NODE.Health and Evidence Based Digital Medicine

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Mount Sinai Health System

Founded in 1852

Not-for-profit Academic Medical Center

7 Hospitals, 1 Medical School, 15 Institutes

3500+ beds, 135 operating rooms

12+ Ambulatory Surgical Centers

200+ community location around New York

36,000 employees

6,200 physicians; 2,000 residents

2.6 million outpatient visits

500 thousand ER visits

170 thousand inpatient visits

This is our Burning Platform

Courtesy Mike Berger

Value based healthcare is real!

FOR IMMEDIATE RELEASE
January 26, 2015

Contact: HHS Press Office
202-690-6343

Better, Smarter, Healthier: In historic announcement, HHS sets clear goals and timeline for shifting Medicare reimbursements from volume to value

In a meeting with nearly two dozen leaders representing consumers, insurers, providers, and business leaders, Health and Human Services Secretary Sylvia M. Burwell today announced measurable goals and a timeline to move the Medicare program, and the health care system at large, toward paying providers based on the quality, rather than the quantity of care they give patients.

HHS has set a goal of tying 30 percent of traditional, or fee-for-service, Medicare payments to quality or value through alternative payment models, such as Accountable Care Organizations (ACOs) or bundled payment arrangements by the end of 2016, and tying 50 percent of payments to these models by the end of 2018. HHS also set a goal of tying 85 percent of all traditional Medicare payments to quality or value by 2016 and 90 percent by 2018 through programs such as the Hospital Value Based Purchasing and the Hospital Readmissions Reduction Programs. This is the first time in the history of the Medicare program that HHS has set explicit goals for

Health Systems Unprepared for

Value Based Care

Value based care has arrived

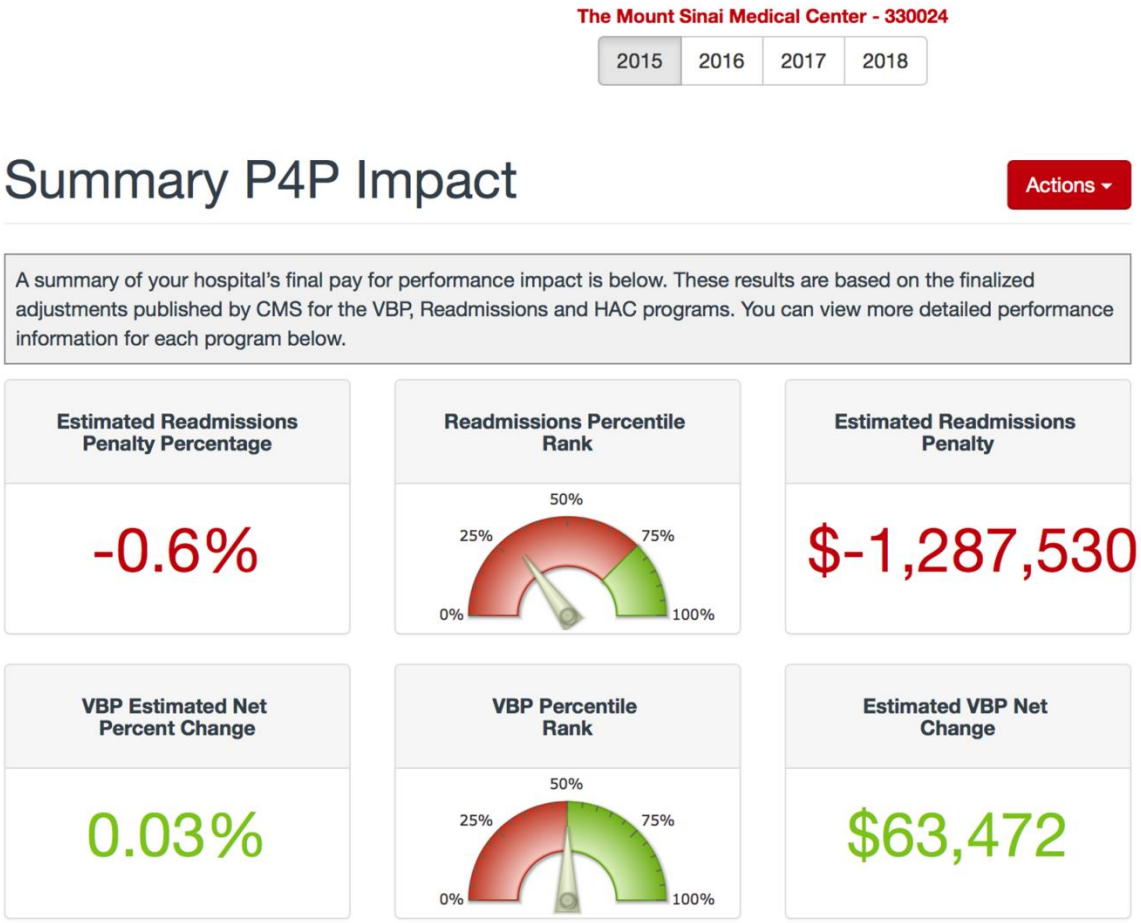
76% of hospitals face readmissions penalties

50% of unprepared for bundles and MACRA

http://khn.org/

Mount Sinai

Mount Sinai Readmission penalties



Mount Sinai

Advisory Board, Courtesy: Robby Freeman

Poor healthcare apps could cost hospitals $100 million a year, Accenture says

While 66 of the 100 largest hospitals in the United States offer consumers mobile health apps, only 2 percent of patients are using them, new report finds.

By Bill Siwicki | January 06, 2016 | 07:37 PM

SHARE 644

Accenture, 2016

We need tools to address triple whammy!!!

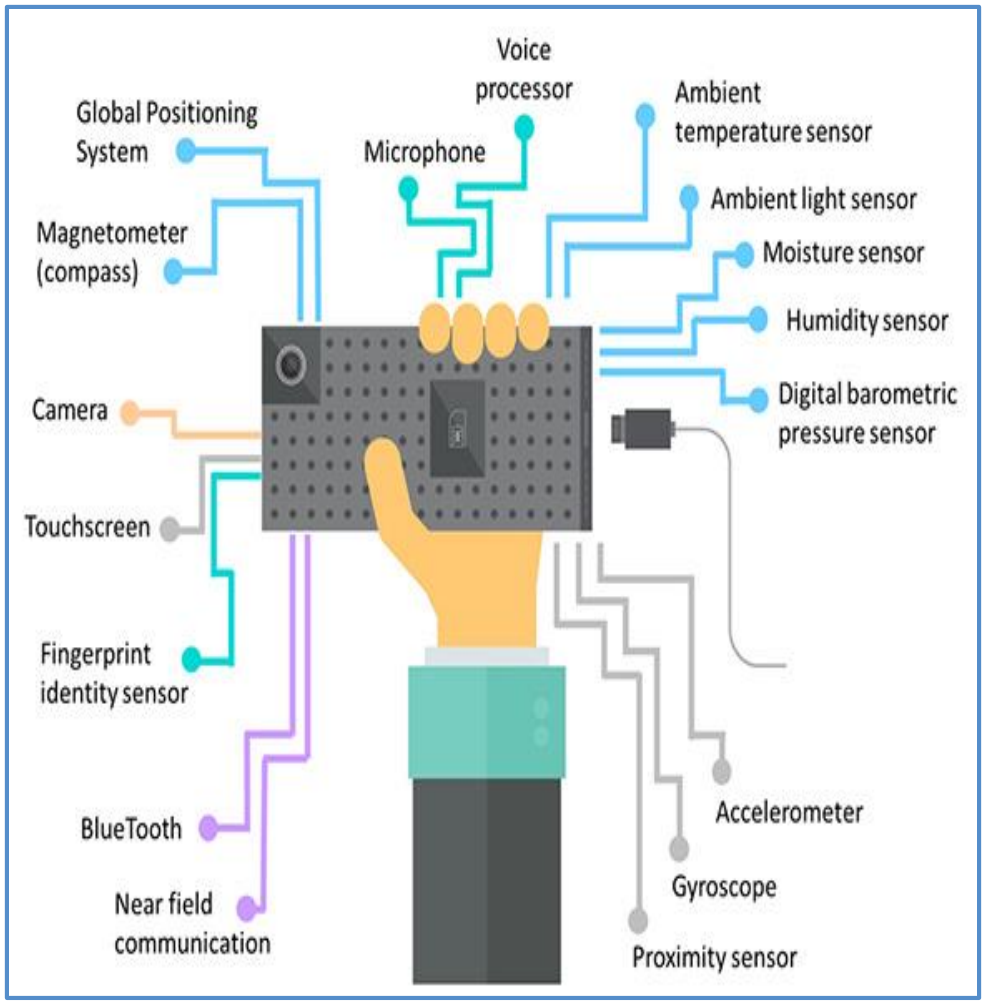
http://blog.tauedu.org/medical-jokes-doctor-and-patient

Going beyond the EHRs to find an Answer to Value-Based HealthCare

Computers are like a bicycle for the mind..

I think one of the things that really separates us from the high primates is that we're tool builders. Humans are one of least efficient species when it comes to using energy to move a kilometer. But, a human on a bicycle, blew the comparison away, completely off the top of the charts- **Steve Jobs**

Emergence of the new field of Digital Medicine



265,000 Mhealth Apps

Telemedicine

Linked Wearables

AI/Machine Learning

Secure Messaging

Augmentic/ Virtual Reality

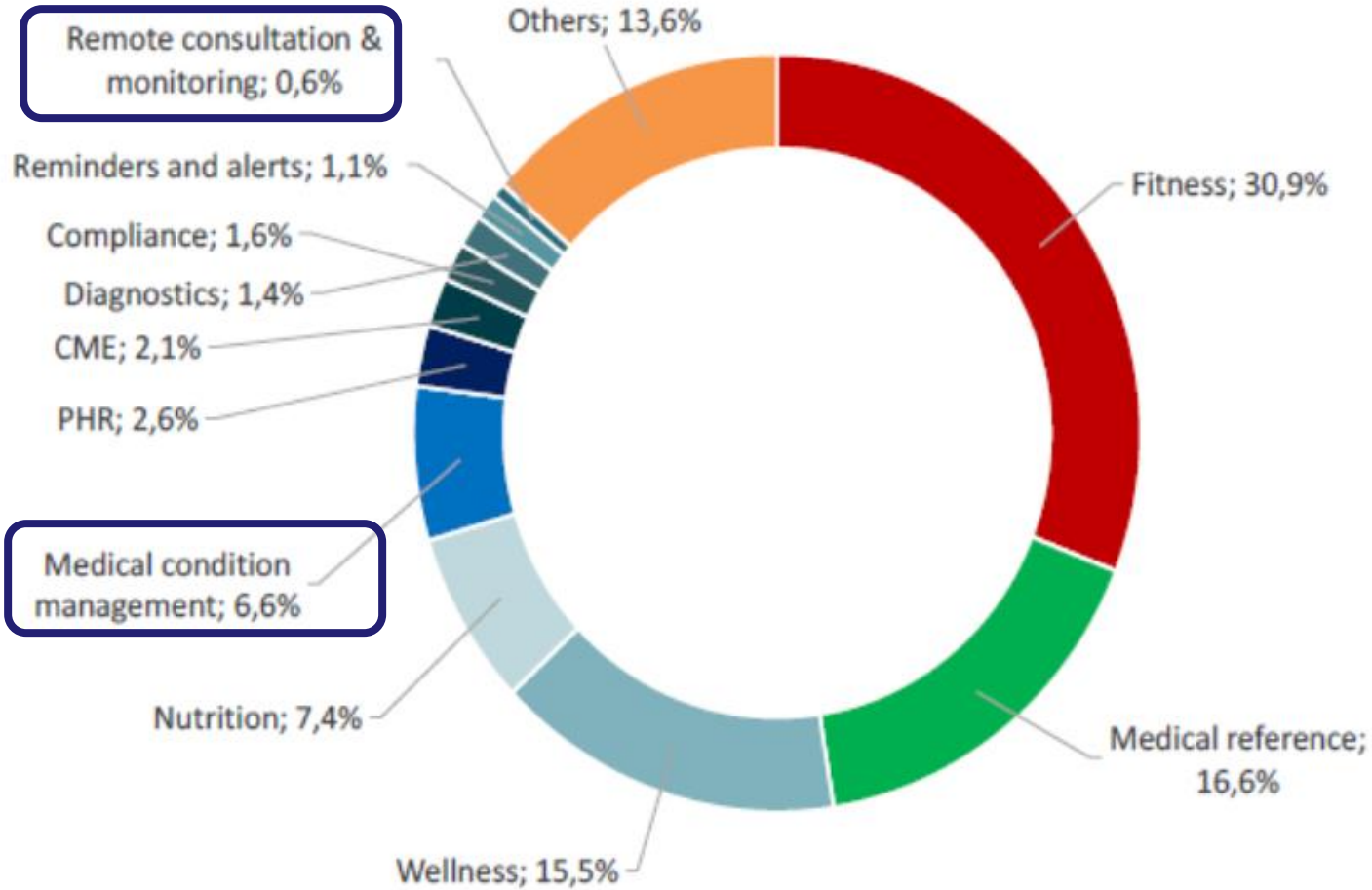
Voice commands/ Alexa

Chat Bots

Exposome

Mount Sinai

Digital Medicine App Landscape

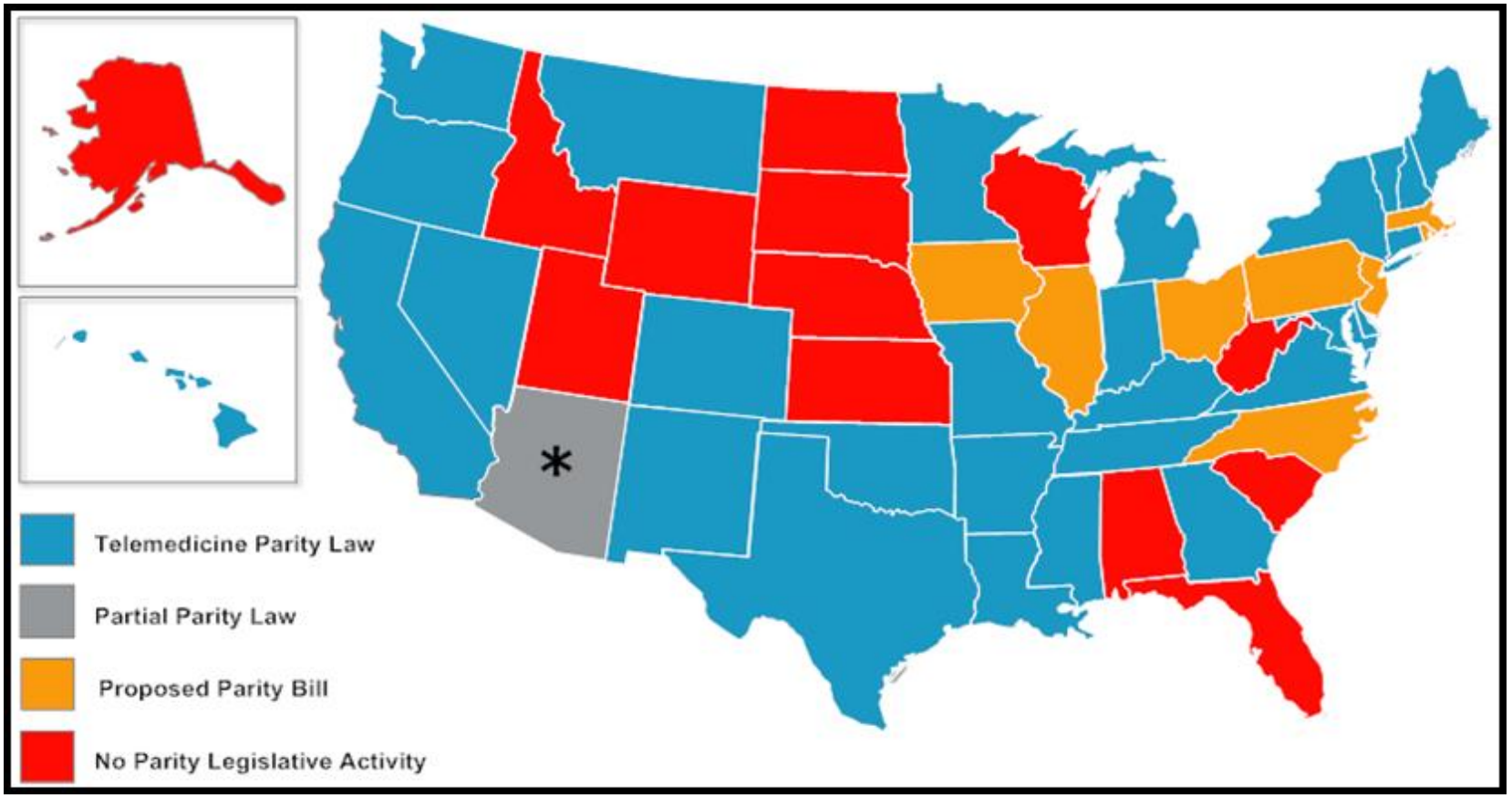


mHealth economics

In RCT, patients using BlueStar saw a greater mean A1c decline than those receiving usual care: 1.2% (1.9% vs 0.7%) over a 12 month period

Quinn, C et al, Diabetes Care, 2011

Telemedicine becomes mainstream:
46 states now have some sort of Parity Law

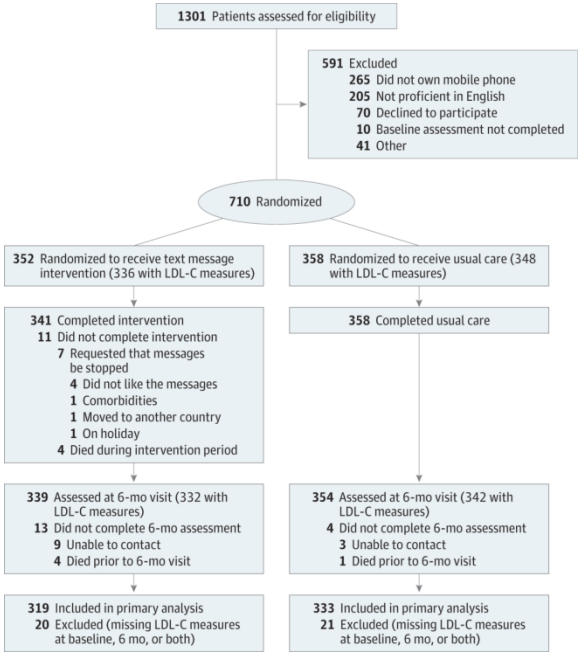


A significant reduction in emergency department visits (OR = 0.27) and hospitalization (OR = 0.46) was reported with telehealth care in COPD patients

McLean S Br J Gen Pract, 2012

From: **Effect of Lifestyle-Focused Text Messaging on Risk Factor Modification in Patients With Coronary Heart Disease: A Randomized Clinical Trial**

JAMA. 2015;314(12):1255-1263. doi:10.1001/jama.2015.10945



At 6 months, levels of LDL-C were significantly lower in intervention participants (mean difference, −5 mg/dL with reductions in systolic blood pressure (−7.6 mm Hg) and BMI (−1.3),, and a significant reduction in smoking (26% vs 44%; **relative risk, 0.61** [95% CI, 0.48 to 0.76]; *P* < .001).

The majority reported the text-message program to be useful (91%), easy to understand (97%), and appropriate in frequency (86%).

Figure Legend:

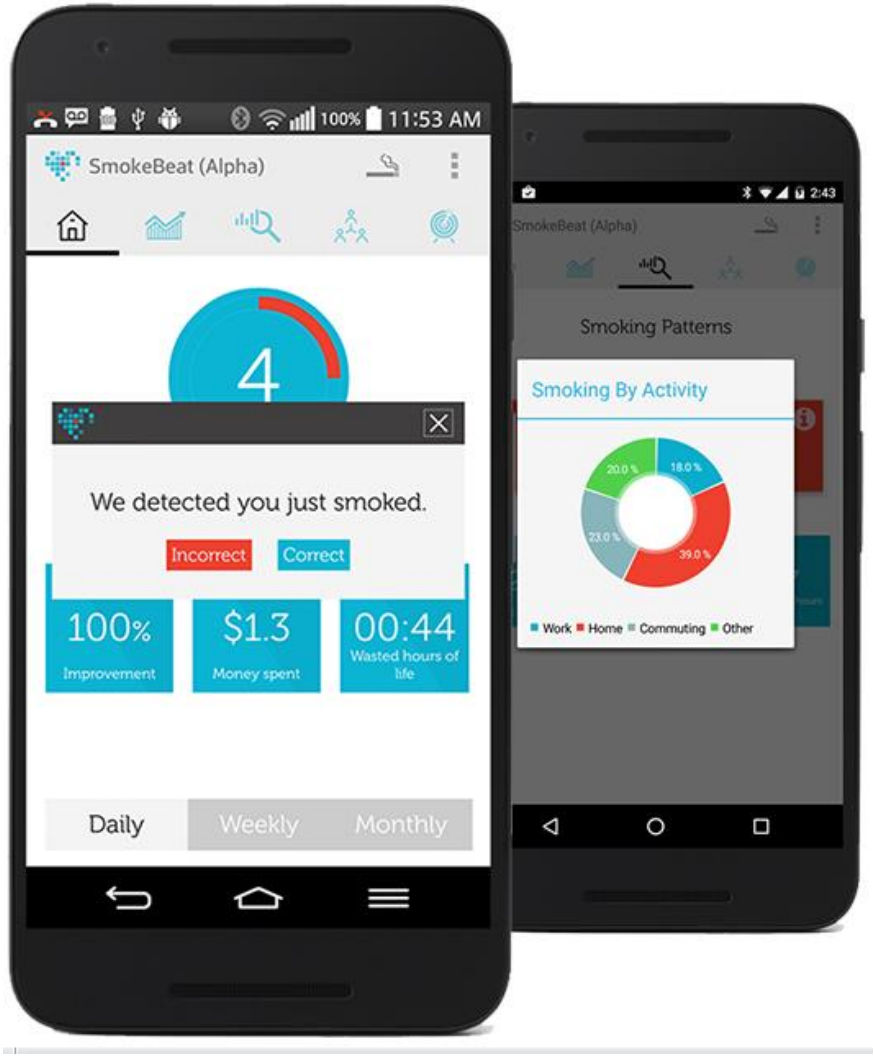
Enrollment of Participants in the TEXT-ME Randomized Clinical TrialLDL-C indicates low-density lipoprotein cholesterol.

2016: Year of Wearables / Implantables / digestibles

mHealth + Telehealth World Congress, 2015

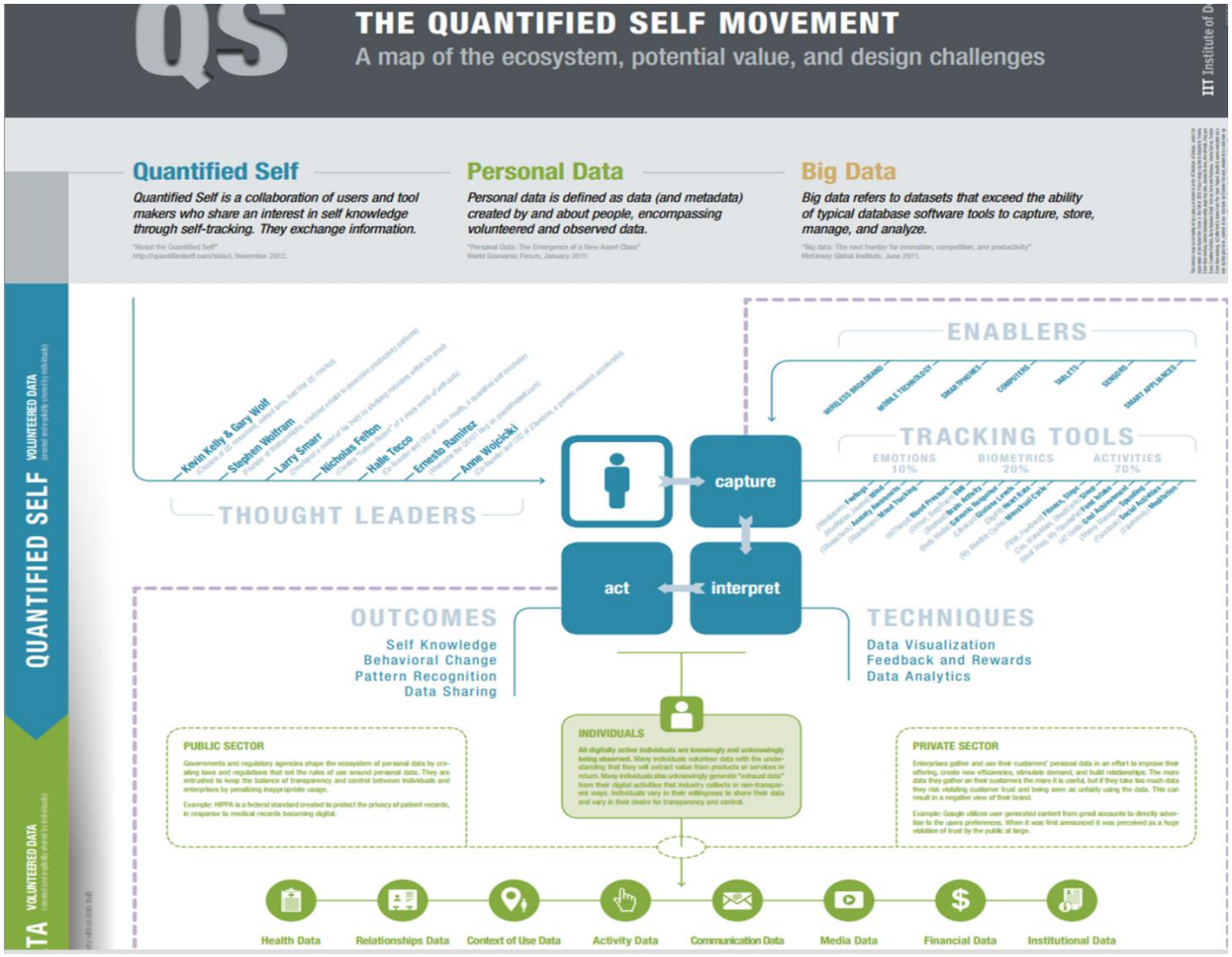
Somatix (Wearables)

Somatix is a behavioral medication software platform, utilizing real-time interventions based on data gathered from standard wearables. Its first product, SmokeBeat is addressing the global smoking cessation market; its customers include corporate employers, health insurance companies and clinics



www.somatixinc.com

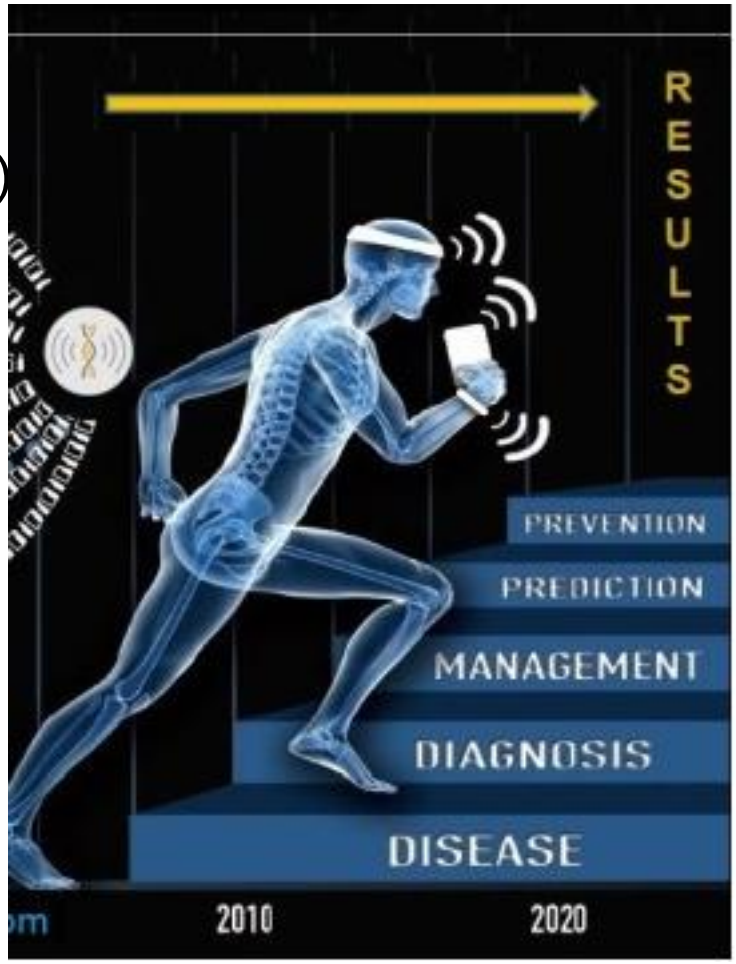
From Quantified Self to Quantified Population Health



Angarita et al. Quantified Self
Swan M, Big Data, 2013

Envisioning digital care in year 2020

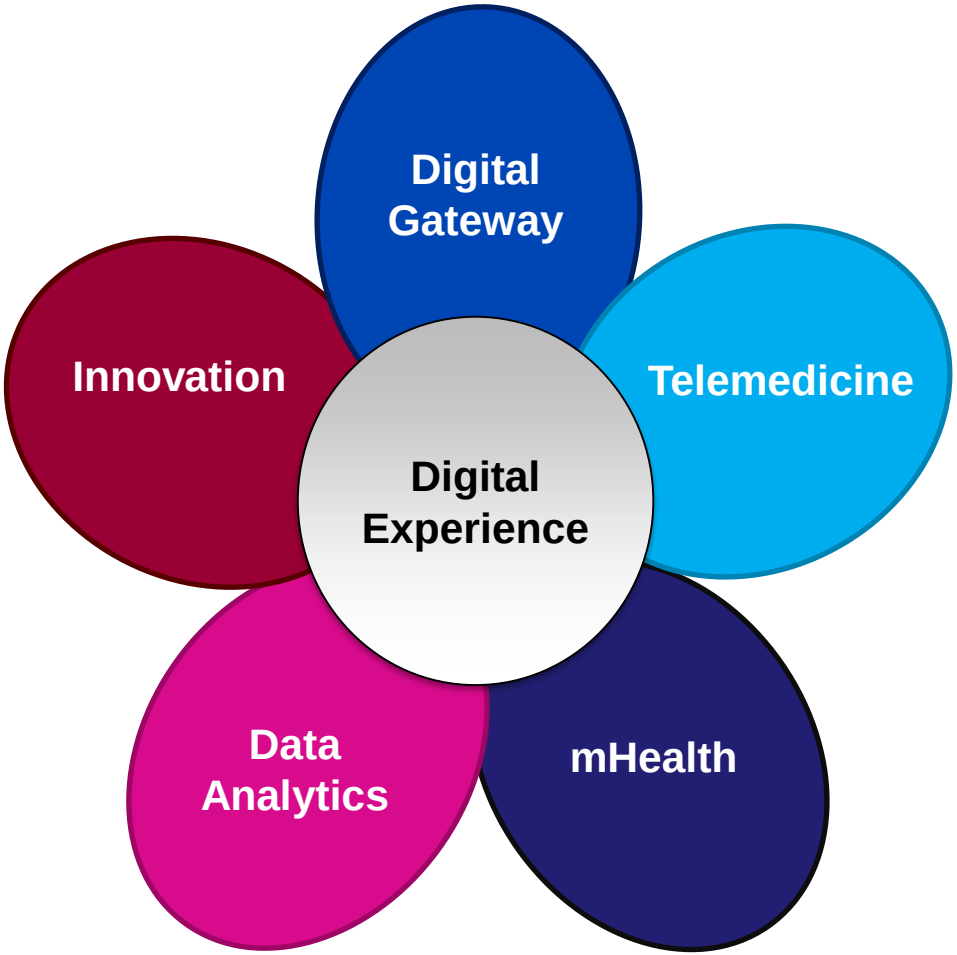
- ✓ Virtual care (**telemedicine and messaging**)
- ✓ 24/7 tracking **(remote monitoring)**
- ✓ Population health (**predictive analytics**)
- ✓ Empowerment **(SDH, peer networking)**
- ✓ Prescribing Apps (**AR/digital therapeutics**)



Paul Sonnier, Storyofdigitalhealth.com

How do we get there?
Build Capacity for Digital Transformation

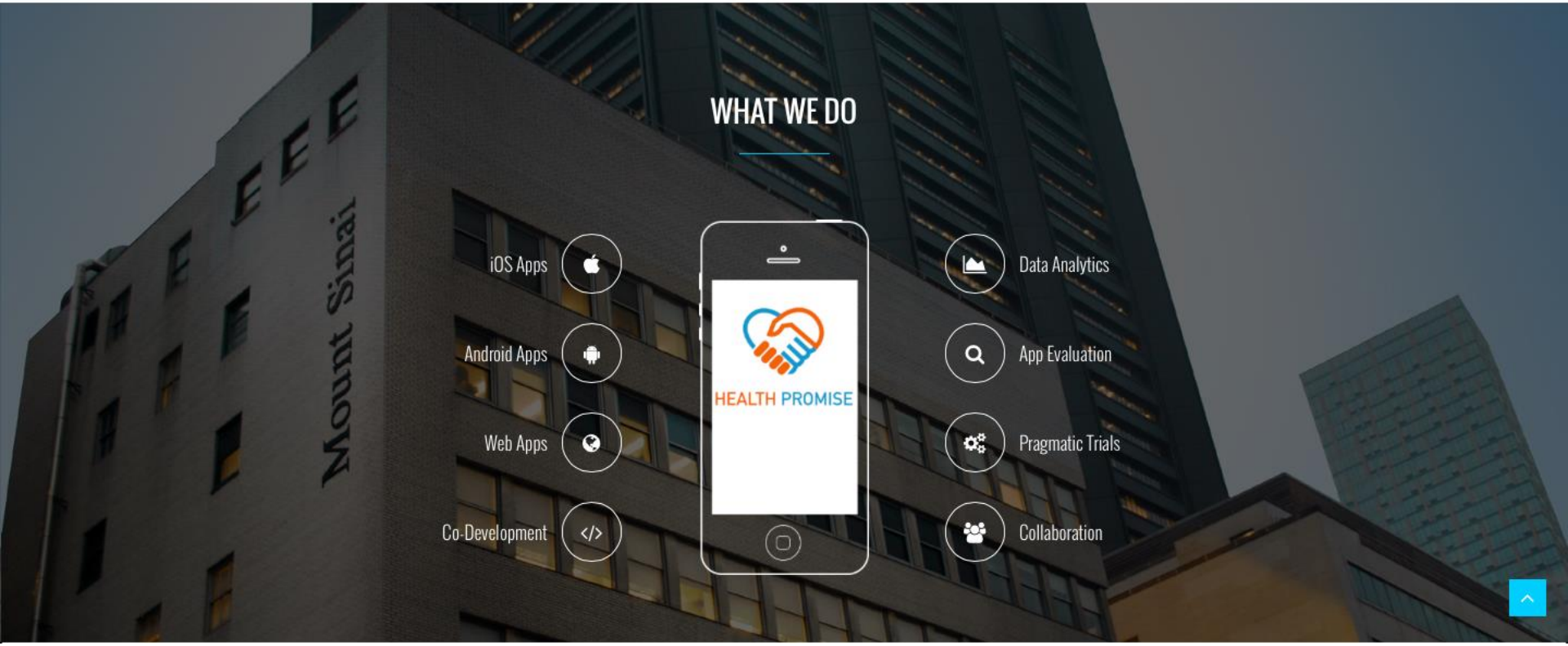
“The Digital Daisy”



Courtesy Bruce Darrow and Digital Medicine Advisory Team

MISSION

APPS + ANALYTICS = AWESOME OUTCOMES



AppLab: Academic Research Organization in Digital Medicine

Providers

The Multiplier Effect

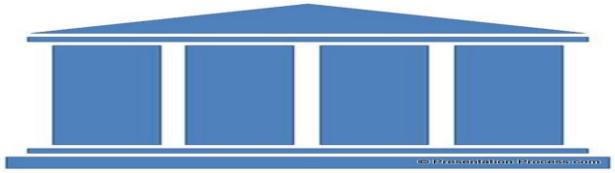
Patients

The Team

Collaborators

Pop Health & ACO

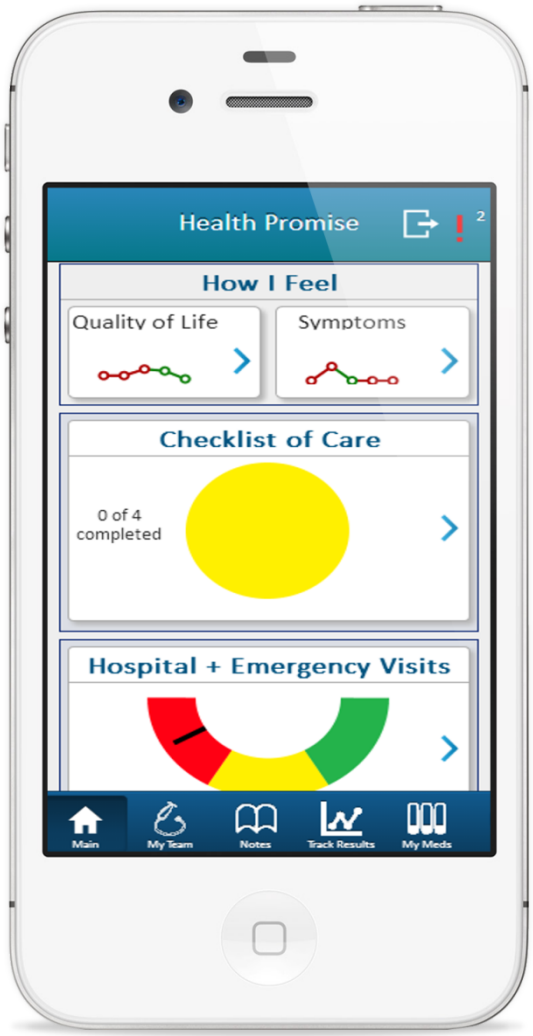
MSIP | IT | DOM | CTSA

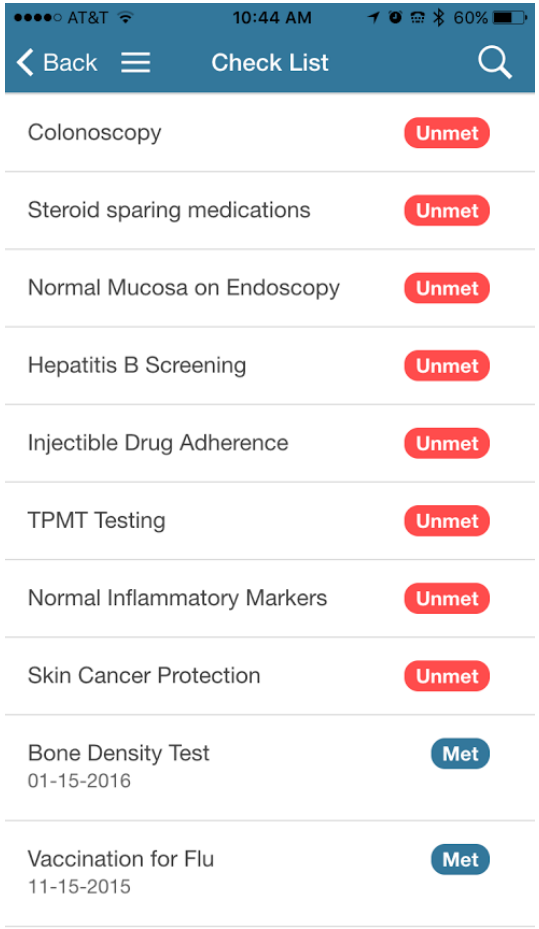


Researchers

25 funded Projects, 100 investigators served, Digital Medicine Community created

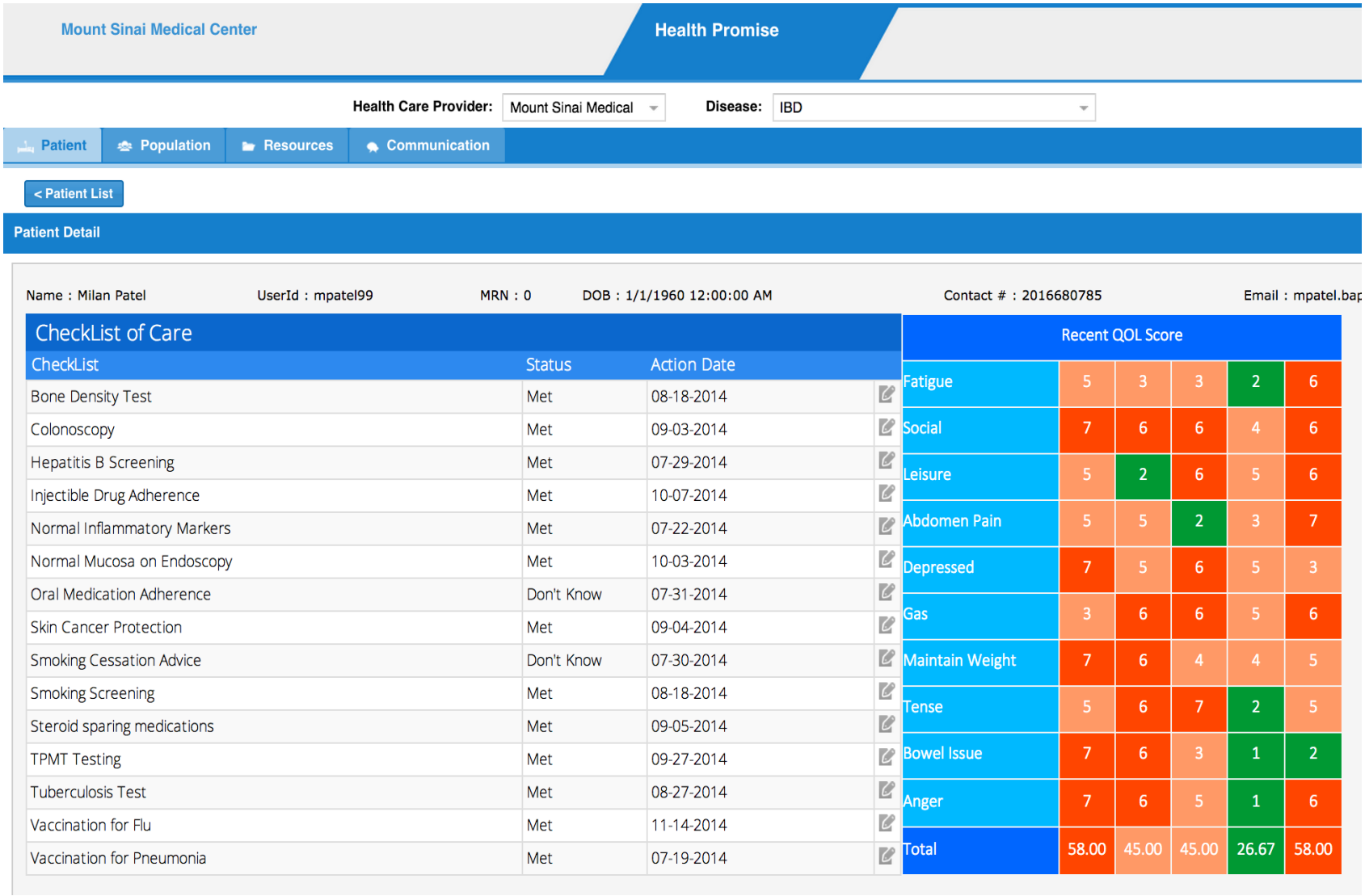
Remote Monitoring in IBD: HealthPROMISE





Atreja A, JMIR Res Protocol, 2015

Realtime population health dashboard w/ app data



CheckList of Care

CheckList	Status	Action Date
Bone Density Test	Met	08-18-2014
Colonoscopy	Met	09-03-2014
Hepatitis B Screening	Met	07-29-2014
Injectible Drug Adherence	Met	10-07-2014
Normal Inflammatory Markers	Met	07-22-2014
Normal Mucosa on Endoscopy	Met	10-03-2014
Oral Medication Adherence	Don't Know	07-31-2014
Skin Cancer Protection	Met	09-04-2014
Smoking Cessation Advice	Don't Know	07-30-2014
Smoking Screening	Met	08-18-2014
Steroid sparing medications	Met	09-05-2014
TPMT Testing	Met	09-27-2014
Tuberculosis Test	Met	08-27-2014
Vaccination for Flu	Met	11-14-2014
Vaccination for Pneumonia	Met	07-19-2014

Recent QOL Score

Fatigue	5	3	3	2	6
Social	7	6	6	4	6
Leisure	5	2	6	5	6
Abdomen Pain	5	5	2	3	7
Depressed	7	5	6	5	3
Gas	3	6	6	5	6
Maintain Weight	7	6	4	4	5
Tense	5	6	7	2	5
Bowel Issue	7	6	3	1	2
Anger	7	6	5	1	6
Total	58.00	45.00	45.00	26.67	58.00

Registration: ClinicalTrials.gov NCT02322307

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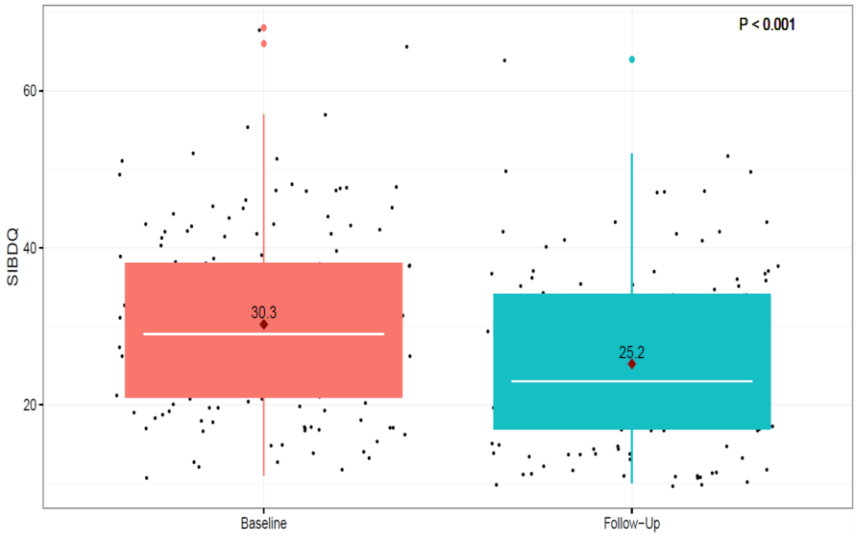
Improvement in QOL and Quality Indicators in IBD with HealthPROMISE



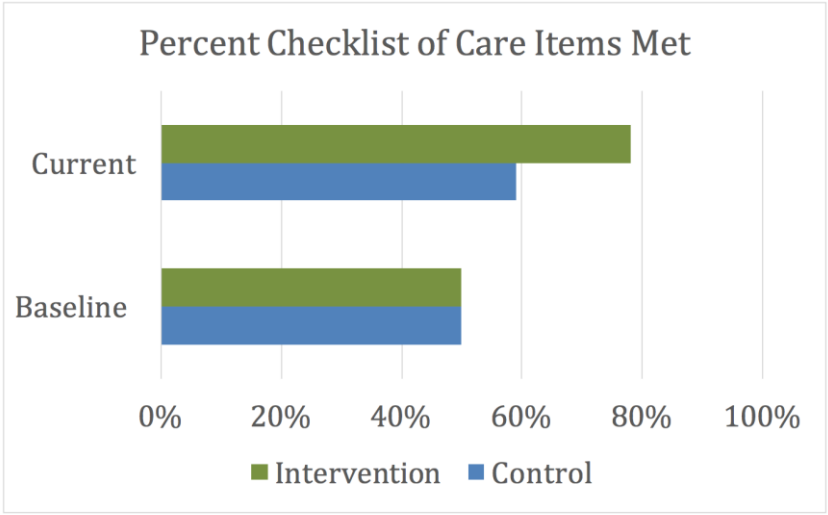
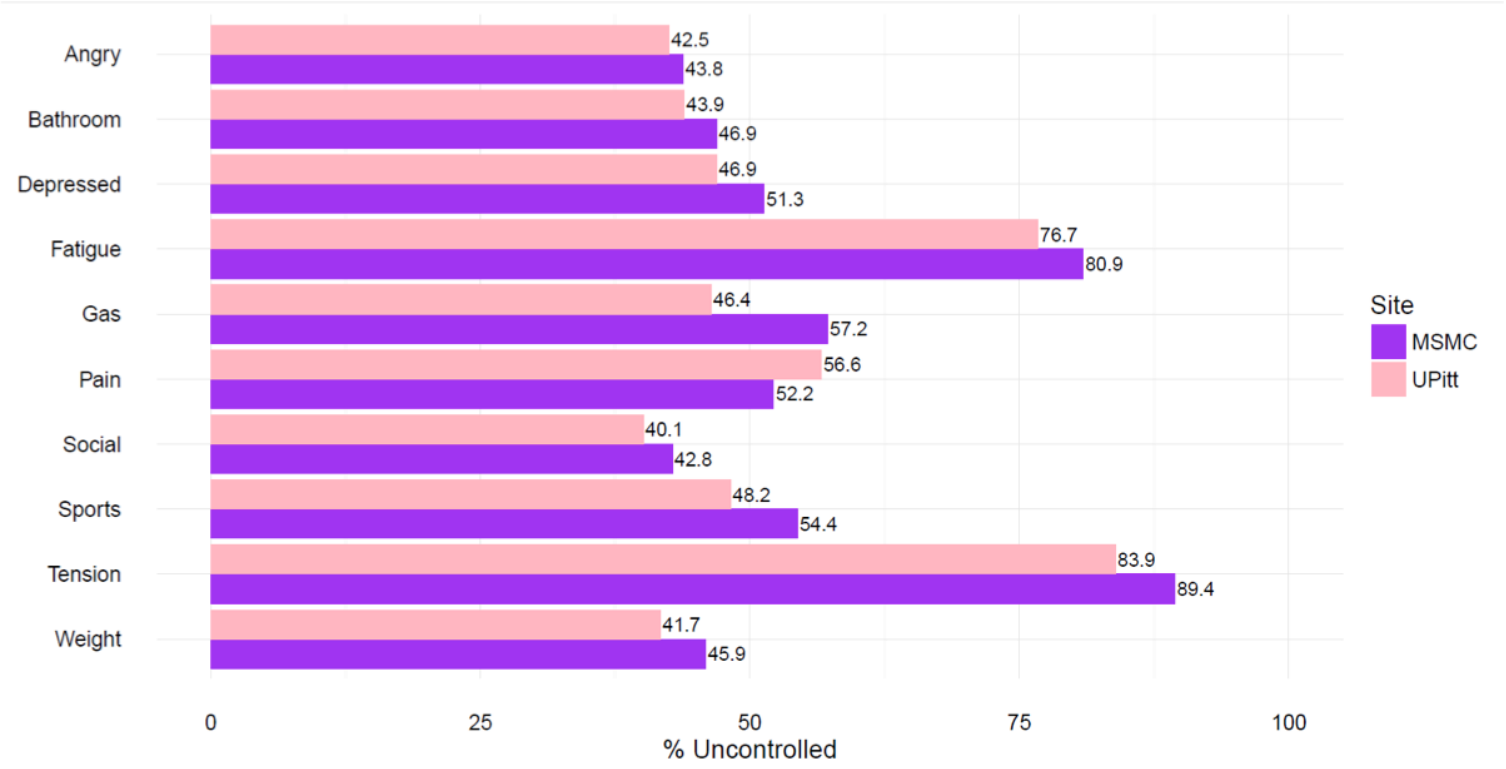


Figure 2. Improvement in Percentage of Patients meeting eligible Quality of Care metrics in control (9%) versus Intervention (28%), P<0.01

Atreja A, DDW, San Diego. 2016

Fatigue and Tension as major drivers of poor quality of life in more than 75% of IBD patients

Mount Sinai patients with app and UPMC patients with paper based survey



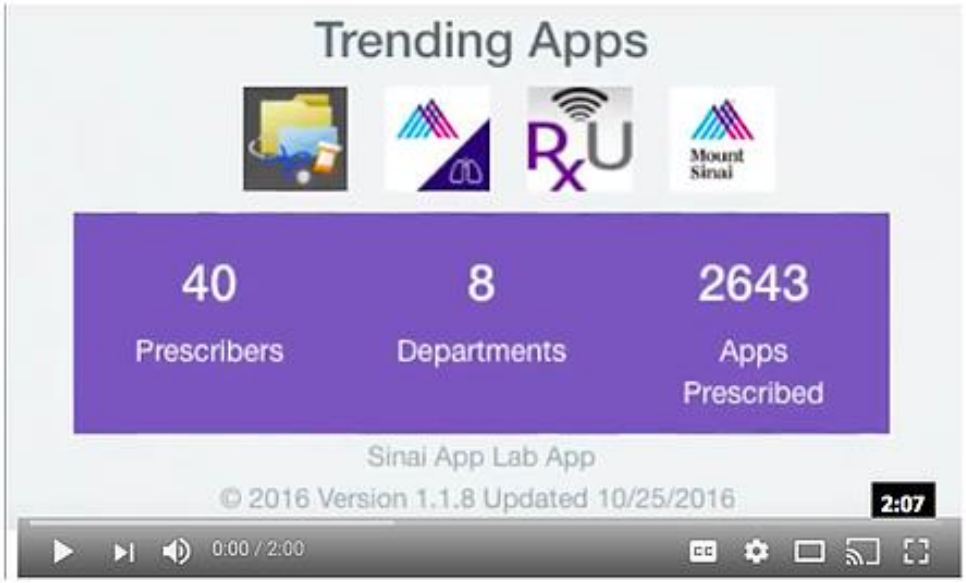
Singular Platform for Digital Transformation

Specialty Specific customized solutions for patient care and research

- Health Education Content, Videos, Webinars
- Survey and Feedback
- Tracking Apps, Websites
- Wearables
- Telemedicine
- Appointment Scheduling
- Social Patient Engagement
- Clinical Trials

https://www.youtube.com/watch?v=1Ax926yrEQc

The Time for Prescribing Apps has Come!!



Five clinical sites at Mount Sinai Health System took part in initial pilot aiming to prescribe apps to 100 patients

We achieved 20x our goal and ended up prescribing apps to over 2000 patients!

Watch video or click here for details

NPR Marketplace: An App to Prescribe other Healthcare Apps!!

RxUniverse: Usability and Learnability

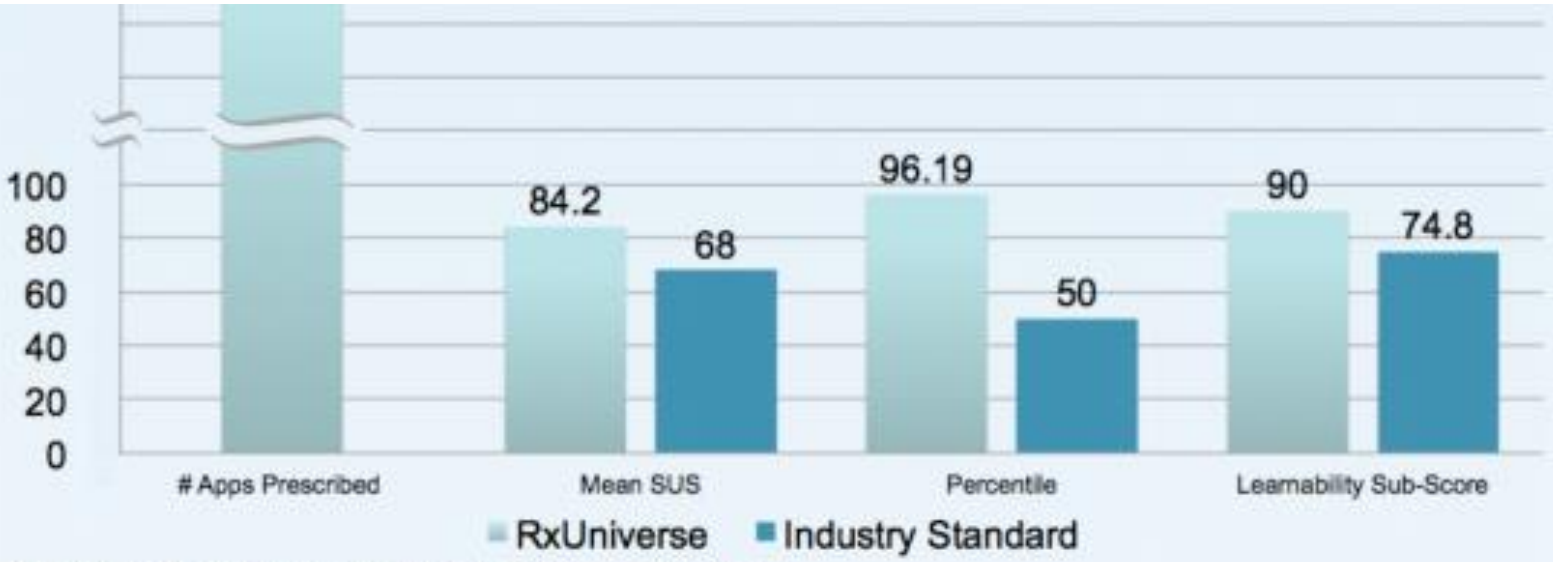
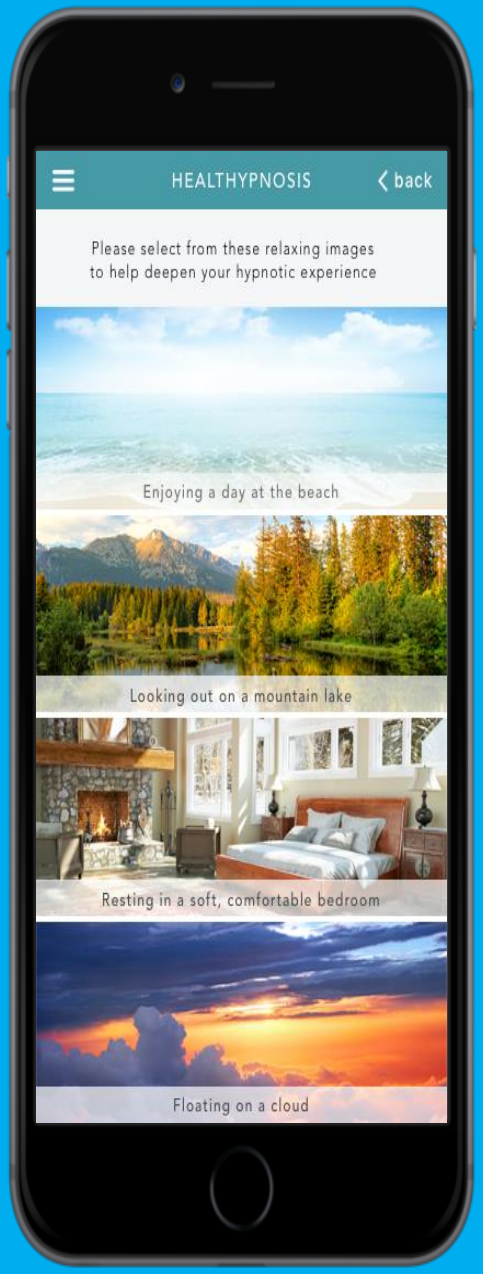
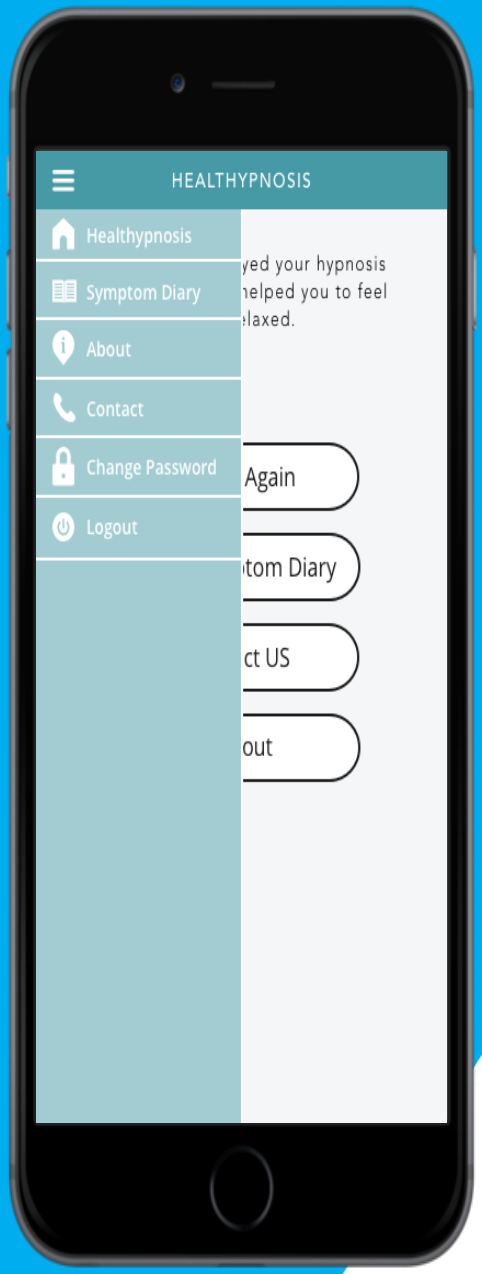


Figure 5. Adoption, Usability, and Learnability of RxUniverse vs. Industry Standards.

	System Usability Score Items		
Q1	I think that I would like to use RxUniverse frequently.	Q6	I thought there was too much inconsistency in the RxUniverse platform.
Q2	I found RxUniverse unnecessarily complex.	Q7	I would imagine that most people would learn to use RxUniverse very quickly.
Q3	I thought RxUniverse was easy to use.	Q8	I found the RxUniverse platform very cumbersome to use.
Q4	I think I would need the support of a technical person to be able to use	Q9	I felt very confident using RxUniverse.

Descriptive Scoring for the SUS		
Adjective	**Mean SUS**	**SD**
Worst Imaginable	12.5	13.1
Awful	20.3	11.3
Poor	35.7	12.6
Okay	50.9	13.8
Good	71.4	11.6





HEALTHYPNOSIS

PI: Guy Montgomery
Julie Schnur

Mount Sinai

AdhereTech

Patented Smart Pill Bottles
to Track & Improve Adherence

Validated Use-Case

Readmission Reduction

Through the use of the mobile application, HeartHealth, healthcare providers are able to remotely monitor their patients' blood pressure and weight in the 30 day high risk period post discharge.

Patient Satisfaction

Increased positive health outcomes due to high patient satisfaction with the platform

Readmission Rate Reduction

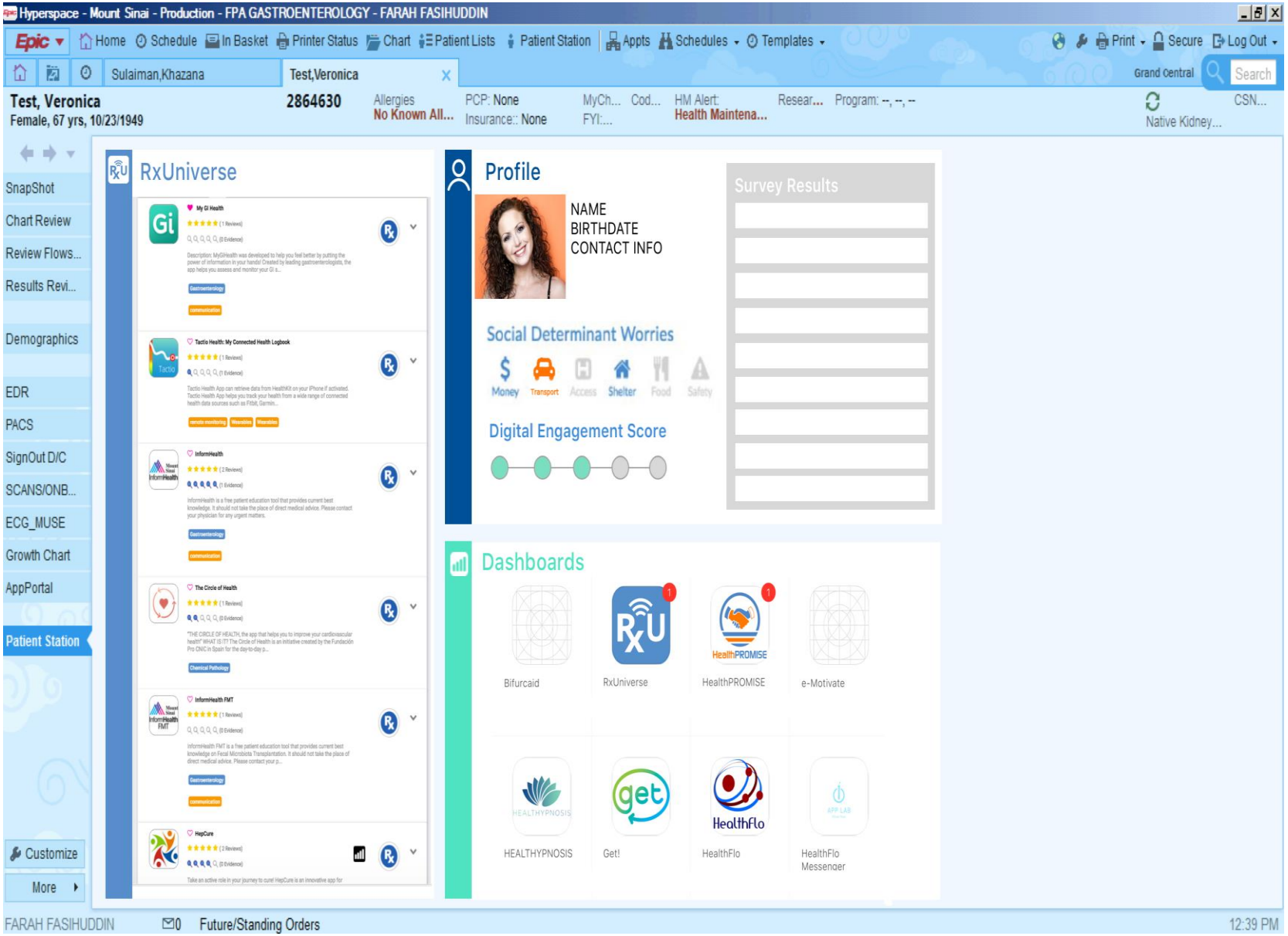
10% readmission rate compared to the national rates of >20% readmission within 30 days of discharge

Activated Patients

Who continue to use the mobile apps and smart devices to track BP and weight

Pinney S, et al. | Use of Electronic Patient Reported Outcomes and Automated Devices for Heart Failure Disease Management | iproc 2017;3(1):e24 | URL: http://www.iproc.org/2017/1/e24 | DOI: 10.2196/iproc.8459

Enterprise-wide SDoH Assessment

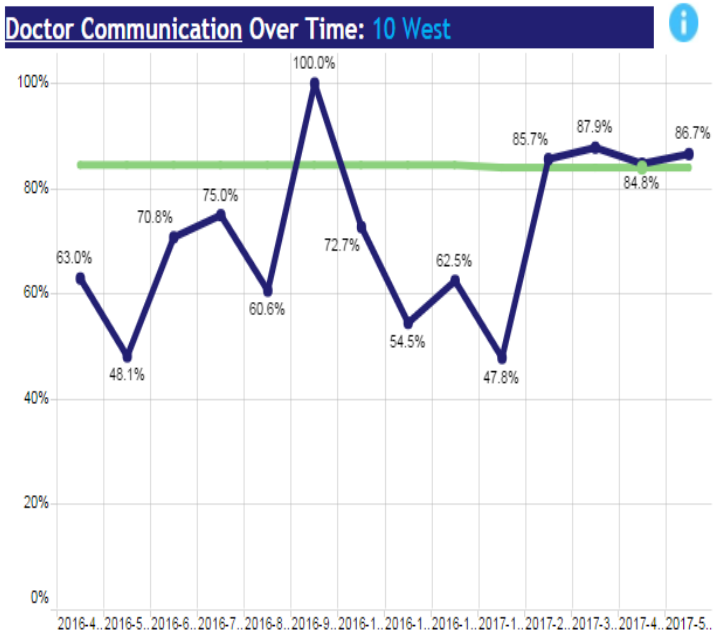


Real Time Patient Experience Survey and Service Recovery (MIPS)

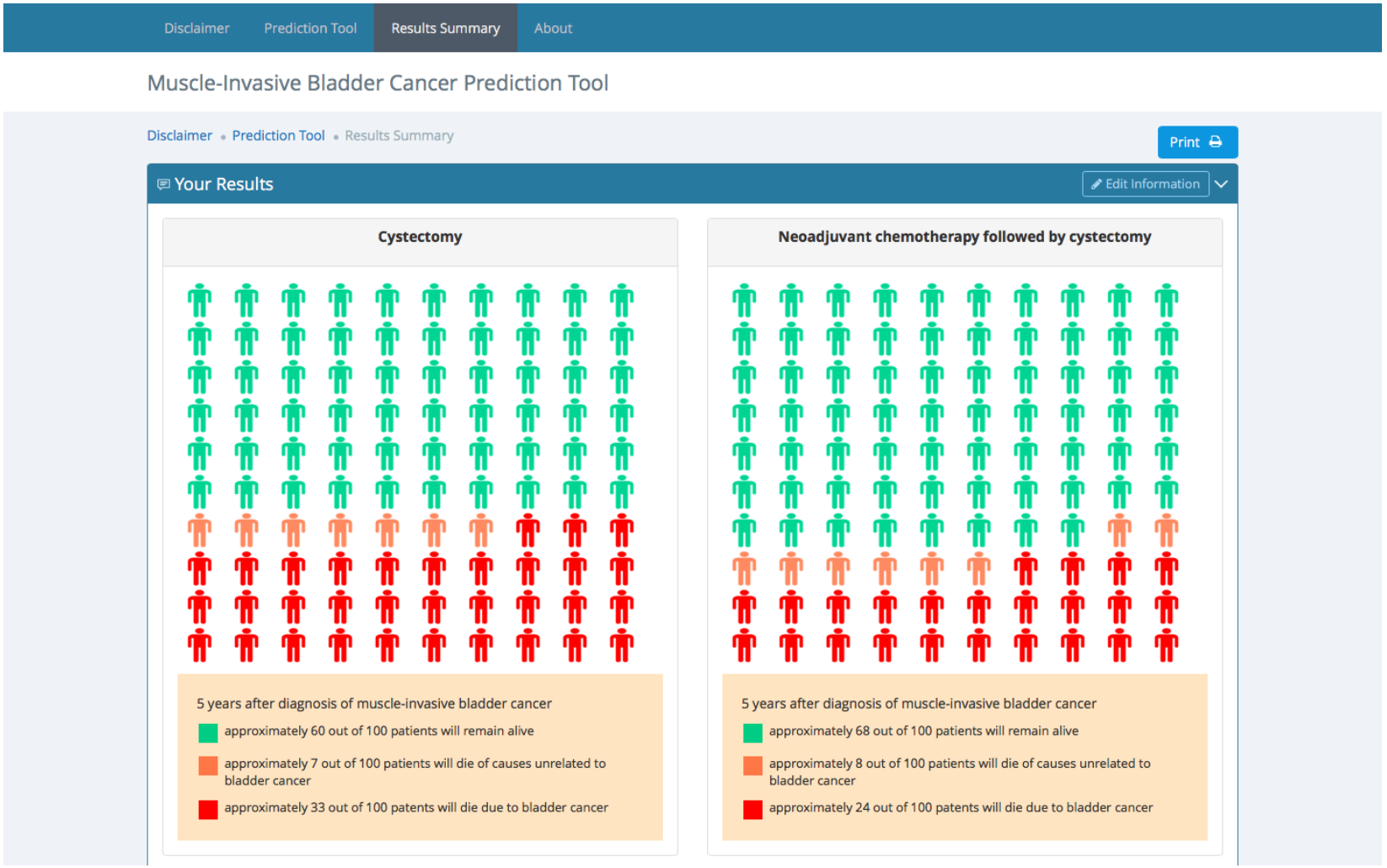
Patient Satisfaction Survey

Please select the number of stars on a scale of 1-5, with 1 being the worst, and 5 being the best, please rate the following:

4. How well your doctor communicated your medical plan with you.
   ☆ ☆ ☆ ☆ ☆
5. How well your nurse communicated your medical plan with you.
   ☆ ☆ ☆ ☆ ☆
6. How well the staff explained the purpose and side effects of new medications.
   ☆ ☆ ☆ ☆ ☆
7. How well the staff is preparing you for leaving the hospital (discharge).
   ☆ ☆ ☆ ☆ ☆
8. How would you rate your experince in the hospital thus far?
   ☆ ☆ ☆ ☆ ☆

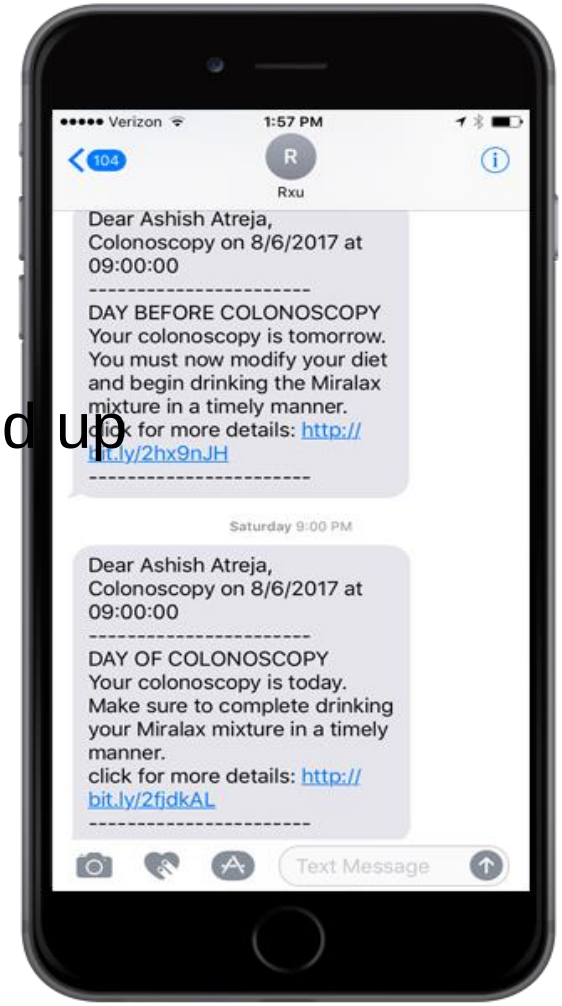


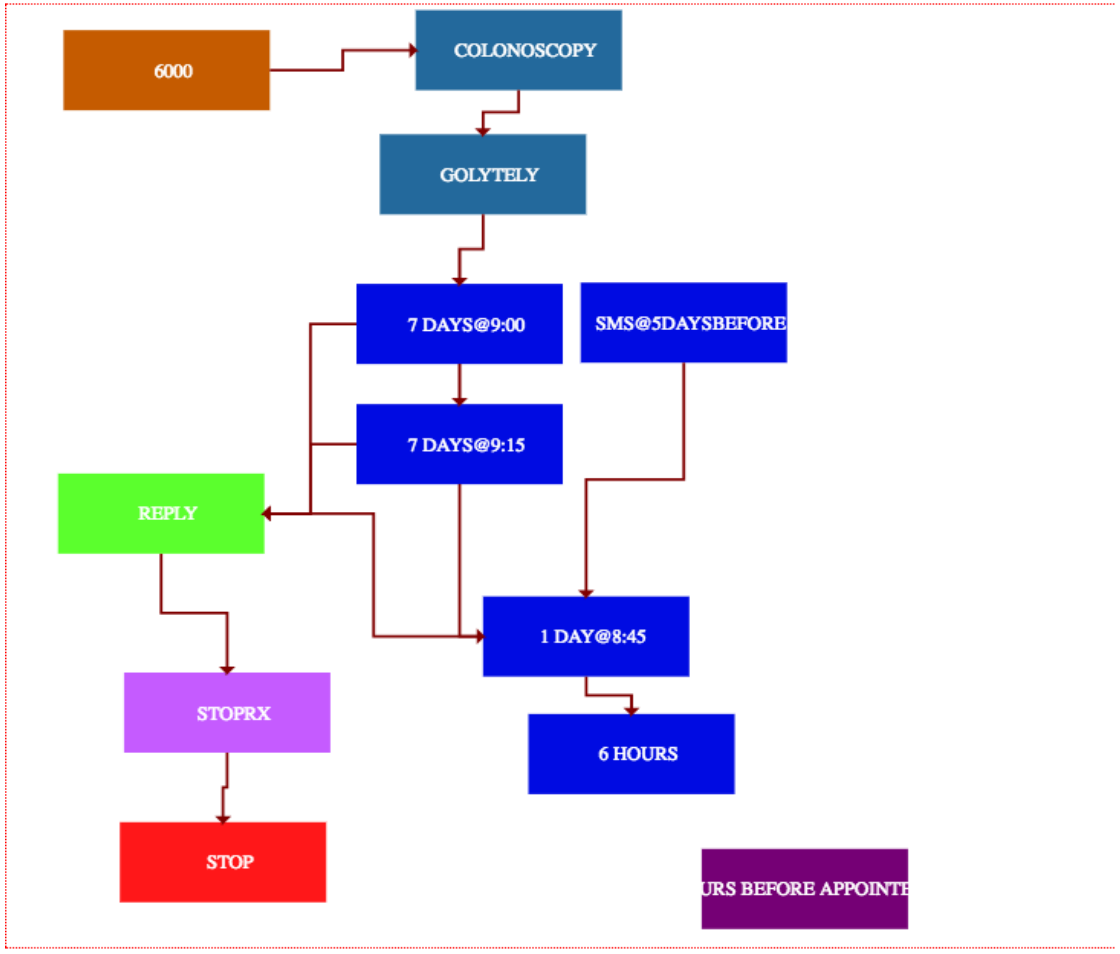
CLINICAL DECISION AID: BLADDER CANCER RISK TOOL (OCM)



Peri-procedural Support for Bundles

eaned up





Exponential ROI

One Stop Shop for Multiple Transformation Use-Cases

Ongoing Use-cases

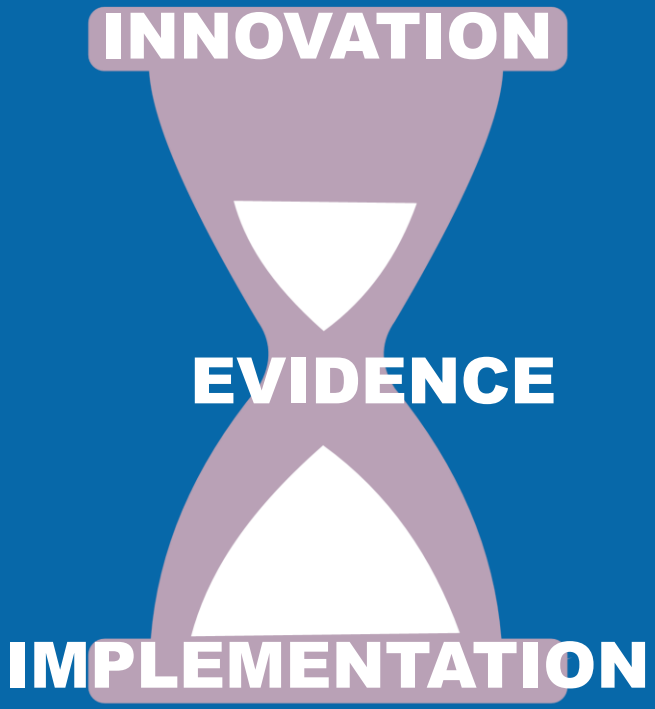
- Providing PHR access to populations at scale
- Behavioral health apps
- Pre and Post Surgery Engagement
- Transitions of Care
- Remote Monitoring of 5 high cost diseases
- Employee Engagement and Wellness
- Assess Social Determinants
- Readmission Reduction
- Patient Reported Outcomes

ROI through

Leveraging investments made (PHR)
Improving peri-op throughput
Remote monitoring and CCM Codes
Patient experience survey and
Real time service recovery
Reducing readmission penalties
MACRA-Increased score- QI activities
CIN and Pop Health (Top 5 diseases)
At-risk contracts and ACO

Rx.Health

BOTTLENECK : Creating Evidence for Digital Medicine

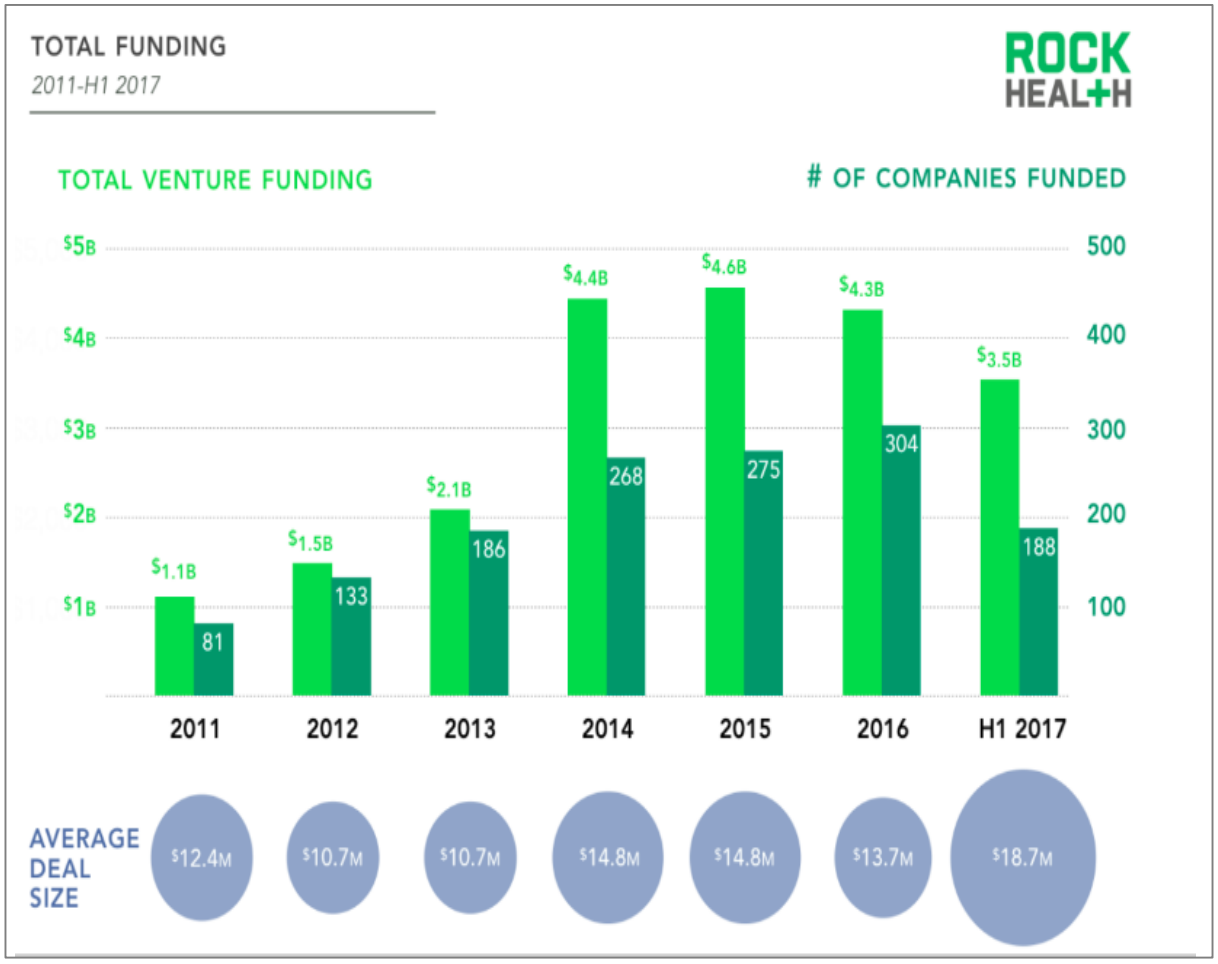


mHealth Lacks Evidence:
Takes “scatter shot” approach

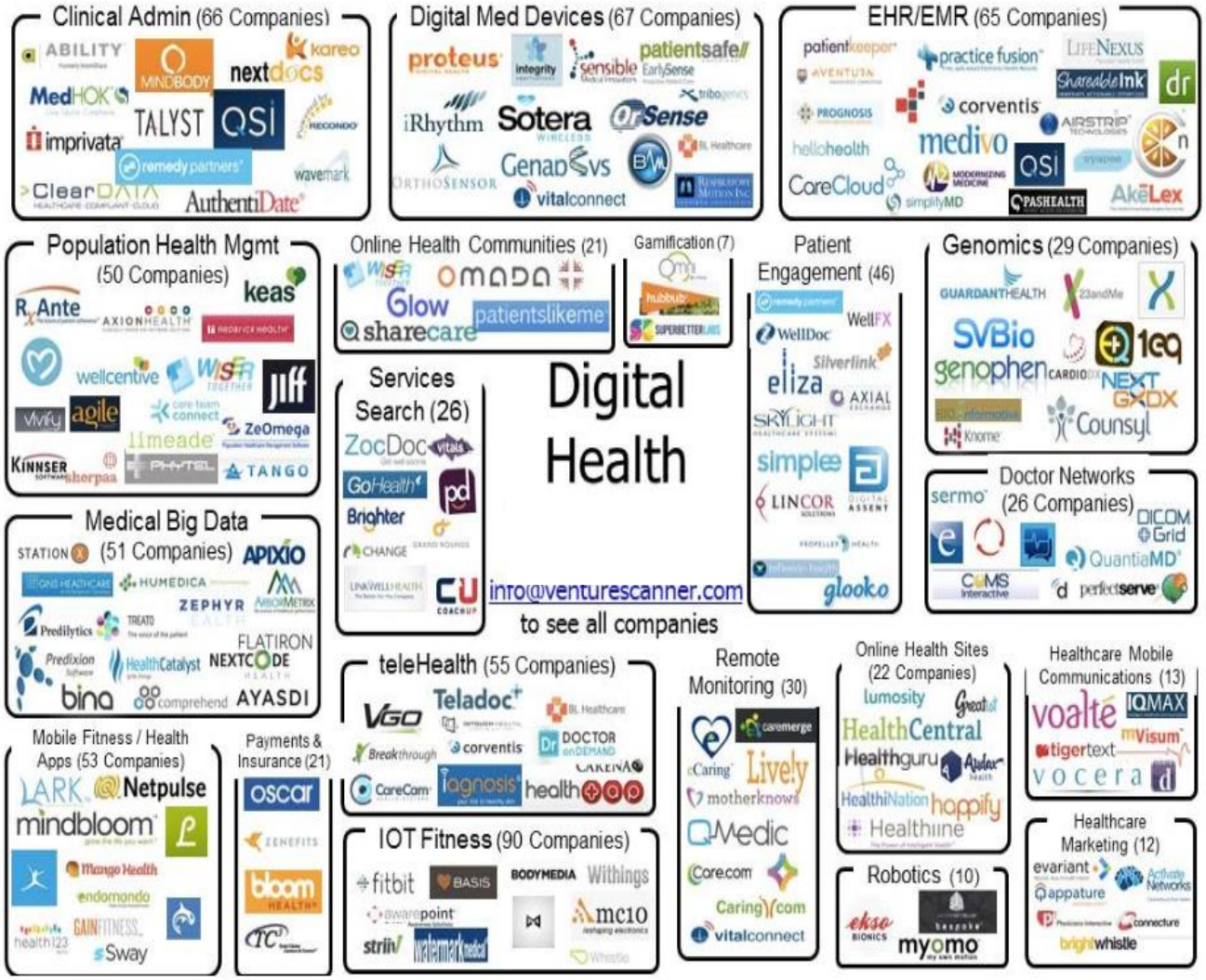
--World Bank

Tsai et al. PLOS Medicine. Scaling up mHealth: Where is the evidence?

Digital Health Investment fueled by Innovation Economy



Problem of Plenty



The ‘Burden of Proof’

From $4.5 Billion To Nothing: Forbes Revises Estimated Net Worth Of Theranos Founder Elizabeth Holmes

Future generations of startup founders should ensure they are working with venture capital firms that have ***ample experience in health care.*** These investors will understand that it takes time to build a successful and long-lasting company.”

- Christina Farr, *Fast Company*

Scripps Wired for Health study results show no clinical or economic benefit from digital health monitoring

By **Jonah Comstock** | January 19, 2016

SHARE 2767

PeerJ

✔ PEER-REVIEWED

A prospective randomized trial examining health care utilization in individuals using multiple smartphone-enabled biosensors

The results are in for the Scripps Translational Science Institute's **Wired For Health study**, and there's no sugar-coating it: they're disappointing for those working in digital health. The **six-month randomized control trial** found no short-term benefit in health costs or outcomes for patients monitoring their health with connected devices.

"It was a bit disappointing, but remember, this was the first multisensor trial that's ever been reported, so in that respect it was a pioneering effort," study author and STSI Director Dr. Eric Topol told MobiHealthNews. "And you know, it was very difficult because we had these three different sensors, glucose, blood pressure, and heart rhythm, and a lot of patients had all three problems or two of them, and had to have a dashboard created. There are a lot of logistical challenges there."

https://peerj.com/articles/1554/

July 12, 2016

WHY POKÉMON GO IS SECRETLY THE WORLD'S NEWEST FITNESS PHENOMENON

Legions of eager Pokémon masters are suddenly realizing what FitBit wearers have long known: Walking around all day is actually one hell of a workout.

BY MICHAEL RODIO Follow

INNOVATION
Digital Technologies

+

RIGOR
Evidence-based Medicine

Evidence-Based Digital Medicine (EBDM)

NODE Health: Guiding Principles

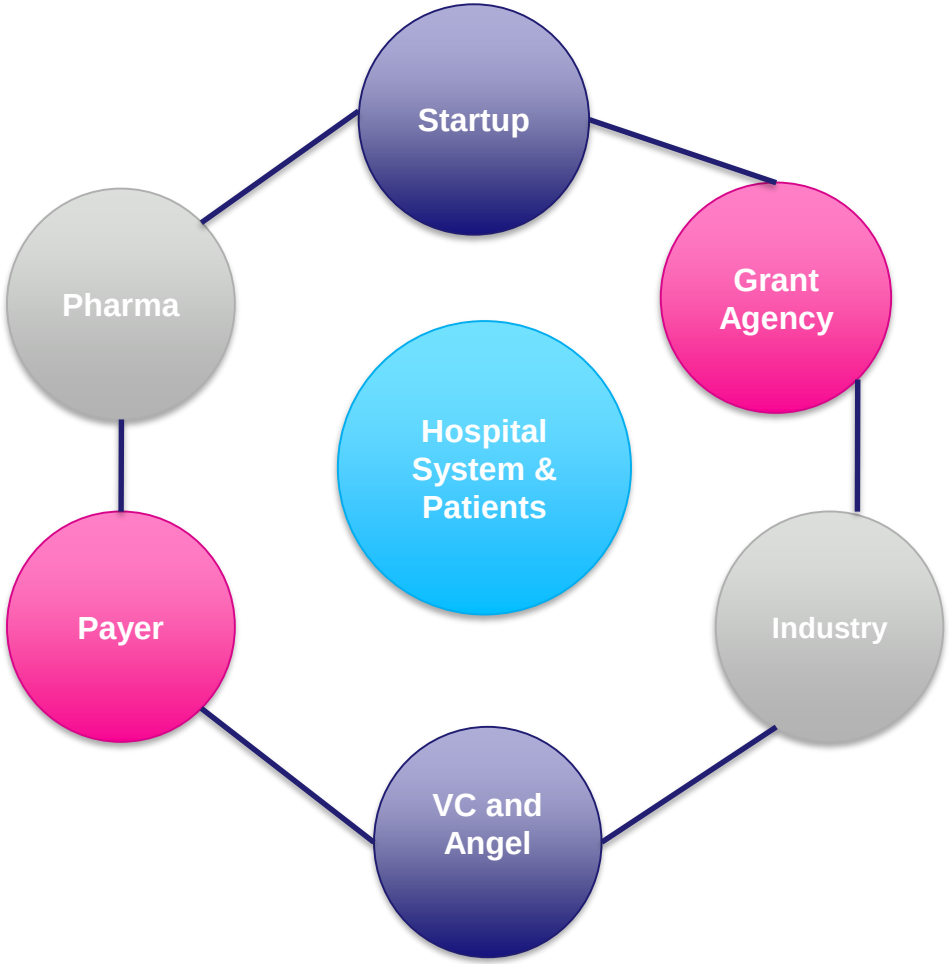
1. **Share** information about ongoing innovation and single site trials
2. **Standardize** existing governance,regulatory and best practices
3. **Support** multi-site digital medicine trials and implementations

1. Evidence Challenge

2.Transformation Challenge

NODE HEALTH

NODE Health Foundation



Launched Feb 2016

APP LAB
Mount Sinai

Personal Connected Health Alliance

Executive Board

Megan
HealthIm

Brian
LifeBridge Health

Dr. Jeet Barmecha
SBH
Health

Jay
Modus

Sameer
Badlani
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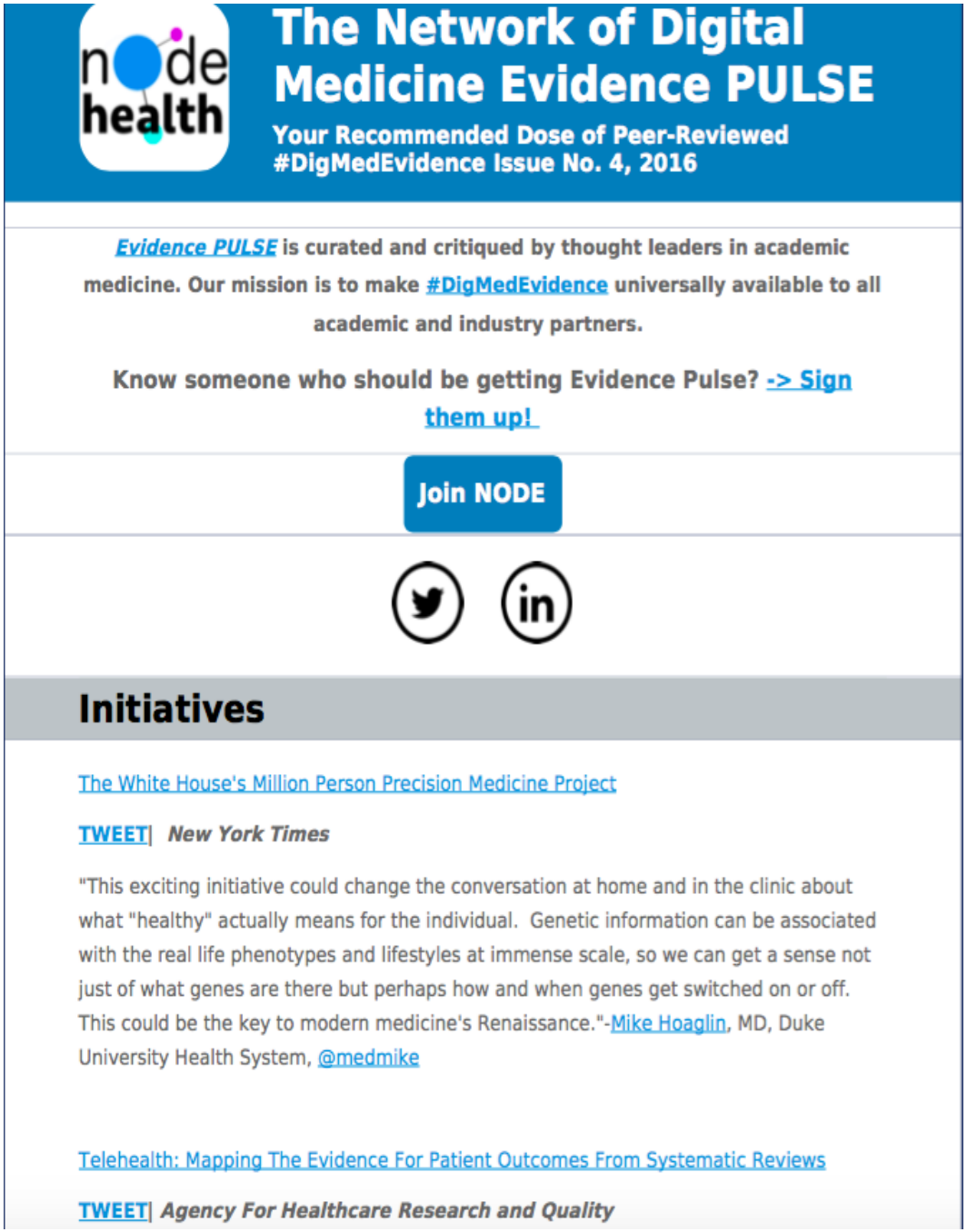

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Editor(s): Dorsey E.R. (Rochester, N.Y.)
Editorial Board

Contents: all years

Year	Vol.	Issue	pp.	Issue Release Date

JOURNAL Partnership

Bibliographic Details

Digital Biomarkers
Journal Abbreviation: Digit Biomark
e-ISSN: 2504-110X (Online)
DOI: 10.1159/issn.2504-110X
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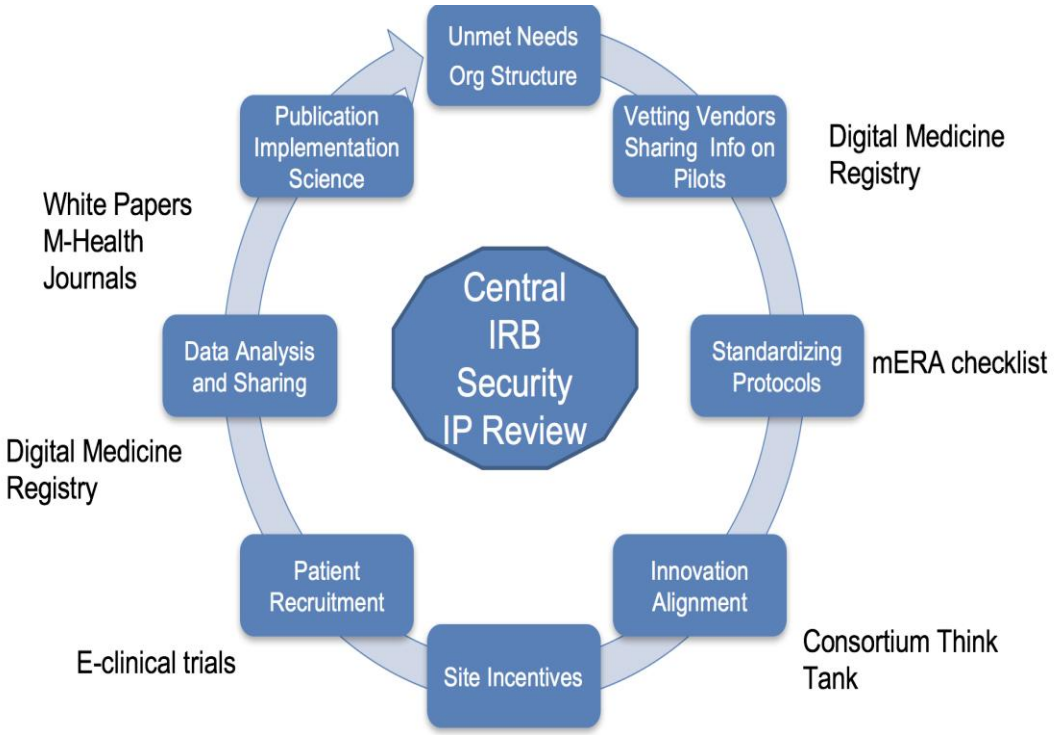

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