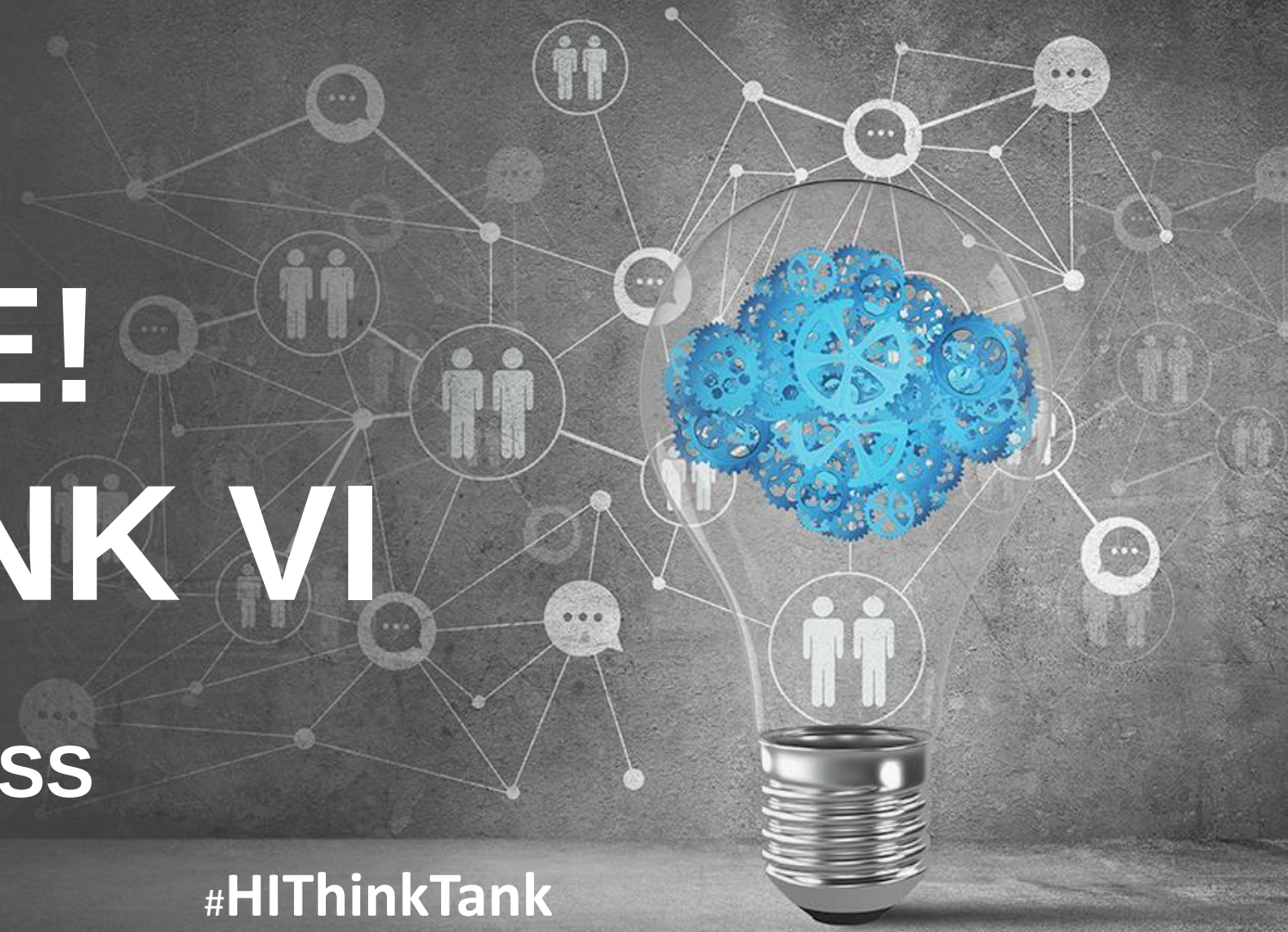
WELCOME!
THINK TANK VI



JUSTIN BARNES, FHIMSS
DR. BOB MONTEVERDI

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THE DAY AHEAD…

First, **thank you to all a**nd **much appreciation** to those that are participating via the live videostream

We started the Think Tank 3 years ago to form a highly collaborative environment that creates and **shares best practices as well as strategies to successfully navigate the future of healthcare**

We will cover 3 primary themes today

- **Care Strategy**
- **Innovation**
- **Leadership**

Today is about education, collaboration as well as best practice & strategy sharing. I will publish the participant list so if you want to follow up on any specific topics or discussions that we can't dive deep into, please feel free individually.

As a ground rule - please keep your questions in a constructive nature *(with no lamenting)* – 10 second questions with 30 second to one-minute answers tend to work best.

Past Think Tank Collaborators

- Atrium Health
- Partners Healthcare
- Northwell Health
- UPMC & UPMC Health Plan
- Thomas Jefferson University
- University of Virginia Health System
- Duke Health
- Resurgens Orthopaedics
- Christus Health
- UT Southwestern Medical Center/ Parkland Health
- Boston University School of Medicine
- Tahoe Forest Hospital District
- Pratt Regional Medical Center
- Nemaha County Hospital
- Florida Association of ACOs
- Children's Integrated Center for Success
- Reliant Medical Group
- Nemours Children's Health System
- Dartmouth-Hitchcock
- Sturdy Memorial Hospital
- Phoenix Children's Hospital
- Lima Memorial Health
- OhioHealth
- Covenant Health
- Halifax Health
- HCR ManorCare
- FastMed Urgent Care
- Institute for Family Health
- UNC/ Rex Health Ventures
- MedAllies, Inc.
- HHS/ ONC
- Intel
- Philips Healthcare
- Qualcomm Life
- McKesson
- Notable Health
- Meditech
- Cerner
- Allscripts
- CPSI
- NextGen Healthcare
- Change Healthcare
- New York eHealth Collaborative
- Practice Fusion
- Connection
- CDW
- Qure4U
- HIPnation
- NeHII
- Livongo Health
- LifemedID
- WallerMD
- Call9 Inc.
- eviCore healthcare
- Commonwealth Health
- Insight Enterprises
- HealthEC
- Lenovo Health
- Center for Connected Medicine (CCM)
- Justin Barnes Advisors
- Elevation Health
- StudioNorth

CARE STRATEGY

Directly and unscripted from thought leaders on the front lines of healthcare

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SYLVAN WALLER, MD

HEALTHCARE INNOVATION ADVISOR

CARE STRATEGY

VIEW FROM THE LEADING EDGE

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CARE STRATEGY: VIEW FROM THE LEADING EDGE

A visit to the doctors office hasn't really evolved in decades.

- You still have to schedule an appointment, often by phone, sometimes online, but always with an inconvenient time and far out in the future.
- You still have to fill out paperwork in triplicate, answer the same questions multiple times, and get your temperature taken when you are there for your annual wellness visit.
- And then you wait. Practices are overbooked, delays are common, and as a consumer experience, most visits rate low on our list of fun things to do.

CARE STRATEGY: VIEW FROM THE LEADING EDGE

So how are Care Strategies evolving to solve these problems?

- What if you had a more longitudinal interaction with healthcare?
- What if there was a care continuum where you had instant, ongoing access to the level of care you needed.
- What if there was no such thing as a ”visit?”

CARE STRATEGY: VIEW FROM THE LEADING EDGE

So how are the people in this room solving these problems?

- Creating solutions that lower the barriers to care for information seeking patients. Think about a curated database, robust symptom checker, ML/AI that learns from each interaction, and then validated educational information for the patient.

- Escalating those patients that need a higher level of care, remote monitoring, virtual care, or ultimately a community based care strategy to meet people where they want to be seen.

CARE STRATEGY: VIEW FROM THE LEADING EDGE

So how are the people in this room solving these problems?

- Companies today are creating dynamic tools based on AI and ML that take into account your past medical history, your longitudinal healthcare experience, social determinants of health, the evolving medical literature and can help determine a diagnosis and treatment.

CARE STRATEGY: VIEW FROM THE LEADING EDGE

- **Key Learning:** Rethinking the traditional healthcare visit and creating a more longitudinal model of care improves efficiency, productivity, and communication.

- **Key Learning:** Creating different access points based on the consumers needs improves communication, engagement, and ultimately outcomes.

- **Key Learning:** The combination of advanced systems that include tools for health and wellness, digital health solutions that are built on learning models, and keeping people at the center of the process will take these solutions from concept into reality.

EVELYN GALLEGO, MBA, MPH, CPHIMS

INTEGRATING SOCIAL DETERMINANTS OF HEALTH (SDOH) IN EMERGING CARE MODELS

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INTEGRATING SDOH IN EMERGING CARE MODELS

- There is broad consensus that SDOH information improves whole person care and lowers cost. Unmet social needs negatively impact health outcomes
  - **Food insecurity** correlates to higher levels of diabetes, hypertension, and heart failure.
  - **Housing instability** factors into lower treatment adherence.
  - **Transportation barriers** result in missed appointments, delayed care, and lower medication compliance.

- One of the biggest barriers to addressing social risk and social needs in clinical settings is the limited standards available to represent the data. We need standards to promote the:
  - Collection and use of the data
  - Facilitate the sharing of the data across clinical and non-clinical organizations
  - Facilitate payment for social risk data collection and intervention activities

Arons A, DeSilvey S, Fichtenberg C, Gottlieb L. Documenting social determinants of health-related clinical activities using standardized medical vocabularies. JAMIA Open. 2018;2(1):81-88. (http://sirenetwork.ucsf.edu/tools-resources/mmi/compendium-medical-terminology-codes-social-risk-factors)

INTEGRATING SDOH IN EMERGING CARE MODELS

- **Key Learning:** Despite increased interest around identifying and addressing SDOH in context of US health care settings, existing medical coding vocabularies and health information exchange standards are poorly equipped to capture related activities.
- **Call to Action:** In May 2019, the Gravity Project was launched as a multi-stakeholder public collaborative with the goal to develop, test, and validate standardized SDOH data for use in patient care, care coordination between health and human services sectors, population health management, public health, value-based payment, and clinical research.

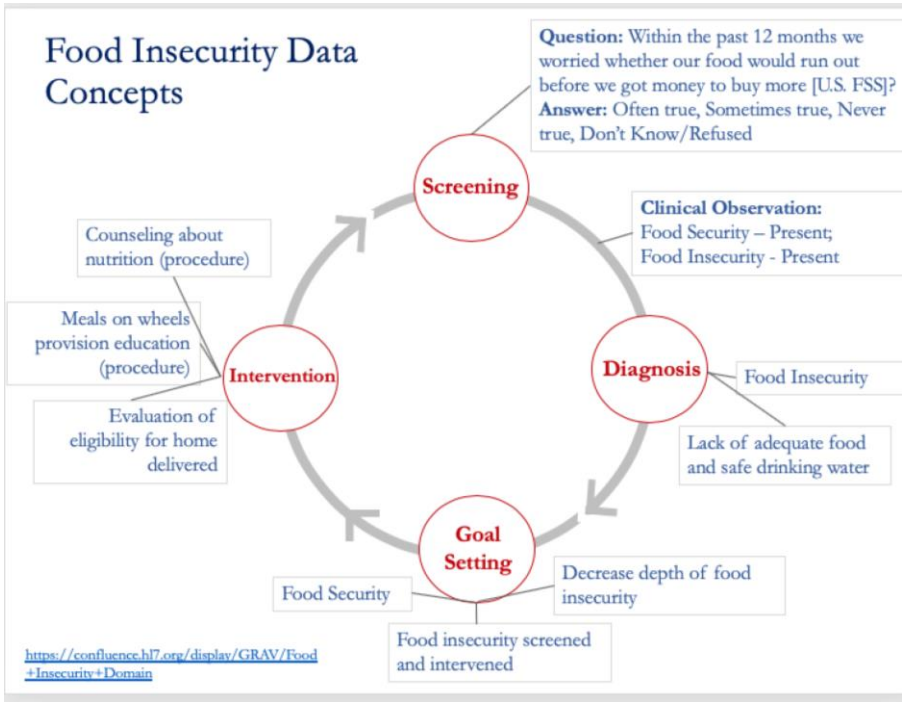
The Gravity Project was initiated by the Social Interventions Research and Evaluation Network (SIREN) with funding from the Robert Wood Johnson Foundation and in partnership with EMI Advisors LLC.

- **Gravity Project Scope:** Develop data standards to represent patient level SDOH data documented in EHRs across four clinical activities: screening, assessment/diagnosis, goal setting, and treatment/interventions.
  - Phase 1 (2019-2020) priority SDOH domains are: food insecurity, housing instability and quality, and transportation barriers.

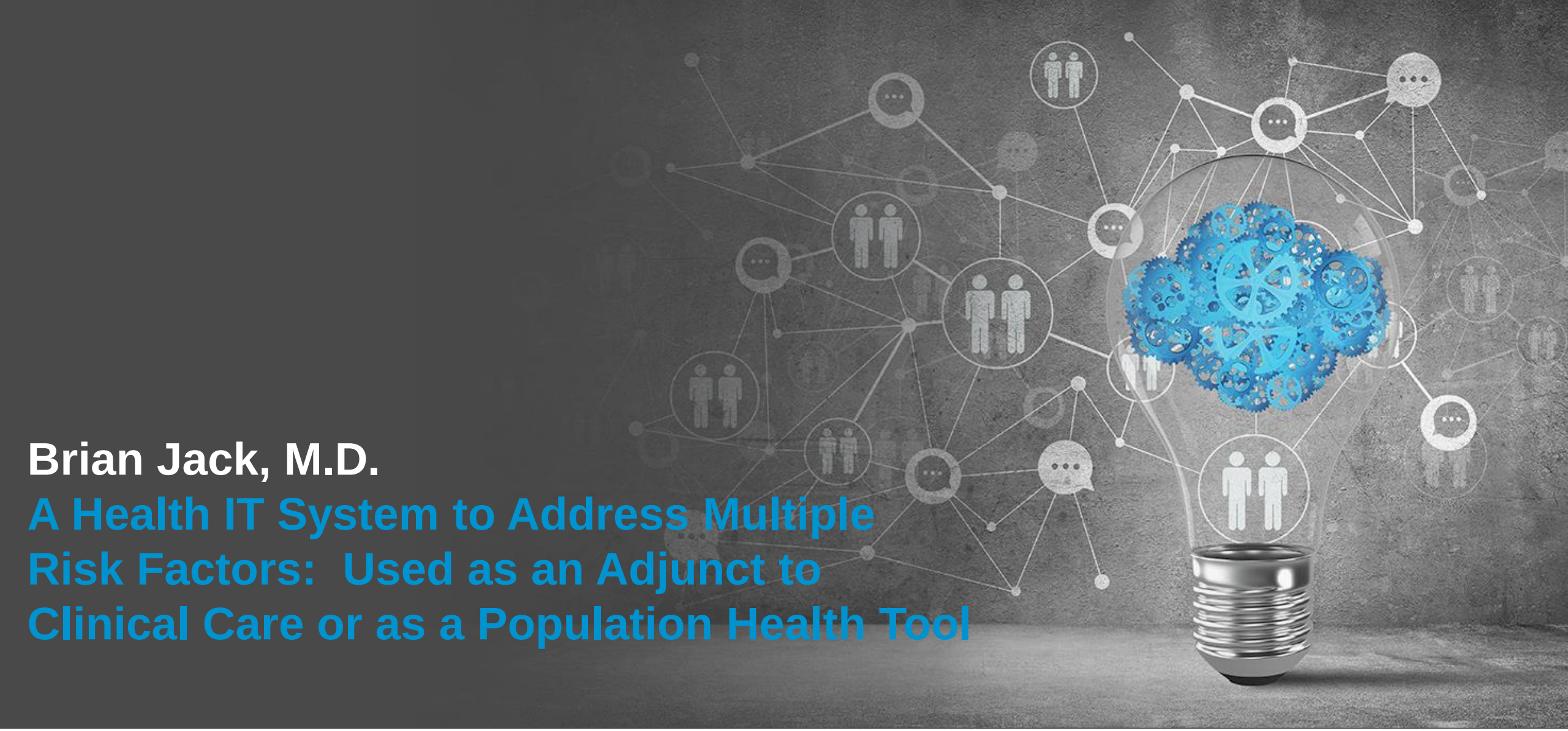
https://confluence.hl7.org/display/GRAV/The+Gravity+Project

SDOH INTEROPERABILITY GLIDE PATH

- **HL7 FHIR Accelerator:** In August 2019, Gravity officially joined the HL7 FHIR Accelerator Program and is on target to publish an HL7 SDOH FHIR Implementation Guide for Sept. 2020.
- **Public Collaboration:** Gravity has convened over **800** participants from across the health and human services ecosystem from clinical provider groups, community-based organizations, standards development organizations, federal and state government, payers, and technology vendors.



- **Industry Considerations:**
  - **Regulatory Trends**. Incorporation of Gravity data sets into ONC ISA, USCDI
  - **Payment Reform**. CMS, MA, and MCO payments for medically or home delivered meals, housing, and transportation services
  - **Tech Innovations**. Growth of community referral systems like UniteUs, Aunt Bertha, Now Pow.



Brian Jack, M.D.

A Health IT System to Address Multiple Risk Factors: Used as an Adjunct to Clinical Care or as a Population Health Tool

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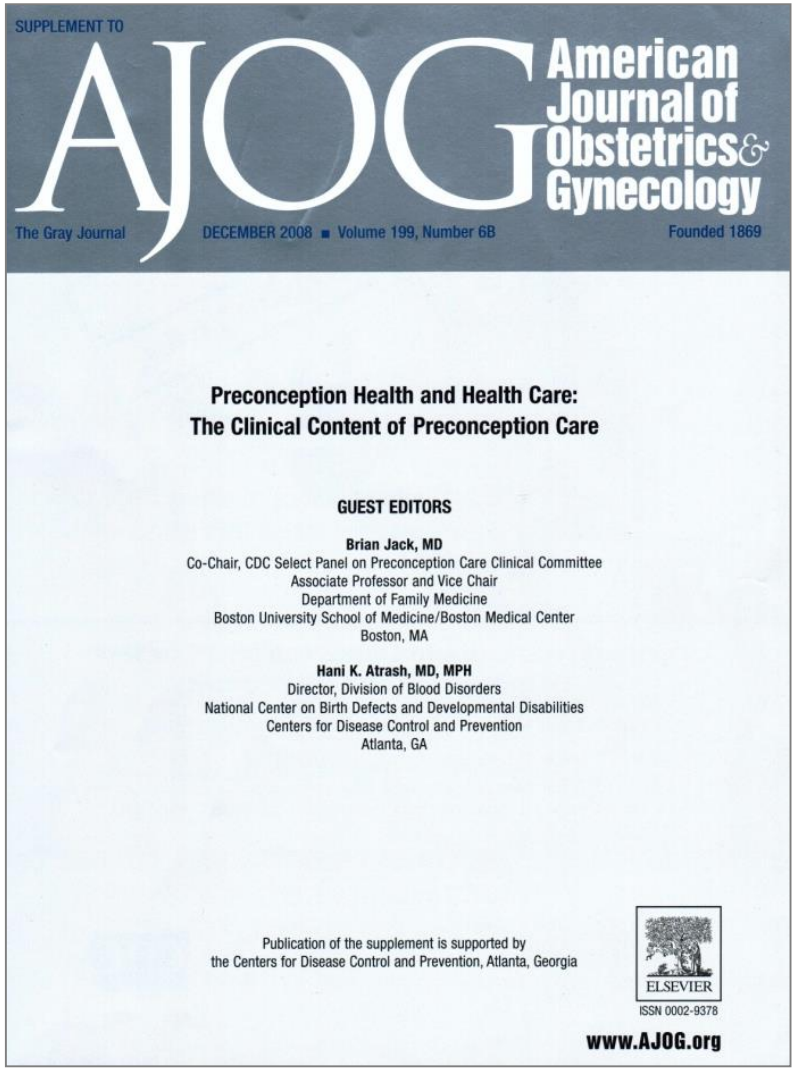
CDC Select Panel on Preconception Care
The Clinical Content of Preconception Care



- Health promotion
- Immunization
- Infectious disease
- Medical conditions
- Psychiatric conditions
- Parental exposure
- Family and genetic history
- Nutrition
- Environmental exposure
- Psychosocial risk
- Medication
- Reproductive history
- Special populations

Components of Preconception Care

Domain	Components of Preconception Care
Family planning	Physical Activity, Weight Status, Nutrient Intake, Folate, Immunizations, Substance Use, Sexually Transmitted Infections, Human Papillomavirus (HPV), Hepatitis B, Varicella, Measles/ Mumps/Rubella, Influenza, Diphtheria/Tetanus/Pertussis (DTaP)
Infectious diseases	HIV, Hepatitis C, Tuberculosis, Toxoplasmosis, CMV, Listerosis, Parvovirus, Malaria, Gonorrhea, Chlamydia, Syphilis, History of Genital Herpes, Asymptomatic bacteruria, Periodontal disease, Bacterial Vaginosis, Group B Strep
Medical conditions	Diabetes, Thyroid Disease, PKU, Seizures, Hypertension, Rheumatoid Arthritis, Lupus, Renal Disease, Cardiovascular, Thrombophelia, Asthma
Psychiatric	Depression/Anxiety, Bipolar disease, Schizophrenia
Parental Exposures	Alcohol, Tobacco, Illicit Substances
Family History	All Individuals, Ethnicity-based, Family history, Personal history
Nutrition	Dietary Supplements, Vitamin A, Folic Acid, Multivitamins, Vitamin D, Calcium, Iron, Essential Fatty Acids, Iodine, Underweight, Overweight, Eating Disorders
Environment	Mercury, Lead, Soil and Water Hazards, Workplace Exposure, Household Exposure
Psychosocial Risks	Inadequate Financial Resources, Access to Care, Physical / Sexual Abuse
Medications	Prescription, Over-the-counter, Medication, Dietary Supplements
Reproductive	Prior Preterm Birth Infant, Prior C-Section, Prior Miscarriage(s), Prior Stillbirth, Uterine Anomalies
Special Populations	Women with Disabilities, Immigrant and Refugee Populations, Cancer

Is it possible for busy clinicians to deliver this care?

Can Health IT help?

Motivational Interviewing about Family Planning (sexually active, not wanting pregnancy, not using Birth control)

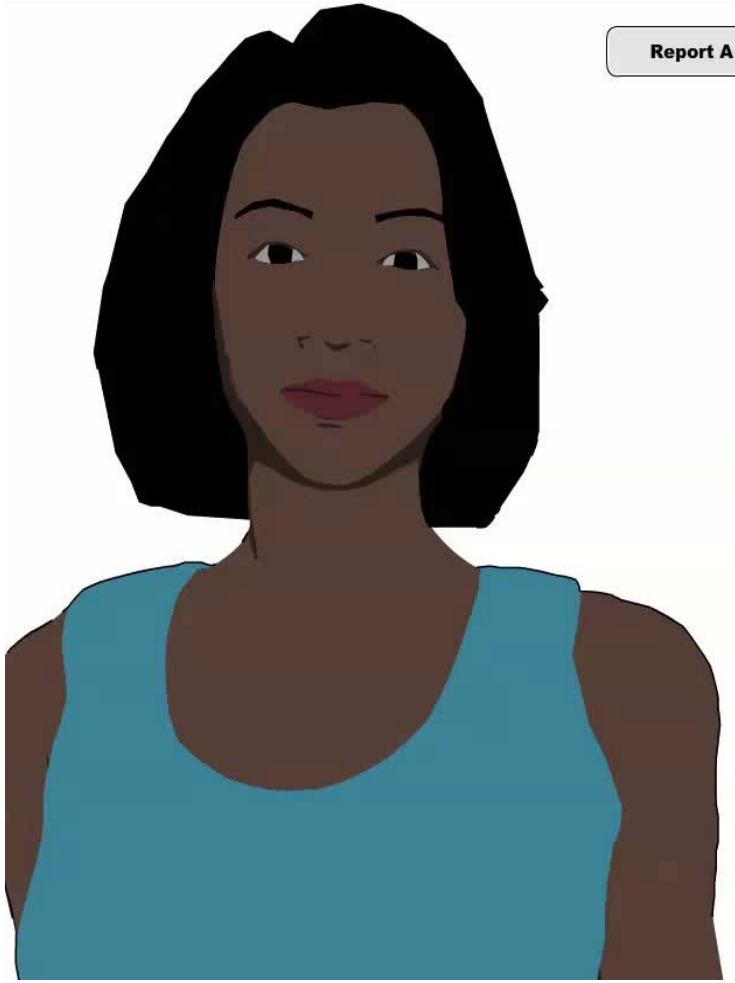
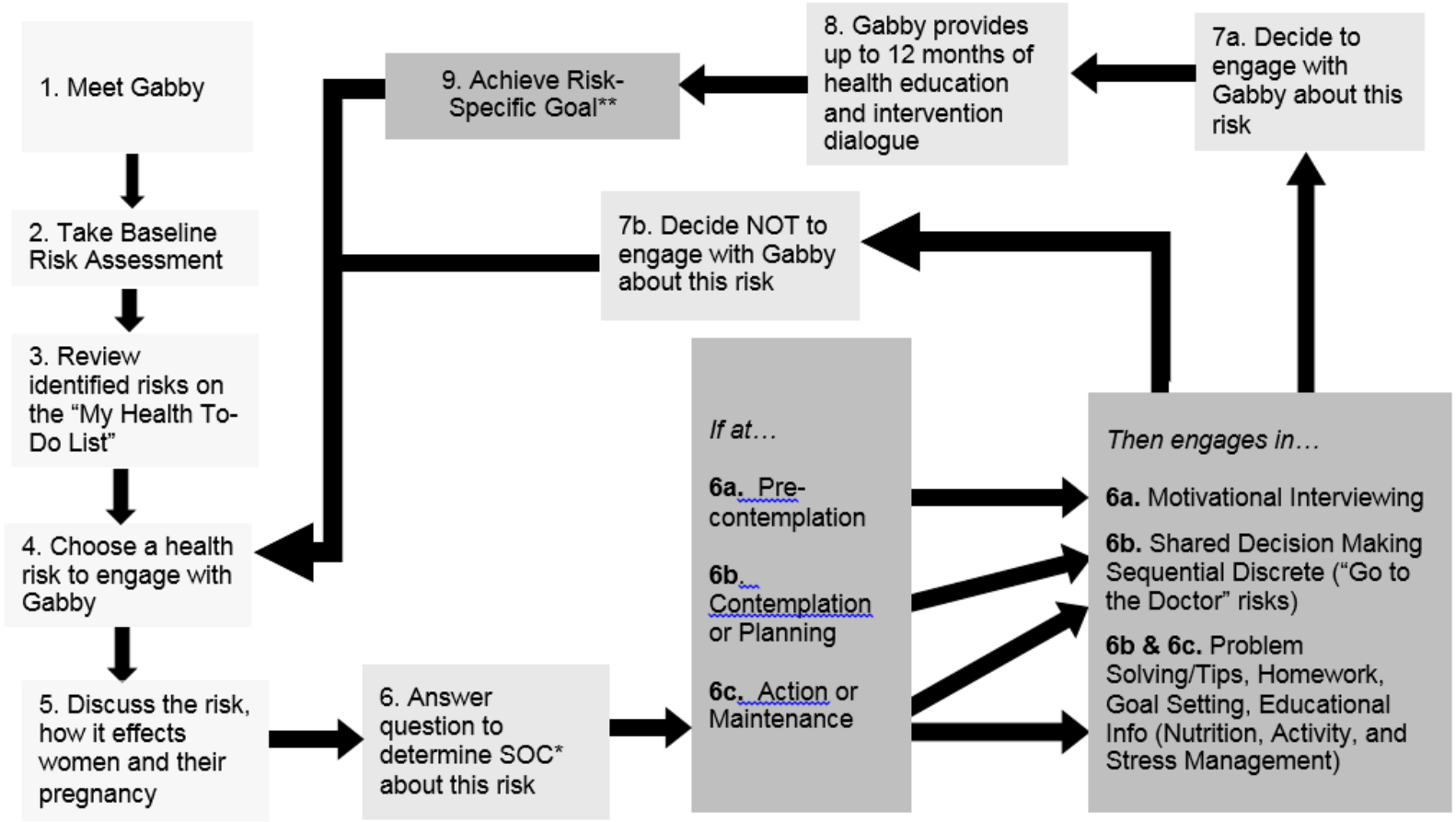


Diagram of a Typical Gabby System Interaction



* Stage of Change, Based on Prochaska & DiClemente's Transtheoretical Model of Change

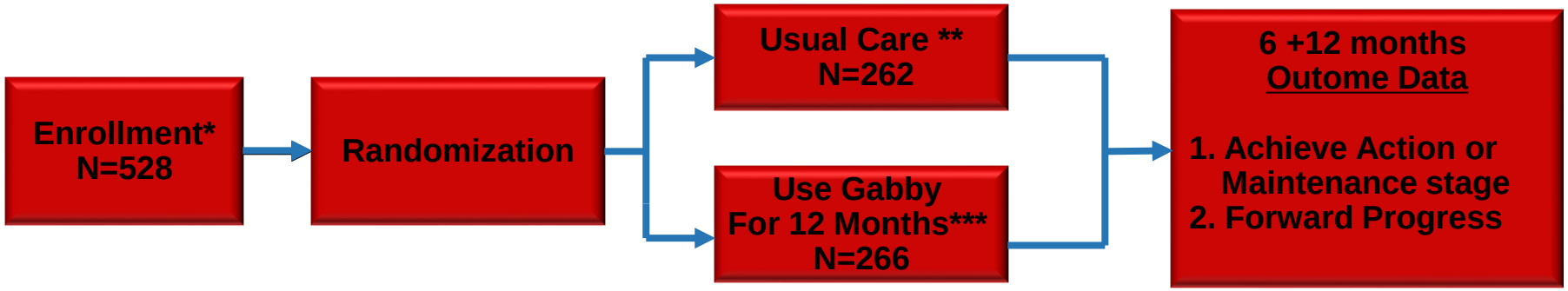
** "Goal" is risk-dependent, i.e., agrees to go to doctor to get a Human Papilloma virus vaccine or agrees to take folic acid.

Longitudinal Behavior Change Techniques Used by Gabby

- Motivational Interviewing to reach out to pre-contemplators
- Shared Decision Making to assist with complicated decisions (FP choice)
- Problem Solving to provide solutions to common barriers
- Goal setting to provide long-term motivation
- Homework to keep users engaged outside of system
- "Sequential Instructions" to walk users through processes
- Tips, Social Reinforcement, etc.

Supporting the user with information, tools, and encouragement throughout the behavior-change process

Gabby Randomized Controlled Trial



*** Enrollment Criteria ***

- Self-identify AA/Black
- Women
- Ages 18-39
- Not Pregnant
- Telephone and Computer/Internet Access

**** Usual Care: Receive a letter listing risks suggesting they speak with a physician**

***** Intervention: Gabby Intervenes on >100 health risks in 13 clinical domains as defined by CDC**

****** Outcome Data based Transtheoretical Model Stage of Change**

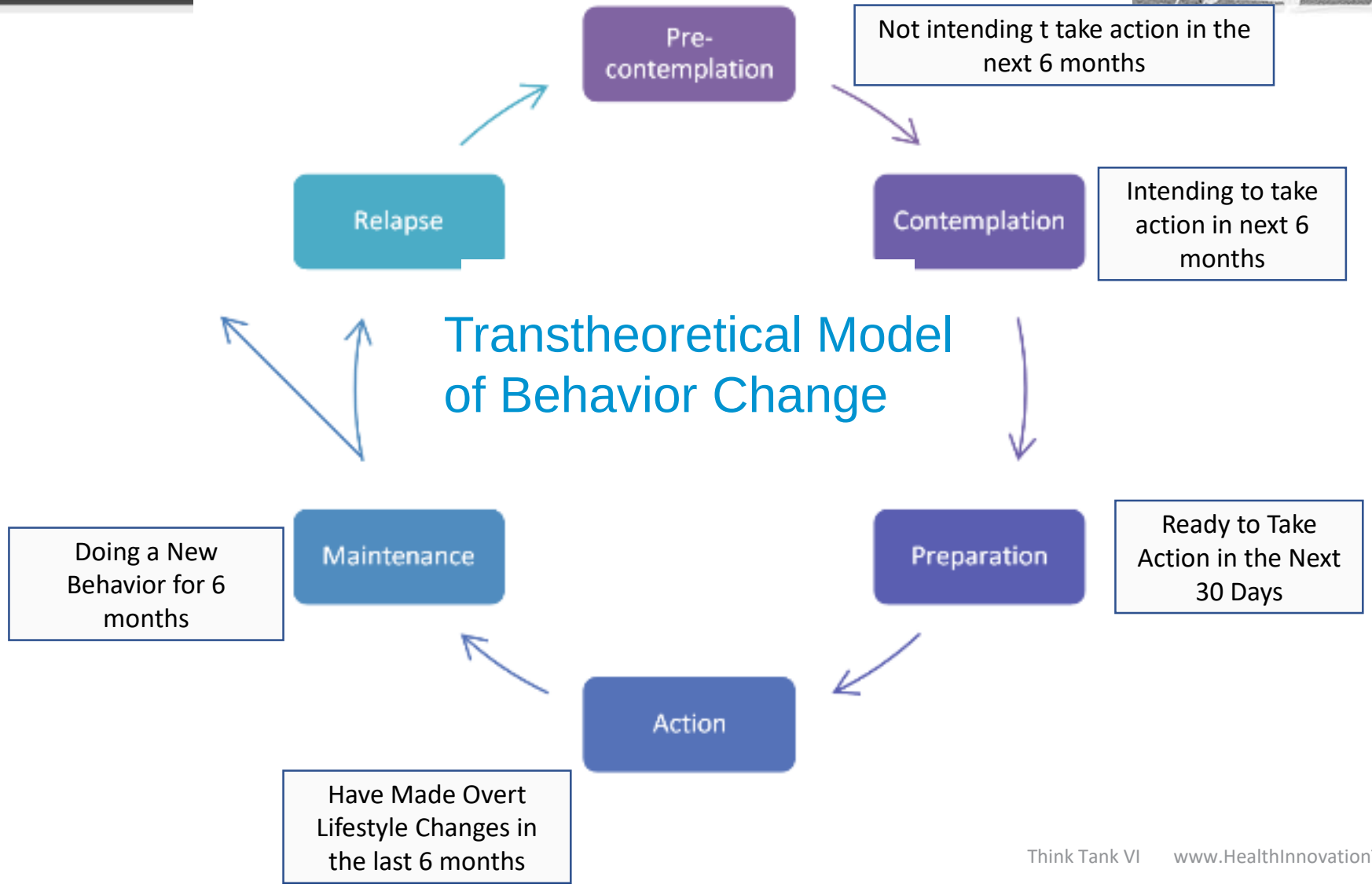
National Institute for Minority Health and Health Disparities grant R01 MD006213

ClinicalTrials.gov Identifier: NCT01827215

Recruitment Distribution of Study Subjects from 35 states and 242 cities (N=528)

National Institute for Minority Health and Health Disparities grant R01 MD006213

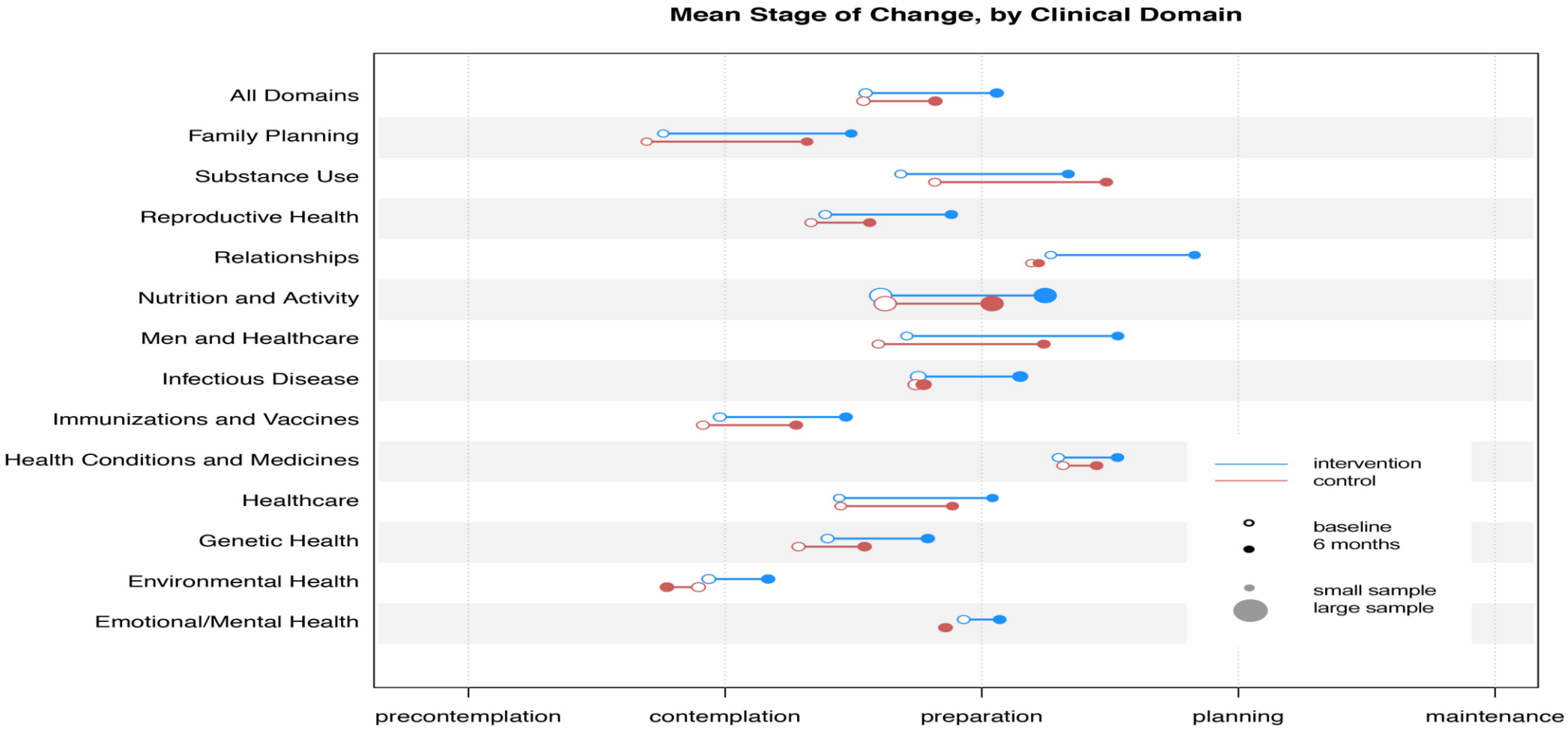
Outcome Variable Based on the Transtheoretical Model



Primary Outcomes at 6 Months and Maintained at 12 Months

	Gabby Group (n = 262) rate per 10 risks triggered (SD)	Control Group (n = 266) rate per 10 risks triggered* (SD) †	Rate Ratio‖	P-value‡
At 6 months:				
Number of risks at action or maintenance§	5.00 (2.89)	4.27 (2.83)	1.17	0.0004
Number of risks that progressed¶	4.21 (2.62)	3.55 (2.32)	1.19	0.0012
Number of risks that progressed or remained at action or maintenance	5.94 (2.73)	5.12 (2.73)	1.16	0.0010
At 12 months:				
Number of risks at action or maintenance	5.6 (2.75)	5.09 (2.94)	1.1	0.0001
Number of risks that progressed	4.37 (2.71)	4.02 (2.54)	1.09	0.0710
Number of risks that progressed or remained at action or maintenance	6.4 (2.70)	5.68 (2.93)	1.13	0.0002

Mean Stage of Change by Health Content Area
Gabby vs. Control



Participant Quotes about Gabby

"The nurse or doctor they tell you, but like, how they say it, they say it in different ways. But how Gabby said it - she actually said something that I actually understood!" **Participant #76)**

"Sometimes the doctor is really busy - they might not have the time to answer…have time or the patience to talk with you about those issues… so in that way Gabby is better." **(Participant #61)**

"Umm, its like, it seems like she is not going to judge you if, like, there are things that you <u>did</u> or something." **(Participant #76)**

Final Thoughts

1. **Patient Facing AI is now a reality**
2. **Gabby is the most advanced, comprehensive and tested HIT system currently available**
3. **Can be**
   - -- **Adjunct to Clinical Care**
   - -- **Population Health Tool**
4. **Scalability can address Important Clinical Problems**
   - -- **Plans for trials to address clinical outcome**
5. **Young consumers want to use this technology**
6. **Emphasis is now on implementation**

Break

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JOHN HALAMKA, MD,
&
PAUL CERRATO, MA

TACKLING THE MISDIAGNOSIS DILEMMA WITH MACHINE LEARNING

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TACKLING THE MISDIAGNOSIS DILEMMA WITH MACHINE LEARNING

- Diagnostic errors cause 6-17% of hospital adverse effects
- Dx errors affect about 12 million US adults annually.
- Autopsy data: dx errors contribute to about 10% of deaths about 280,000 deaths/year.
- Only 500 airplane accident deaths in one year.

TACKLING THE MISDIAGNOSIS DILEMMA WITH MACHINE LEARNING

Source: CRICO, the risk management foundation of the Harvard Medical Institutions

TACKLING THE MISDIAGNOSIS DILEMMA WITH MACHINE LEARNING

What's causing these mistakes?

"The complexity of medicine now exceeds the capacity of the human mind." (NEJM)

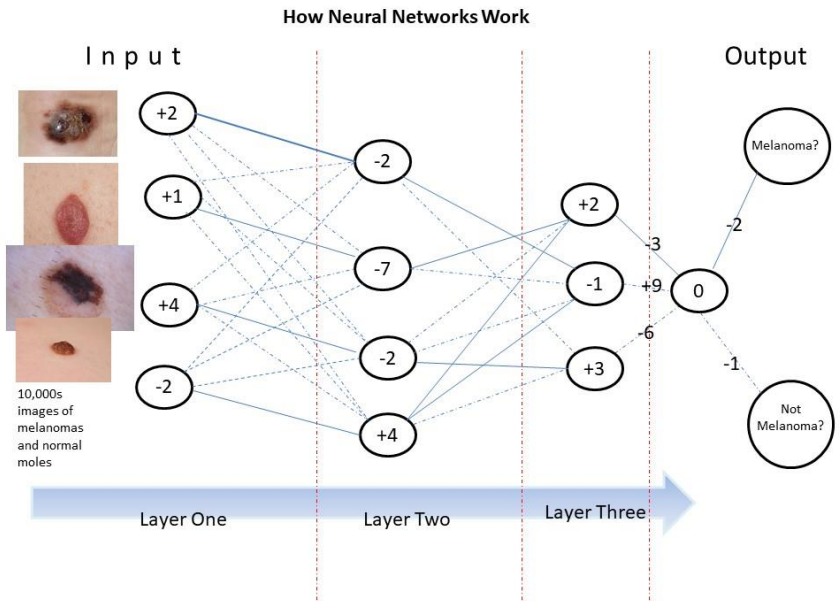
TACKLING THE MISDIAGNOSIS DILEMMA WITH MACHINE LEARNING

Role of machine learning in Medicine

IBM Deep Blue Supercomputer vs Google's AlphaZero:
Old school vs new school AI.

- Old school example: Encyclopedia-like clinical decision-making tools vs machine-learning based algorithms for diabetic retinopathy, melanoma, sepsis etc
- Use of deep learning and neural networks—giant step forward in digital world

TACKLING THE MISDIAGNOSIS DILEMMA WITH MACHINE LEARNING



Machine learning vs skin cancer

- Deep convolutional neural network
- Algorithm can distinguish melanoma from normal mole, initially trained using 129,000 clinical images
- As effective as trained dermatologists is accurately diagnosing skin cancer

Esteva A. Kuprel B, Novoa RA et al. Dermatologist-level classification of skin cancer with deep neural networks. *Nature.* 2017;542:115-118.

PBS Video: https://www.pbs.org/video/what-neural-net-ncuj6v/

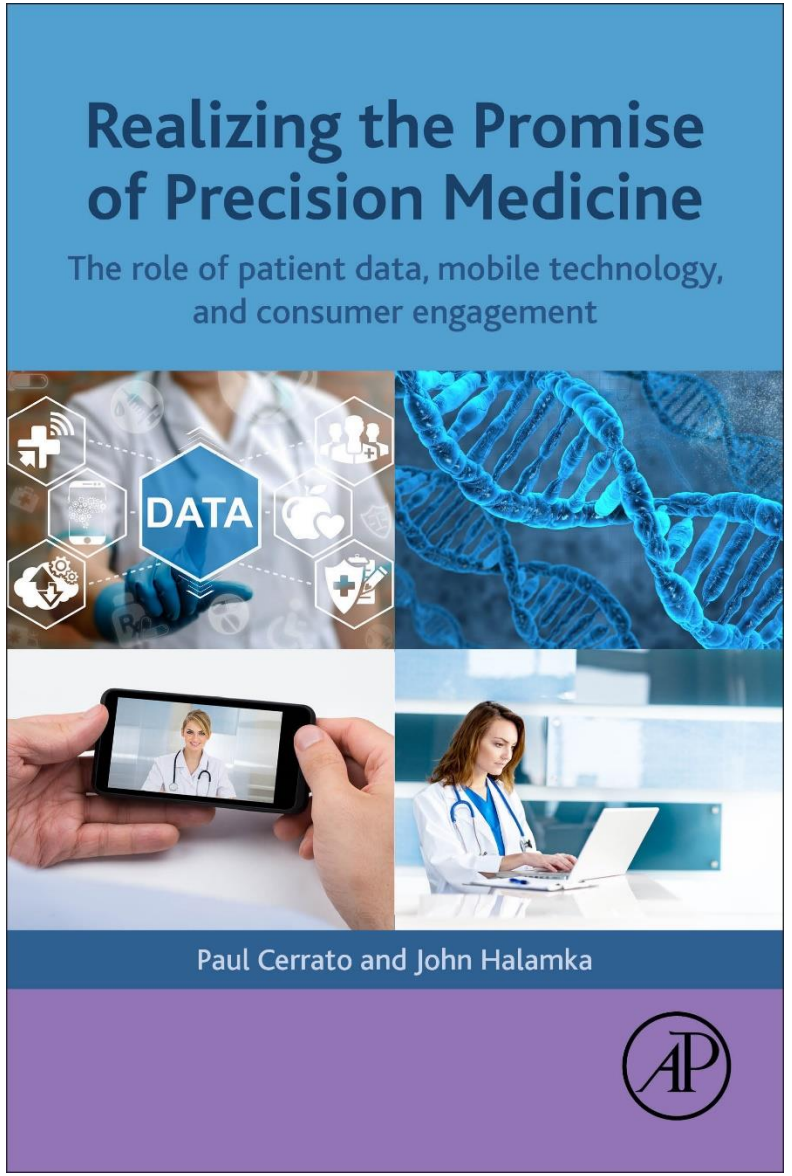
Tackling the Misdiagnosis Dilemma with Machine Learning

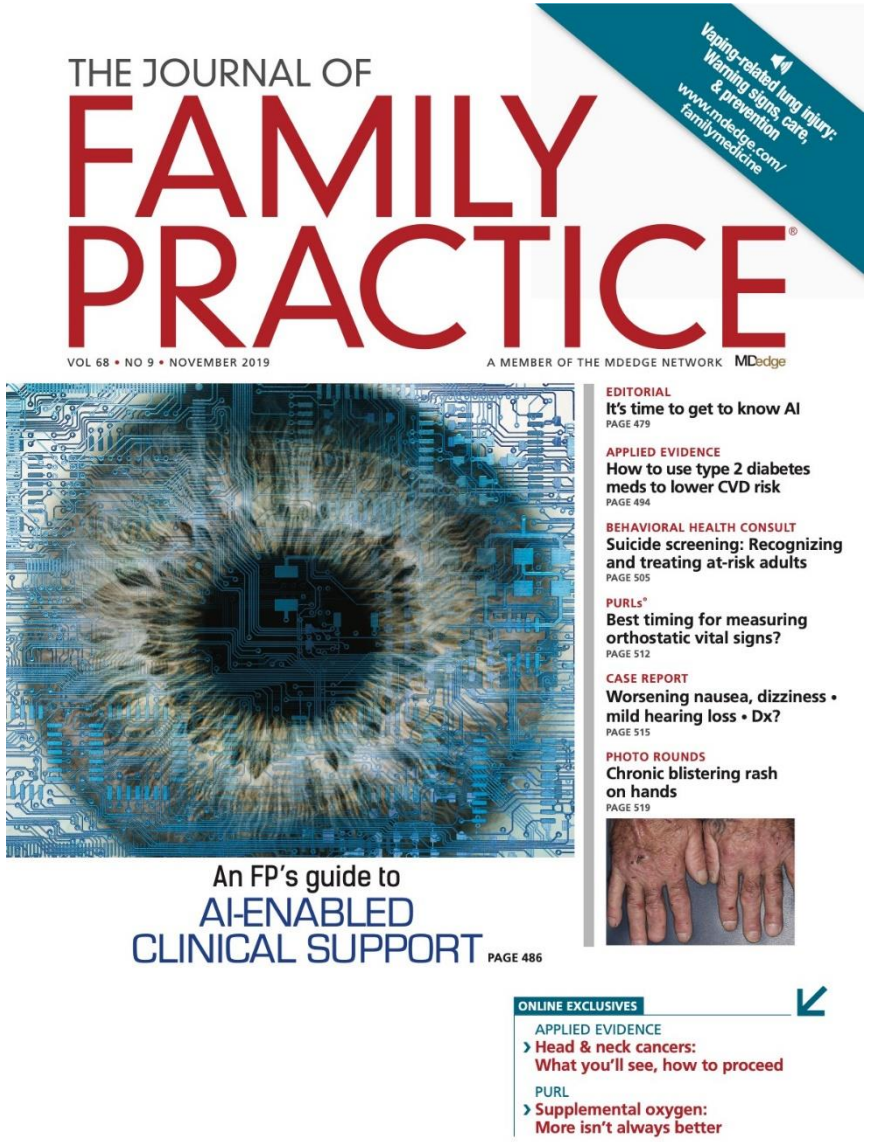
- IDx-DR is FDA cleared system that uses fundus camera and machine learning based algorithms to analyze retinal images and help detect diabetic retinopathy

- Google research:
  - Trained on 128,175 retinal images
  - Compared computer analysis to analysis by 54 ophthalmologists
  - Computer-based results: 87% to 90% sensitivity, 98% specificity
  - As good as or better than human counterparts
  - Gulshan et al. Development and Validation of a Deep Learning Algorithm for Detection of Diabetic Retinopathy in Retinal Fundus Photographs. JAMA. 2016;316(22):2402-2410.

HARV
MEDICAL SC

The Transformative Power of Mobile Medicine
Leveraging Innovation, Seizing Opportunities, and Overcoming Obstacles of mHealth
Paul Cerrato and John Halamka


Realizing the Promise of Precision Medicine
The role of patient data, mobile technology, and consumer engagement
DATA
Paul Cerrato and John Halamka


THE JOURNAL OF
FAMILY PRACTICE
Vaping-related lung injury: Warning signs, care, & prevention www.mdedge.com/familymedicine
VOL 68 • NO 9 • NOVEMBER 2019
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EDITORIAL
It's time to get to know AI
PAGE 479
APPLIED EVIDENCE
How to use type 2 diabetes meds to lower CVD risk
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BEHAVIORAL HEALTH CONSULT
Suicide screening: Recognizing and treating at-risk adults
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PURLs®
Best timing for measuring orthostatic vital signs?
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CASE REPORT
Worsening nausea, dizziness • mild hearing loss • Dx?
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Chronic blistering rash on hands
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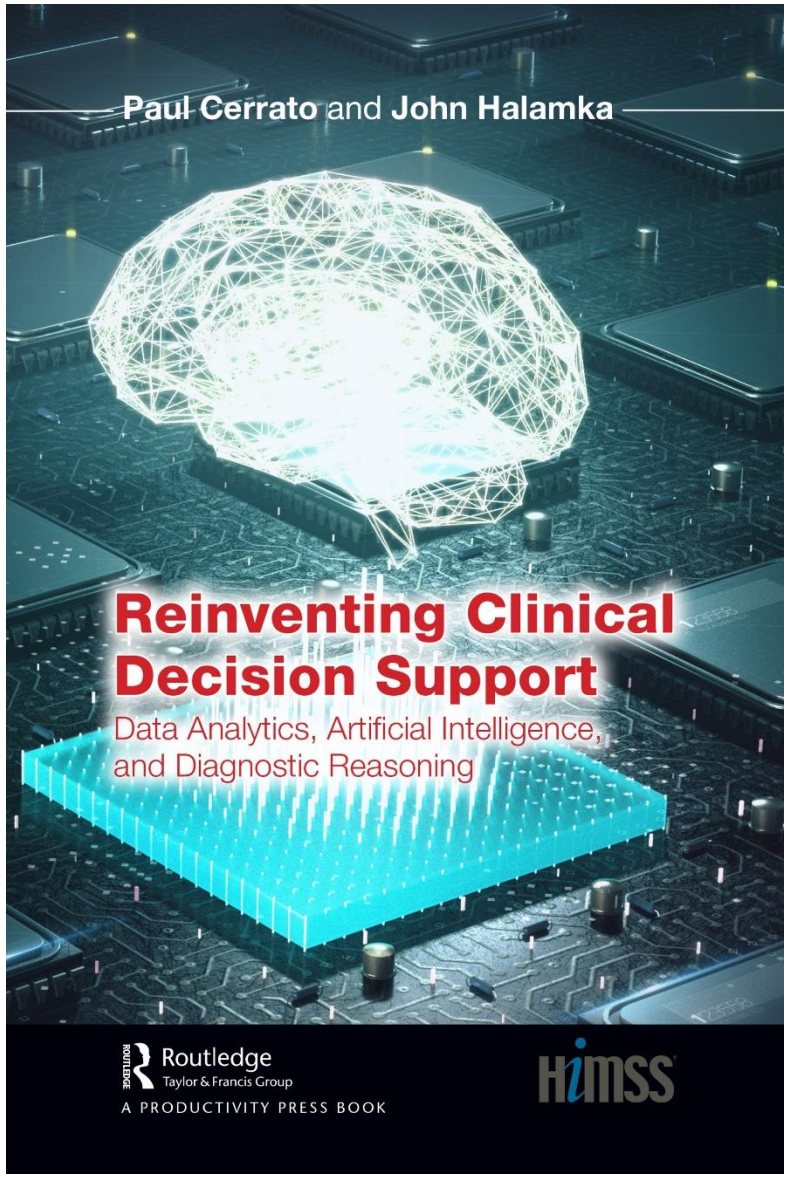
An FP's guide to
AI-ENABLED CLINICAL SUPPORT PAGE 486
ONLINE EXCLUSIVES
APPLIED EVIDENCE
› Head & neck cancers: What you'll see, how to proceed
PURL
› Supplemental oxygen: More isn't always better


Paul Cerrato and John Halamka
Reinventing Clinical Decision Support
Data Analytics, Artificial Intelligence, and Diagnostic Reasoning
Routledge
Taylor & Francis Group
A PRODUCTIVITY PRESS BOOK
HIMSS

TACKLING THE MISDIAGNOSIS DILEMMA WITH MACHINE LEARNING

Resources

Targeting depressive symptoms with technology, mHealth. http://mhealth.amegroups.com/article/view/26996/html

Precision Medicine: Q&A with Paul Cerrato and John Halamka, MD
https://www.medpagetoday.com/resource-centers/ra-pso-psa-related-disorders/precision-medicine-qa-paul-cerrato-and-john-halamka-md/1383

Will AI Improve Cancer Diagnosis and Treatment?
https://www.idigitalhealth.com/news/will-ai-improve-cancer-diagnosis-and-treatment

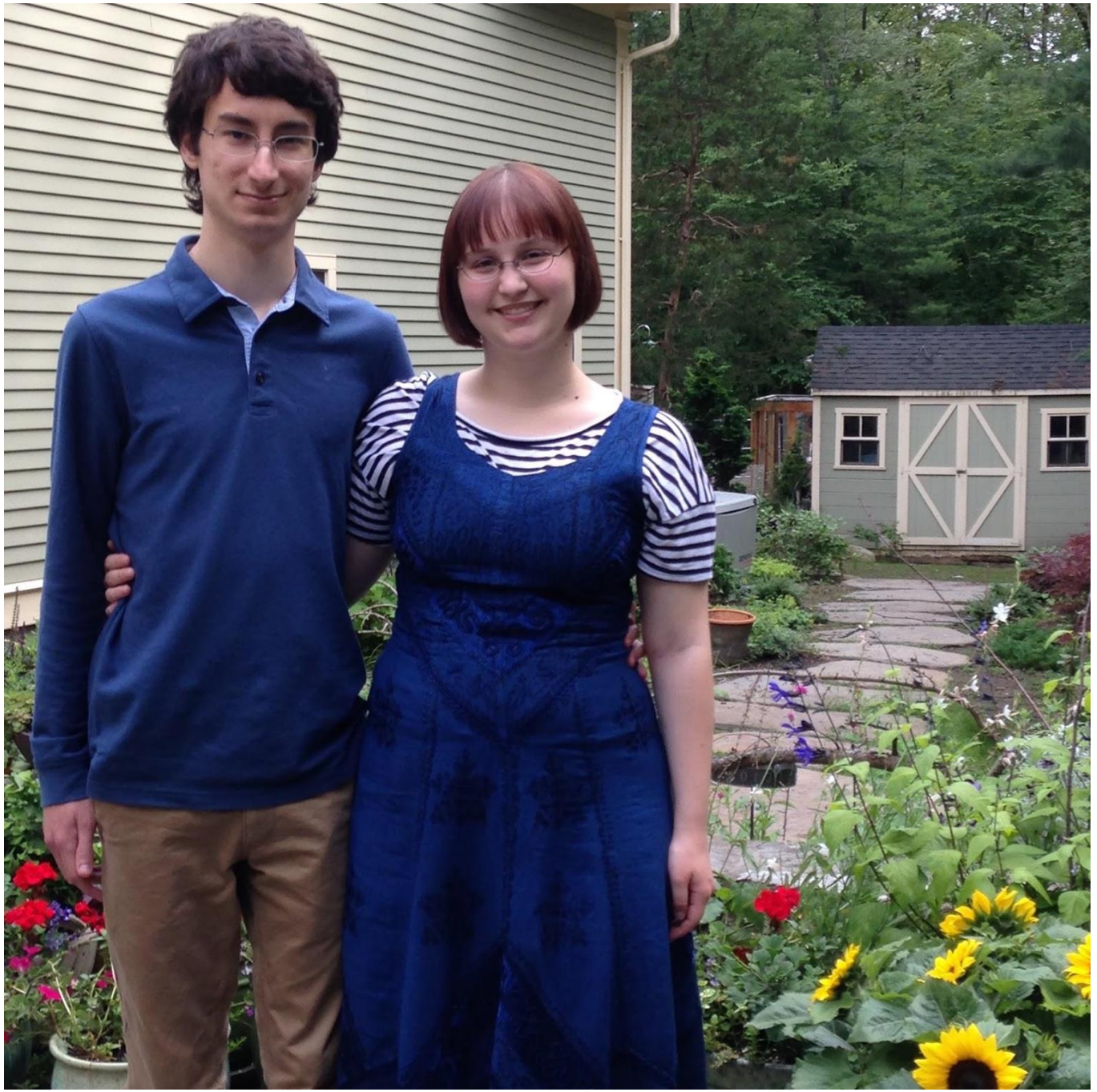
Mental Health Apps: Do They Work? Are They Safe?
https://www.idigitalhealth.com/news/mental-health-mhealth-apps-work-safe

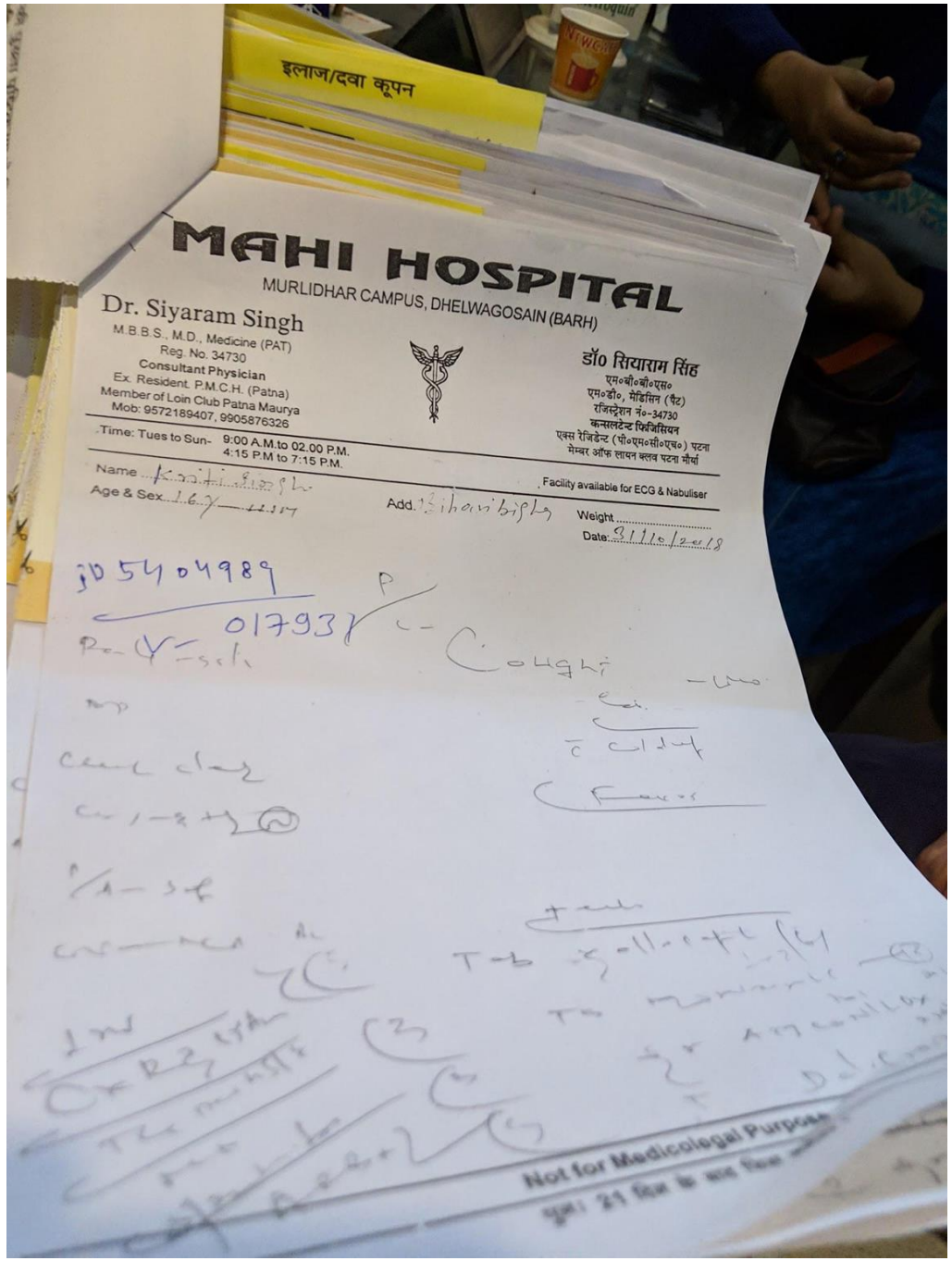
Thi**s Just In: "The Transformative Power of Mobile Medicine" with Paul Cerrato & Dr. John Halamka**
https://www.youtube.com/watch?v=grqtUdO5IPM

Realizing the Promise of Precision Medicine
https://www.amazon.com/Realizing-Promise-Precision-Medicine-Technology/dp/0128116358

The Transformative Power of Mobile Medicine
https://www.elsevier.com/books/the-transformative-power-of-mobile-medicine/cerrato/978-0-12-814923-2?countrycode=US&campaign_source=google_ads&campaign_medium=paid_search&campaign_name={campaign}&gclid=EAIaIQobChMI_cGUrrTP5QIVn4FaBR2P_AyTEAQYASABEgK52fD_BwE

UNITY FARM

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MURLIDHAR CAMPUS, DHELWAGOSAIN (BARH)
Dr. Siyaram Singh
M.B.B.S., M.D., Medicine (PAT)
Reg. No. 34730
Consultant Physician
Ex. Resident. P.M.C.H. (Patna)
Member of Loin Club Patna Maurya
Mob: 9572189407, 9905876326
डॉ० सियाराम सिंह
एम०बी०बी०एस०
एम०डी०, मेडिसिन (पैट)
रजिस्ट्रेशन नं०-34730
कन्सलटेन्ट फिजिसियन
एक्स रेजिडेन्ट (पी०एम०सी०एच०) पटना
मेम्बर ऑफ लायन क्लब पटना मौर्या
Time: Tues to Sun- 9:00 A.M.to 02.00 P.M.
4:15 P.M to 7:15 P.M.
Facility available for ECG & Nabuliser
Name
Age & Sex
Add.
Weight
Date:
Not for Medicolegal Purpose

LONDON

One of the most respected and experienced digital health experts in the world last week called on the Australian Digital Health Agency (ADHA) to stop the current trajectory of the My Health Record (MHR) project immediately and refocus and prioritise investment where it will have real and near-term benefit for the Australian health system.

What Innovations Will We Adopt in the Short Term?

- Internet of things and wearable health devices will connect to the enterprise
- Artificial Intelligence and Machine Learning are mainstream tools available
- from multiple platform providers
- The era of apps and cloud hosted services has arrived
- Application Programming Interfaces are increasing in number and sophistication
- New incentives will shape strategy

Challenges We Still Face

- Medical/legal precedent for acting on new sources of data
- Data provenance
- Turning data into information, knowledge and wisdom
- Understanding normal variation
- Security and privacy concerns

TACKLING THE MISDIAGNOSIS DILEMMA WITH MACHINE LEARNING

Harvard Business Review

Technology | 3 Myths About Machine Learning in Health Care

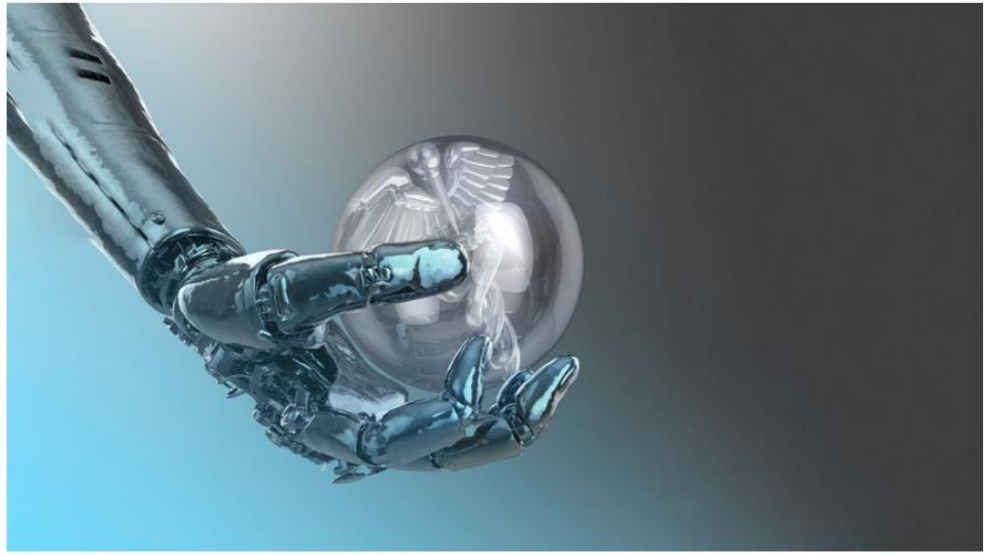
TECHNOLOGY

3 Myths About Machine Learning in Health Care

by Derek A. Haas, Eric C. Makhni, Joseph H. Schwab, and John D. Halamka

November 13, 2019

Summary Save Share 2 Comment Print $8.95 Buy Copies



VICTOR HABBICK VISIONS/SCIENCE PHOTO LIBRARY/GETTY IMAGES

https://hbr.org/2019/11/3-myths-about-machine-learning-in-health-care

Closing Thoughts

- The future for the app and cloud economy is very bright
- Government can be a convener, enabler, and funder
- The technology we need is already in place
- API standards are rapidly maturing
- The EHR is necessary but will no longer be the center of the healthcare universe

STEVEN LANE, MD, MPH

CLINICAL INFORMATICS DIRECTOR, PRIVACY, INFORMATION SECURITY & INTEROPERABILITY
SUTTER HEALTH

INTEROPERABILITY:

DATA LIQUIDITY TO SUPPORT CARE COORDINATION AND POPULATION HEALTH

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Perspective

- Primary care family physician x > 30 years
- Clinical informaticist x > 25 years – Interoperability focus x 10
  - California Payer-Provider HIE Collaborative Workgroup
  - Car*e*quality – Board, Steering Committee
  - DirectTrust – Clinicians Steering Workgroup
  - Epic Care Everywhere Governing Council
  - HL7 Da Vinci Project – Steering Committee, Clinical Advisory Council
  - HIMSS – Interoperability & HIE Committee
  - HHS/ONC – Health Information Technology Advisory Committee
  - The Sequoia Project – Board

Outline

- Interoperability
  - Definitions
  - Tools / standards
  - Successes
  - Challenges

Interoperability Definitions

21st Century Cures Act

- Health information technology that enables the secure exchange of electronic health information with and use of electronic health information from, other health information technology without special effort on the part of the user;
- allows for complete access, exchange, and use of all electronically accessible health information for authorized use under applicable State or Federal law;
- does not constitute information blocking

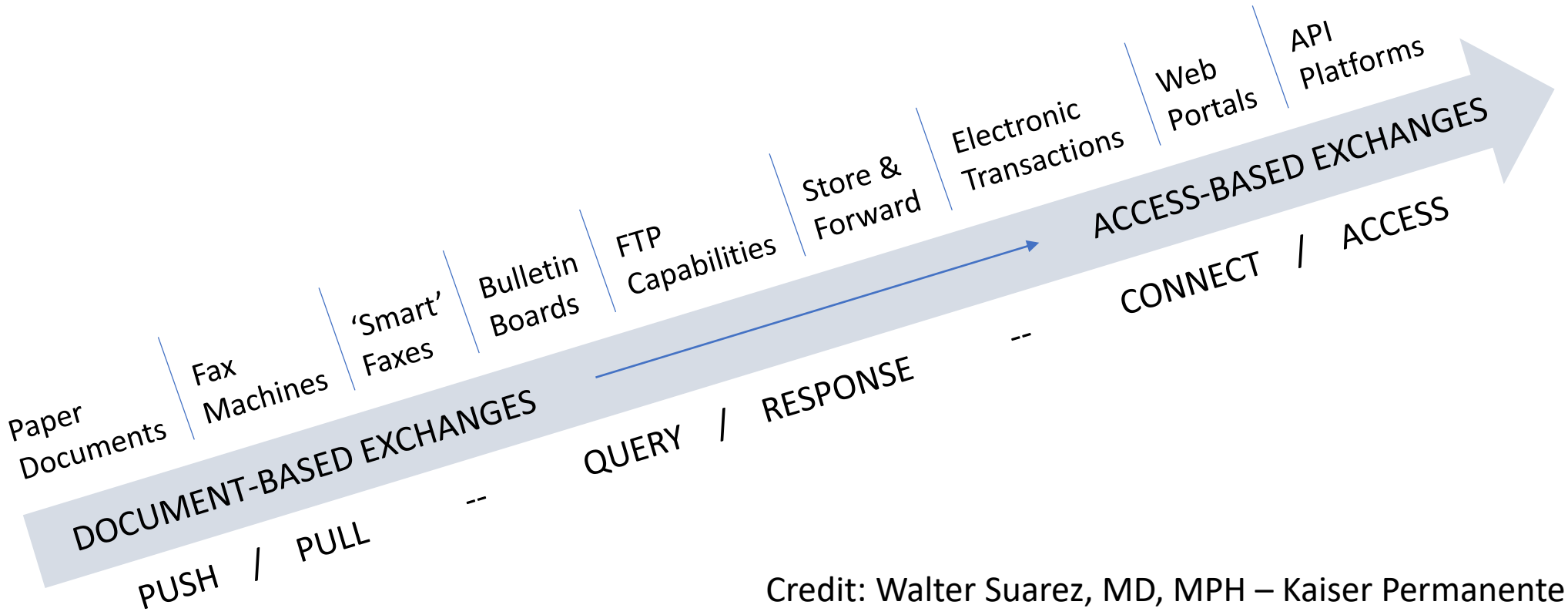
HL7

- Technical Interoperability: Physical conveyance of a 'payload' including syntax
- Semantic Interoperability: Communication of consistent meaning of information
- Process Interoperability: Useful integration of exchanged information into an actual workflow or work setting, assuring the system's usability

HIMSS

- Foundational Interoperability: System connectivity
  > Data
- Structural Interoperability: Field level formatting
  > Syntax
- Semantic Interoperability: Codification of data
  > Interpretation, meaning
- Organizational Interoperability: Functional, policy, workflow
  > Utility, benefit, outcomes

Evolution of Interoperability Tools



Credit: Walter Suarez, MD, MPH – Kaiser Permanente

Evolution of Interoperability Data Standards

- 1982 – Accredited Standards Committee (ASC) X12 Version 1
  - Electronic Data Interchange (EDI) for financial / administrative transactions
  - 1996 – Named in HIPAA as required standard

- 1987 – Health Level 7 (HL7) Version 2
  - Point-to-point connectivity
  - Intra-operability within institutions

- 2005 – HL7 Clinical Document Architecture (CDA)
  - Human readable XML documents
  - Scalable

- 2011 – HL7 Fast Healthcare Interoperability Resources (FHIR®)
  - Modern, flexible, healthcare focused
  - 2019 – First normative release (R4)

Interoperability Successes

- HIE/HIOs – Regional, state level, proprietary
  - Central data repository
  - Connectivity, messaging for multiple stakeholders
  - Services – ADT/event reporting, analytics, shared care plan
- National Networks
  - Direct Interoperability
  - eHealth Exchange
  - Vendor-based Networks: CommonWell, Epic Care Everywhere
- Car*e*quality Framework

- FHIR® and application programming interfaces / APIs (Appendix)
  - Patient access and patient-mediated exchange

Direct Interoperability

- All ONC certified EHRs have the ability to send and receive Direct messages, though many have not implemented this functionality
  - 2.2M Direct Addresses, 232K organizations, 292K patients/consumers
- Use cases:
  - Transitions of care; closed loop referrals
  - Care coordination messaging
  - Push notifications – Event notification, results delivery, reporting

- **70M** transactions per month

eHealth Exchange

- Four Federal Agencies
  - Veterans Affairs
  - Department of Defense
  - Social Security Administration – Benefits determination
  - CMS – ESRD quality reporting
- 70,000 medical groups
- 5,200 dialysis centers
- 61 (>50%) of regional/state HIEs
- 75% of US hospitals
- 8,300 pharmacies
- 120M patients
- **16M** documents exchanged / month

CommonWell

- Core services:
  - Patient ID and linking
  - Record locator
  - Data Broker – Document exchange
- Participants: 15K provider sites
- 66M patient records

- **22M** documents exchanged / month

Epic Care Everywhere

- 367 Epic customer organizations
  - Hospitals with access: 1,983
  - Clinics: 45,671
- All 50 states +
  - Australia
  - Canada
  - England
  - Lebanon
  - Netherlands
  - United Arab Emirates
- Non-Epic connections via eHealth Exchange, Carequality, direct:
  - 1,652 connections to 110 unique vendors

- **120M** documents exchanged / month

Carequality

- Policy framework and technical methodology for networks and other implementers to exchange with each other
  - CommonWell, Epic Care Everywhere, eHealth Exchange (soon)
- 600,000 Physicians, 40,000 Clinics, 1,700 hospitals
- Working with The Sequoia Project as the Recognized Coordinating Entity (RCE) to implement the national Trusted Exchange Framework & Common Agreement (TEFCA)

- **80M** documents exchanged / month

Standards-Based Exchange Volumes

	Monthly documents exchanged	Monthly transactions	All-time totals
DirectTrust		70M	1.2B messages
eHealth Exchange	16M		
CommonWell	22M		119M records
Epic Care Everywhere	120M		
Carequality Framework	80M		500M records

Interoperability Challenges

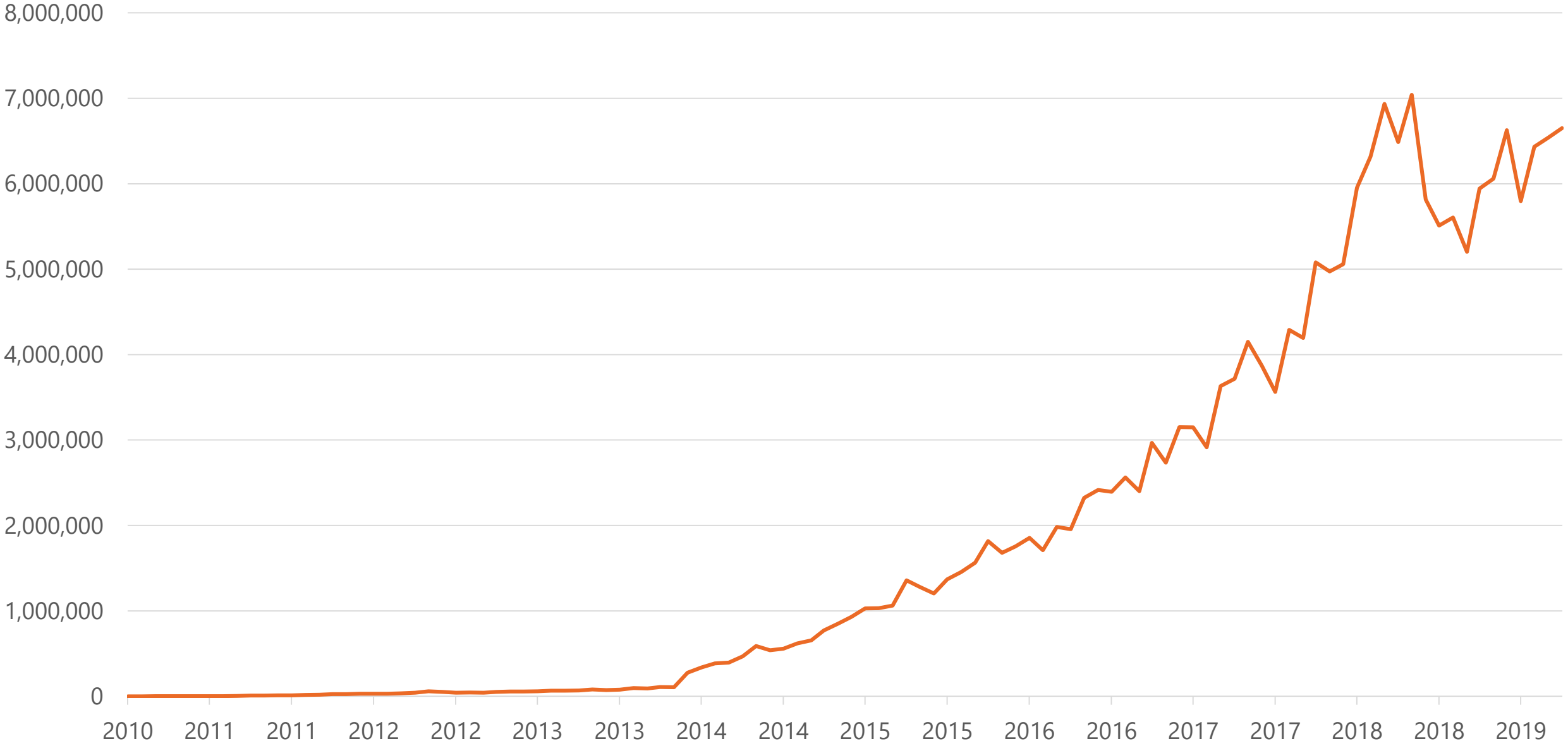
Data liquidity and access is critical to support Care Coordination and Population Health

BUT…

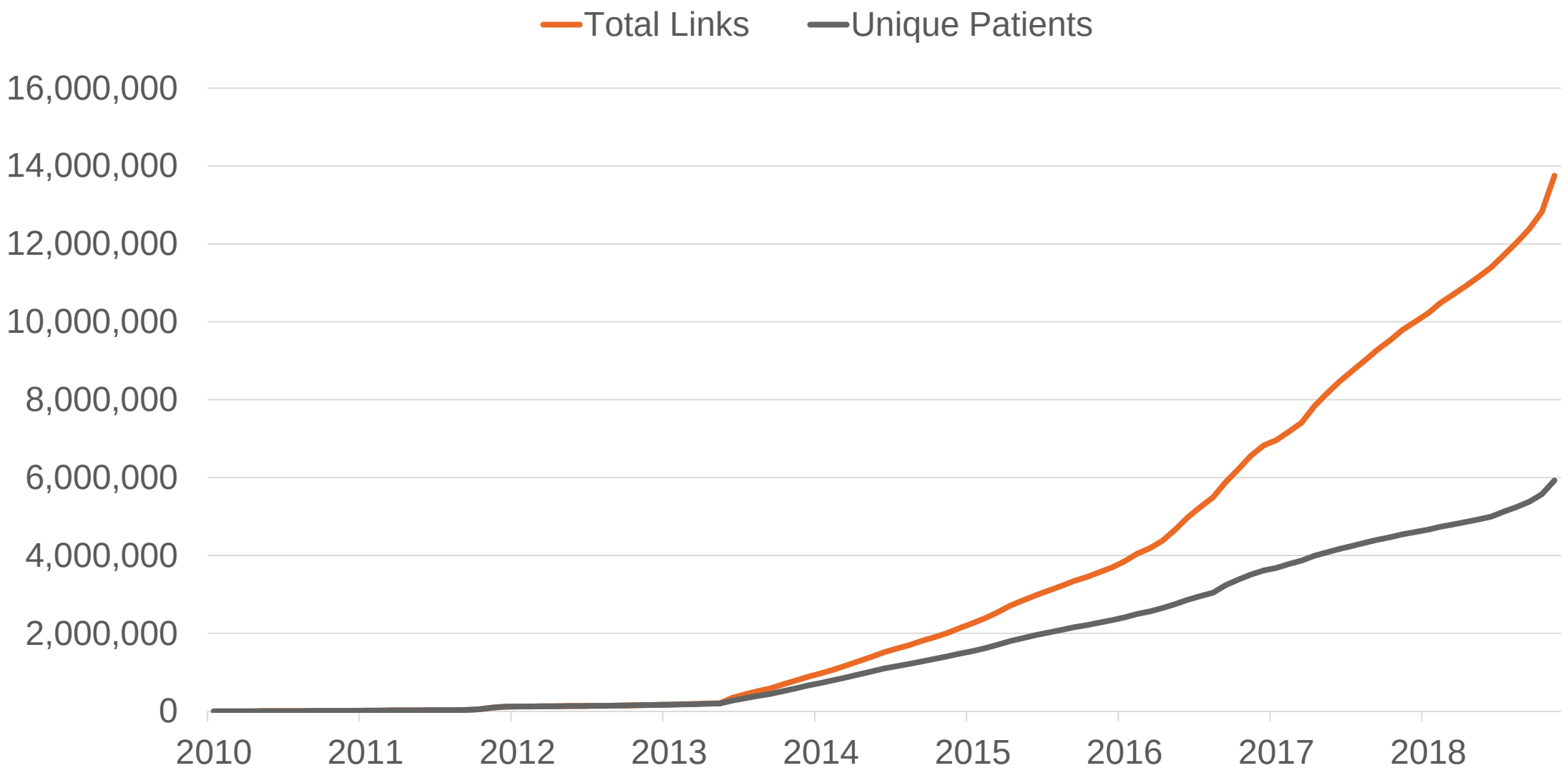
Significant challenges exist:

- Clinicians drowning in data (and messages)
- Discrete data reconciliation, integration and use
- Competing priorities
- Aligned incentives – Value-based care

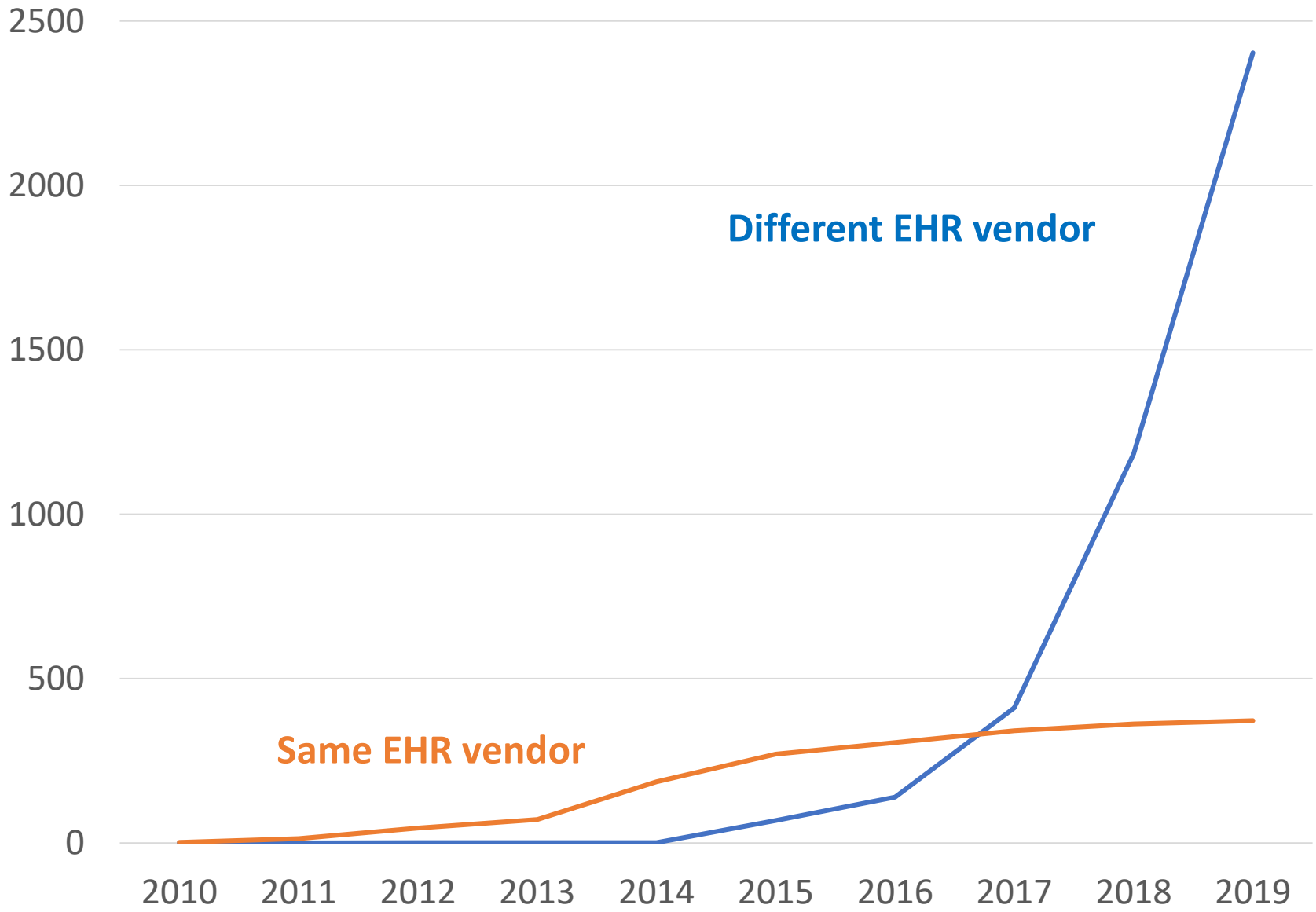
Patient Records Exchanged Monthly @ Sutter



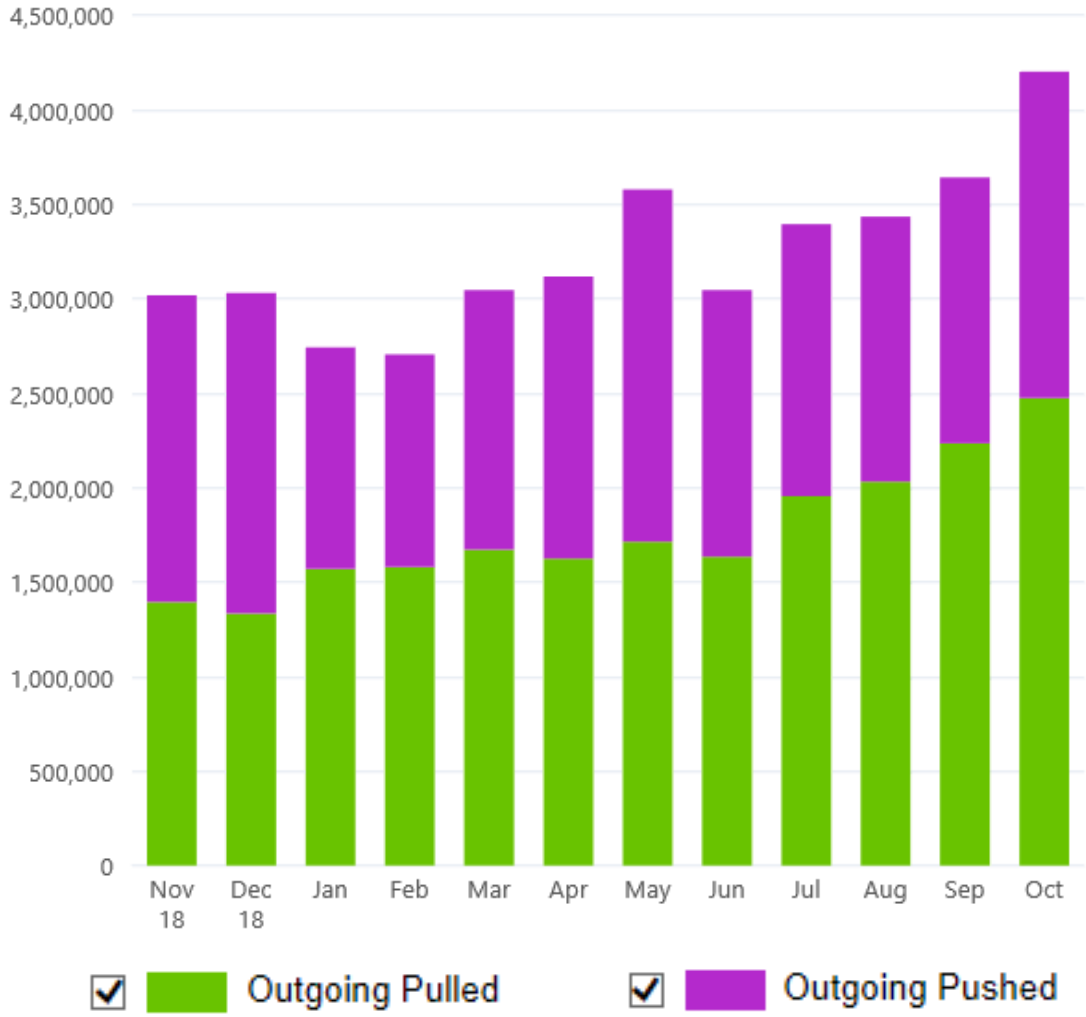
Cumulative Patient Links @ Sutter



Unique Trading Partners

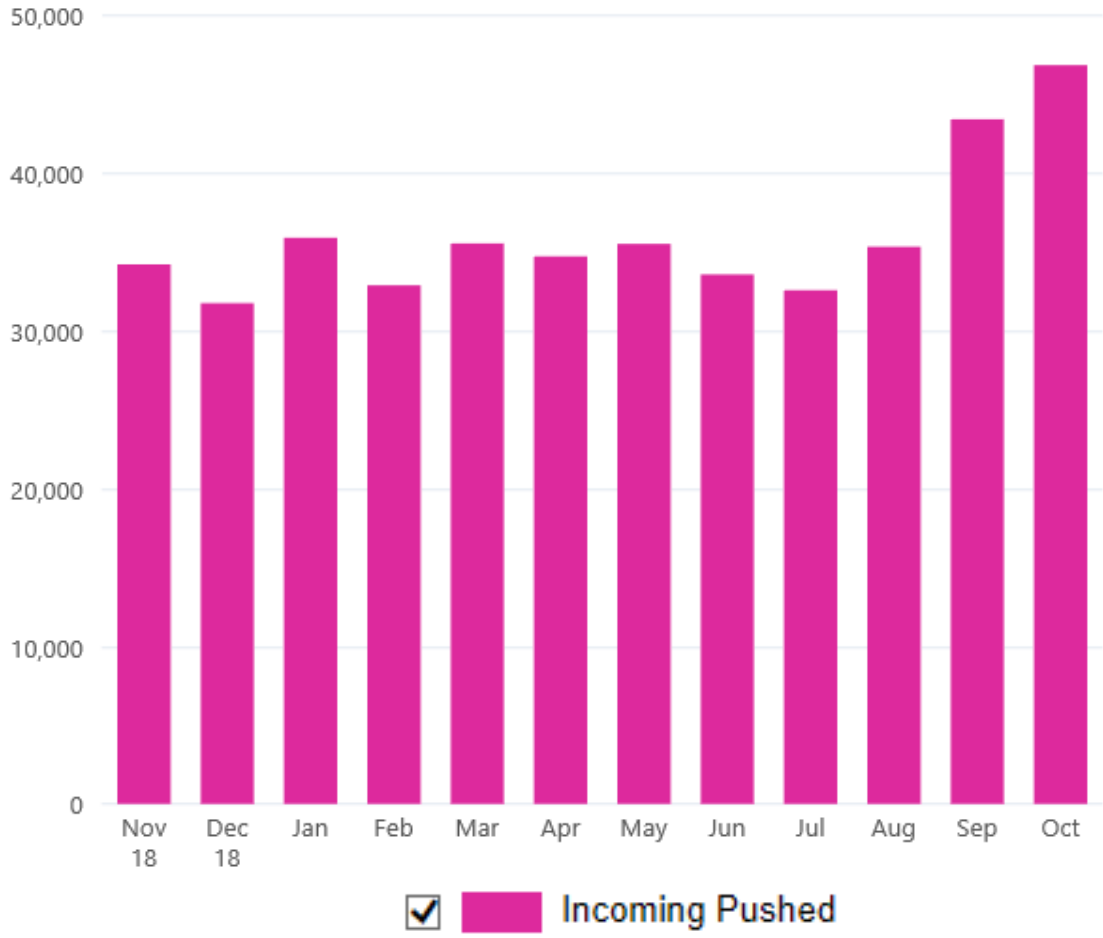


Incoming vs. Outgoing Messages



Incoming Direct Messages

- Transitions of Care
- Referrals
- Pharmacy notifications; Izs.
- Pharmacy Benefit Management notifications
- ***#AxeTheFax…***
  - BUT lack consistent message context, robust routing functiona message delivery notification, standard email functions – Subje CC, reply, forward, etc.



Discrete Data Reconciliation

- PAMI Data:
  - **P**roblem list diagnoses
  - **A**llergies
  - **M**edications
  - **I**mmunizations

INCORPORATED OUTSIDE DATA @ SUTTER

In the past month, clinicians added:

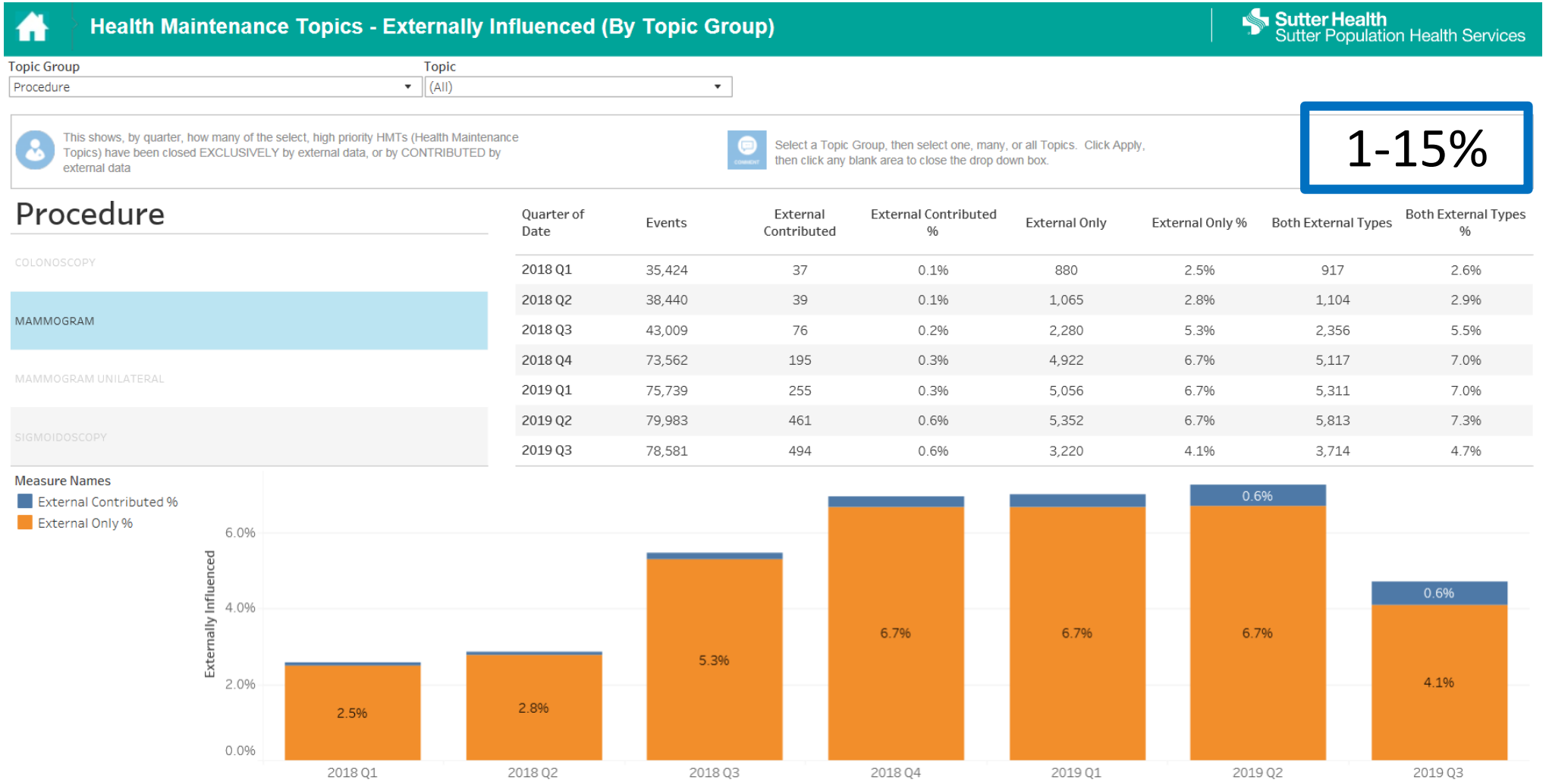
Problems	Allergies	Medications	Dispenses	Immunizations
44,622	17,492	56,660	100,582	260,318

- Standardized mapping to established data sets
- Inconsistent data entry, formatting
- PAM data reconciliation required to meet MIPS/PI requirements re *Closing Referral Loops*

Discrete Data Integration and Use

- Additional data types:
  - Assessments – e.g., PHQ-9 depression screening
  - Care Teams
  - Clinical notes – Longitudinal view of internal & external encounters
  - Lab results
  - Procedures
  - Vital signs – Pediatric growth chart data, registry metrics

Care Gaps Closed by External Clinical Data



Quarter of Date	Events	External Contributed	External Contributed %	External Only	External Only %	Both External Types	Both External Types %
2018 Q1	35,424	37	0.1%	880	2.5%	917	2.6%
2018 Q2	38,440	39	0.1%	1,065	2.8%	1,104	2.9%
2018 Q3	43,009	76	0.2%	2,280	5.3%	2,356	5.5%
2018 Q4	73,562	195	0.3%	4,922	6.7%	5,117	7.0%
2019 Q1	75,739	255	0.3%	5,056	6.7%	5,311	7.0%
2019 Q2	79,983	461	0.6%	5,352	6.7%	5,813	7.3%
2019 Q3	78,581	494	0.6%	3,220	4.1%	3,714	4.7%

Questions?

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Appendices re FHIR®

Fast Healthcare Interoperability Resources (FHIR®)

- Modern web-base data structure, transport and security
- Supports exchange of targeted data via Application Programming Interfaces (APIs)
- Allows a user to request just the data (resources) of interest in a well-defined format
- Purpose-built for healthcare
- Rapid development without the need for specialized technical training
- International community of developers

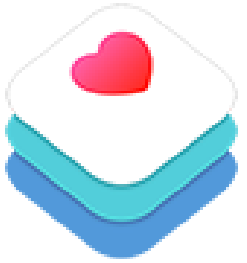
Regulatory / Policy Support for FHIR

- ONC 2015 Edition Certification Criteria Final Rule (October, 2016)
  - Certified EHRs must support API interfaces via open technology
- CMS Meaningful Use Stage 3
  - Providers must implement API platform and allow consumers to use third-party apps to access their health information
- CMS Interoperability and Consumer Access NPRM (February, 2019)
  - Proposed requiring health plans doing business with CMS must implement an API platform and allow consumers to use third-party apps to access the data health plans have on them (claims, financial)
- ONC Health IT Certification Updates and Information Blocking NPRM (February, 2019)
  - Proposed new API and FHIR certification requirements for EHRs and
  - Require entities subject to information blocking (providers, vendors, HIEs) to allow data access/exchange with other providers, health plans, consumers

Patient Access & Consumer-mediated Exchange

- Based on HIPAA individual right of access to health data
- Early FHIR® success
  - Blue Button 2.0 – CMS making claims data available to Medicare beneficiaries via API, FHIR, and Apps
  - Apple Health Records

Apple Health Records

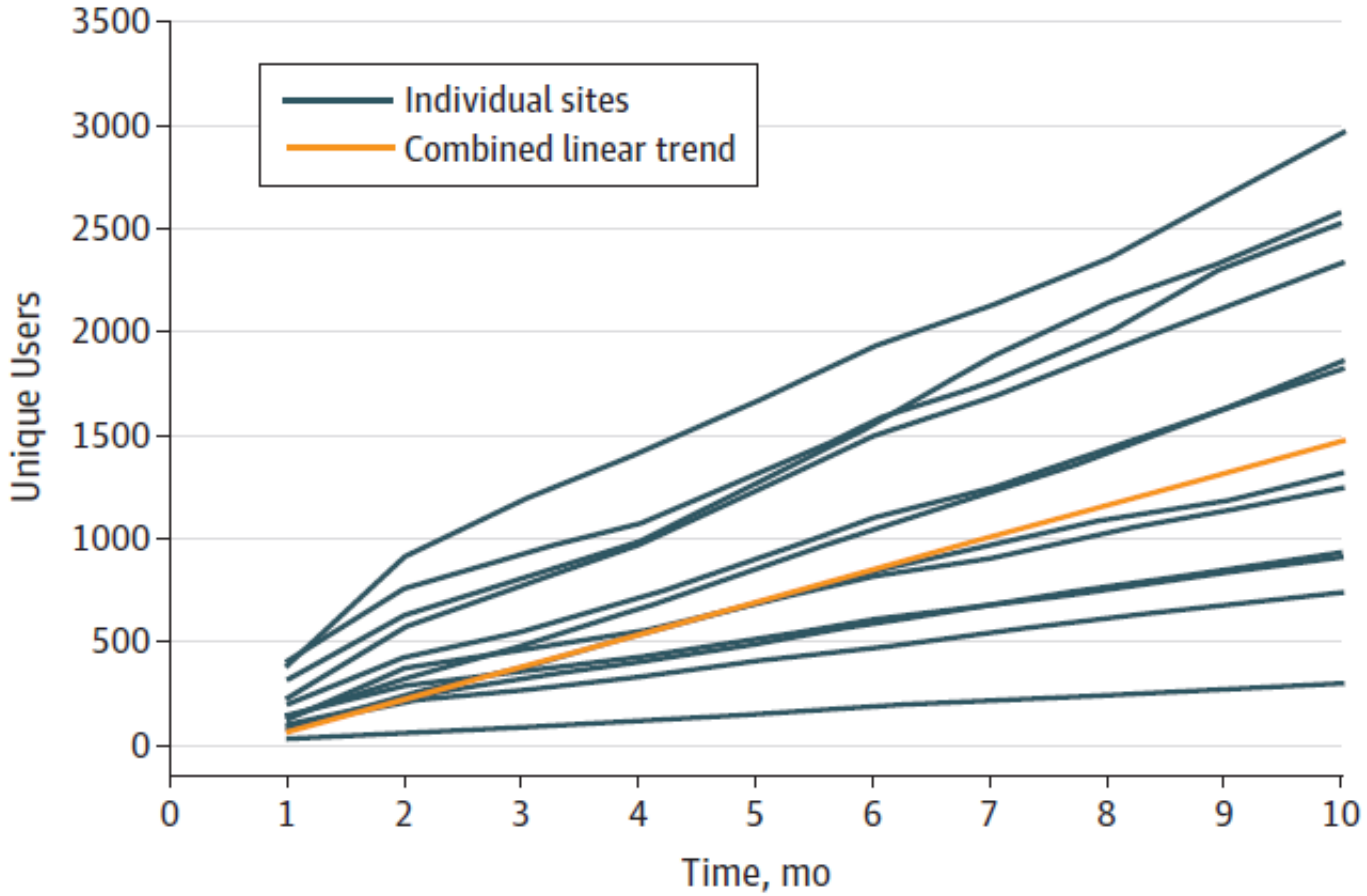


- Apple Health Records
  - Healthcare organizations offer FHIR® API-based access to data from multiple vendors – AthenaHealth, Cerner, Epic, VA (11/2019)
  - LabCorp and Quest lab data access / integration
  - 387 organizations/practices live a/o 10/23/2019 https://support.apple.com/en-us/HT208647
  - Data maintained in iOS
  - Individuals allow apps to access and use data collected in personal record

➢ Samsung Health

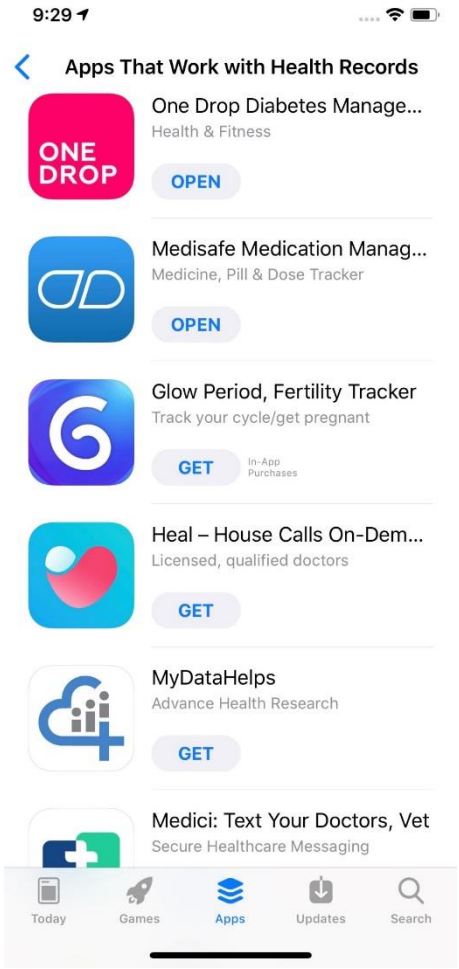
Patient-facing API Access Metrics

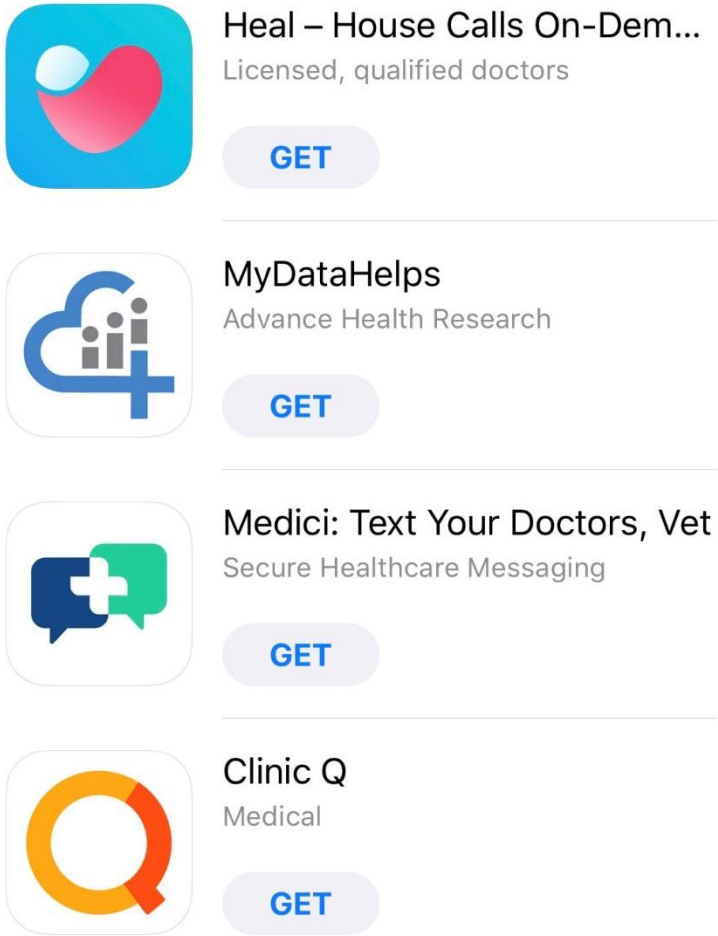
- 12 health systems' go-live experience (Adler-Milstein J, Longhurst C, JAMA)



Apps leveraging Health Record Data

- 7 Patient facing apps:





Evolving FHIR Use Cases

- EHR applications
  - Argonaut Project – clinical notes, assessments, bulk data access
  - SMART – Substitutable Medical Apps, Reusable Technology (>70 apps)
- Payer-Provider Exchange
  - Da Vinci Project
  - CMS Beneficiary Claims Data API (BCDA) – Medicare ACO claims
  - CMS Data at the Point of Care (DPC) – Traditional Medicare claims
- Social Determinants of Health – Gravity Project
- Post-Acute Care Interoperability Project – PACIO
- Research – Vulcan

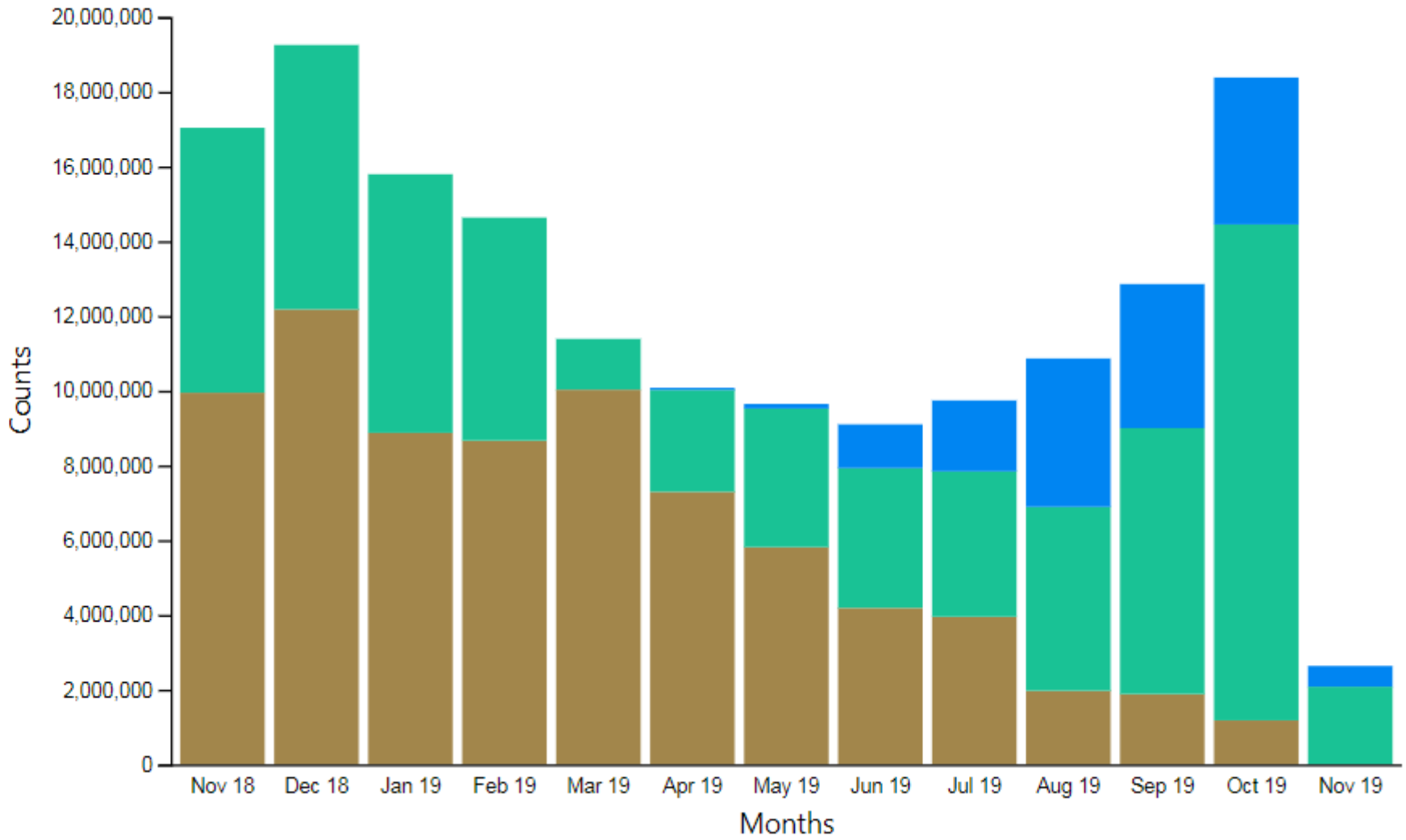
Apps connecting to us:

Reset

Search Apps

- + My Organization's Apps 6
- − App Orchard Apps 3
  - TC Trustee Premier for Patient Payments
  - Apple Health
  - VPSX
- + Meaningful Use 3 Apps 7
- + Unknown Apps 1

Counts of APIs invoked by **17 Apps** in **the past year**



MONICA BOLBJERG, MD

OPTIMIZING PATIENT ENGAGEMENT & CONSUMERISM

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Changing the patient experience

Whenever you interact with a patient

At home

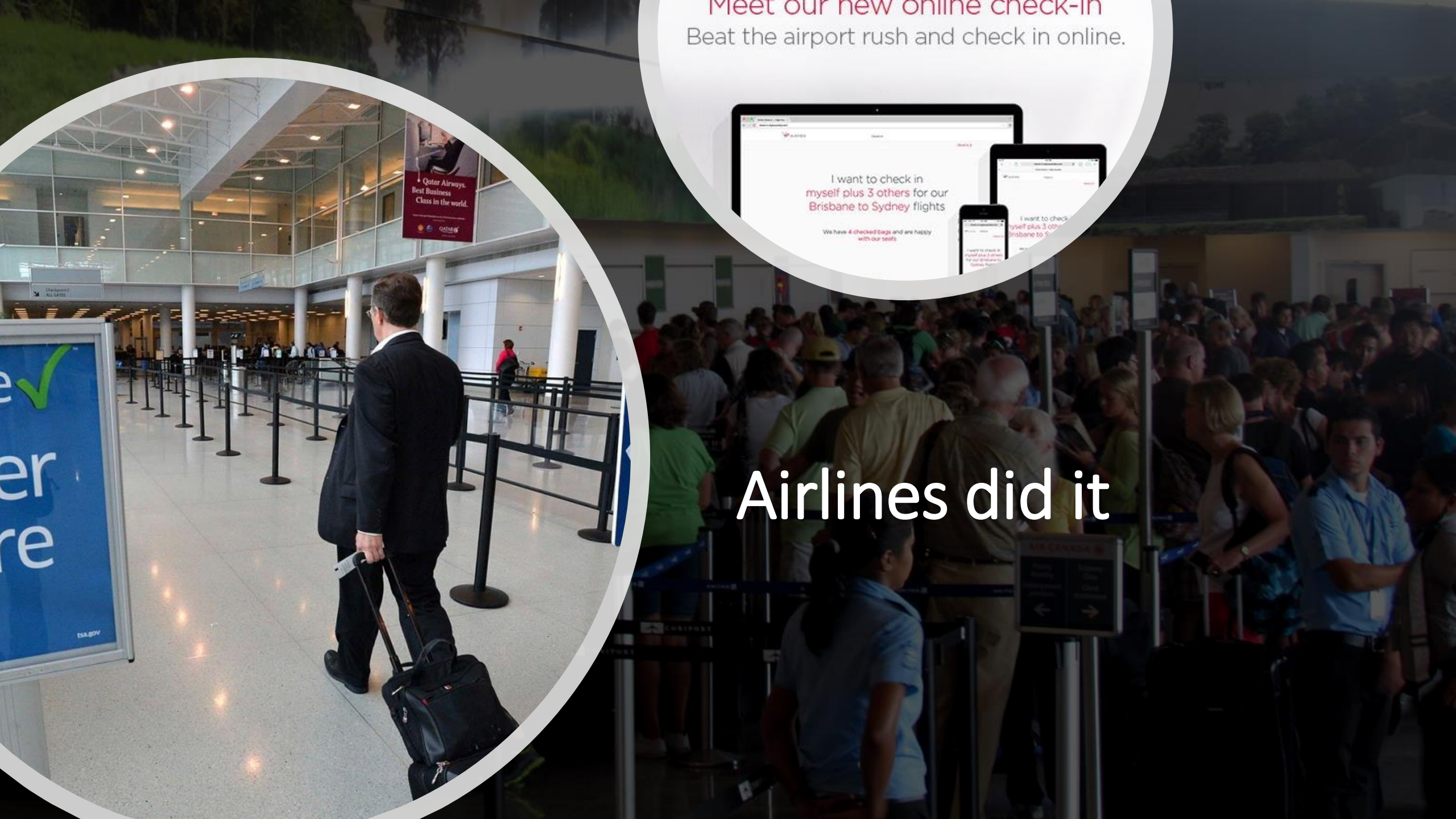
+

In the office

+

Sharing data

Banks did it



Airlines did it

Now Healthcare is doing it

Why Healthcare is finally changing?

- Strong economic incentives
- Efficient technology is now available
- Patients are ready…

Patients are technology savvy

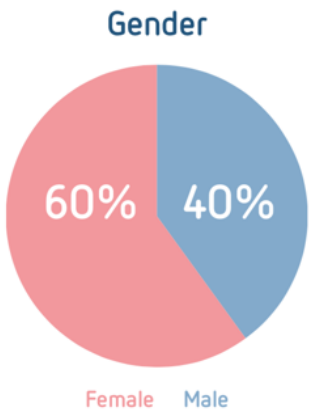
- Everyone has internet access
- ALL ages are using smart-phones or tablets

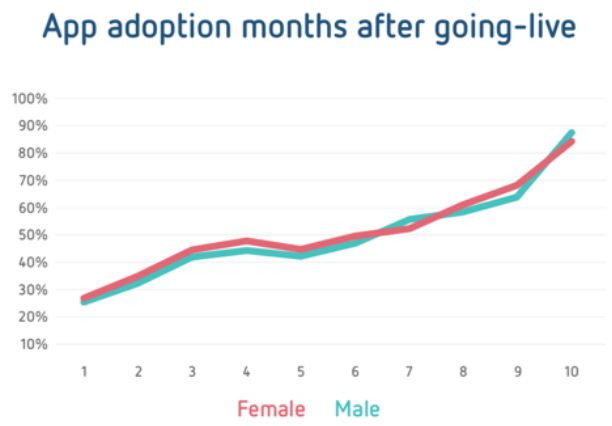
Patient Engagement Strategies That Work

20 years' experience…

Best practice engagement numbers

85% adoption rate after 6-9 months





Technology Best Practice Checklist

- Integration – integration – integration
- Supports current work-flows
- Seamless to use for staff and physicians
- SSO – Single sign-on
- Works on all platforms: iOS, Android, all browsers
- High patient adoption numbers: >75% – ask for stats!

Adoption Strategies & Best Practices

- Be patient, don’t try to implement everything at once, start with check-in
- Front desk staff and schedulers will drive adoption – train them well
- Physicians will create ongoing engagement – remember to train them
- ‘Advertise’ the new technology (website, fast lanes, phone message)
- Once you have 50% adoption rate, roll out next tools

The ROI is there..

Based on a 50 MD practice

- Check-in from home – save 10 minutes per patient ~$40,000/month
- Eliminate last-minute cancellations of surgery – save ~$50-100,000/month
- Simplify post-procedure follow-up – save ~$50,000/month
- Document outcome with PRO – better payer contracts and more referrals
- See more patients! Scale using technology to optimize flow
- Improve online reputation

CONSUMERISM OPTIMIZATION

- **Key Learning:** All ages will do it, Integration is key, Find value for the physician and they will drive the ongoing engagement
- **Measuring Outcomes:** Patient flow, Access to the right data at the right time, Patient satisfaction drives physician satisfaction and increases revenues
- **Key Findings Report Out:** ROI is strong: $50,000 - $100,000 per month for a 50 MD practice

LUNCH

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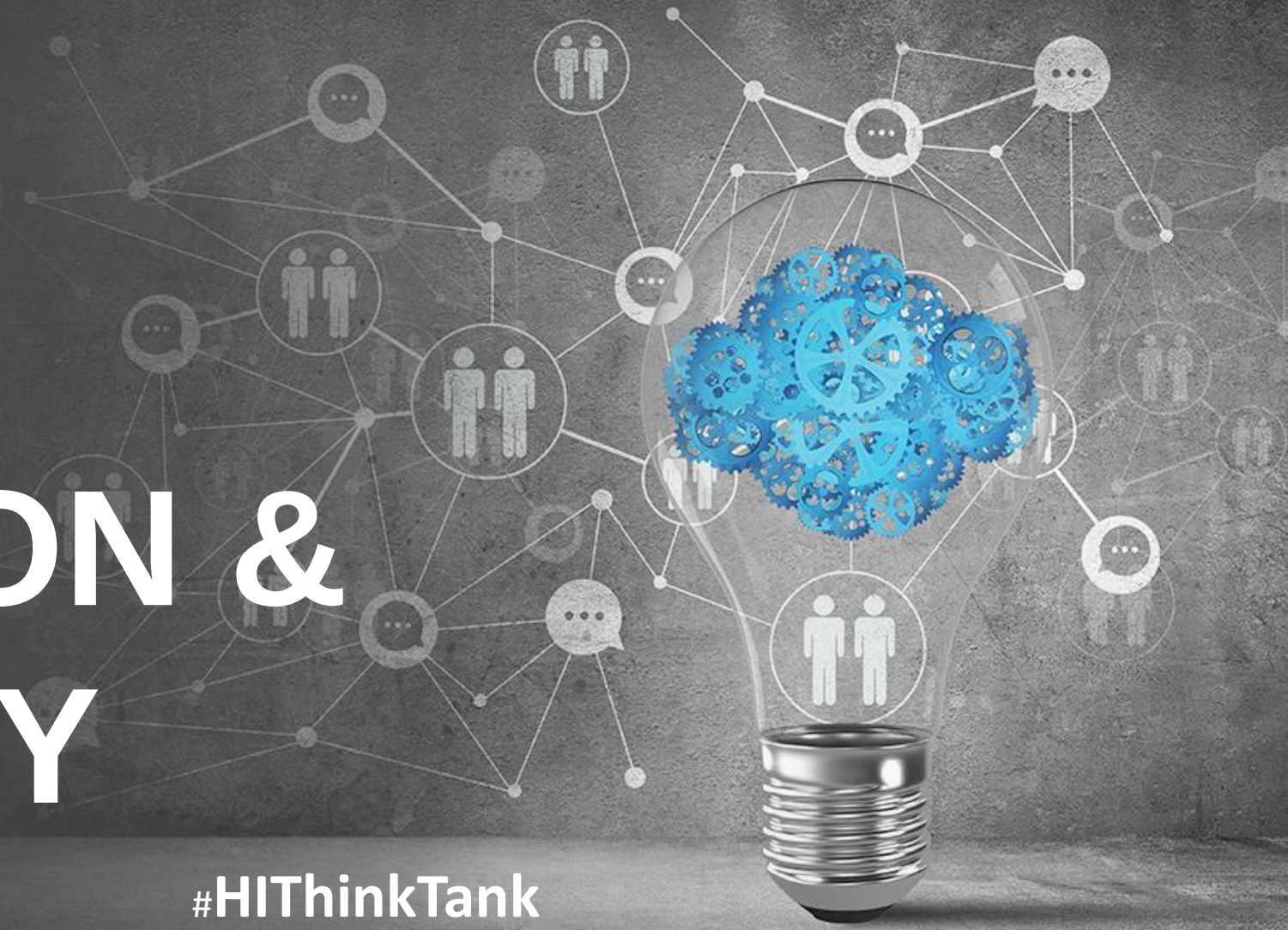
EDUCATION & STRATEGY



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STRATEGIC PARTNERSHIPS
GENOME MEDICAL

THE AGE OF GENOMICS

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GENOMICS IS CHANGING HEALTH CARE

Improving the quality of care through genetics and genomics.

PREVENTION

DIAGNOSIS

TREATMENT DECISIONS

THE PROBLEM

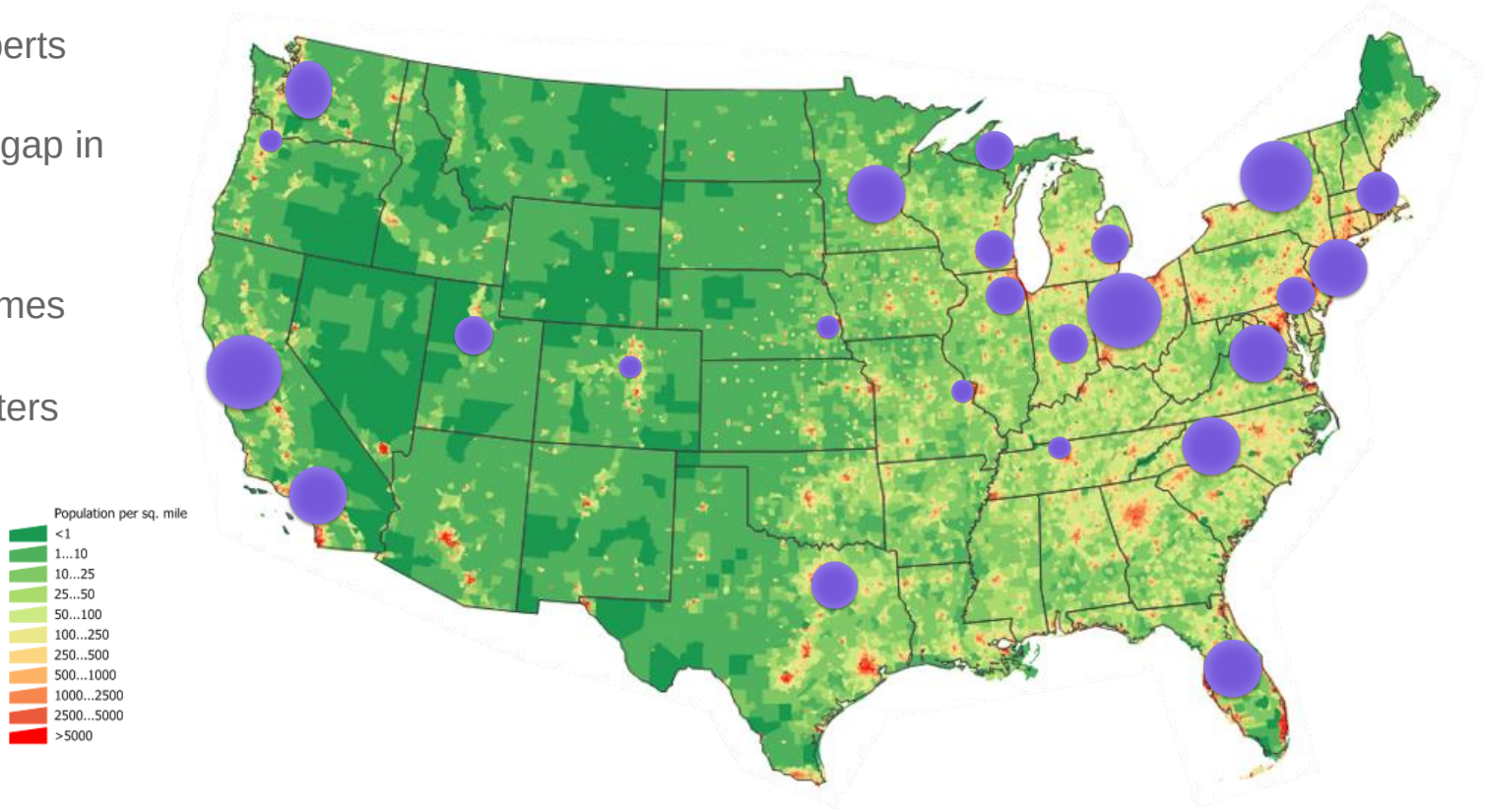
GENOMIC MEDICINE IS INACCESSIBLE TO MOST

CHALLENGES

- Too few experts
- Knowledge gap in clinical care
- Long wait times
- Limited centers

U.S. Population Density

Location of Genetic Specialists

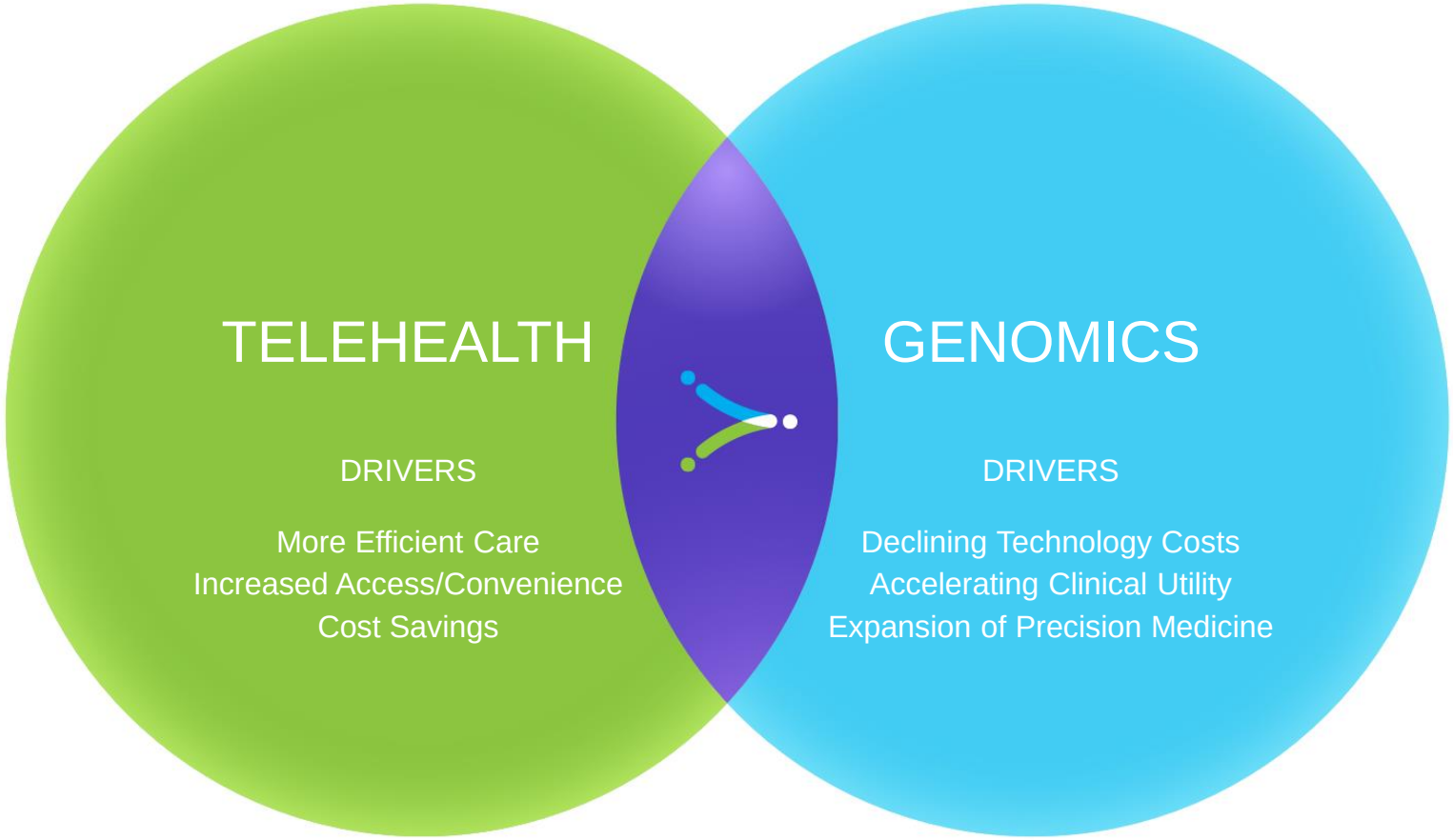


OPPORTUNITIES

- Genomic medicine improves patient care
- Genomic medicine has the potential to reduce cost of care delivery

TELEGENOMICS MEDICAL PRACTICE

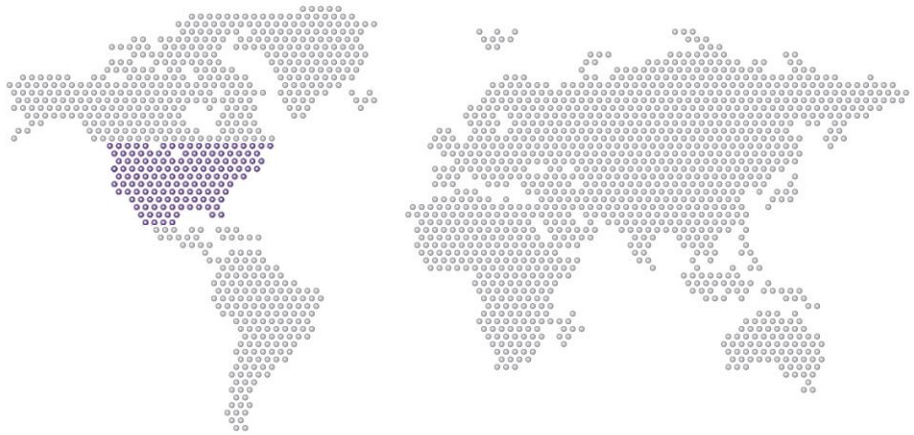
We are democratizing access to genomic based medicine via telehealth.

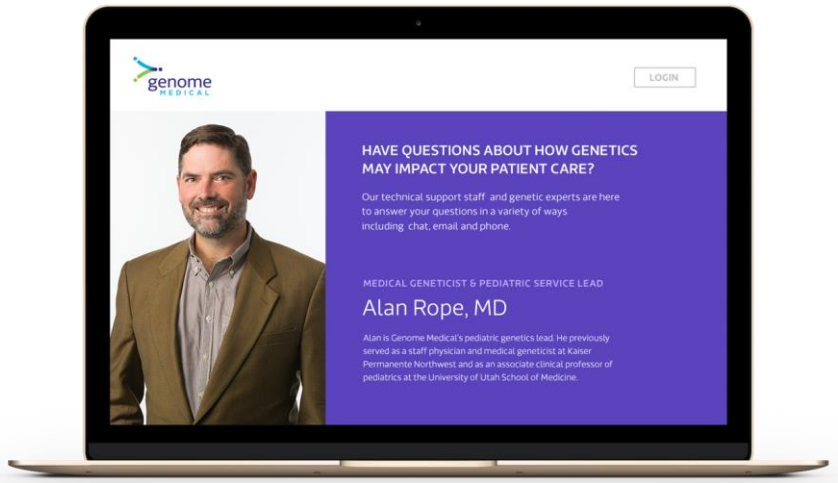


OUR VISION

BRINGING GENOMIC MEDICINE TO EVERYDAY CARE

Fast, effective, affordable, and medically responsible genomic care.





The Largest Network of Clinical Genomics Expertise

Genomic Care Delivery Platform

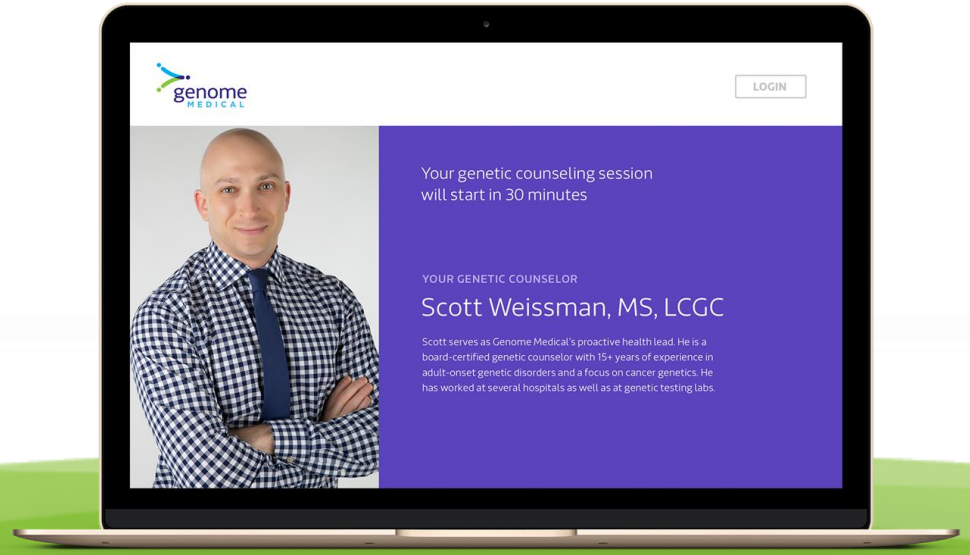
BUILDING THE LARGEST CLINICAL GENOMICS NETWORK

50+

CLINICIANS

>12 yrs

AVG CLINICAL EXPERIENCE



On Demand

NEXT DAY APPOINTMENTS

24/7

ACCESS TO RESOURCE CENTER

Cancer | Cardio | Proactive | Reproductive | Pediatric | Pharmacy

WHAT WE DO

GENETIC NAVIGATORS

The Right Patient The Right Care The Right Time

GENOME CARE DELIVERY™ PLATFORM

EDUCATE

Understand how genetics and genomics may inform patient care.

ASSESS

Which patients will benefit most from genetic services?

SELECT

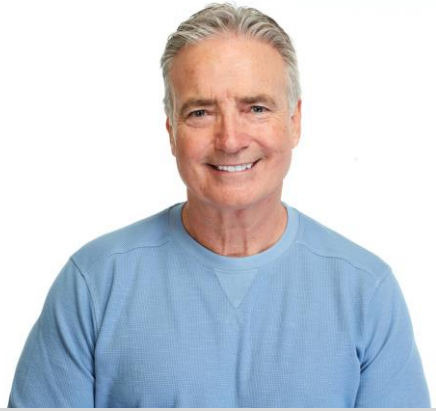
Which genetic test is indicated?

INTEGRATE

How does this information change clinical care?

SUPPORT THROUGHOUT THE GENOMIC JOURNEY

Our genomes inform care at different life milestones.

NEWBORN SCREENING	**PEDIATRICS** (symptomatic)	**FAMILY PLANNING** (carrier, fertility)	**RISK ASSESSMENT** (cancer, cardiac)	**HEALTH MANAGEMENT** (PGx, symptomatic)
				
BIRTH	CHILDHOOD	YOUNG ADULT	ADULTHOOD	LATER LIFE

JEFF COUGHLIN

SENIOR DIRECTOR, HIMSS PUBLIC POLICY UPDATE

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PUBLIC POLICY UPDATE

- **Care Strategy**
  - Minimizing clinician burden continues to be a focus area for ONC and CMS
  - MIPS Value Pathways Program built on a foundation of population health measures
  - Regulatory Sprint to Coordinated Care addressing impediments to better coordinate care
- **Innovation**
  - ACOs are generating savings for Medicare and shared savings for organizations
  - Interoperability rules are encouraging new market entrants and innovative developers
  - Telehealth/RPM rules solidly in place: Are codes being used? Facilitate broadband access?
  - Patients at the center of the paradigm and provided more control over their own data
  - FDA regulation key component; FDA pre-cert program; Draft CDS Guidance addresses AI/ML
- **Leadership**
  - Health system redesign still on the table; Medicaid's piece; Medicare-for-All and other options
  - Questions surrounding future of value-based care; how to continue to focus on outcomes?
  - New consumer privacy legislation; connection to health data; to be modeled after GDPR?
  - Workforce needs of future and federal and state roles

JAMIE SKIPPER, CEO – ELEVATION

COMMENTS ON ONC & CMS 2019 RULES

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INTERESTING COMMENTS ON ONC'S & CMS'S 2019 NPRMS

- Support for implementing FHIR APIs
  - Support for using FHIR Release 4 for certification
  - Access to health information for patients and caregivers
- Concerns about overbroad definitions of EHI, HIN, and Provider
- Mixed responses to new Patient Event Notification Condition of Participation (CoP)
  - Commenters who did not receive health IT incentive payments thought that the use of a CoP was not an appropriate vehicle for encouraging the use of patient event notifications
  - Supporters of interoperability and patient care advocates believe this CoP will help improve continuity of care and patient outcomes
- Support provision requiring MA plans, Medicaid managed care plans, CHIP managed care entities, and QHPs in the FFEs to participate in trusted exchange networks
- Concerns over adding provider information to NPPES in the Telehealth genre

KEY LEARNINGS FROM COMMENTS ON ONC'S NPRM

- **Key Learning:** Adoption of FHIR Release 4 will be foundational. Additional resources should be invested in order to update your product and become ONC certified. Developers should prioritize developing user-centered health IT interfaces.
- **Key Learning:** How terms like HIN, EHI, provider will be defined will effect compliance strategies. Ramping up compliance efforts should begin now, not after definitions are confirmed in the Final Rules.
- **Key Learning:** Be prepared to support patient event notifications in their products.
- **Key Learning:** It will be important to determine if and how product(s) will interface with or serve as a health information service provider (HISP) and what local or regional data exchange partnerships will make sense.
- **Key Learning:** Organizations offering remote services using providers who are fully virtual will have to consider provider safety and privacy issues.

RECENT DEVELOPMENTS IN TELEHEALTH

- Re-introduction of the Creating Opportunities Now for Necessary and Effective Care Technologies (CONNECT) for Health Act of 2019

- 2019 PFS Rule
  - Added a new category of technology-based services that are reimbursable by Medicare but not considered “Medicare telehealth services” and therefore not subject to the requirements of “Medicare telehealth services” (e.g. originating site requirements)

- 2020 PFS Rule
  - Adds three new bundled payment codes for telehealth treatment of opioid use disorder

- 2020 Medicare Advantage and Part D Flexibility Final Rule
  - When creating bids for basic Medicare benefits, Medicare Advantage Plans are now permitted to include telehealth benefits beyond what is allowed under Original Medicare

LEADERSHIP

Directly and unscripted from thought leaders on the front lines of healthcare

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KAMAL JETHWANI, MD MPH;

SENIOR DIRECTOR – PARTNERS HEALTHCARE

LEADERSHIP – LEVERAGING VISION AND CORE STRATEGIES TO SUCCESSFULLY NAVIGATE THE FUTURE OF HEALTHCARE

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CONVENTIONAL LEADERSHIP CHALLENGES

- **Leading innovation in general** requires a leadership style that is:
  - Nimble – circumstances change all the time (market conditions, organizational commitment, younger teams)
  - Decisive but sensitive to new information
  - Builds influence through trust and inspiration, not hierarchy
  - Inspires and motivates, instead of leveraging fear/hierarchy/discipline
  - Takes risks – keeps some semblance of internal stability in the face of external chaos
  - Builds trust within team to deal better with external chaos

- **Leading innovation WITHIN Healthcare** – all of the above in the face of:
  - Hierarchical, bureaucratic, show moving systems
  - Highly regulated environments
  - Small budgets, but expectations at scale
  - Legacy IT and EMR issues

UNLEARNING!

- **Leading Innovation: Old Habits to reconsider:**
  - Systematic, function-based complex reporting or organizational structures (Prefer simpler goal oriented and nimble org structures)
  - Traditional ways to evaluate managers – need more leaders, fewer managers
  - Committee-based decision making
  - Allergic to failure (instead, plan and prepare for it)
  - Prioritizing experience over creativity/talent (hardest to solve)

- **New Organizational Paradigm:**
  - Simple, goal-oriented team structures
  - Leaders grooming others to lead, not manage
  - Simpler, transparent, data-backed decision making
  - Willingness and permission to fail (fast) and pivot accordingly

LEADING INNOVATION IN HEALTHCARE

- **Key Learning:** The key task is to sell a strong vision to leaders as well as staff, keep it consistent, and weather the chaos while maintaining stability internally
  - Goals are often not business-critical for the larger org in the short term – it's hard to keep the C-suite's eye on the ball and show incremental success
  - 'Jobs to be done' are less specific, more self-driven – needs a different set of skills/talent
  - Model the behavior you want to see – taking calculated risks, being transparent in activities and prioritization, pushing the envelope and making sense of an ever-changing world

- **Measuring Outcomes:** Select key metrics to report on to leadership as well as staff on a regular basis that:
  - Change frequently enough
  - Your team has control over
  - Measurable for the process, not just outcomes (took meetings, instead of closed deals)

- **Summary:** Be a leader who is comfortable with chaos, can keep the eye on the ball no matter what, and change strategies in a nimble way in the face of new information, but continues to inspire everyone in one direction

FUTURECASTING SESSION

COLLABORATE AND VISIONCAST ON WHERE HEALTHCARE AND INNOVATION IS HEADED OVER THE NEXT 2-5 YEARS

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FUTURECAST FROM 2 YEARS AGO

- 3-5 year FutureCast predictions from 2017

FutureCast Participant Themes

- Continued evolution with value-based care
- Rich & poor healthcare - one prediction for no more company sponsored healthcare and becoming personally directed
- Reduction/ elimination of fee-for-service
- Payor consolidation - march towards single payer?
- Large growth for telehealth, virtual care & eConsults
- Precision medicine & genomics advancements leading to superior individualized care
- Connected health & IoT also supporting superior individualized care

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FUTURECAST

- **Care Delivery & Strategy:** *What evolutions can we expect?*
- **Innovation:** *What innovations will emerge?*
- **Leadership:** *How will we need to evolve as leaders and strategists?*

Care Delivery & Strategy

What evolutions can we expect?

Innovation

What innovations will emerge?

Leadership

How will we need to evolve as leaders and strategists?

WRAP UP

- Did we miss anything of importance?

Thank you!