

# DIGITAL HEALTH IS MOVING MAINSTREAM: How Can We Harness the Opportunity?

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# THE DIGITAL HEALTH VISION

Care delivered outside of a traditional setting that is not dependent on specific time and place restrictions. It integrates technology, often includes Patient Generated Health Data and seeks to include the patient in the process and help them become more engaged.



# DIGITAL HEALTH BY THE NUMBERS

Worldwide mHealth market to reach

**\$59 Billion  
by 2020**

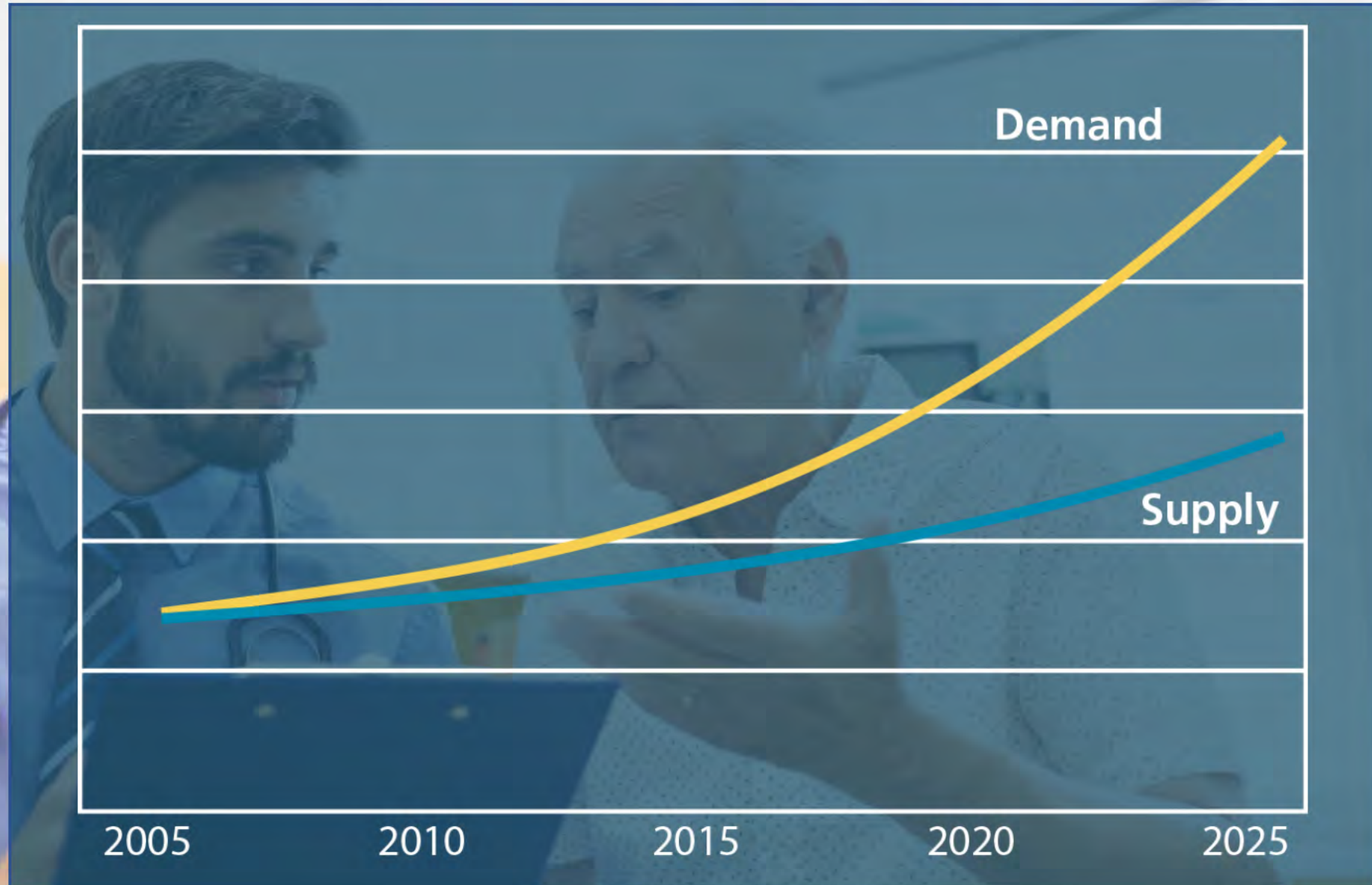
More than  
**6.1 Billion**  
people will have  
smartphones or  
tablets with access  
to mobile health  
apps by 2020

There will be  
**300 Million**  
pieces of clothing  
& accessories with  
embedded health  
monitoring devices  
by 2020

The **top 3**  
therapy fields  
for connected  
health solutions  
are **diabetes**,  
**obesity** and  
**hypertension**



# We Must Get it Right!



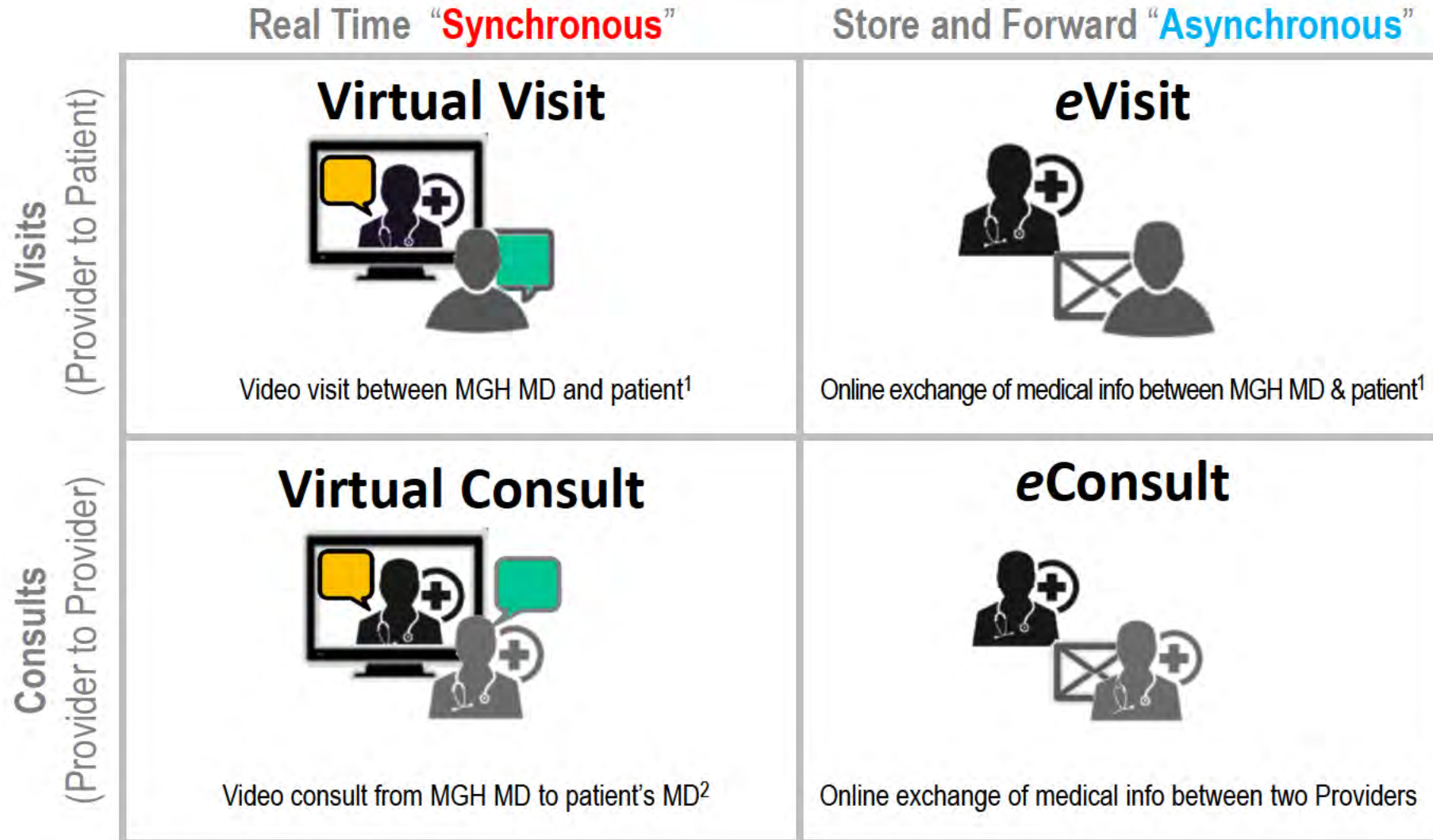
# THE DIGITAL HEALTH LANDSCAPE

Telehealth  
Remote Monitoring  
Digital Therapeutics  
Artificial Intelligence





# TELEHEALTH TAXONOMY



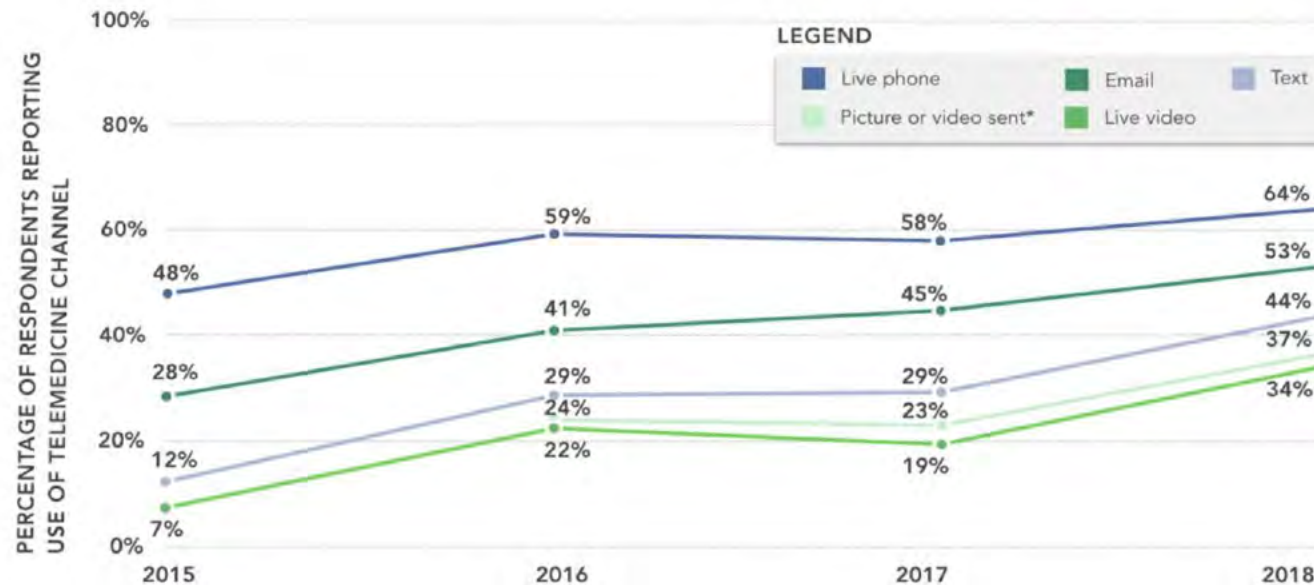
<sup>1</sup> Exchange where the provider gives the patient medical advice, or determines if travel to MGH for in-person encounter is advisable

<sup>2</sup> Exchange where the MGH consultant “Expert” gives referring provider medical advice

# TELEMEDICINE ADOPTION TRENDS

TELEMEDICINE ADOPTION BY CHANNEL  
2015-2018

ROCK  
HEALTH



\*Missing data point means the question was not asked in 2015.

Source: Rock Health Digital Health Consumer Adoption Survey (n<sub>2018</sub> = 4,000; n<sub>2017</sub> = 3,997; n<sub>2016</sub> = 4,015; n<sub>2015</sub> = 4,017)

- Wearable use shifting from fitness to managing health
- Urban patients twice as likely to use video telemedicine than rural
- Currently only capturing 0.5% of a 400+ million patient addressable market

Data from 2018 Rock Health  
Digital Health Consumer  
Adoption Report



# MGH VIRTUAL VISITS STUDY RESULTS

**79%** of patients found it more convenient to find a time for a follow-up virtual visit vs. an in person one

**68%** of patients rated virtual video visits at 9 or 10 on a 10 point scale

Clinicians reported that virtual video visits are superior to office visits for timely scheduling of appointments (**70.5%**) and for visit efficiency (**52.5%**)







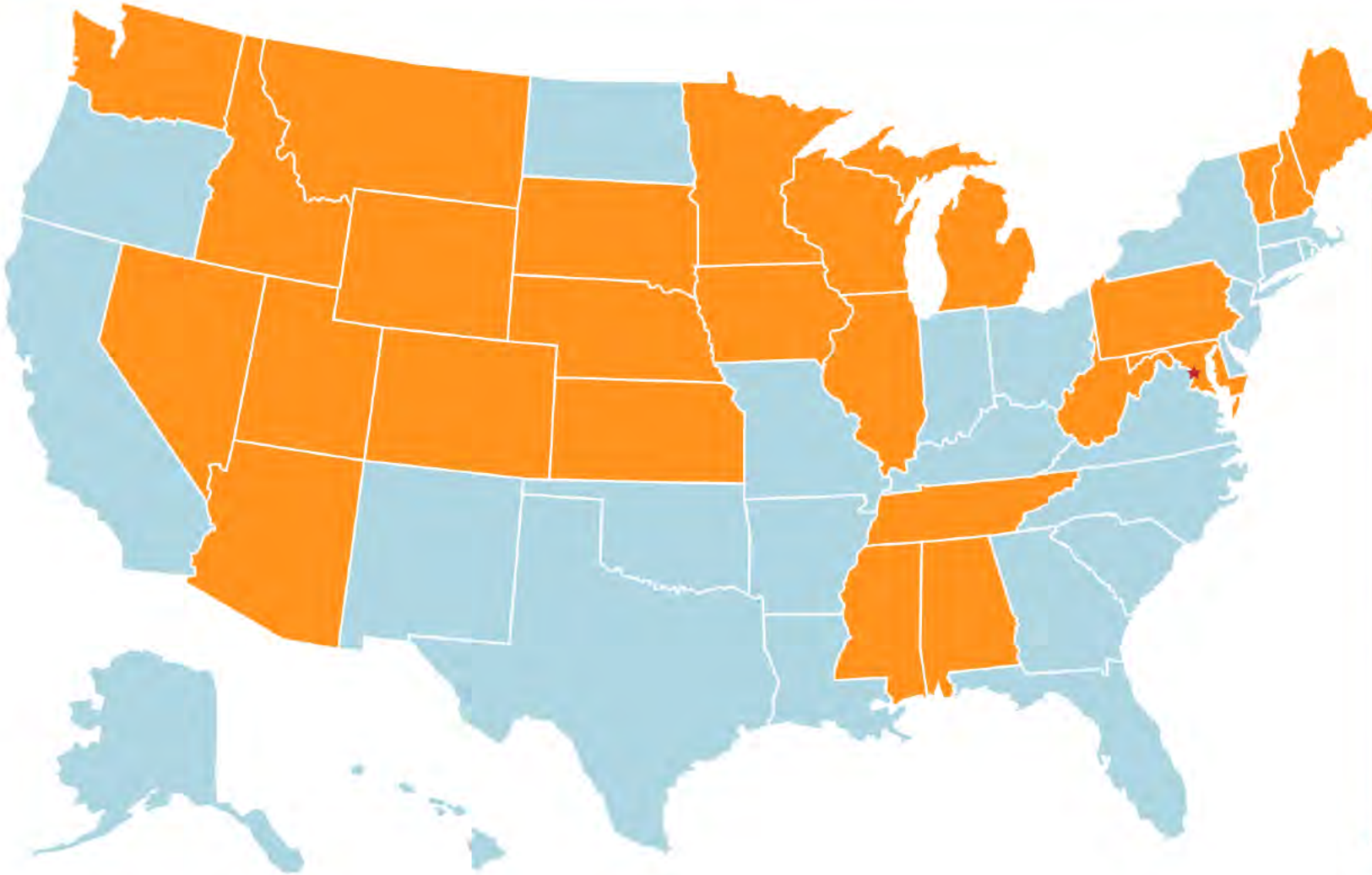
A photograph of an older Black man with a grey beard and mustache, wearing a light purple button-down shirt. He is looking down at a black smartphone in his hands with a confused or frustrated expression. A woman with long brown hair, wearing a light blue shirt, is standing next to him, looking at the phone. The background is a blurred indoor setting with a window.

# ISSUES WITH FRAGMENTED APPROACH

- Patient Confusion & Dissatisfaction
- Reimbursement & Revenue Differences
- Increased Legal Exposure
- Inefficient Use Of System Resources



# INTERSTATE MEDICAL LICENSURE COMPACT



- Launched in 2014 by the FSMB
- 25 States are current members  
(District of Columbia & Guam as well)
- As of December 31, 2018, 4,511 medical licenses have been issued to providers to practice telehealth in multiple states

A photograph of two male doctors in white lab coats walking through a modern hospital corridor. The doctor on the left is older with white hair, wearing a blue patterned tie and holding a folder and glasses. The doctor on the right is younger with a beard, wearing a pink tie and holding a document. They are both looking at the document held by the younger doctor. The background shows a bright, modern hospital interior with large windows and architectural details.

# eCONSULTS

60% OF PATIENTS  
CARED FOR IN  
PRIMARY CARE



# ONLINE SECOND OPINIONS





# ONLINE SECOND OPINIONS

THE ADDRESSABLE  
MARKET FOR ONLINE  
SECOND OPINIONS IS  
ESTIMATED TO REACH  
**\$3.4 BILLION** BY 2020

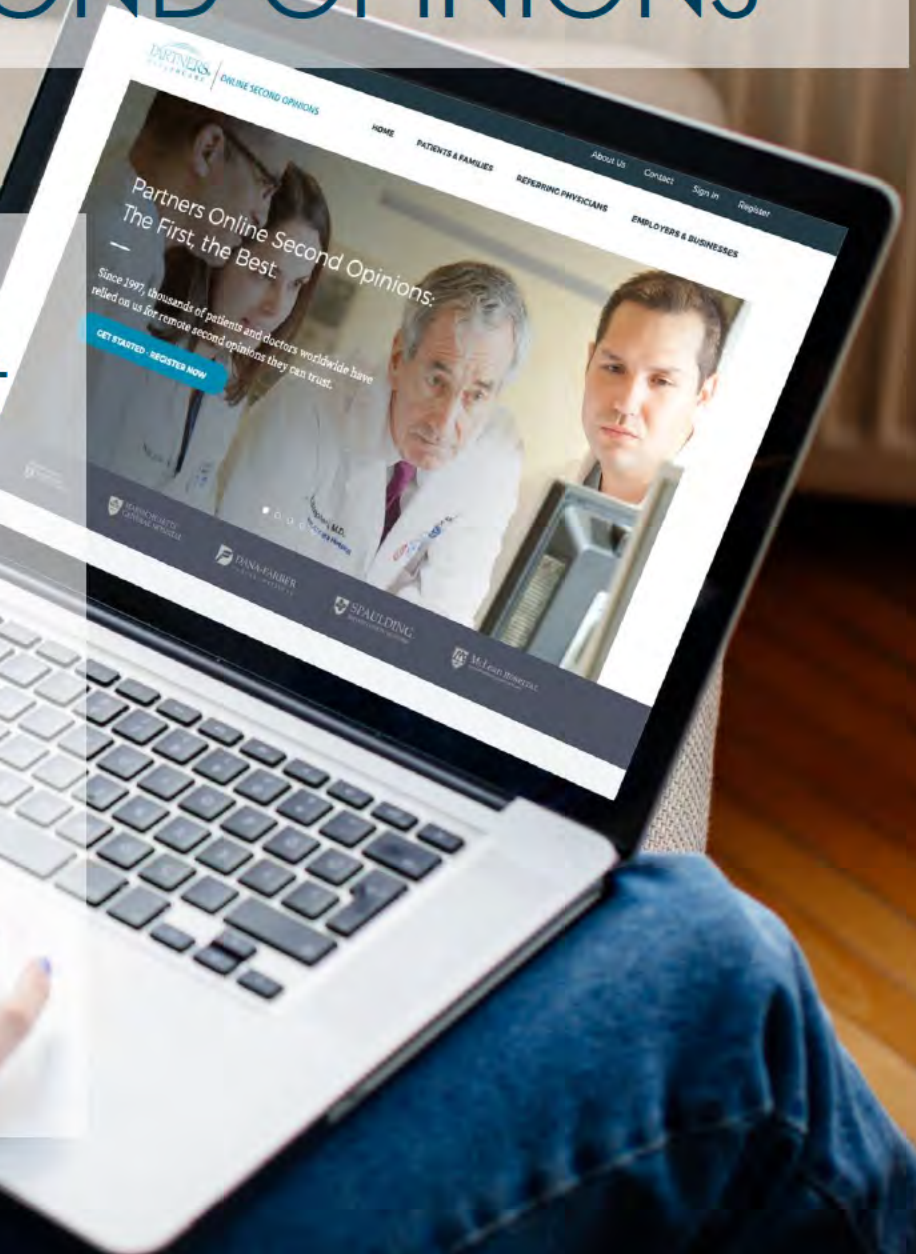




# PARTNERS ONLINE SECOND OPINIONS

A 2003 study in the British Journal of Medicine documented the significant impact online second opinions have had on improving patient outcomes

- **90%** of patients over the year studied received a new recommended treatment plan
- **5%** of patients had a change in diagnosis



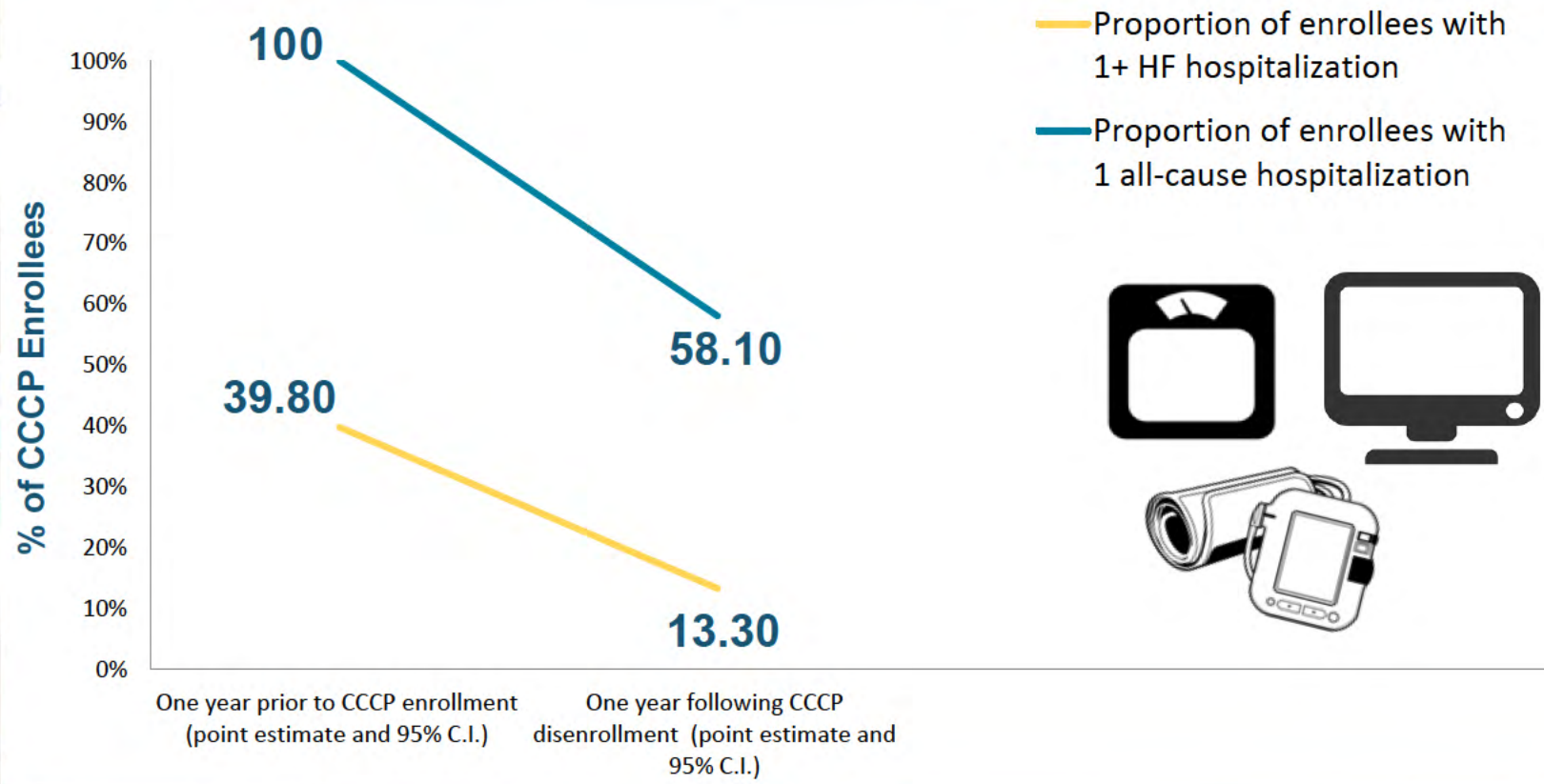


# REMOTE MONITORING



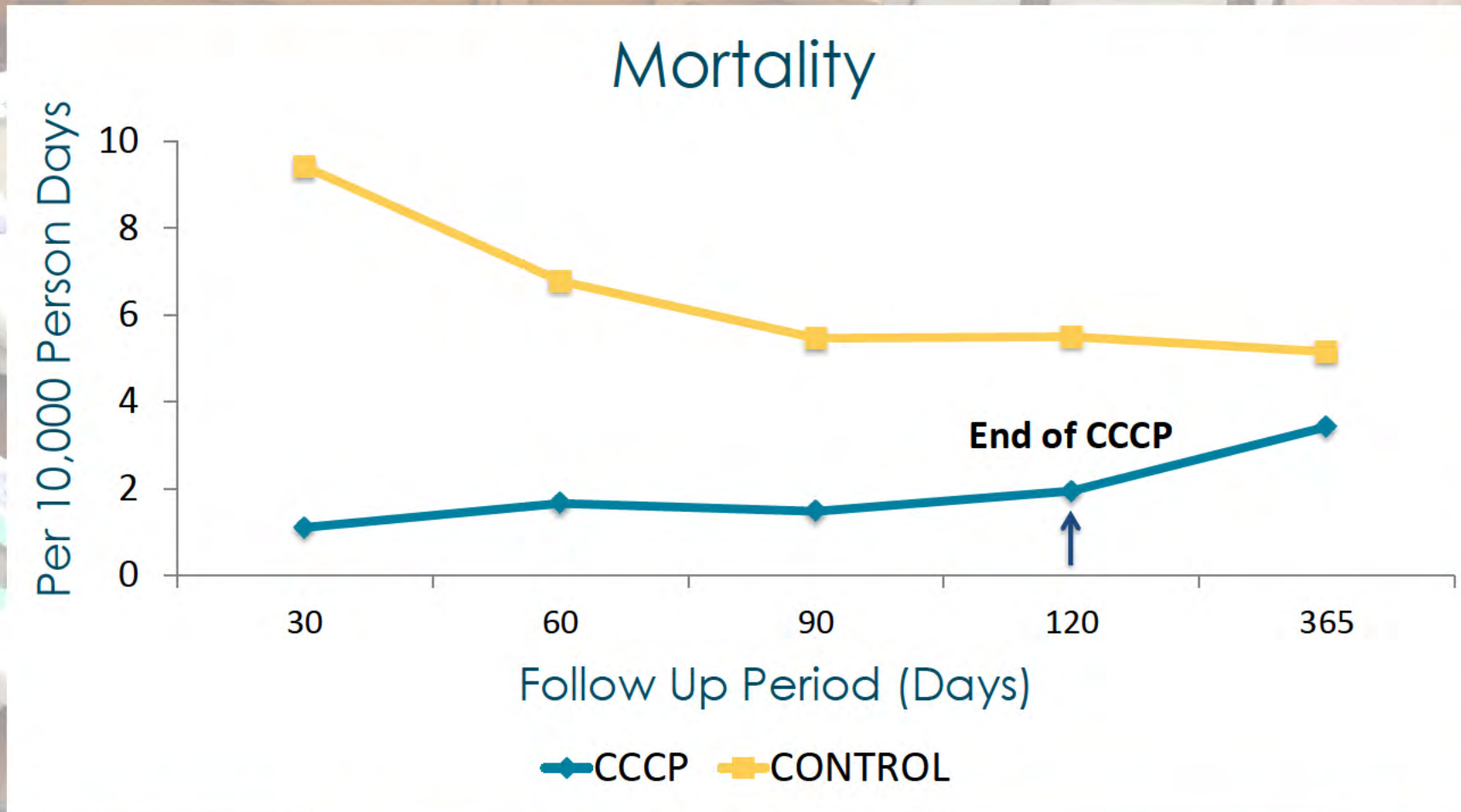


# CONNECTED CARDIAC CARE





# ONE YEAR MORTALITY IN CCCP



Data Includes 303 CCCP patients and 252 controls seen at Partners Healthcare in 2012.

Ref: J Med Internet Res. 2015 Apr 22;17(4):e101. doi: 10.2196/jmir.4417.



PGHD*Connect* is a cloud-based digital health platform that provides a link to securely share patient generated health data between patients and providers.

Members of the patient's care team can view the data via MyChart and Epic.



# THE NEW PGHDCConnect MOBILE APP

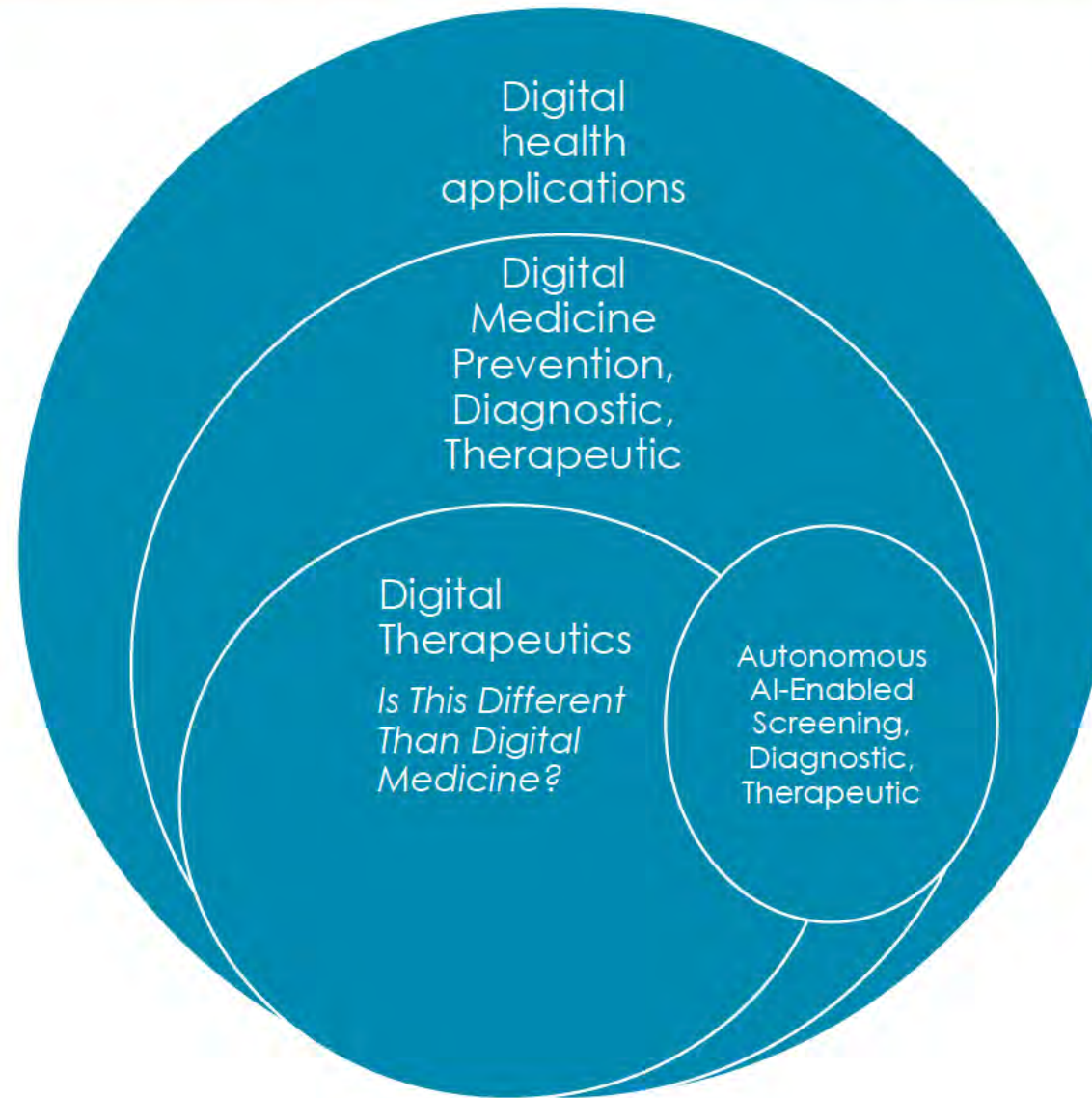




# DIGITAL THERAPEUTICS



# CONTEXTUAL PERSPECTIVE





# FEATFORWARD

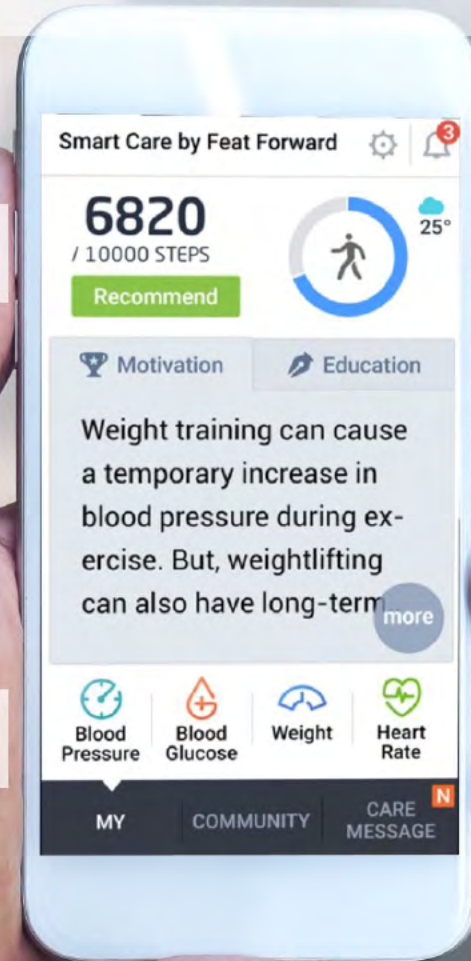
Activity Goals

Biometric Tracking

Alerts

Weather

Messaging

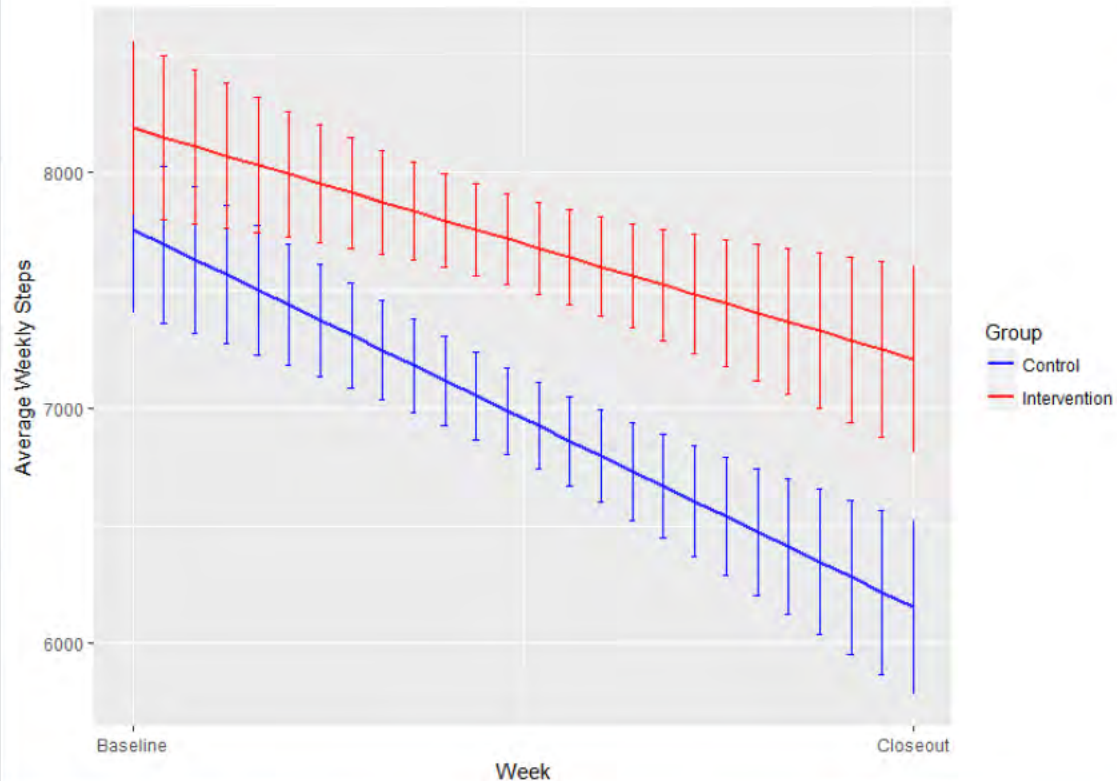


# WEEKLY AVG DAILY STEPS (WDS)

Smart Care by Feat Forward

6820

Change in WDS by group over time (*unadjusted*)



Baseline-adjusted slopes for WDS by cohort

	Control [n]	Intervention [n]	p-value
Overall	-57.94 [110]	-29.29 [100]	0.015*
Obesity	-90.23 [59]	0.95 [52]	<0.001***

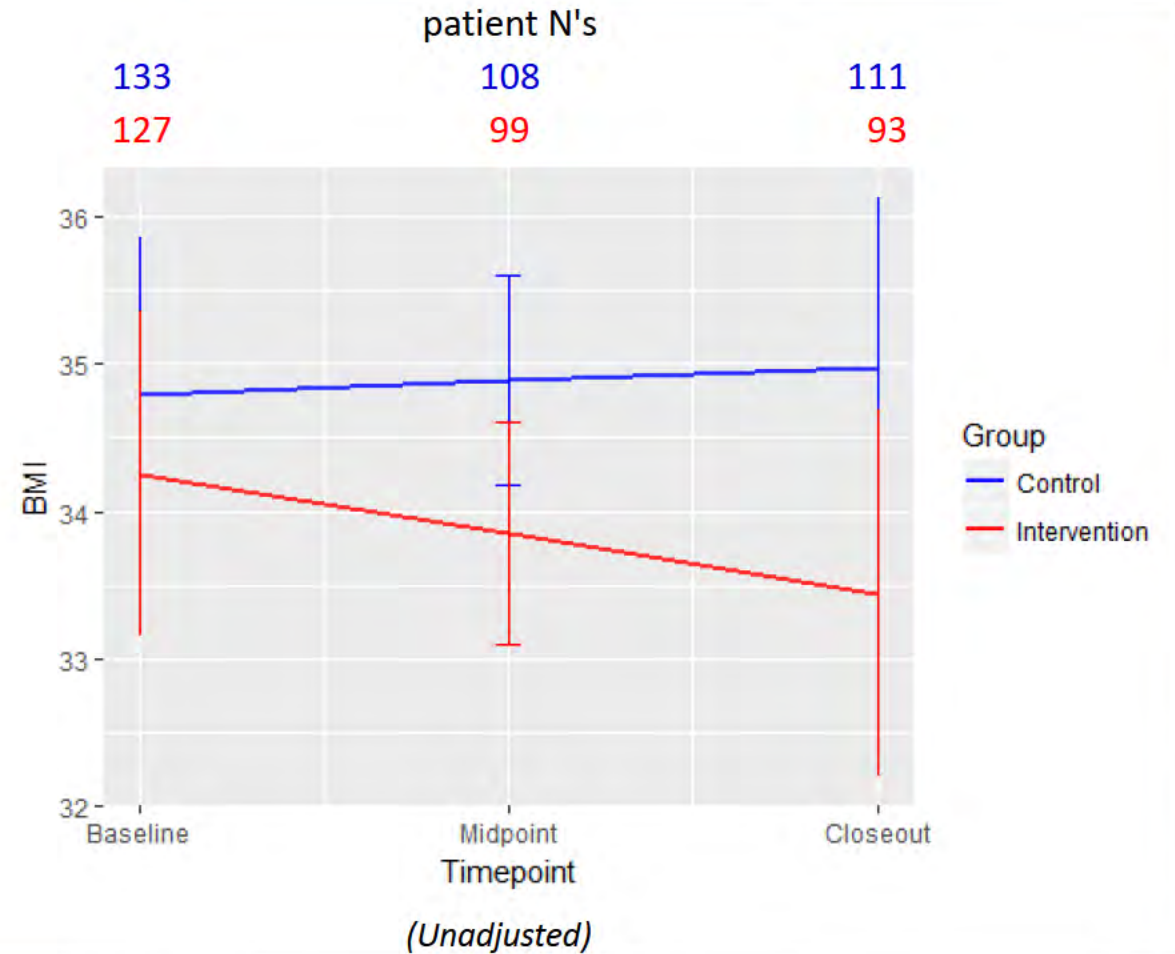


# BMI

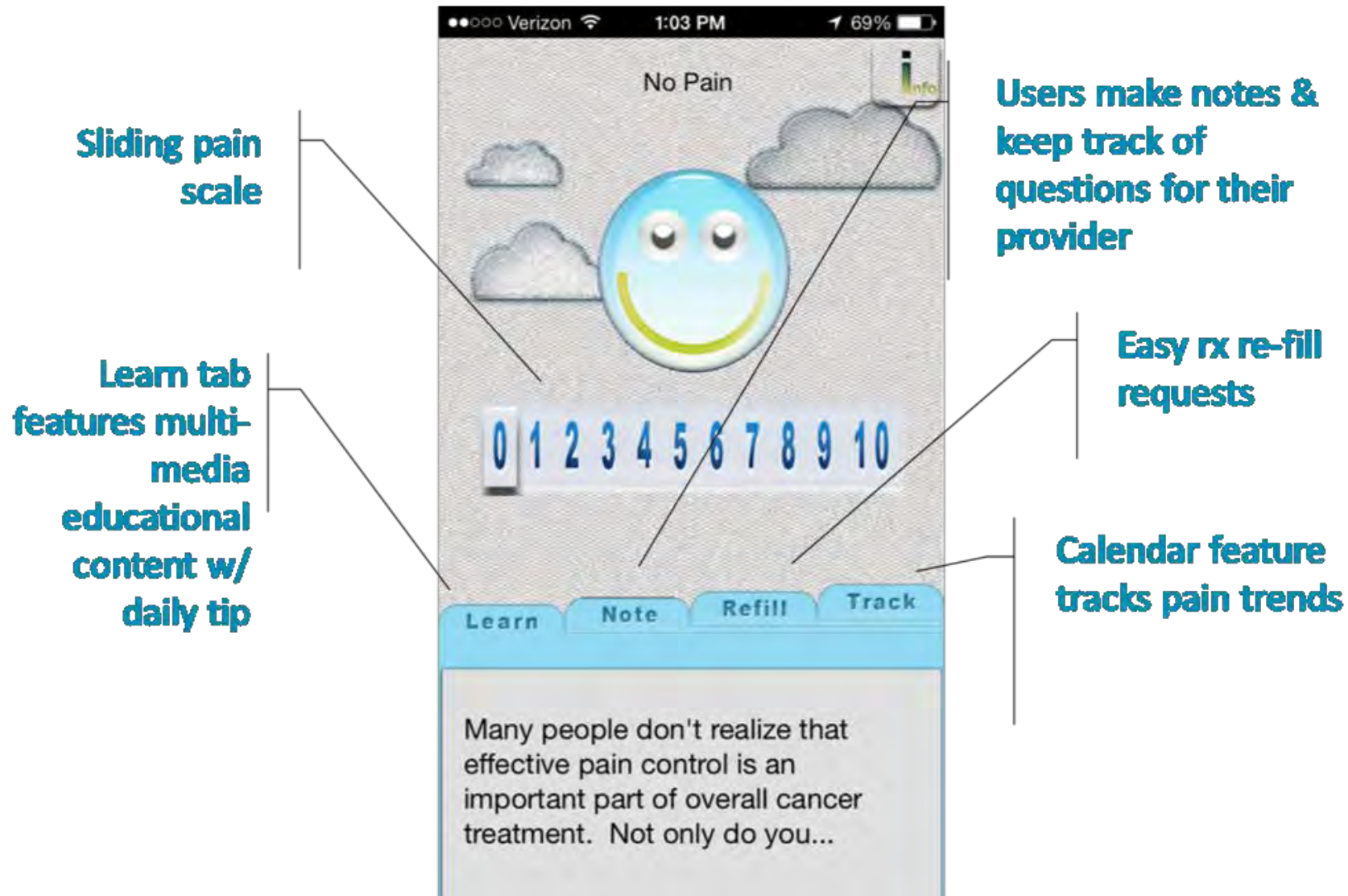
Smart Care by Feat Forward

## Baseline-adjusted slopes for BMI by cohort

	Control [n]	Intervention [n]	p-value
<i>Overall</i>	-0.025 [133]	-0.232 [128]	<b>0.041*</b>
Obesity	-0.086 [68]	-0.236 [67]	0.362
Hypertension	0.056 [74]	-0.253 [75]	<b>0.002**</b>



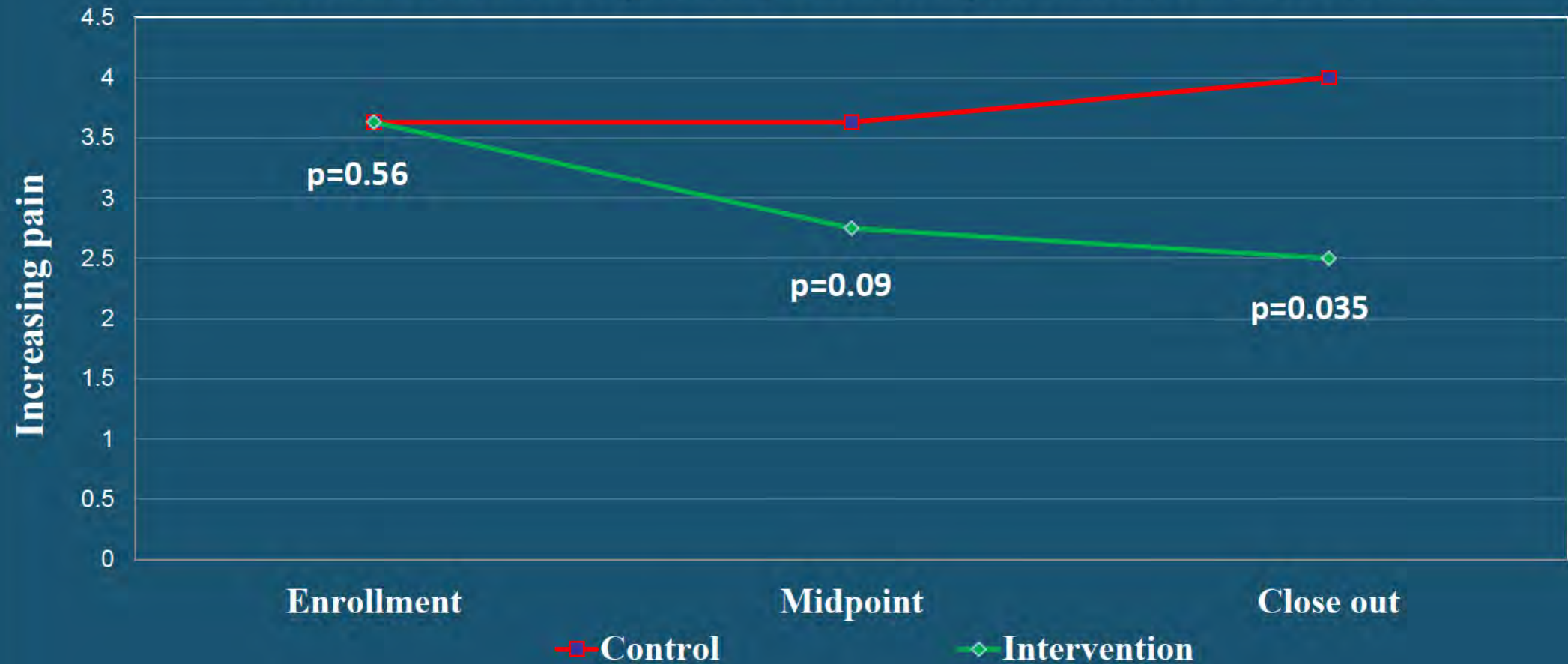
# ePAL



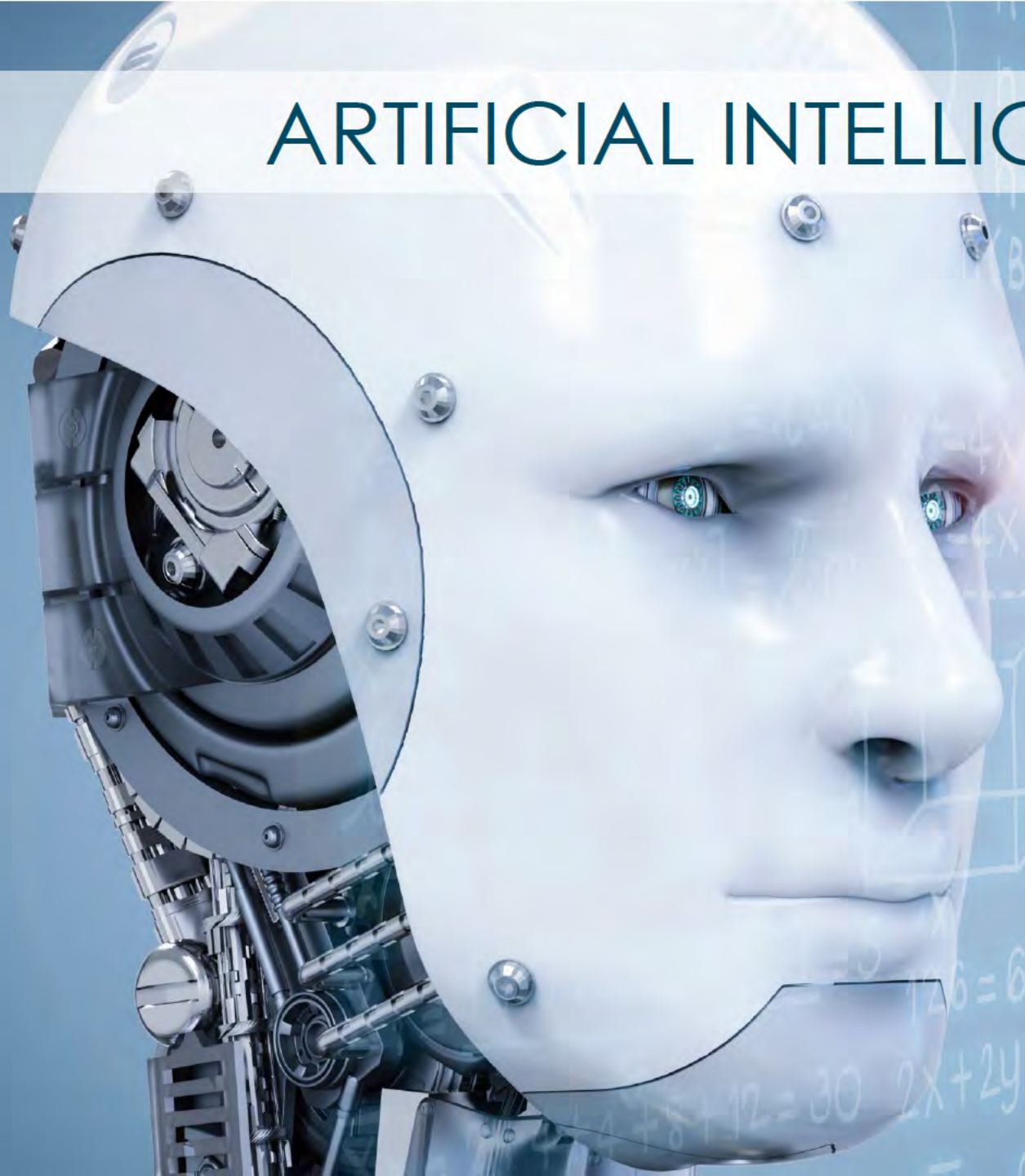


# ePAL CLINICAL RESULTS

Median Pain Severity levels (BPI Severity): Control vs. Intervention



# ARTIFICIAL INTELLIGENCE





BIGGER THAN WHAT HUMANS OR  
TECHNOLOGY CAN ACHIEVE ALONE





BIGGER THAN WHAT HUMANS OR  
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AI ALONE: 92%





# BIGGER THAN WHAT HUMANS OR TECHNOLOGY CAN ACHIEVE ALONE

AI ALONE: 92%

HUMANS ALONE: 96%





# BIGGER THAN WHAT HUMANS OR TECHNOLOGY CAN ACHIEVE ALONE

AI ALONE: 92%

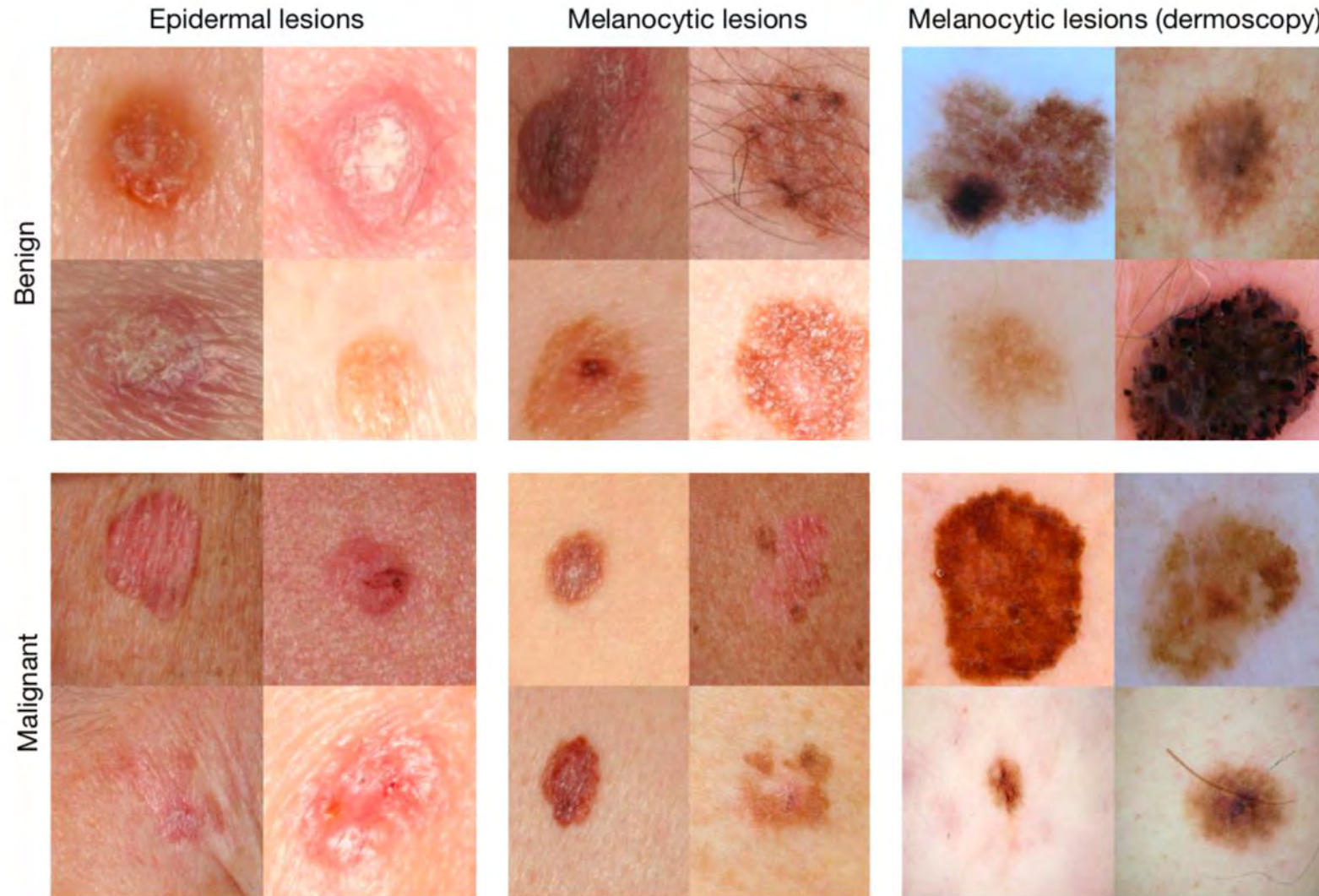
HUMANS ALONE: 96%

AI + HUMANS: 99.5%



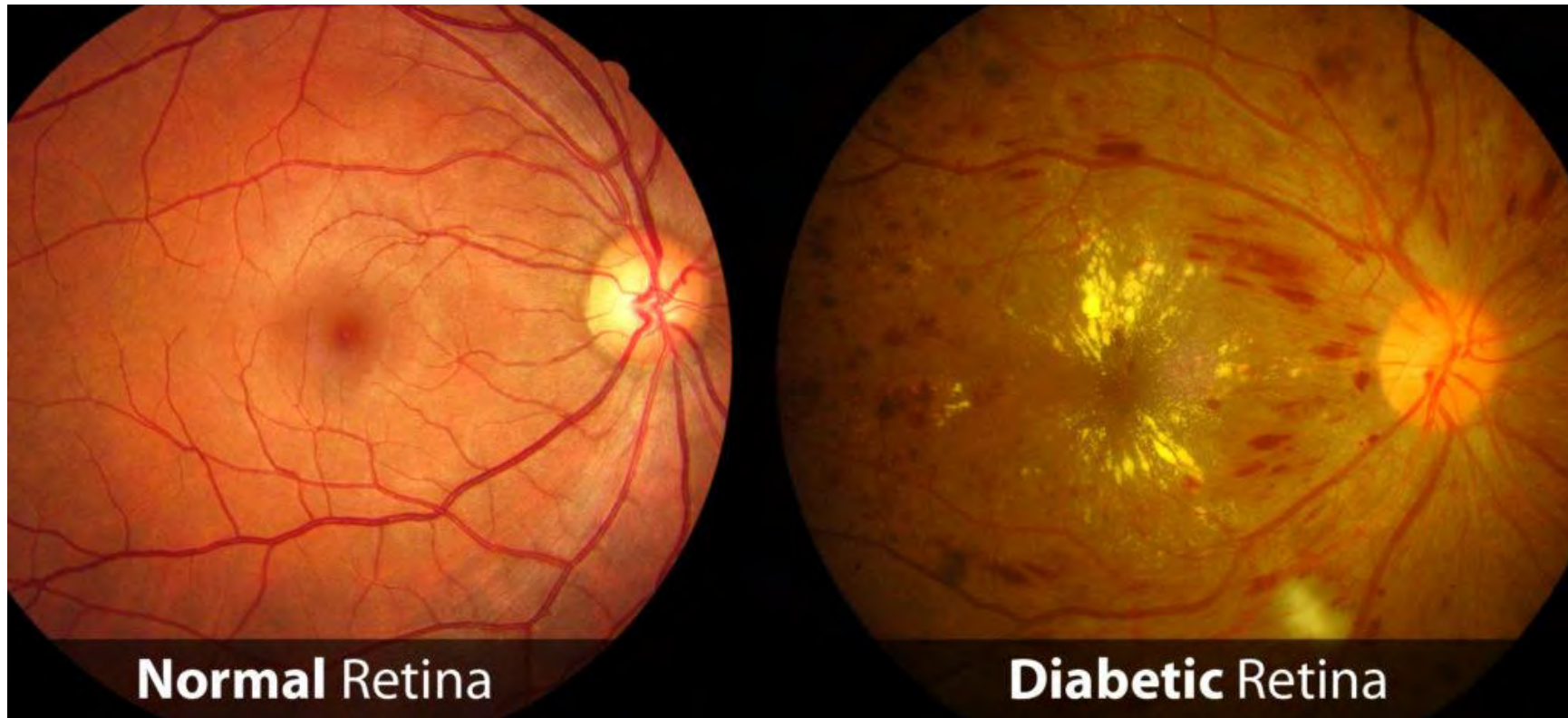


# Dermatology: Deep neural network classifies skin conditions *as well as* a dermatologist



# Ophthalmology: Deep learning system detects diabetic retinopathy across multiethnic population

The Deep Learning System had high sensitivity and specificity for identifying diabetic retinopathy and related eye diseases using retinal images from multiethnic populations with diabetes.

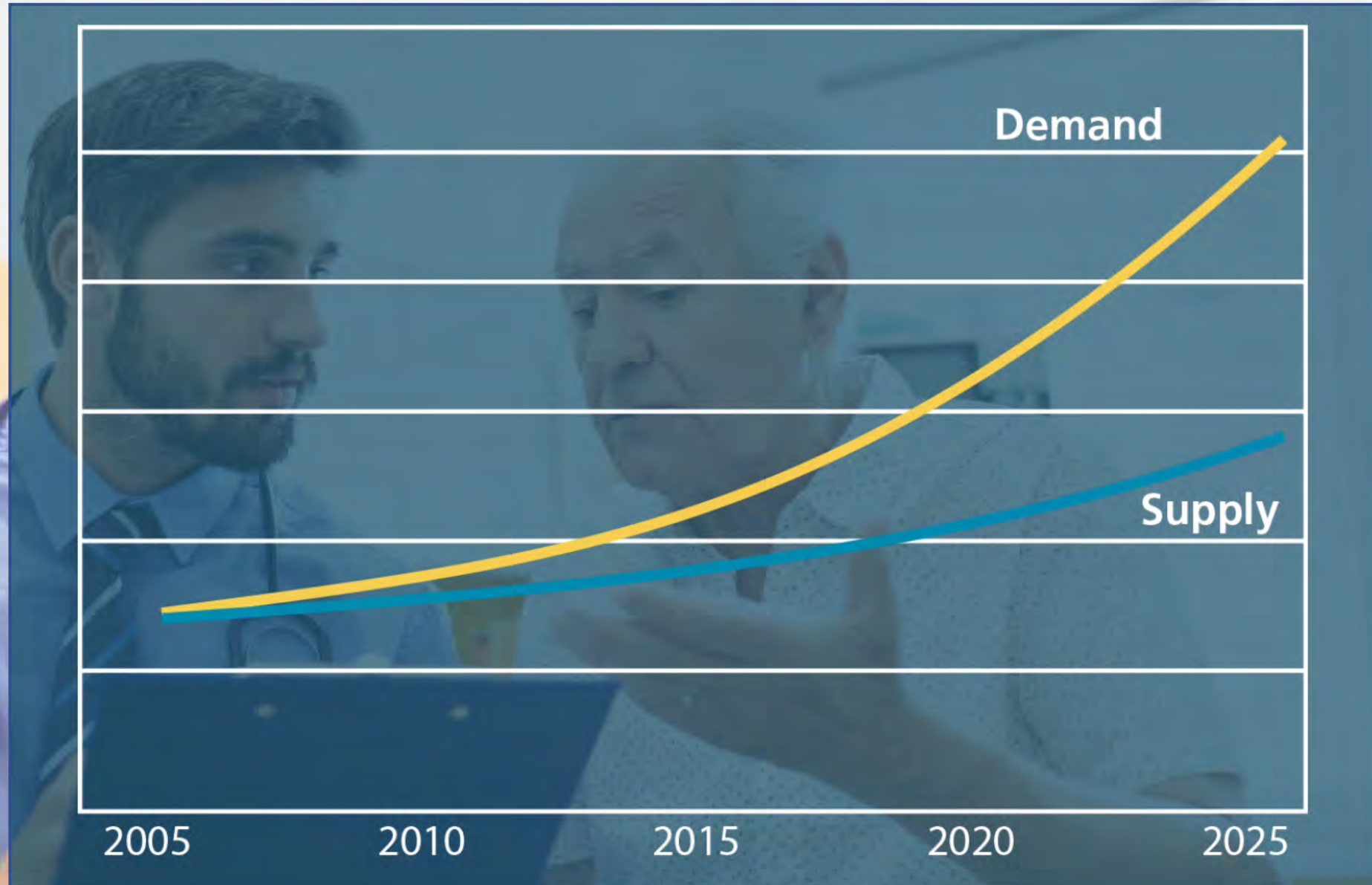






# HOW WILL WE REGULATE AI?

# RATIO OF PROVIDERS TO PATIENTS





A photograph of a doctor in a white lab coat and a patient in a red and blue plaid shirt sitting at a desk. The doctor is on the left, gesturing with his hands while speaking. The patient is on the right, listening. A computer monitor is visible in the background. A semi-transparent white box with dark blue text is overlaid in the center of the image.

# THE TECHNOLOGY GENIE IS OUT OF THE BOTTLE



A photograph of a doctor in a white lab coat and tie, sitting at a desk and gesturing with his hands while talking to a young man in a red and blue plaid shirt. The young man is sitting in a chair, looking towards the doctor. A computer monitor is visible on the desk between them. The background is a bright, out-of-focus office or clinic setting.

# THE TECHNOLOGY GENIE IS OUT OF THE BOTTLE

A new regulatory framework that accepts time and place independent care delivery, but maximizes patient safety is required



# CONNECT WITH ME



## **Author of 2 Books**

- The Internet of Healthy Things
- The New Mobile Age

*Available at Amazon.com*

## **The cHealth Blog:**

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