Moving From the Past into the Future
How Intermountain Healthcare motivates and measures patient activity

Stepping Back to Move Forward
Moving Diabetes Prevention into the Digital Age
Intermountain Healthcare

- Integrated healthcare delivery system in Utah and SE Idaho
- 22 hospitals
- Insurance company – SelectHealth
  - 750,000 covered lives
- 35,000 employees
- 1400 employed physicians
  - 385 Primary Care MDs
- 3000 affiliated physicians
- Provide care for ~ 60% of Utahns
- Have financial risk for ~ 36% of patients seen in our facilities
Post Operative Ambulation

Central Region
Medical Director
Mark Ott, MD
Overview

- Post-operative ambulation
- Diabetes Prevention
- Physical Activity Vital Sign (PAVS)
Opportunity

- Over 50 million surgeries in the US (annually) and a similar number of ER/office visits for injuries
- 30 million (IP/OP) surgeries where walking could potentially help recovery

Why does this matter?

Healthcare organizations and providers assuming financial risk:

- ACOs
- Bundled-payment (BPCI) participants
- Penalties

50+ studies cite efficacy in recovery
Today 0 formal programs exist
Hospital-stay reductions of 0.5-1.5 days
Savings of more than $100B nationwide
Length of Stay Costs

- National average length of stay is 6.3 days\(^1\)
- Each day of a hospital stay increases hospital costs by $4,287\(^2\)
- The average surgical complication increases LOS by 8 days\(^3\)
- A half-day reduction in LOS per surgery would save $110 billion\(^4\)
Readmission Costs

Nearly one in five Medicare patients are readmitted within 30 days.\(^5\)

Surgical readmissions most commonly occur after:
- Cardiac surgeries
- Joint replacements
- Bariatric procedures\(^6\)

Unnecessary readmissions cost $25 billion a year.\(^7\)
Obstacles

Why hasn’t postoperative walking been widely adopted?

- No out-of-the-box program exists.
- Patients are difficult to motivate.
- Proper dosing has not been determined.
- Nurses lack time and other resources.
- Technology has not been readily available.
Technological Challenges Addressed

**Detects peaks associated with signal**
- The algorithm reads acceleration data in the three principal directions, combines them into one, and finds all of the peaks associated with the signal.

**Doesn't count other activities as steps**
- Many activities, such as driving and typing, can generate false steps. These steps are filtered out because they are not periodic, like walking or running.

**Counts steps from hospital patients**
- Hospital patients have a distinctive way of walking that is hard for a traditional pedometer to pick up. The new algorithm uses a moving threshold to detect hospital shuffle and gives the patient credit.

**How to do all this without draining the battery?**

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Evolution of Activity Tracker & Sync Station

Version 1
- Not sensitive enough

Version 2
- Requires charging
- Easily lost

Version 3
- 4-month battery life
- Improved interface

Version 4
- Sensor, display and sync in one device
- Android OS for rapid development

The activity tracker is a 3-axis accelerometer that:
- MOTIVATES: reminds patients to walk
- MEASURES: tracks steps/shuffling and goals achieved
- INTEGRATES: uploads data automatically
What counts as a step?

Walking: Peaks of similar size at similar intervals

Driving: Peaks of different sizes at odd intervals
Pre and Post Surgery Gait Samples

![Graph showing pre-operative and post-operative gait samples.](image)

- **Pre-operative gait**
- **Post-operative gait**
Algorithms

Adaptive Threshold
- Optimizes sensitivity level before and after surgery.

Gait Features
- Evaluates recovery progress by interpreting gait patterns.

Sampling Logic
- Fine-tunes each patient's sensor for individualized accuracy.

Fall Detection
- Detects gait patterns that could indicate a fall.

Dynamic Goals
- Calculates personalized goals from patient data.

Automated DGI
- (Dynamic Gait Index)
  - Automates standardized walking test.
Social/Distribution Challenges Addressed

- Pharmacy/MD Office/Pre-Op Clinic
- Same Day OR Registration
- Pre-op email and mailing based off surgery schedule
Educational and Motivational Challenges Addressed

The Rx Navigait website:

- MOTIVATES: displays goals, sends reminders, and facilitates messaging
- MEASURES: tracks daily, weekly, and monthly progress
- INTEGRATES: connects to sensor and hospital systems
How am I doing as a doctor at motivating my patients to be active?
Evolution of a Walking Program

POST-SURGICAL WALKING PROGRAM: PROTOTYPE MILESTONES

**Evolution of a Walking Program**

**September 2013**
- **Partnership**
  - Sarvyshepa partnered with Dr. Off to develop post-surgical walking programs

**January 2014**
- **Device Refinement**
  - Tested varied levels of sensitivity; highest sensitivity proved most useful in hospital setting
- **Walking, with Goals**
  - Dr. Off enrolled patients in walking program with goals; iPhones used to sync, track, and display data
- **Walking, No Goals**
  - High-sensitivity tri-motion trackers tested with 10 surgical patients

**March 2014**
- **Subgroup Analysis: Bone Marrow Transplants**
  - Collected baseline activity data from bone marrow transplant patients at LDS Hospital

**September 2014**
- **Pilot 1: 10th Floor Walking Program**
  - Began enrolling 400 patients in post-surgical walking program; iPads display goals and progress in rooms; Verizon Hotspots sync and track data

**January 2015**
- **Expanded Office: Calling**
  - Rolling out Vital Steps to number IHC offices; using call center to communicate

**July 2015**
- **Pilot 2: Walking Program Starts**
  - Pre-op surgical patients enrolled in walking program, with customized goals to bring post-op activity to pre-op levels over 30 days
- **Rx Navigail Roll Out**
  - Rolled out Rx Navigail to IHC offices, using using office staff to hand out prescriptions

**Beyond Walking**
- **Algorithm**
  - Used 9-axis motion trackers to collect raw data to validate patient movement algorithms

**Rx NavigailAndroid**
- Using off-the-shelf Android, too develop rapid iteration hardware platform
Current Statistics

As of January 12, 2016

- Total patient enrolled: 1000 (Current – 1300 participants)
- Currently active: 286
- At 2 months, 25-30% of participants are still using RxNavigate
- Each increase walk in hospital decreases LOS by 0.17 days

***early finding – more time required to fully validate
The more compliant a patient is with the ambulating goals, the sooner they go home! (6 – 8 days vs. 2 – 4 days)

Current Statistics

100%
75%
50%
25%

Device + Education

Device

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Results

Decrease in 30-day readmission rates for patients in the Rx Navigait program

Increase in daily steps after discharge for patients in the Rx Navigait program
Surgical Experience and Activity

At 30 days are you still using your Rx Navigait?

Physicians and Staff talked to you about activity?

Would have Surgery again?

No  Yes
Results

How helpful did you find your Rx Navigait device in your post-operative recovery? (n=102)

53%
Results

How easy to use did you find the Rx Navigait tracking device to be? (n = 102)

66%
To what extent do you feel you have been able to recover more quickly, or better, from your surgery because of using the Navigait Activity tracking device?

Results

- Not at all: 30%
- To a little extent: 20%
- To a moderate extent: 25%
- To a great extent: 15%
- I don’t know: 10%

Total: 100%
Unsolicited Patient Quotes

- "There's nothing like coming to the hospital and receiving something cool like this!"
- "My daughter has a fit bit and has been trying to get me to get something like this!"
- "Ok! This is going to be fun! [and a minute later] Ok! This is going to be fun!"
- "This is such a great thing you're doing!"
- "What a great program!" & "This is just what he needs!"
- "My daughter will be so happy I'm doing this."
- "I did every single thing on the checklist."
- "I walked 1 time around the hall, and then 2 times around, and then 3!"
- I have had multiple family members of surgery patients get so excited about the device that they ask me if they can get one, too.
Stepping Back to Move Forward
The Diabetes Disaster

- 29.1 million Americans have diabetes (90-95% T2DM)¹
- 86 million Americans (1 in 3 adults) have prediabetes (preDM)¹
- 2 out of 3 people with diabetes die from heart disease or stroke²
- US spends $174 billion/year on diabetes¹

1 out of 3 Medicare dollars is spent on diabetes³

1 in 3 adults are at risk for type 2 diabetes, and most don’t know it

SBIRT: Screening, Brief Intervention, and Referral to Treatment

**Screening:** Develop a systematic and comprehensive screening process across many different venues (e.g. clinics, emergency rooms, hospitals, employees, and community settings)

**Brief Intervention:** Develop, disseminate and implement best-practices regarding diabetes prevention appropriate for different venues

**Refer to Treatment:** Refer individuals to evidence-based interventions based on their preference

*In addition to…..*

*Comprehensive evaluation to include program reach, adoption, implementation, effectiveness (clinical, cost, patient experience), and maintenance.*
Intermountain Healthcare Diabetes Prevention Program

Patients

Omada
- MNT
- W2H
- PreDM 101

Employees

SelectHealth Members

Community Members

CB PreDM 101
- Community Based DPP

MNT = Medical Nutrition Therapy
W2H = Weigh to Health
PreDM 101 = Prediabetes 101
Sustaining a 5% Weight Loss

REGRESSION TOWARD THE MEAN

% Patients who achieved 5% weight loss

- Month 6-12: 23.3% (p<0.0001)
- Month 13-18: 14.7% (p=0.73)
- Month 19-24: 19.1% (p=0.68)

- Gaining Weight: 20.1%
- Losing Weight: 20.7%
• 16 week DPP curriculum
• 1 year of support
• Personalized health coaching
• Small-group support
• Digital tracking tools
Health Data Tracking

• **Wireless scale** is mailed to each participant in their ‘Welcome Kit’ allowing for transmission of daily weights into their personal profiles.

• **Digital pedometer** is provided to track physical activity.
  - Link/upload data from personal PA tracking devices

• **Food diary** in the Omada web portal and mobile app facilitates tracking of eating habits.

*Manage What You Measure*
## Physical Activity and DPP Outcomes

<table>
<thead>
<tr>
<th></th>
<th>1 Month (All)</th>
<th>1 Month (Only Enrollment)</th>
<th>2 Month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># Patients</td>
<td>Avg Log Days</td>
<td># Patients</td>
</tr>
<tr>
<td>Weight Gain</td>
<td>5</td>
<td>4.7556</td>
<td>Weight Gain</td>
</tr>
<tr>
<td>No Change</td>
<td>11</td>
<td>3.3663</td>
<td>No Change</td>
</tr>
<tr>
<td>1-4.9% Loss</td>
<td>24</td>
<td>4.6071</td>
<td>1-4.9% Loss</td>
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<tr>
<td>&gt;5% Loss</td>
<td>10</td>
<td>5.7957</td>
<td>&gt;5% Loss</td>
</tr>
<tr>
<td>Overall</td>
<td>50</td>
<td>4.5896</td>
<td>Overall</td>
</tr>
</tbody>
</table>

**Avg Log Days** = Average number of days where physical activity was entered into the Omada website

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**Intermountain Healthcare**
Practical Solutions for Integrating Physical Activity in the Evolving US Healthcare Landscape
Physical Activity Vital Sign

1. On average, how many days a week do you perform physical activity or exercise?
2. On average, how many total minutes of physical activity or exercise do you perform on those days?
   \[
   \text{days/week} \times \text{minutes/day} = \text{min/week (PAVS)}
   \]
3. Describe the intensity of your physical activity or exercise:
   - light = casual walk
   - moderate = brisk walk
   - vigorous = jogging

![Physical Activity Vital Sign Form](image)
### Pediatric Physical Activity Vital Sign

On average, **how many days per week** does your child get at least 60 minutes of moderate to vigorous physical activity or play (heart beating faster than normal, breathing harder than normal)?

<table>
<thead>
<tr>
<th>days per week: ________</th>
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</table>

**On most days of the week does your child:**

- Walk or bike to school? □ yes □ no
- Participate in **physical education class** at school? □ yes □ no
- Participate in **organized physical activity** (sports, dance, martial arts, etc.) or spend 30 minutes or more **playing outside** not during school hours? □ yes □ no
- Have LESS than 2 hours of recreational screen time (video games, TV, Internet, phone, etc.)? □ yes □ no
Use of Physical Activity Data

CLINICAL
- Physicians
- Physical therapist – for patients with neuromuscular conditions
- Registered dietitians – for patients with nutrition and weight concerns
- Cardiopulmonary rehab specialists - for patients with cardiac and pulmonary conditions

EVALUATION
- Research
- Population Health Management
- Payer

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Percent of Patient Visits in Primary Care Where Physical Activity was either Asked or Advised.

Filter Instructions: Choose reporting level from left to right. When finished, you can save your view by clicking "Original View" on bottom right of page.
Summary

- Importance of clinical champions and organizational leadership
- Shift in reimbursement from fee for service (*we make more money when people are sick*) to value-based reimbursement (*we make more money when we keep people healthy*) has been a key driver
- Technology is a facilitator, rather than a solution
- Blended approach to support the role of healthcare in “*moving* patients toward health” – that includes both self-reported and objective data
Summary

• Technology facilitates improvement in healthcare delivery and health outcomes

• Technology in isolation is not the solution – it needs to be seamlessly integrated into clinical care and clinical operations

• Identify clinical champions and engage system leadership

• The enemy of good is perfect – start somewhere……

Mission:
“Helping people live the healthiest lives possible”

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