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Città della Salute e della Scienza di Torino

**GIORNATE
CARDIOLOGICHE
TORINESI**

**TURIN,
October
25th-27th
2018**

Starhotels Majestic

Smartphones for heart healthy life

Amir Lerman, MD

Barbara Woodward Lips Endowed Professor
Director Cardiovascular Research Center
Department of Cardiovascular Diseases
Mayo Clinic, Rochester, MN

DISCLOSURE

Relevant financial relationship(s) with industry

Itamar Medical: advisory board

Volcano/Philips consultant

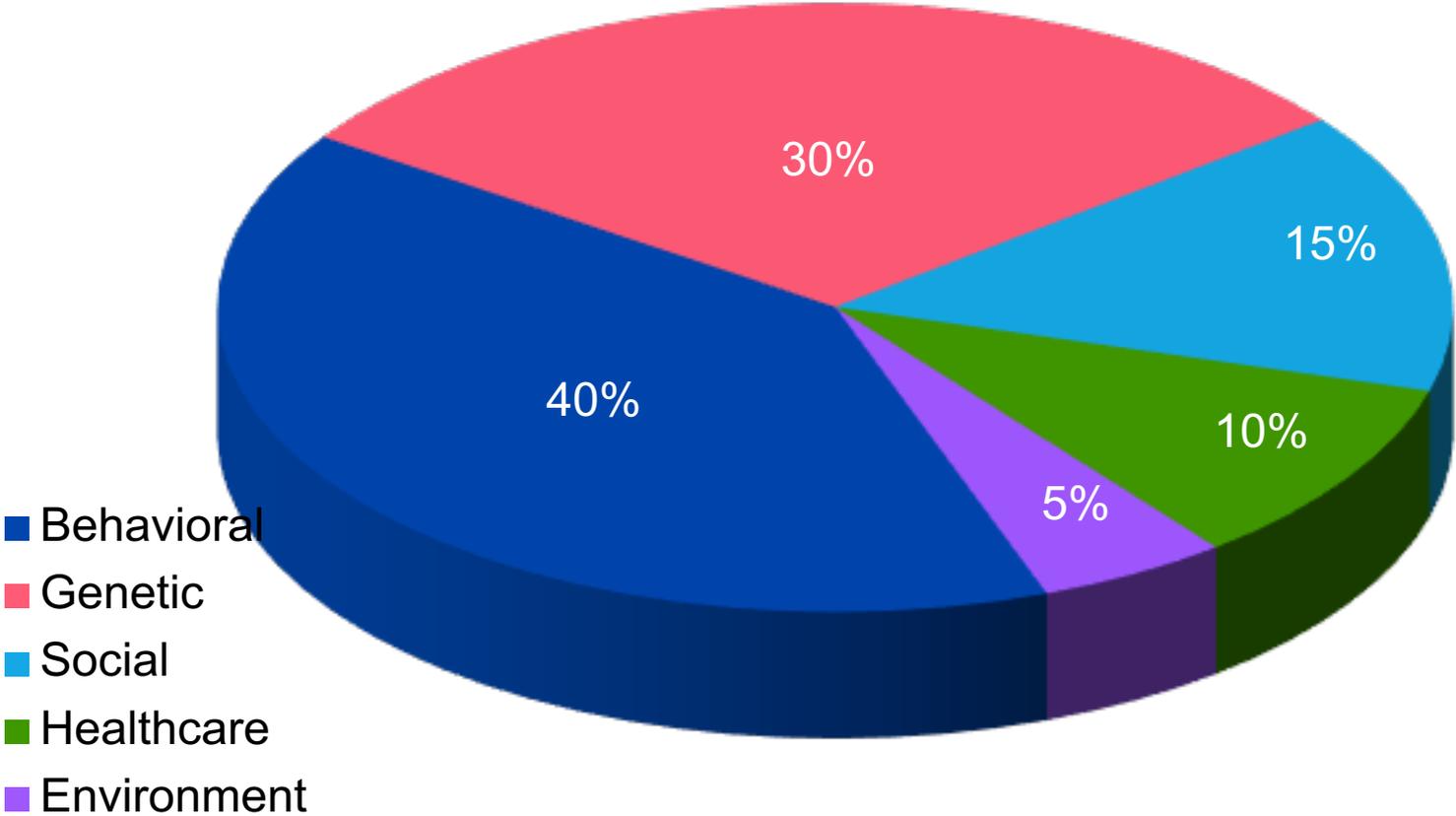
Off Label Usage

None

What are currently estimated number of available health related apps on the marketplace?

1. 30,000
2. 50,000
3. 300,000
4. 90,000

Contribution to Premature Death



Mayo Clinic Facts: *non profit organization*



150 years of clinical practice and intellectual properties



1.3 MILLION

People from all 50 states and 140 countries

4,500

Staff physicians and scientists

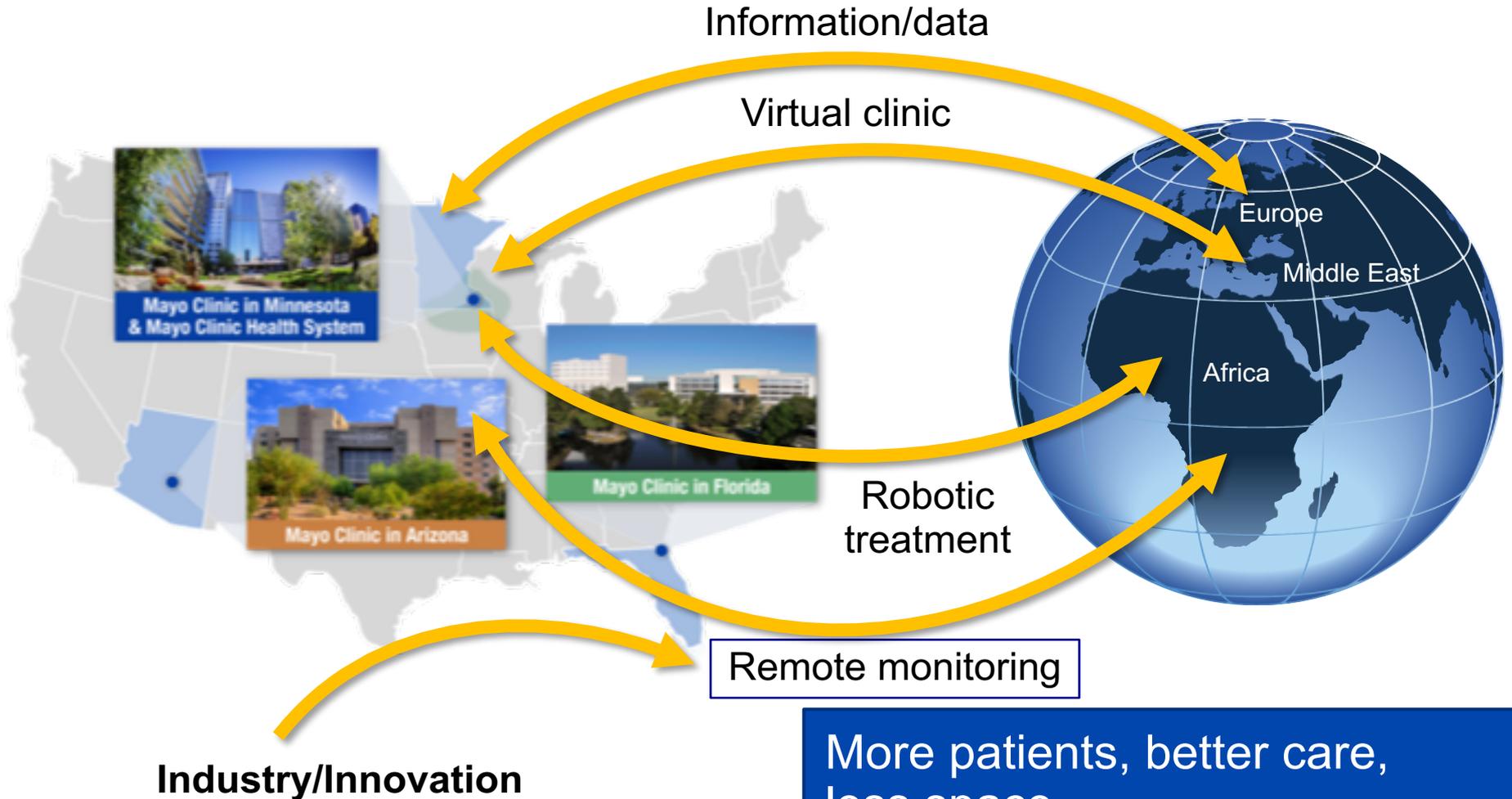
641,000

Hospital days of patient care

\$10.3 Billion

Total revenue from current activity

Reaching out to our Patients



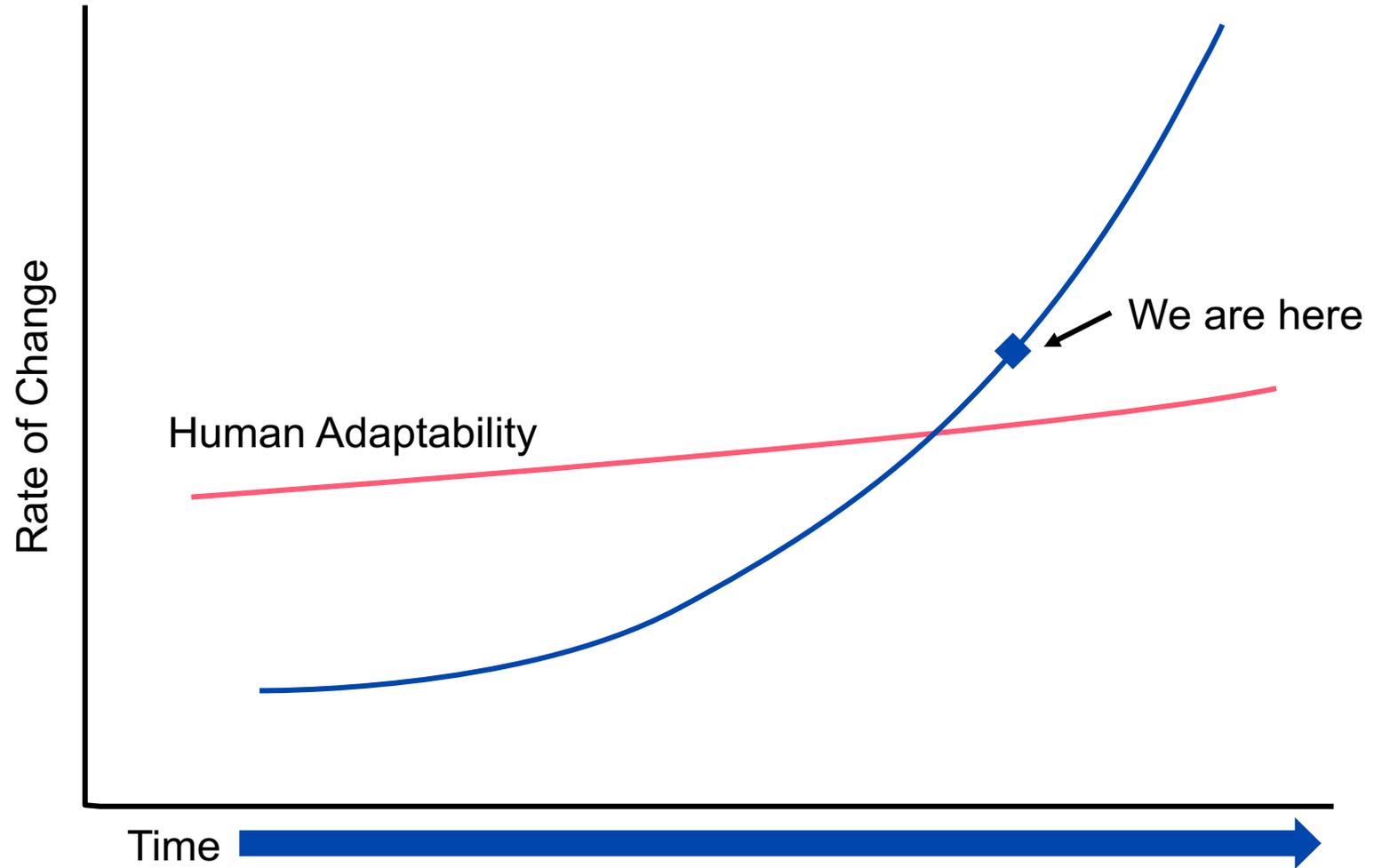
More patients, better care,
less space



What Happened Before 2007?

- Facebook didn't exist yet
- Twitter was still a sound
- Cloud was still in the sky
- 4G was a parking space
- “applications” were what you sent to college
- LinkedIn most people thought it was a prison
- Big Data was a good name for a rap star

The Race Between Human and Technology



Where are the Future Opportunities in the Cardiovascular Field?

Unmet Patients' need

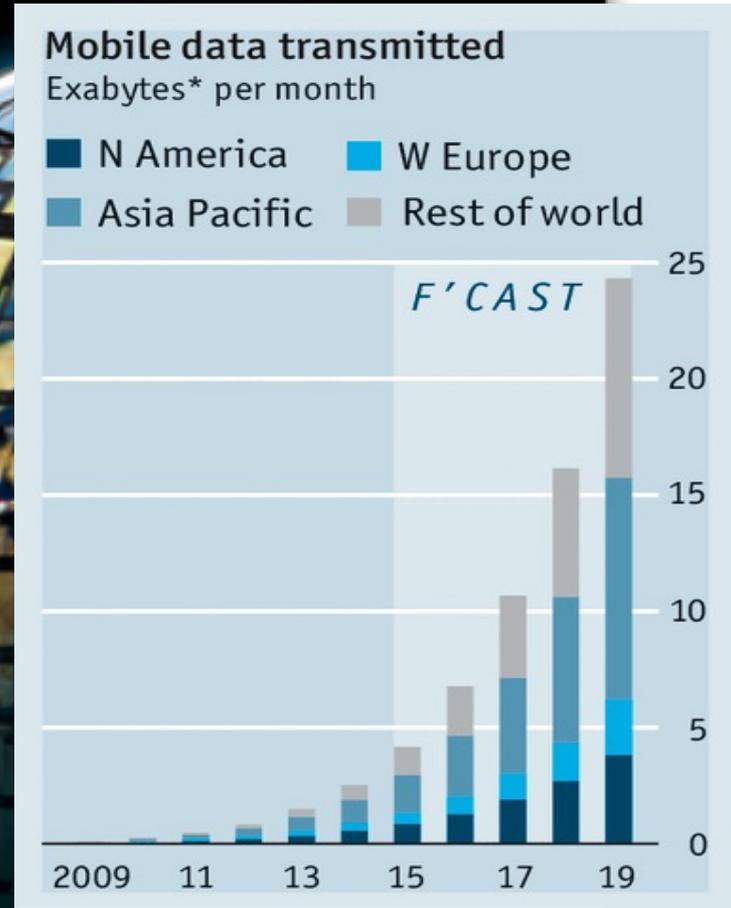
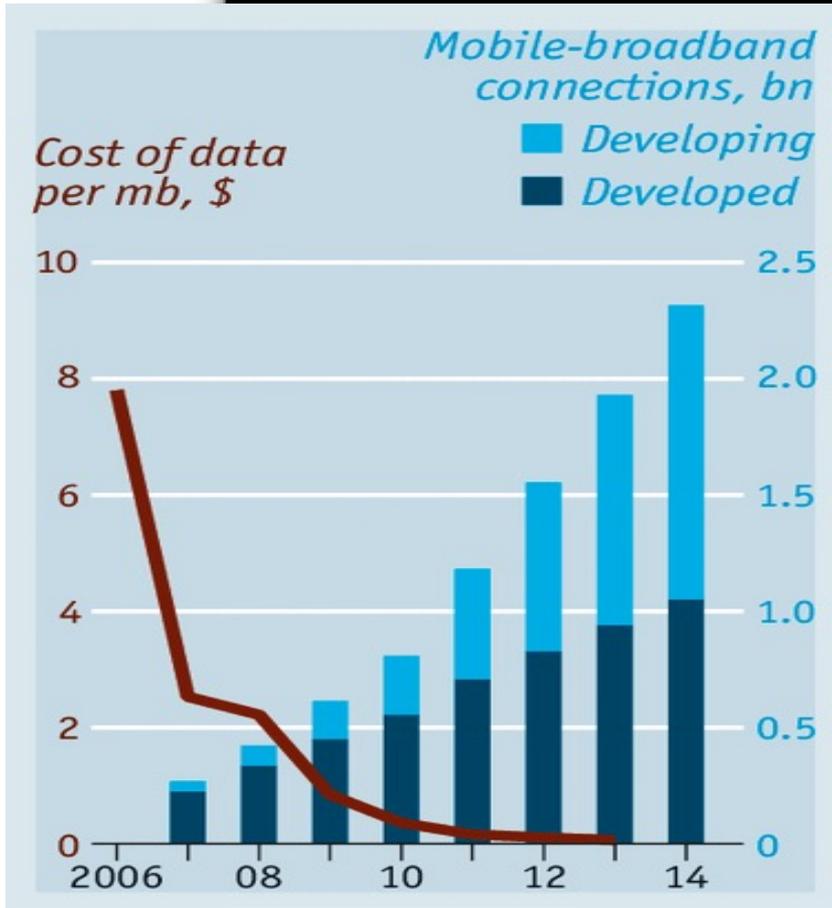
Technology

Mash up

a mixture or fusion of disparate elements.

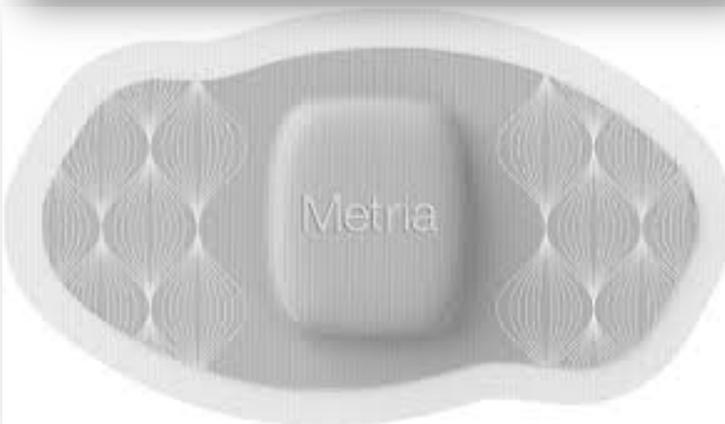
Military Technology Academic Centers

Planet of the phones

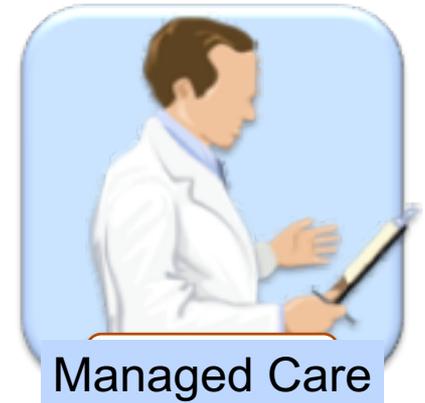
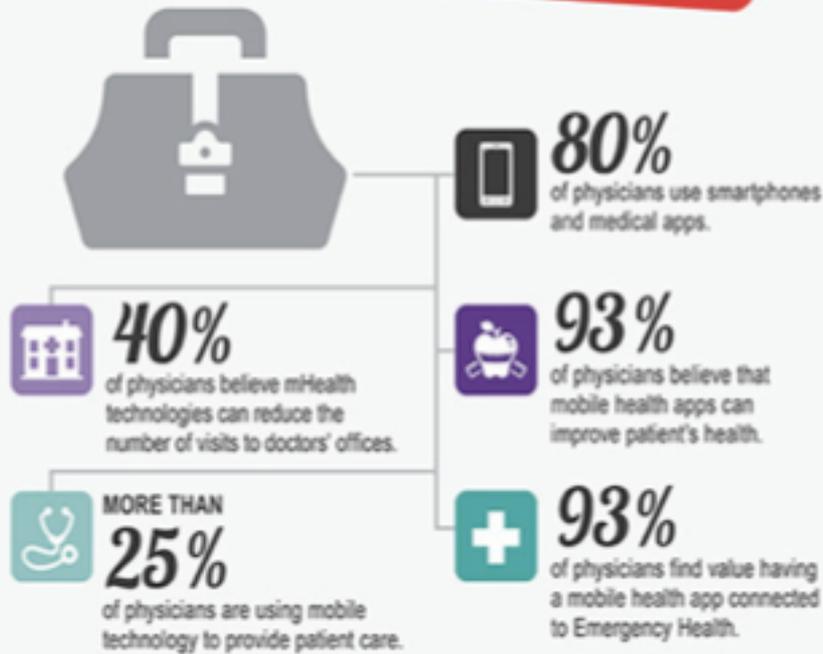


The Wearable Decade

...from watches, patches and tattoo's



Do Doctors Recommend mHealth Apps?



Digital Impact on Customer Experience

Review s



70%

Comfortable communicating with doctors via texting, email, video instead of seeing them in person

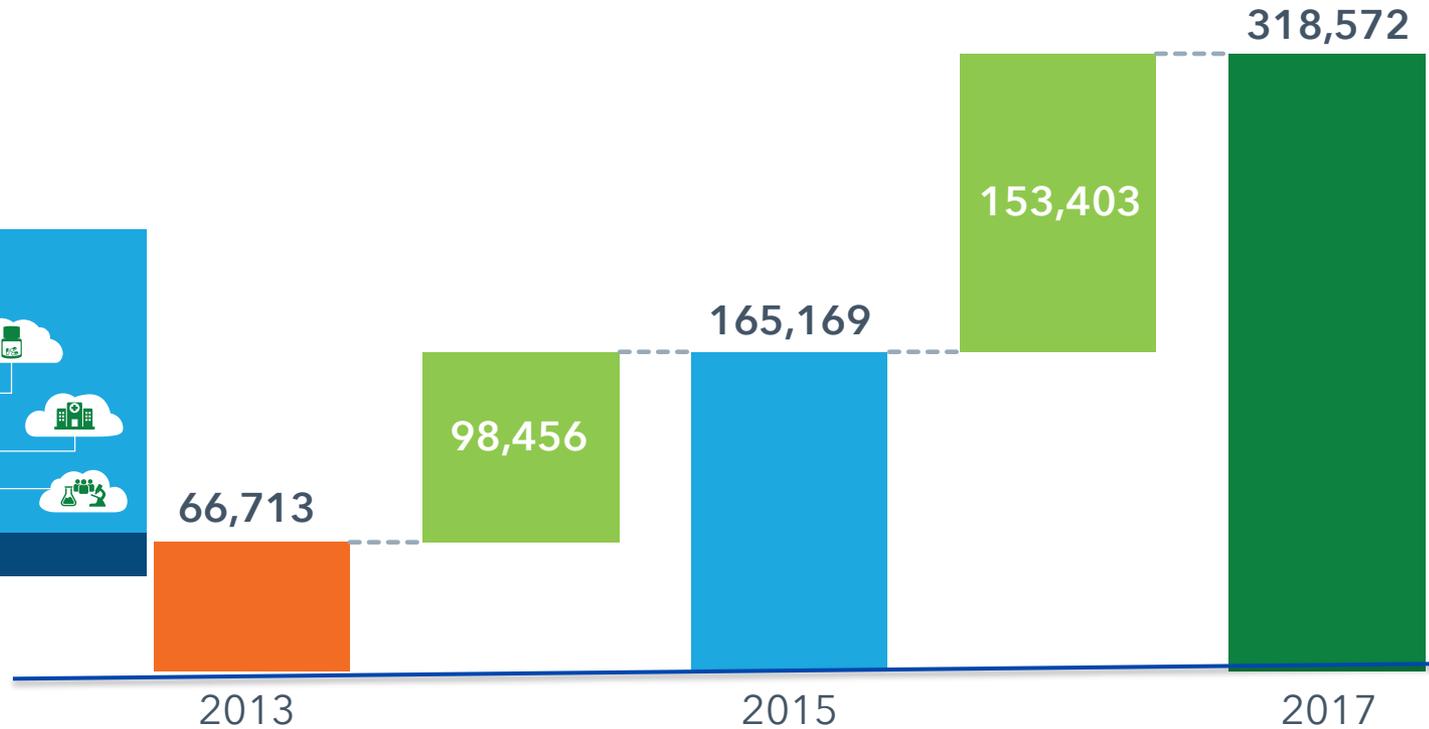
Number of Digital Health Apps



NOVEMBER 2017

The Growing Value of Digital Health

Evidence and Impact on Human Health and the Healthcare System



Effectiveness of a Smartphone Application for Weight Loss Compared With Usual Care in Overweight Primary Care Patients

A Randomized, Controlled Trial

Brian Yoshio Laing, MD, MPH*; Carol M. Mangione, MD, MSPH; Chi-Hong Tseng, PhD; Mei Leng, MD, MS; Ekaterina Vaisberg, BS; Megha Mahida, BS; Michelle Bholat, MD, MPH; Eve Glazier, MD; Donald E. Morisky, MSPH, ScD; and Douglas S. Bell, MD, PhD

Conclusion: Smartphone apps for weight loss may be useful for persons who are ready to self-monitor calories, but introducing a smartphone app is unlikely to produce substantial weight change for most patients.

Patients:
kg/m² or
Intervent
with (n =
(MyFitness

Trial to Examine Text Message–Based mHealth in Emergency Department Patients With Diabetes (TEXT-MED): A Randomized Controlled Trial

Sanjay Arora, MD; Anne L. Peters, MD; Elizabeth Burner, MD, MPH; Chun Nok Lam, MPH; Michael Menchine, MD, MPH

Study objective: Increasingly, low-income inner-city patients with diabetes utilize emergency departments (EDs) for acute and chronic care. We seek to determine whether a scalable, low-cost, unidirectional, text message–based mobile health intervention (TEXT-MED) improves clinical outcomes, increases healthy behaviors, and decreases ED utilization in a safety net population.

Methods: We conducted a randomized controlled trial of 128 adult patients with poorly controlled diabetes (glycosylated hemoglobin [Hb A_{1c}] level ≥8%) in an urban, public ED. The TEXT-MED group received 2 daily text messages for 6 months in English or Spanish. The primary outcome was change in Hb A_{1c} level. Secondary outcomes included changes in medication adherence, self-efficacy, performance of self-care tasks, quality of life, diabetes-specific knowledge, ED utilization, and

Conclusion: The TEXT-MED program did not result in a statistically significant improvement in Hb A_{1c}.

Research

JAMA | Original Investigation

Effect of Wearable Technology Combined With a Lifestyle Intervention on Long-term Weight Loss

The IDEA Randomized Clinical Trial

CONCLUSIONS AND RELEVANCE Among young adults with a BMI between 25 and less than 40, the addition of a wearable technology device to a standard behavioral intervention resulted in less weight loss over 24 months. Devices that monitor and provide feedback on physical activity may not offer an advantage over standard behavioral weight loss approaches.



A Digital Health Intervention to Lower Cardiovascular Risk

A Randomized Clinical Trial

CONCLUSIONS AND RELEVANCE Among South Asian individuals, a DHI was not associated with a reduction in MI risk score after 12 months and was not influenced by knowledge of genetic risk status.

Original Investigation | HEALTH CARE REFORM

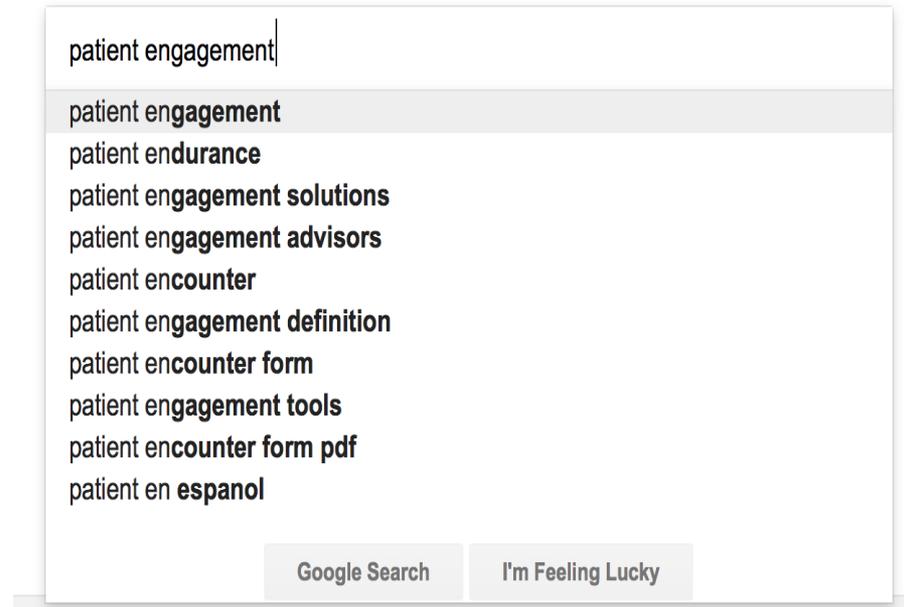
Effectiveness of Remote Patient Monitoring After Discharge of Hospitalized Patients With Heart Failure

The Better Effectiveness After Transition-Heart Failure (BEAT-HF) Randomized Clinical Trial

CONCLUSIONS AND RELEVANCE Among patients hospitalized for HF, combined health coaching telephone calls and telemonitoring did not reduce 180-day readmissions.

Lessons Learned

- Population is key
- Beware barriers
- Increased application use = improvement in risk factors
- Patient engagement = benefit
- How can we engage patients?



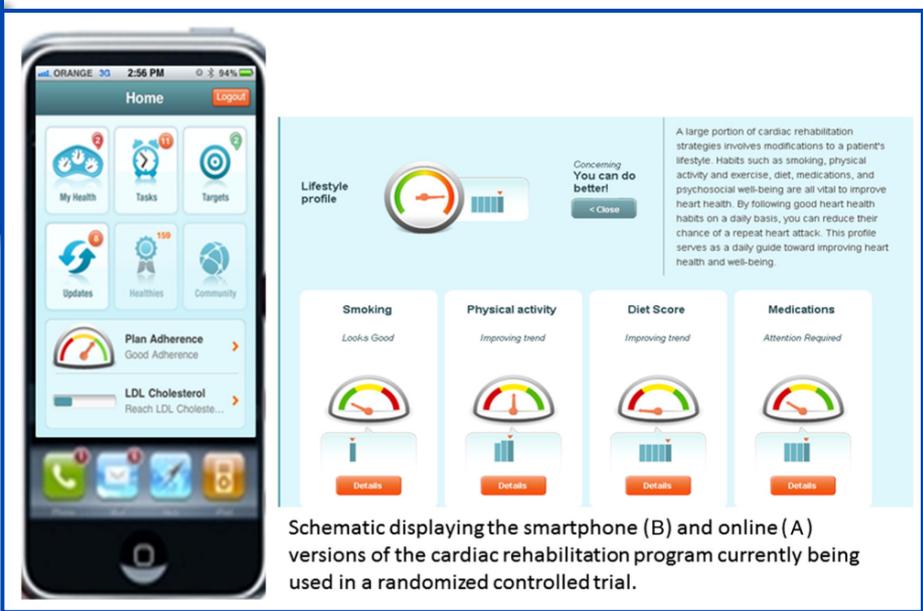
Workplace Health Program

- Between 2011 and 2014 CareHere, LLC (Nashville, TN) created and implemented an incentive plan for employees
- 81 employers in 42 states encompassing 30,974 employees in a variety of occupations
- Digital health intervention (DHI) offered to all who enrolled
- All participants had a baseline exam with check ups at 90 day intervals for one year

Using an online, personalized program reduces cardiovascular risk factor profiles in a motivated, adherent population of participants

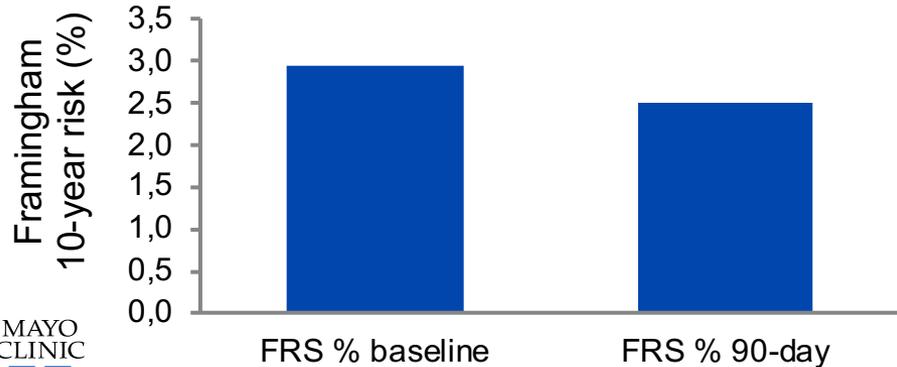
R. J. Widmer, MD, PhD,^{*} Thomas G. Allison, PhD,^{*} Brendie Keane, RN,^{*} Anthony Dallas, MD,^{*} Lilach O. Lerman, MD, PhD,^b and Assie Lerman, MD^{*} Rochester, MN and Nashville, TN

- A cohort of employees with CV risk factors were prospectively assigned to a web-based personal health assistant and had repeat measurements taken at 90 days
- Subjects who successfully reduced risk profile received an **Incentive**: a reduction in their in health insurance cost:

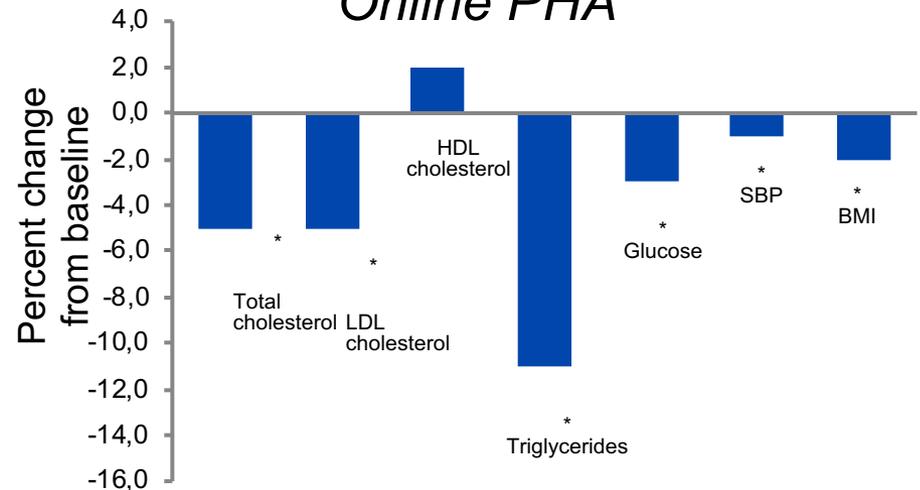


Schematic displaying the smartphone (B) and online (A) versions of the cardiac rehabilitation program currently being used in a randomized controlled trial.

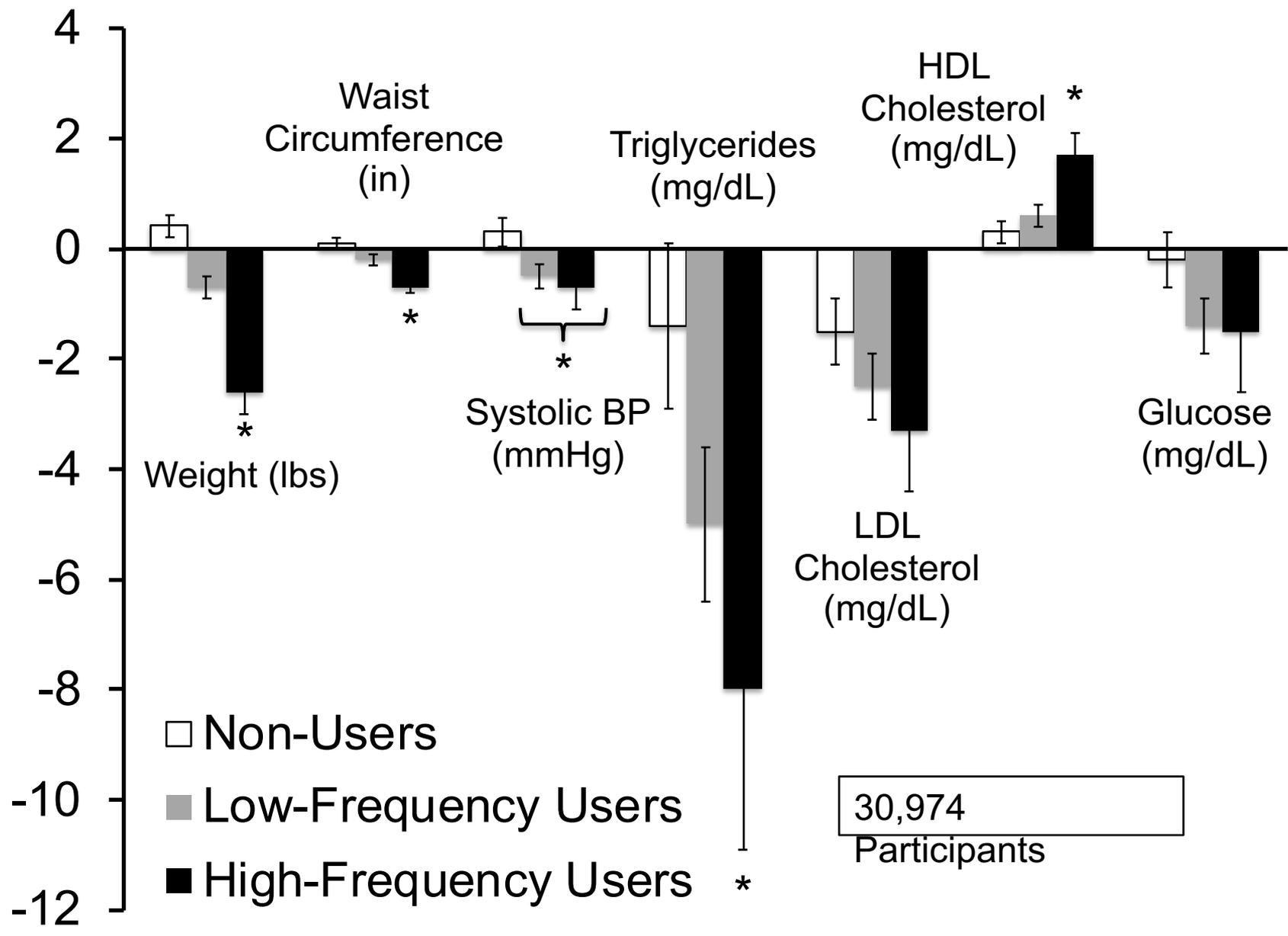
Reductions in Raw FRS (left) and Converted FRS 10-year cardiovascular risk percentage (right)*



Percent Change from Baseline in Risk Factors After Completing the Online PHA



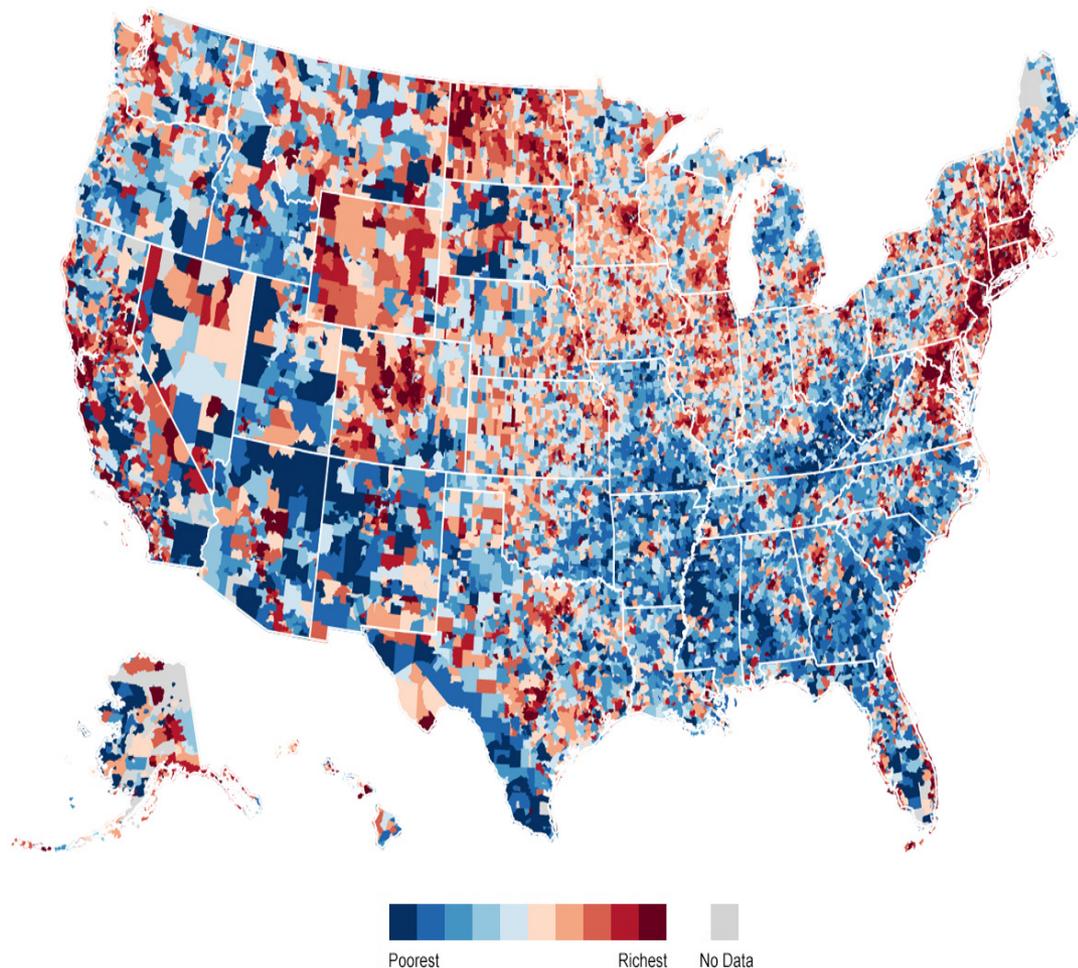
Change from baseline after one year



Socioeconomic Environment in Digital Health

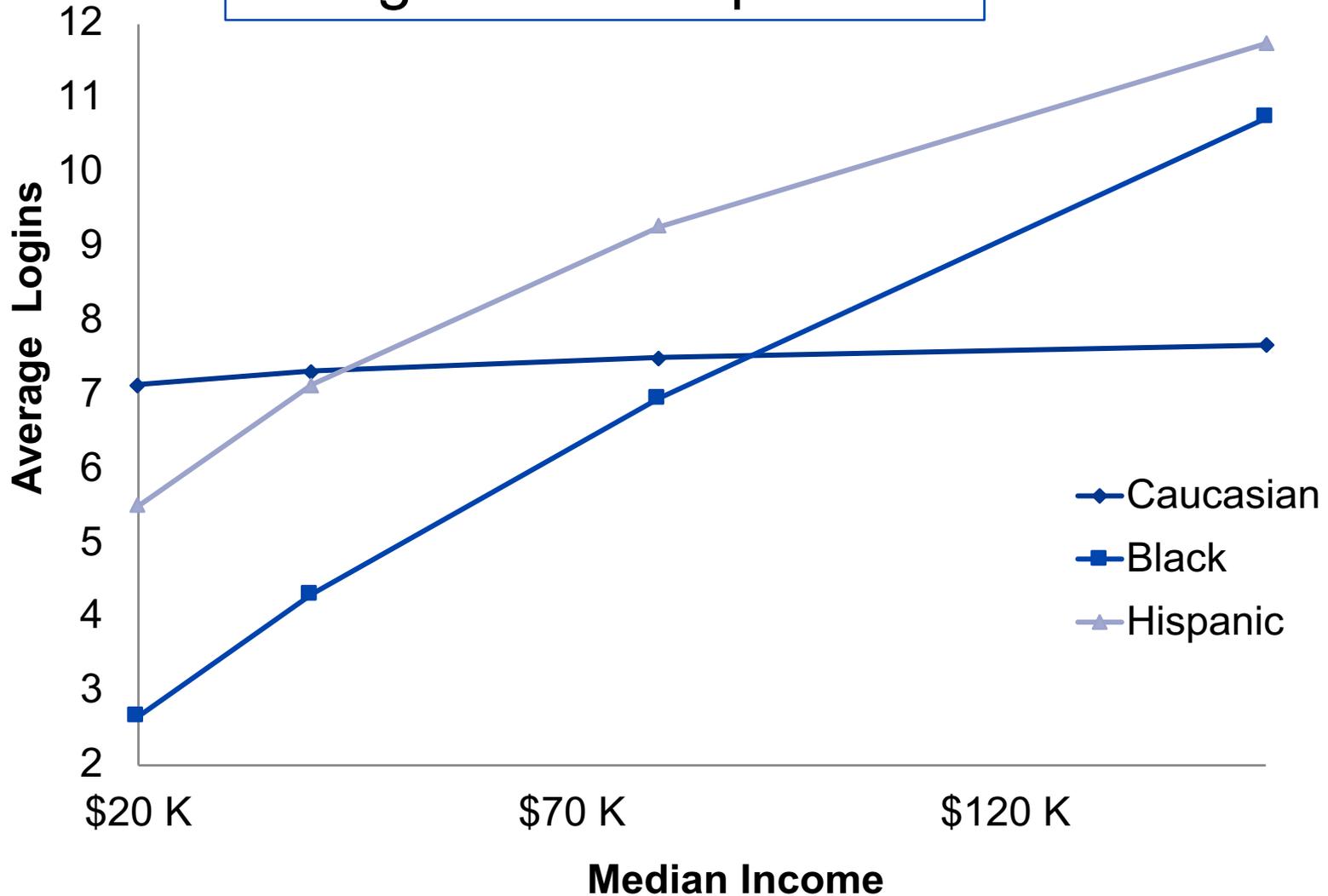
- DHI usage based on socioeconomic environment
- Higher income = increased application use?
- Difference among racial groups?

Median Household Income



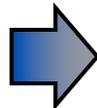
Digital Health and Socioeconomic Status

No age or sex dependent



Study Design: Cardiac Rehabilitation

Mayo Expertise
Guidelines



healarium

Funding: BIRD Foundation

Shared IPs



- Secondary Prevention
- Patient-Centered:
 - Monitoring
 - Feedback



Daily Tasks and
Educational
Material

Cardiac Rehabilitation
Patients

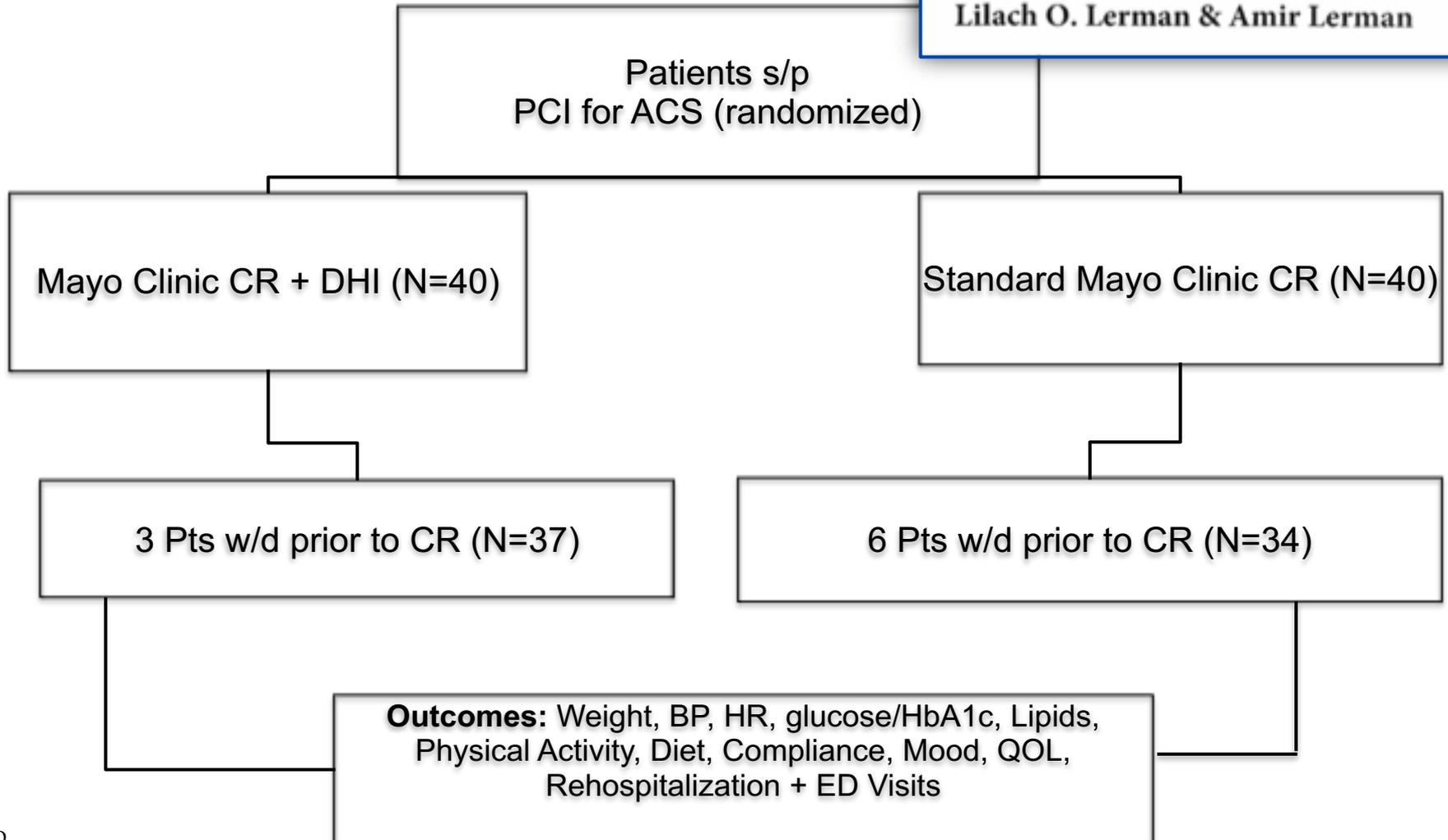
Digital health intervention during cardiac rehabilitation: A randomized controlled trial



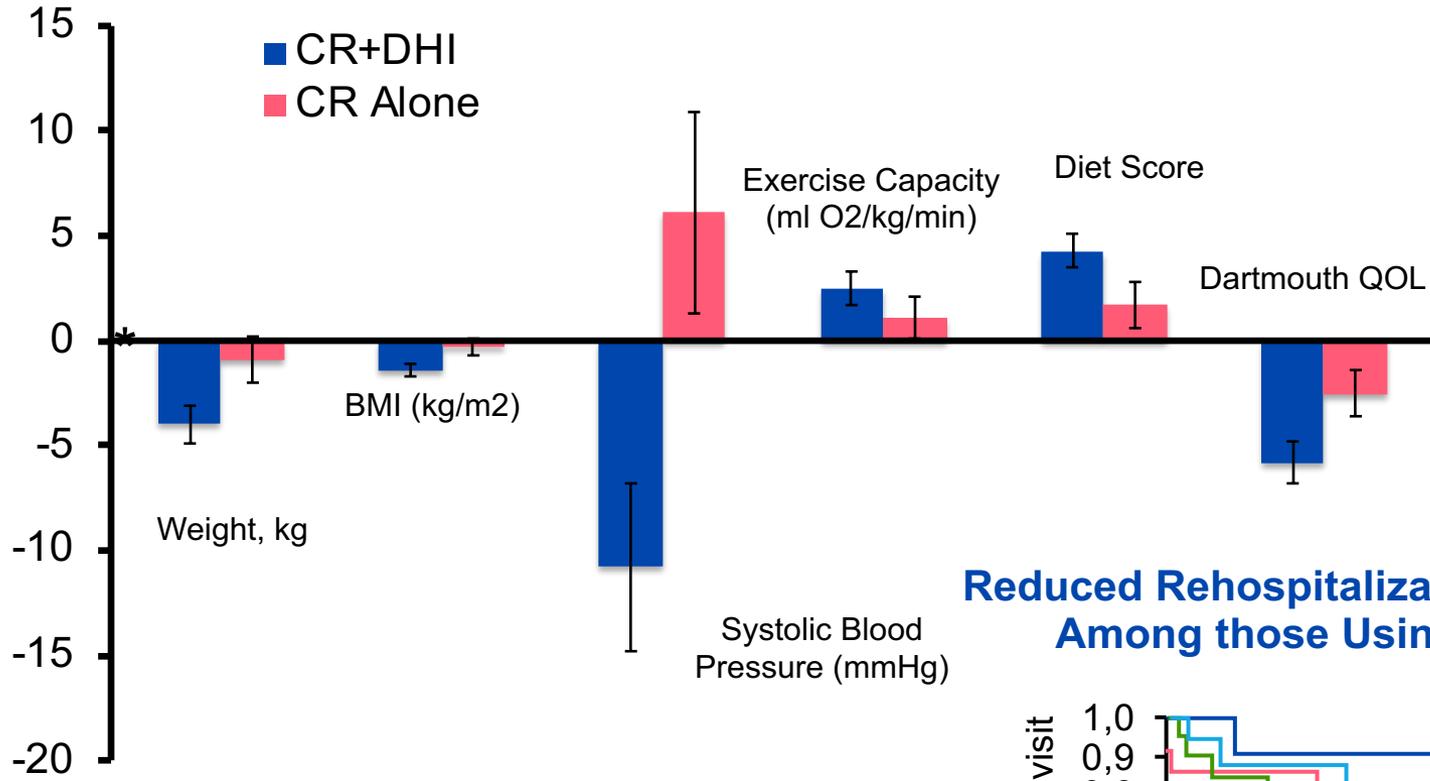
R. Jay Widmer, MD, PhD,^a Thomas G. Allison, PhD, MPH,^a Ryan Lennon, MS,^b Francisco Lopez-Jimenez, MD,^a Lilach O. Lerman, MD, PhD,^c and Amir Lerman, MD^a Rochester, MN

Digital Health Intervention as an Adjunct to Cardiac Rehabilitation Reduces Cardiovascular Risk Factors and Rehospitalizations

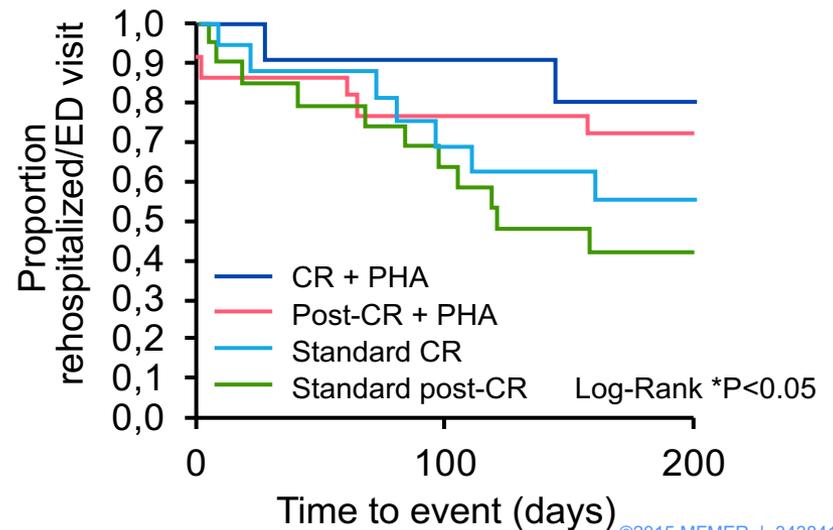
R. Jay Widmer, Thomas G. Allison, Lilach O. Lerman & Amir Lerman



Risk Factor Reduction after 3 Months of CR



Reduced Rehospitalizations/ED Visits Among those Using the PHA



Loneliness, Social Isolation, and Cardiovascular Health

Ning Xia¹ and Huige Li¹⁻³

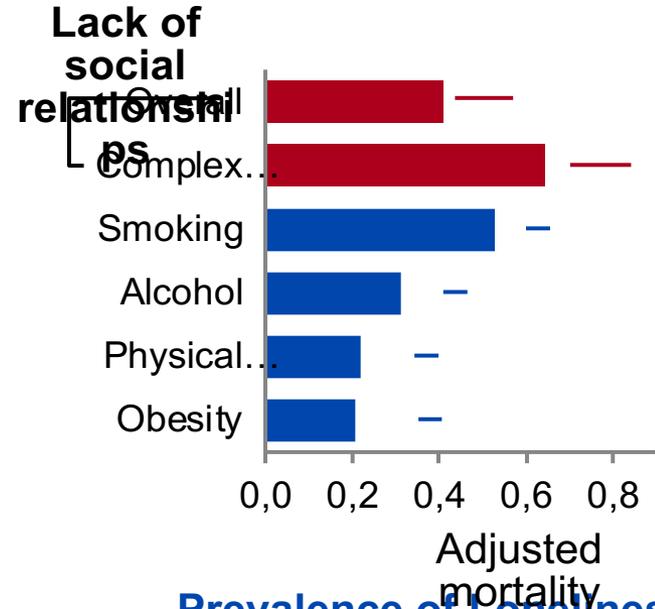
Social Isolation Actually Hurts Your Heart, A New Study Says | Time

TIME

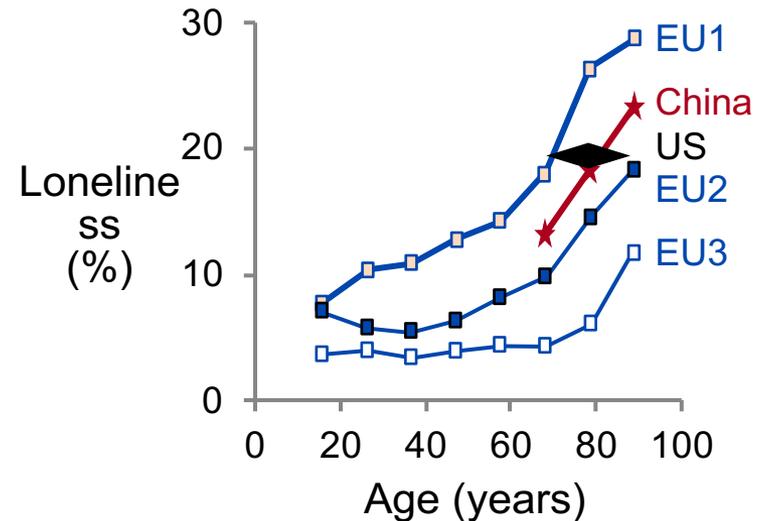
Loneliness Can Actually Hurt Your Heart. Here's Why



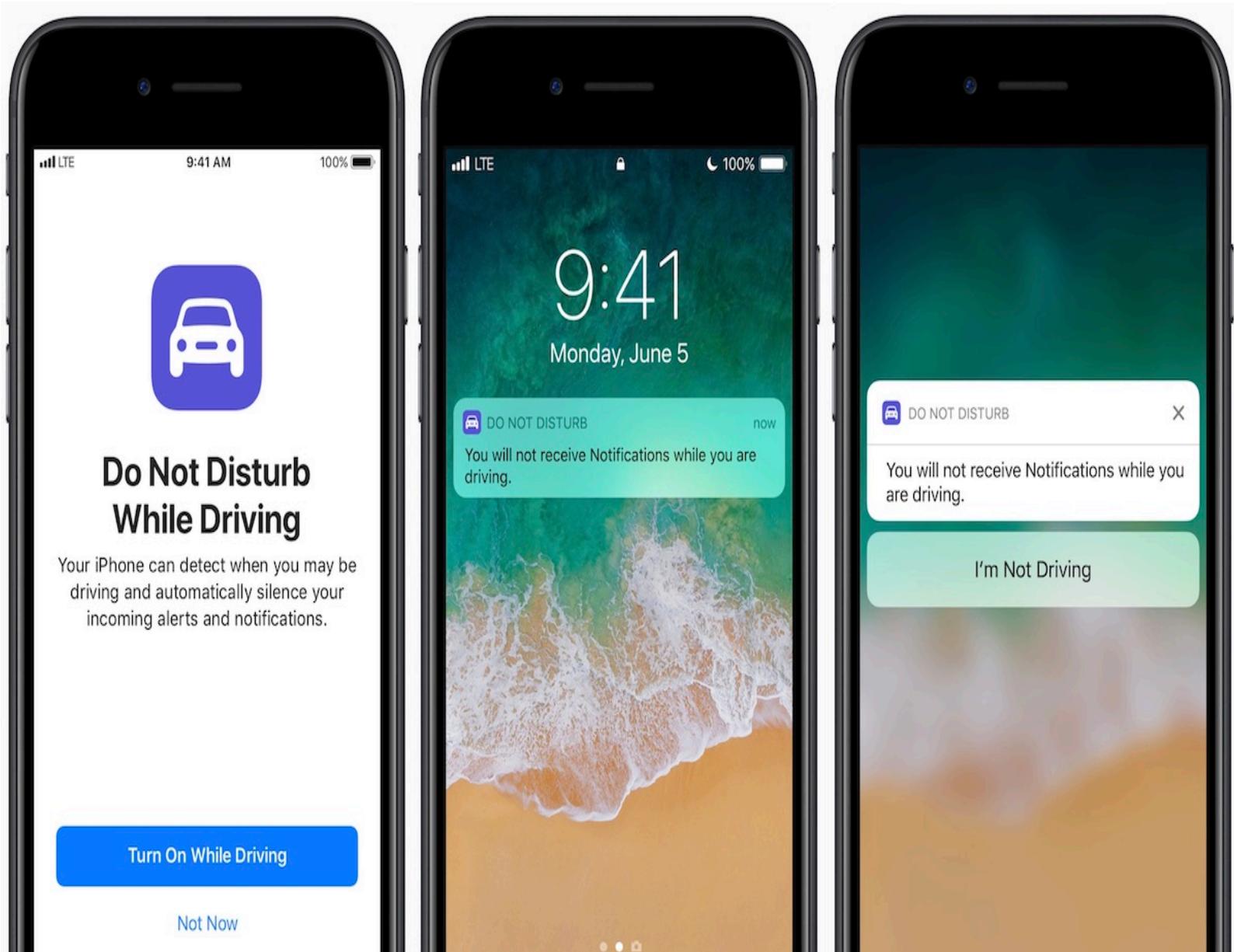
Impact of Social Support on Mortality



Prevalence of Loneliness



Timing of Engagements



Association of Search Engine Queries for Chest Pain With Coronary Heart Disease Epidemiology

Conor Senecal, MD; R. Jay Widmer, MD, PhD; Lilach O. Lerman, MD, PhD; Amir Lerman, MD

- Relative search frequency over time or geographic area
- A score (0 to 100) is provided about the relative frequency



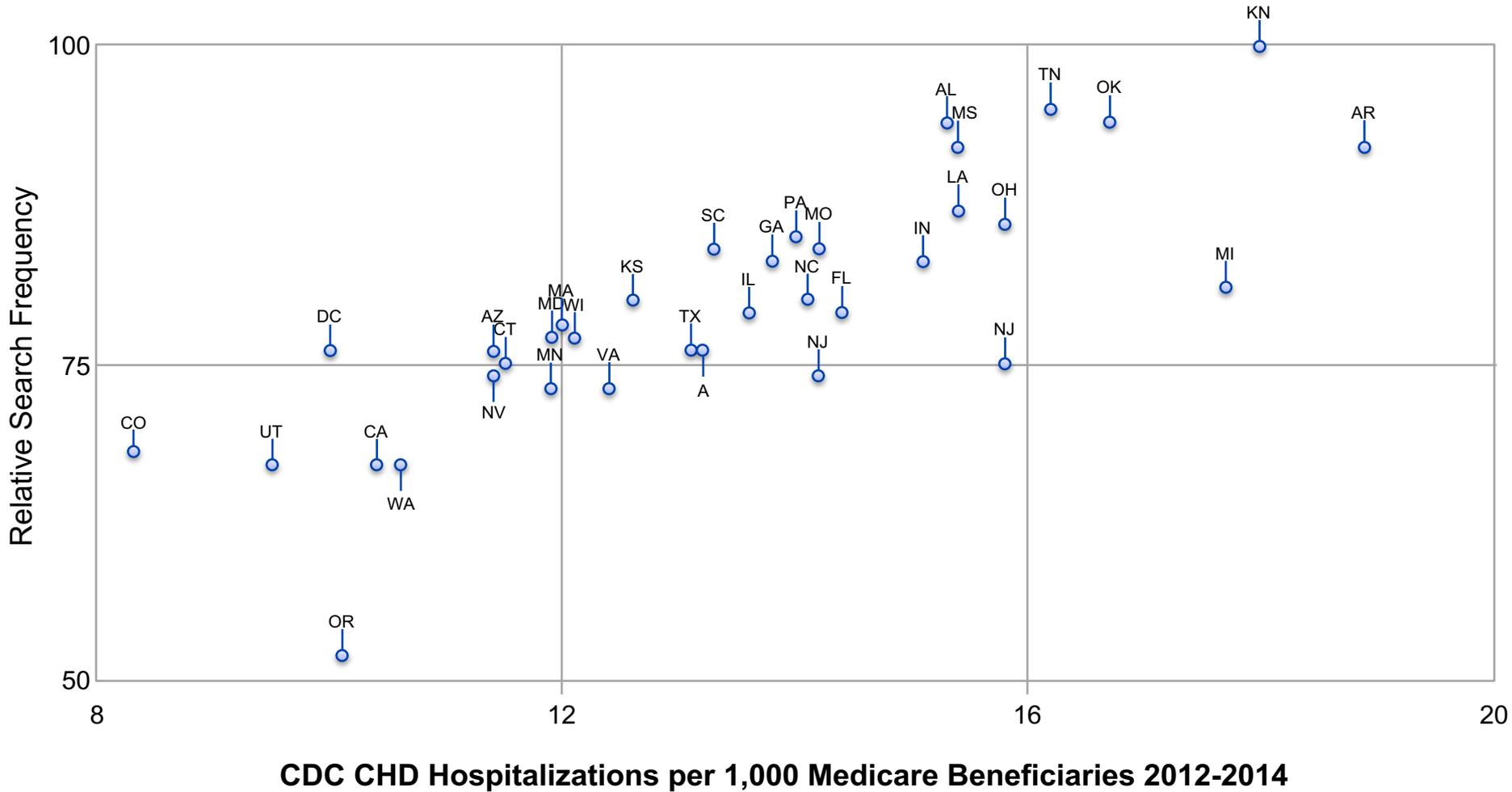
chest pain|

chest pain
chest pain **anxiety**
chest pain **icd 10**
chest pain **mayo clinic**
chest pain **after eating**
chest pain **stress**
chest pain **right side**
chest pain **when swallowing**
chest pain **gas**
chest pain **relief**

Google Search

I'm Feeling Lucky

Search Frequency of CP on Google vs CHD Hospitalization Rate



Frequency of Chest Pain Searches

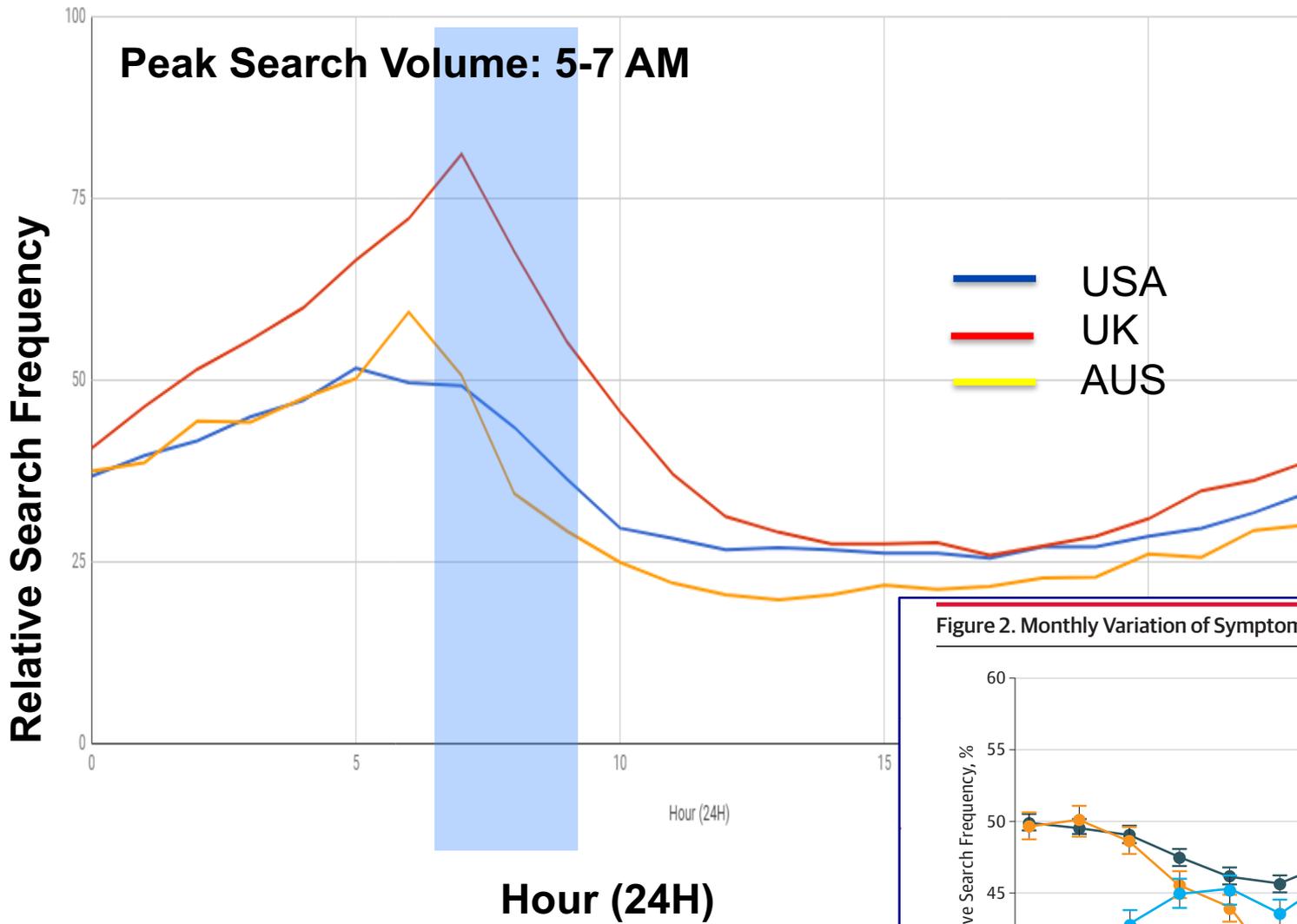
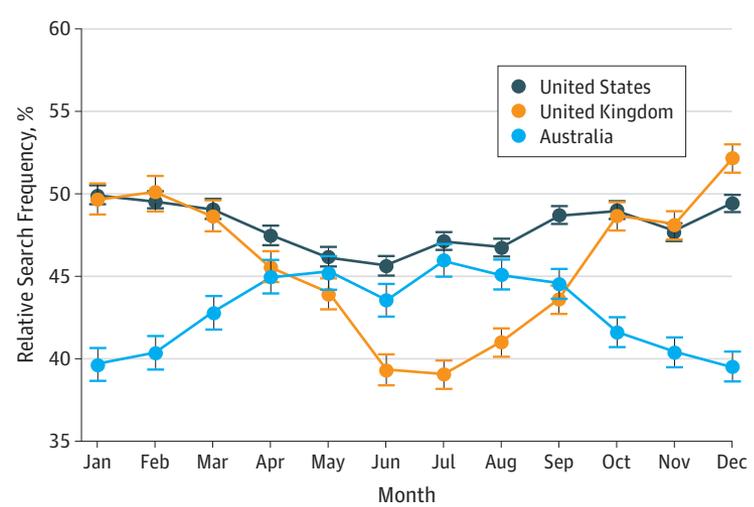
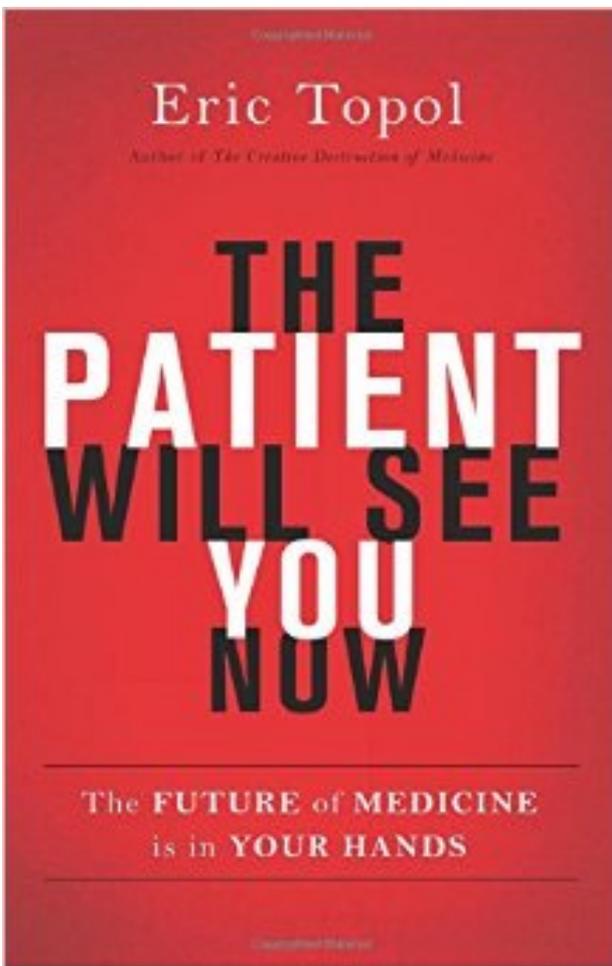
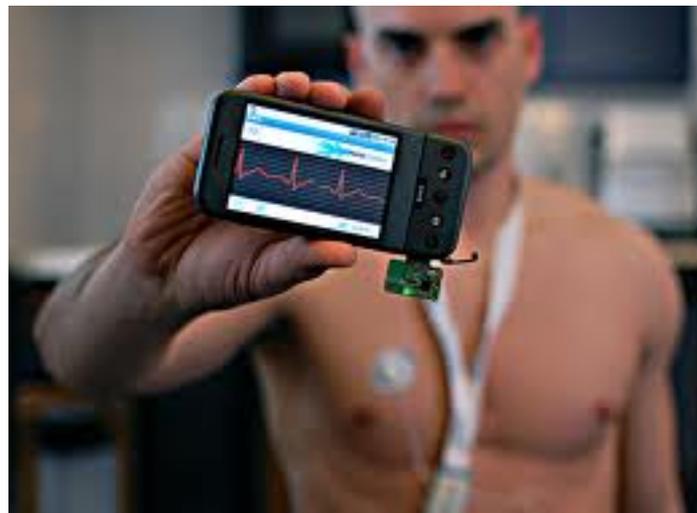


Figure 2. Monthly Variation of Symptom Search





Is it realistic?



Half of US Physicians have burnout

Triad of symptoms:

Emotional
exhaustion

Depersonalization

Sense of diminished
accomplishment



Cynicism

Inefficiency



What makes a successful digital health

- Evidence/Guideline-Based
- Recognized medical brand name
- User friendly and incentive-Based
- Right timing
- Flexible operating platform – able to be easily modified based on new scientific data and guidelines
- Interact with Social Media
- Wide applicability and distribution (i.e. smartphones)
- Not dependent on proximity to medical center
- Respect the physicians' time

The Future of Smartphone Heart Health

- Digital health provides a new tool to help behavior associated diseases, including primary and secondary cardiovascular prevention
- Increasingly evidence shows benefit if patients are engaged
- Patient engagement may be enhanced through more directed messaging
- Online symptom search may provide an avenue for providing timely care while patients are engaged

Thank You
Questions?

Lerman.Amir@mayo.edu

