Reaching out in real time: Identifying patients at imminent risk for nonadherence to chronic cardiovascular medications

Susan Moore, PhD, MSPH; Thomas Glorioso, MS; Meg Plomondon, PhD, MSPH; Sheana Bull, PhD, MPH; Lisa Sandy, MA; Michael Ho, MD; David Maguid, MD
Acknowledgements

- Nudge study team
- Patient participants

This study was funded by the National Institutes of Health (NIH) Health Care Systems Research Collaboratory by cooperative agreement UG3HLD144163 from the National Heart, Lung, and Blood Institute. This work also received logistical and technical support from the NIH Collaboratory Coordinating Center through cooperative agreement U24AT009676. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.
Nudge: Study Overview

- Up to half (50%) of patients with cardiovascular conditions don’t take their medications as prescribed.
- Medication non-adherence is a complicated problem that results in poor health outcomes, high health care costs, and preventable deaths.
- Previous adherence interventions have been resource intensive, high-burden, inconsistent, and with mixed results.
Nudge: Study Overview

- Behavioral “nudges” are strategic reminders that show promise for supporting positive behavioral change.
- Digital technologies, particularly mobile phones, are more omnipresent now than ever before, offering opportunity to deliver behavioral nudges in a timely fashion.
- Year 1 pilot (UG3); Years 2-5 RCT (UH3).
Nudge Pilot: Year 1, Aim 1

- Develop and test tools, infrastructure, and procedures needed for a proposed large, multi-center, randomized trial.
  - Develop and refine library of behavioral messages
  - Establish patient identification, eligibility, and randomization procedures across the 3 sites
Nudge Pilot: Year 1, Aim 2

- Pilot intervention delivery to demonstrate feasibility of and preliminary effects within 3 engaged healthcare systems.

  - Deliver Nudge messages at each site
  - Solicit feedback from patient, provider, and health system stakeholders
  - Develop final protocol for UH3 RCT
Data Workgroup Objectives – Pilot

- Create a system to use health care delivery system pharmacy refill data to identify patients with a 7-day gap in cardiovascular medication refills, *on a rolling basis.*
  - Establish data infrastructure
  - Create and refine algorithms for population identification
  - Data collection and quality control (ongoing)
  - Monitor pharmacy data, identify patients with 7-day refill gaps
No text messages

You are due for a refill on your meds

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

[Name]
What problems do you have getting refills? Text
1=transport
2=cost
3=time

2, 3
Study Sites

■ Denver Health and Hospital Authority
  - Integrated safety net system serving Denver, CO
  - Over 200,000 patients annually
  - Enrolled at 8 primary care clinics in Denver metro

■ VA Eastern Colorado Health Care System
  - Tertiary care referral hospital and affiliated clinics
  - 38,000 veterans in CO, WY, MT, KS
  - Enrolled at 4 primary care clinics in Denver metro

■ UCHhealth – originally planned, deferred to phase II (RCT)
Data Infrastructure - Systems

- Denver Health and Hospital Authority (DH)
  - Epic electronic health record
  - Comprehensive data warehouse (clinical and administrative data, including pharmacy)
  - Text message system infrastructure

- VA Eastern Colorado Health Care System (VA)
  - Single electronic health record (Computerized Patient Record System/CPRS)
  - Centralized data warehouse (clinical and pharmacy)

- Surescripts
  - Pharmacy data for external fills (DH, UCHealth)
Data Infrastructure - Flow

- Daily reports from each participating system
  - Eligible participants
  - Refill data

- Secure transmission to study coordinating center

- Incorporation into centralized study database (REDCap)

- Patients with 7-day medication refill gaps receive messages from centralized message administration system (Upland)
  - Message type dependent on study arm
Patient Inclusion

■ Adult cardiovascular (CV) patients (18+ years)
■ One or more condition(s) of interest
  - Hypertension, hyperlipidemia, diabetes, coronary artery disease, atrial fibrillation
■ Prescribed one or more 1 medication of interest
  - Beta-blockers, calcium channel blockers (CCB), angiotensin converting enzyme inhibitors and angiotensin receptor blockers (ACEi, ARB), thiazide diuretic, statins, alpha-glucosidase inhibitors, biguanides, DPP-4 inhibitors, sodium glucose transport inhibitors, meglitinides, sulfonylureas, thiazolidinediones, PGY-2 inhibitors, direct oral anticoagulants
■ Refill gap of at least 7 days
Methods

- Health system internal pharmacy refill data
  - Surescripts integration initially explored, delayed to RCT
  - Approx. two-thirds of DH patients and 70% of VA patients
- CV patients identified through ICD-9 and ICD-10 codes
- Comprehensive medication list created using NDC codes, medication names/descriptions, medication classes
  - 10-digit NDC and 11-digit NDC crosswalk created
- Automated daily custom reports to generate patient lists
  - Prescription date, dosage, medication count, expected refill date
Results

- 400 patients included in pilot phases
  - 60 in message design and testing (phase I), 340 in pilot intervention (phase II)
  - 2 opted out of phase I; 54 opted out of phase II

- 286 patients enrolled in medication tracking
  - (134 VA – 43 days, 152 DH – 19 days)

- 207 patients experienced 7-day gaps and were successfully randomized and enrolled
  - 92 VA, 115 DH
  - 72% gapped on 1 or more medications; 26% gapped on all medications
Challenges

■ Differential system refresh rates
  - Eg third-party data on external fills pulled for patient records just prior to their scheduled clinic visits as standard practice
  - Data warehouse vs. production system
■ Cross-system data transformation and automated integration
■ Monitoring for code changes and updates (eg new NDC codes)
Conclusions

- Real-time health system data can be used to support technology-based intervention at scale for at-risk patients.
- Addressing interoperability issues is essential for long-term sustainability.
Questions?

Susan.L.Moore@cuanschutz.edu
1-303-885-5085