The PREDICT Trial

Prediction using a Randomized Evaluation of Data collection Integrated through Connected Technologies

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About Nudge Unit

Mission
The Nudge Unit aims to leverage insights from behavioural sciences, principally behavioural economics, to design and test interventions that steer providers and patients toward better decisions to improve healthcare delivery and outcomes.
Changing default prescription settings in EMR increased rates of generic drugs

• Change in default implemented across UPHS from brand name to generic prescription

• Opt out mechanism increased generic prescribing rates from 75% to 98%

• Generics drugs associated with higher medication adherence, improved clinical outcomes and reduced costs.

• Behavioral economic technique changing physician and patient behaviour

Mitesh et al, 2016
Nudge Unit Projects

- **Price Transparency** for inpatient laboratory testing (PRICE Trial)
- Using **active choice** and **peer comparisons** to increase statin prescription rates (PRESCRIBE Trial)
- Using **default options** to increase generic medication prescribing rates (Prescription Defaults)
- Using **default options** to decrease opioid prescribing durations (Opioid Prescription Defaults)
- **Gamification** and **incentives** promote weight loss (the Lose it Trial)
- **Gamification** and **social incentives** to improve glycemic control among obese diabetic adults (iDiabetes Trial)
Risk Prediction Models for Hospital Readmission: A Systematic Review

• Objective
  – summarize validated readmission risk prediction models
  – describe their performance
  – assess suitability for clinical or administrative use

• Conclusion
  – 26 models were assessed and found to perform poorly
  – Focuses primarily on claims data & EHR
## Variables considered by studies in evaluating the risk of readmission

<table>
<thead>
<tr>
<th>Variable</th>
<th>Included in final model in (n) out of 26 models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical comorbidities</td>
<td>24</td>
</tr>
<tr>
<td>Mental health comorbidities (mental health illness, substance abuse)</td>
<td>9-11</td>
</tr>
<tr>
<td>Illness severity</td>
<td>1-4</td>
</tr>
<tr>
<td>Prior utilization (hospitalizations, ER visits, clinic visits, index hospital length of stay)</td>
<td>4-14  &quot;Few models included variables associated with overall health and function, illness severity and social determinants of health&quot;</td>
</tr>
<tr>
<td>Overall health and function (mobility, visual, hearing, cognitive status)</td>
<td>1-7</td>
</tr>
<tr>
<td>Social demographic factors (age, race/ethnicity, gender)</td>
<td>7-19</td>
</tr>
<tr>
<td>Social determinants of health (SES, Education, insurance status, social support)</td>
<td>0-5</td>
</tr>
</tbody>
</table>

*Devan et al, 2011*
PA CURE Retrospective Study

- A separate study from the PREDICT Trial
- Examines retrospective data on patients admitted and discharged between 1/1/2012 and 9/30/2014 from UPHS
- Standard prediction model approach using claims data and EHR data
- Additional variables: social/behavioural determinants of health - continuity of care & substance abuse
- 9080 patients have been identified

How this study differs from PREDICT
- PREDICT is an enhanced approach
- PREDICT builds on this study by using step, sleep and survey data
PREDICT Trial Significance

• What is already known on this topic
  – Transition care interventions can reduce readmissions
  – Identifying high risk patients can reduce readmissions
  – Existing prediction models perform poorly
  – Prior studies focused on claims data and electronic health records

• What question this study addresses
  – What can learning about patient’s steps and sleeping tell us about their likelihood for readmissions?
The passive intervention:

Watch OR Phone App
Project’s Significance

• What this study adds to our knowledge
  – Collects an integrated data set
  – Compares methods of activity data collection

• How is this relevant to policy and practice
  – Improve readmission prediction models
  – A platform for designing future interventions
  – For state and nation-wide implementation
# Method

## Consent
- Approach Patient
- UPHS hospitals
- Assess interest

## Enroll
- Create a WTH account
- Complete a series of surveys

## Randomize
- Activity is tracked using phone or watch
- Duration - 6 months

### Inclusion Criteria
- 18 years or older
- Ability to provide consent
- Admitted patient at HUP or Penn Presby Med Center
- Smartphone compatible to Nokia HealthMate
- Walk 10-15 minute/ No hip or foot surgery
- Discharged home
- Live in PA/NJ
- Has an email address
A series of self reported surveys on patient experiences

• Medical Outcome Study Survey
  – Assesses physical, mental and general health
• DOSPERT Risk preferences
  – Assesses risk taking and uncertainty
• MMAS-8
  – Assesses medication taking behaviour
• Big Five Personality test
  – Assessment of personality across 5 dimensions: Openness, Conscientiousness, Agreeableness, Extraversion, Neuroticism
• IPAQ-SF
  – Assesses physical activity levels
Method

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Randomize
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Comparing Methods of Tracking Activity Data

Phone App
- Tracks step counts only
- Lower cost for intervention
- n=250

Watch
- Tracks both steps and sleeping pattern
- Challenges in adoption
- n=250

500 patients enrolled

500 patients enrolled
Nokia HealthMate App Features

• Steps
  – Tracks walk, run and 10+ activities
  – Compete with friends and family

• Sleep
  – Assesses how much sleep schedule is shifted and sleep duration
  – Tracks pattern and graphs trends

• Weight
  – Monitor weight history in the form of a graph
  – Use connected scales to measure weight
  – This functionality is used in the iDiabetes study

• Heart
  – Monitors heart rate
  – Monitors blood pressure manually or via wireless BP monitor
Behaviour Modification

- Patients have access to activity data collected through app
  - Set daily step goals
  - Track progress over time
  - Congratulatory badges
Approximately 672 individuals were approached for the study, of which 585 were excluded. Exclusions were due to:

- Not meeting inclusion criteria (n=293)
  - No smartphone (n=154)
  - Not being discharged to home (n=66)
  - Unable to walk (n=45)
  - Not PA/NJ resident (n=10)
  - Not English speaking (n=6)

- Declined to participate (n=293)

The remaining 84 participants were randomized:

- Phone App Group (n=45)
  - 6 month passive step collection
  - Reminder after 4 days to please open app

- App and Activity tracking watch (n=44)
Addressing Low recruitment

- 84 patients enrolled
- Logistics of recruiting on hospital floors
- Changing and hiring staff
- Goal = 500 patients
Nokia Rebrands Withings Entirely, Launches Two New Products

- Watch rebranded on June 20
- Changed API
- Caused technological disconnections with Way to Health
Role & Take Aways

• Recruiting patients
  – Patient engagement
  – Managing patient questions
  – Data collection process
• Literature search/review
  – Identifying relevant and timely research articles
• Dealing with project challenges
• Contributing to project meetings
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Thank you!
Questions?
References


Mitesh S. Patel, Susan C. Day, Scott D. Halpern, C. William Hanson, Joseph R. Martinez, Steven Honeywell, Kevin G. Volpp. Generic Medication Prescription Rates After Health System–Wide Redesign of Default Options Within the Electronic Health Record. JAMA Internal Medicine, 2016