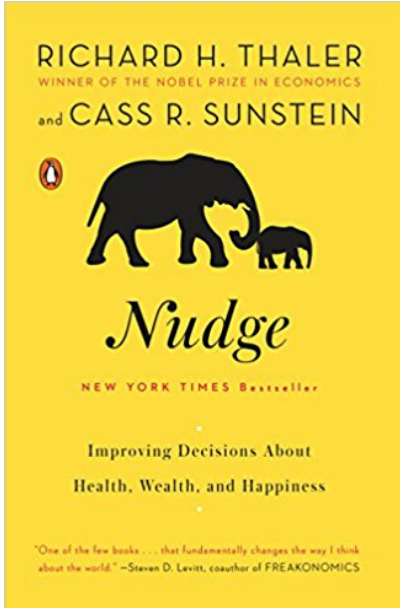
- Use principles from behavioral economics and cognitive psychology
  - Behavior commitments
  - Communicating social norms
  - Narrative stories
- A strategic reminder that can help people adopt healthy behaviors
  - Nobel prize winning economists have shown this can work to improve nutrition, physical activity and other behaviors

The picture can't be displayed.

Patient inclusion

- Adult cardiovascular patients diagnosed with ≥ 1 condition of interest, prescribed ≥ 1 medication of interest, with a refill gap of at least 7 days

Condition	Classes of medications
Hypertension	Beta-blockers (B-blockers), Calcium Channel Blocker (CCB), Angiotensin converting enzyme inihibitors (ACEi), Angiotensin Receptor Blockers (ARB), Thiazide diuretic
Hyperlipidemia	HMG CoA reductase inhibitor (Statins)
Diabetes	Alpha-glucosidase inhibitors, Biguanides, DPP-4 inhibitors, Sodium glucose transport inhibitor, Meglitinides, Sulfonylureas, Thiazolidinediones, and statins
Coronary artery disease	PGY-2 inhibitor (Clopidogrel, Ticagrelor, Prasugrel, Ticlopidine), B-blockers, ACEi or ARB and statins
Atrial fibrillation	Direct oral anticoagulants, B-blockers, CCB

- Patients at one of three participating healthcare systems

- English or Spanish-speaking

Patient identification using EHR

- **Patient identification**
  - ICD 9 and 10 codes for diagnoses
  - NCD classes were compiled to identify patients across 3 HCS
- **Pharmacy refill data**
  - Pharmacy refill data from pharmacies within the system (Denver Health and VA)
  - Surescripts / Panel Query – Medication History for Populations

Surescripts
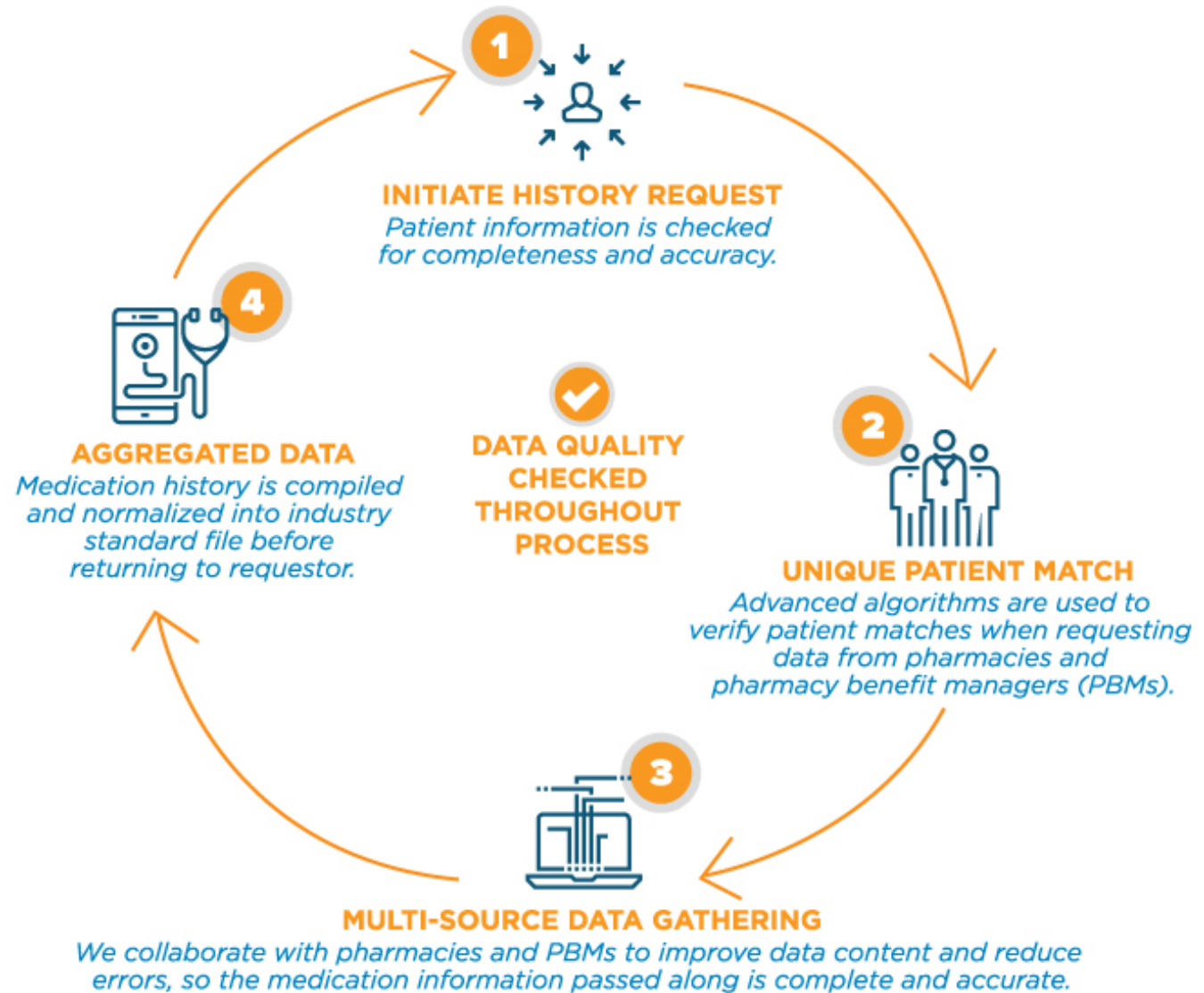
Message development

N of 1 Interviews

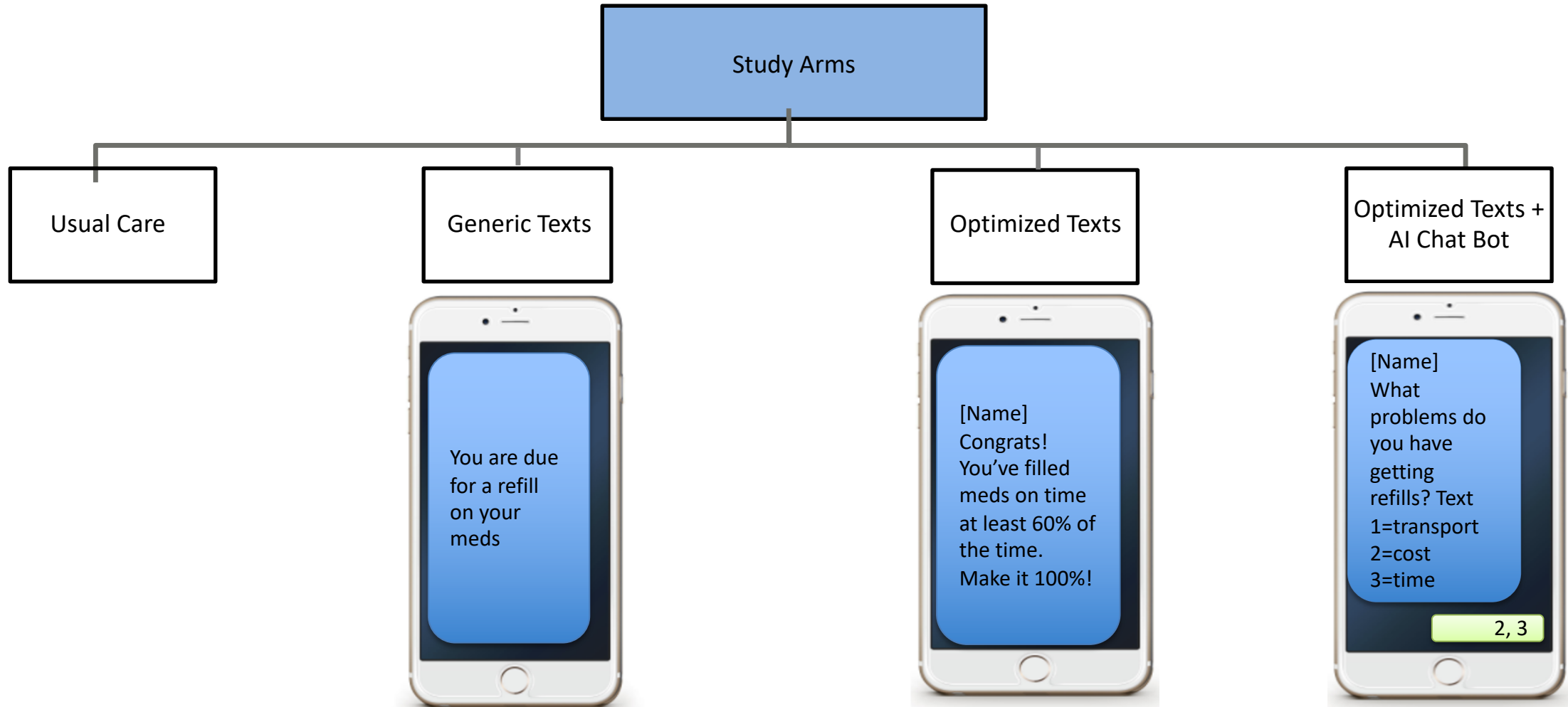- 56 people were interviewed in English or Spanish to obtain message feedback
- **Feedback:** Discouraged the use emojis 😢 or fictitious examples of patients

Stakeholder Panel

- A 12-person, study-specific panel reviewed messages and our proposed study methods
- **Feedback:** Opportunities to improve the interactive voice response (IVR); Accessibility for vulnerable populations; adding a DONE option

Study intervention

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                    │   Study Arms    │
                    └─────────────────┘
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  ┌──────────────┐ ┌──────────────┐ ┌──────────────┐ ┌──────────────────┐
  │  Usual Care  │ │ Generic Texts│ │Optimized Texts│ │ Optimized Texts +│
  │              │ │              │ │              │ │   AI Chat Bot    │
  └──────────────┘ └──────────────┘ └──────────────┘ └──────────────────┘
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Generic Texts:
You are due for a refill on your meds

Optimized Texts:
[Name] Congrats! You've filled meds on time at least 60% of the time. Make it 100%!

Optimized Texts + AI Chat Bot:
[Name] What problems do you have getting refills? Text 1=transport 2=cost 3=time

2, 3

Message example

Study Introduction

Nudge

Temporary opt-out

Second opt-out opportunity & required messages

Monday 12:25 PM

This is a message from the Nudge Project at UCHealth:

You are due to refill your meds.

If you have already filled your prescription let us know by replying DONE.

Reply STOP to quit, HELP for info. Msg&DataRatesMayApply

Opt-out design

- An opt-in recruitment process is infeasible due to high enrollment goals

- Opt-out process
    - A physical opt-out packet mailed to patients includes an information sheet, opt-out sheet, self-addressed and stamped envelope
    - An optional opt out survey designed to help us understand why patients do not participate in low-risk, opt-out studies
        - Materials signed by participating physicians at each healthcare system
        - Four-week deadline to return opt-out form

- Secondary opt-out opportunity in each text message

Proportion of Days Covered (PDC)

- **Operationalizing PDC within EHR and pharmacy refill data**
  - *Requires the use of pharmacy records from each of the HCS during the 365-day follow-up period*

- **Measuring PDC**
  - *Primary PDC measure*
    - PDC1: Analyzing all medications on which a patient gapped at baseline
  - *Secondary PDC measures*
    - PDC2: All medications a patient ever gaps on, calculating PDC from the time of gap
    - PDC3: All medications a patient was prescribed at baseline
  - *Medications prescribed after the baseline gap and enrollment will not be included in any of these definitions of PDC, though they will be considered in secondary analyses.*

Pilot findings

- Piloted study for feasibility and usability with 400 patients at the Denver VA and Denver Health
  - Opt-out rate of 12.5%
  - 60.7% of patients experienced a medication refill gap of 7 days or more during the month-long study period
  - Secondary opt-out rate (responding with "STOP") was lower than expected (1.2%)

Results to date

Opt out packets sent to eligible patients

(n=4660)

Opt out packets returned

(n= 392)

Address undeliverable

(n= 244)

Patients followed for medication gaps

(n=4024)

Patients enrolled with a 7 day medication gap & sent nudges

(n=1352)

Patients that responded "Stop"

(n=32)

Patients that responded "Done"

(n=72)

Patients that received all 5 messages

(n=1248)

Text Message Medication Adherence Reminders Automated and Delivered at Scale Across Two Institutions: Pilot Testing the "Nudge" System

Rapid Fire presentation Monday @ 2:32 pm

Thank you!

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