Personalized Patient Data and Behavioral Nudges to Improve Adherence to Chronic Cardiovascular Medications (The Nudge Study)

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Study objectives

- Conduct a pragmatic patient-level randomized intervention across 3 HCS to improve adherence to chronic CV medications.
  - Primary outcome: Medication adherence defined by the proportion of days covered (PDC) using pharmacy refill data.
  - Secondary outcomes:
    • Intermediate clinical measures (e.g., BP control)
    • CV clinical events (e.g., hospitalizations)
    • Healthcare utilization
    • Costs
Study setting

- Denver Health Clinics
- VA Eastern Colorado HCS Clinics
- UCHealth Clinics

Patient population

- Adult patients diagnosed with ≥ 1 condition of interest and prescribed ≥ 1 medication of interest

<table>
<thead>
<tr>
<th>Condition</th>
<th>Classes of medications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>Beta-blockers (B-blockers), Calcium Channel Blocker (CCB), Angiotensin converting enzyme inhibitors (ACEI), Angiotensin Receptor Blockers (ARB), Thiazide diuretic</td>
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<tr>
<td>Hyperlipidemia</td>
<td>HMG CoA reductase inhibitor (Statins)</td>
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<tr>
<td>Diabetes</td>
<td>Alpha-glucosidase inhibitors, Biguanides, DPP-4 inhibitors, Sodium glucose transport inhibitor, Meglitinides, Sulfonureas, Thiazoldinediones, and statins</td>
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<tr>
<td>Coronary artery disease</td>
<td>PGY-2 inhibitor (Clopidogrel, Ticagrelor, Prasugrel, Ticlopidine), B-blockers, ACEI or ARB and statins</td>
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<tr>
<td>Atrial fibrillation</td>
<td>Direct oral anticoagulants, B-blockers, CCB</td>
</tr>
</tbody>
</table>

- English or Spanish-speaking
Opt-out study design

- Identify patients with CV disease and prescribed medication
- Send opt-out packets to eligible patients
- Patients who do not return opt-out form are eligible for enrollment
- Monitor for gaps with medication refills

Intervention arms

- 7 day gap between medication refills
  - Usual Care
  - Generic Texts
  - Optimized Texts
  - Optimized Texts + AI Chat Bot

Messages:
- [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
Types of nudges employed in this study

- **Social Norms**: Others like you are performing this behavior
  - Example—testimonials "People like Joseph have had success in remembering to pick up his meds by making it a habit to drive by his pharmacy on the way home from work"

- **Behavioral Commitments**: Making a stated intention to take action
  - Example—"Will you mention to a family member your intention to refill your medications today?"

- **Narrative stories**: Evoking emotional connection
  - Example—"Marta has committed to her daughter that she will stay on top of her refills so she’ll be around longer for her grandkids!"

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Sample generic message

This is a message from the Nudge Study at the VA.

Hi Steve, You are due to refill your metformin.

Para mensajes en Español por favor responda Español.

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

Recurring Msps. Reply STOP to quit, HELP for info. Msgs&DataRetesMayApp

View all
Sample optimized message

This is a message from the Nudge Study at Denver Health.

Hi Steve,

We noticed you haven't refilled your Metformin. Reply 1= I'll get them refilled in the next 2 days. Reply 2= I'm still working on a plan to get this done

This is the 1st of 5 messages you'll receive until you can refill

11:43 AM

Sample optimized + AI chatbot message

69866

11:47 AM, Feb 19

This is a message from the Nudge Study at Denver Health.

Hi Steve,

We care about you. Your medications are important! Tell us which of these might affect you? (choose one)

a. If I feel better or worse I stop
b. Tough to remember
c. I don't understand what to take
d. Other

This is the 3rd of 5 messages you’ll receive
Potential Barriers

– Unable to confirm patient receipt of text messages and/or patient comprehension
– Possibility of switching numbers or losing cell service, particularly at the end of the month
– Growing burden of text messages in general
– Competing hospital/health system priorities
– Data integration (e.g., Surescripts pharmacy data)

Lessons Learned

– Stakeholder (i.e., patient, providers and health systems) engagement is critical
– Persistence and adaptability (particularly when COVID occurred) is key
– Creating multi-disciplinary and engaged teams to solve study issues