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EHT

THE STATE OF FITBIT AND WEARABLE TECH AT VA

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LETTER FROM THE EDITOR

Good Day VA!

Welcome, from SimLEARN's Emerging Healthcare Technology Integration (EHTI) portfolio!

We're delighted to be featuring Robert Goldel, Ph.D., Presidential Innovation Fellow, Care and Transformational Initiatives, in our April edition of the EHT Opportunities Magazine. Specifically, we'll be diving into the fantastic work that he is doing in digital health to increase access and improve outcomes with technologies that many Veterans already know and use every day.

There are also six specialists from three different VA care teams who are collaborating with Dr. Goldel. They are Drs. Arash Harzand and Amit J. Shah from Cardiology in Atlanta, Drs. Scott Fears and Smitta Patel from Psychiatry in Greater Los Angeles, and Drs. Lynn Chang and Babak Darvish from COVID Long Haul in Greater Los Angeles.

Everybody has personal and professional interest in utilizing smartphones, mobile applications, and connected devices (wearables) to enable data-driven operations for personalized medicine and building a health system that learns with and from Veterans.

We look forward to bringing you more future content like this from the very best and brightest VA has to offer!

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AD of EHTI, SimLEARN (14HIL2)
Gulf War Veteran, USN

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EXECUTIVE SUMMARY

With the Veteran Administration's (VA) goal to build a Veteran community using innovative digital health technologies towards improving health and wellness, the Veterans Health Administration Innovation Ecosystem (VHAIE) is leading the partnership between the VA and Fitbit, one of the world's leading fitness technology companies.

VA and Fitbit launched a year-long initiative that will support Veterans and VA care teams' health and wellness, especially during the COVID-19 pandemic, through Fitbit's wearable devices, programs, and services. Approximately 10,000 eligible Veterans will participate in a pilot that started in January 2021. During this time, a group of providers across the VA will be exploring various use cases.

This report includes a high-level overview of the VA-Fitbit partnership, the VA-Fitbit Program and the COVID Risks Pilot, and wearable technology in health care. There will also be four Q&A sessions. The first features Dr. Robert Goldel, who is leading the VA-Fitbit initiative, followed by three with the Cardiology, Psychiatry, and COVID Long Haul care teams.

IN COLLABORATION WITH

VA AND FITBIT SUPPORTING VETERAN HEALTH

On January 11, 2021, the Department of Veteran Affairs (VA) announced a new partnership with Fitbit, a fitness wearable company, in an initiative to help support Veteran health and wellness during the COVID-19 pandemic.

Led by Dr. Robert Goldel, Presidential Innovation Fellow at the Veterans Health Administration Innovation Ecosystem (VHAIE) – who is part of VHAIE's Care & Transformational Initiatives (CTI), the VA-Fitbit program is focused on Veterans, caregivers, and VA staff who currently use Fitbit devices. The VA also contracted with Fitbit to provide 10,000 eligible participants with one-year free access to Fitbit Premium and Fitbit Health Coaching programs and services that can aid managing stress, improving sleep, and increasing physical activity.

Along with Dr. Goldel, three VA care teams, namely Cardiology in Atlanta and both Psychiatry and COVID Long Haul in Greater Los Angeles, are contributing their experience and specialized skills to the VA-Fitbit program's quality improvement effort.

Dr. Goldel and associated VA care teams, the VA, and Fitbit will assess the feedback from the VA-Fitbit program itself and outreach efforts with Veteran service organizations and community-based organizations. From the insights gained, they will also continue to consider new ways to help support Veterans' health and well-being.

"This initiative aims to advance how our support becomes more personal when we better understand the day-to-day challenges facing every Veteran, their caregivers and VA staff, and especially now."

- Joshua Patterson
Director of Care and Transformational Initiatives
VHA Innovation Ecosystem

WEARABLE TECHNOLOGY IN HEALTH CARE

What is wearable technology?

Wearable technology is any kind of electronic device designed to be worn on a user's body.

In health care, wearable technology includes electronic devices, like Fitbits and smartwatches, that are designed to collect the data of users' personal health and exercise. It can even send a user's health information to a doctor or health care team in real time.

Common examples include:

• Fitness trackers with wristbands or straps
• Smart jewelry, such as rings, watches, and eyewear
• Wearable ECG and blood pressure monitors
• On-body biosensors
• Sensor-embedded skin patches, fabrics, and objects

Image: TechCrunch

With wearable technology enabling the continuous monitoring of human physical activities and behaviors, as well as physiological and biochemical parameters during daily life, its commonly measured data include vital signs (heart rate, blood pressure, body temperature), blood oxygen saturation, posture, and physical activities via electrocardiogram (ECG) machine and other medical devices.

A smartphone is typically used to collect information, transmit it to a remote server for storage and analysis, and display content to the user. Also, wearable devices and data analysis algorithms are often used together to perform assessment and show longitudinal patterns.

Headbands — EEG

Sociometric badges

Camera clips

Smartwatches

Sensors embedded in clothing

Accelerometer
Altimeter
Digital camera
Electrocardiogram — ECG
Electromyograph — EMG
Electroencephalogram — EEG
Electrodermograph
Location GPS
Microphone
Oximeter — OXI
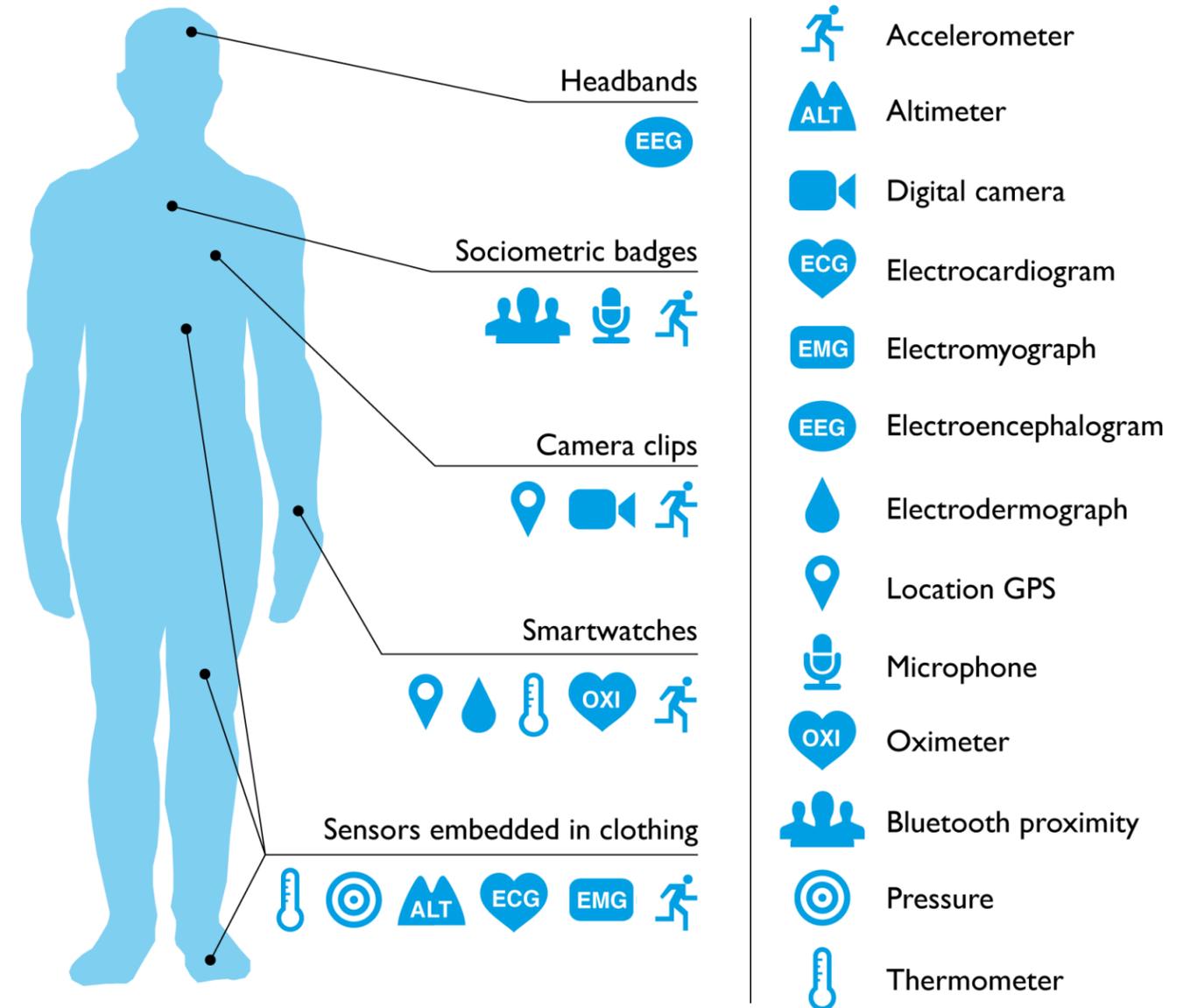Bluetooth proximity
Pressure
Thermometer

Image: Lukasz Piwek, et al.

Who uses wearable technology?

The wearable technology market indicates that devices are a part of everyday life. Brands focused on health and wellness features have integrated into society so that the likes of Fitbits and Apple Watches are now mainstream.

The unexpected onset of the COVID-19 pandemic has rebooted the industry as the public is more invested in tracking their own health with minimal engagement from others by choice and/or necessity.

Compelled by consumers' increasing demand to self-monitor their vital signs, sleep quality, and physical activity, wearable technology companies are committed to expanding and improving their offers.

For instance, after Google acquired Fitbit in November 2019, its later blog mentioned the Fitbit Sense, its most advanced smartwatch that helps the user manage stress through tracking heartbeat rhythms, oxygen saturation, and breathing rate. These more sophisticated metrics not only create a fuller picture of health for the user than previously available, but also raises the bar for competitors to innovate further.

"The pandemic has heightened awareness of unexpected illnesses and health issues, and how consumers can help track and manage their own needs."

- Greg Roughan
Tech Contributor
Unleashed Software

WEARABLES BY THE NUMBERS

3X	Use of wearable technology has tripled in the last four years [1]
67.7M	Wrist band wearables shipped in 2020 [2]
84M	Active health and fiitness app users going into 2020
75%	Consumers who are willing to wear fitness technology [3]
80% +	Users who agree that wearables help them engage their health

Sources: [1] Business Insider, [2] Statista, [3] Insider Intelligence

What are its benefits for health care?

Wearable technologies can be innovative solutions for health care. By providing consumers with the ability to be more active in their care, they can better understand how their behaviors influence their health in real time.

Widely available at various price points, wearable technologies and their applications are designed with prevention of diseases and maintenance of health in mind, such as weight control and physical activity monitoring. Some devices are used for patient management and disease management.

With their ability to provide a more comprehensive picture extending beyond a patient's level of physical activity into their blood pressure, oxygen saturation, and so on, wearable technologies are finding a role among health care teams and in elements of care delivery.

Having access to personalized data generated from wearables can offer a unique way to care for patients and in the following areas.

- *Improved Quality of Patient Care.* Novel insights from wearable technologies can empower clinicians to make more informed care decisions and directly impact clinical outcomes.

- *Cost Savings.* Better managed health, whether coupled with guidance from health care teams, can incentivize patient behavior that reduces clinical visits and hospital readmissions.

- *Faster Diagnosis and Intervention.* Data and automatic analytics from wearables can help with diagnosing issues more quickly, leading to timely intervention and preventing readmissions or negative sequelae, noted The Journal for Nurse Practitioners, which explored patient engagement.

- *Remote Patient Monitoring.* Healthcare organizations using remote patient monitoring (RPM) technologies, including wearables, found that 37% reported a direct link to reduced hospital admissions, according to a KLAS Research report that examined organizations' support for RPM solutions.

- *Research Implications.* The massive amounts of data from wearable devices used by clinicians for personalized medicine can also be used by researchers for exploratory studies in biomedicine and predictive analytics for preventive medicine.
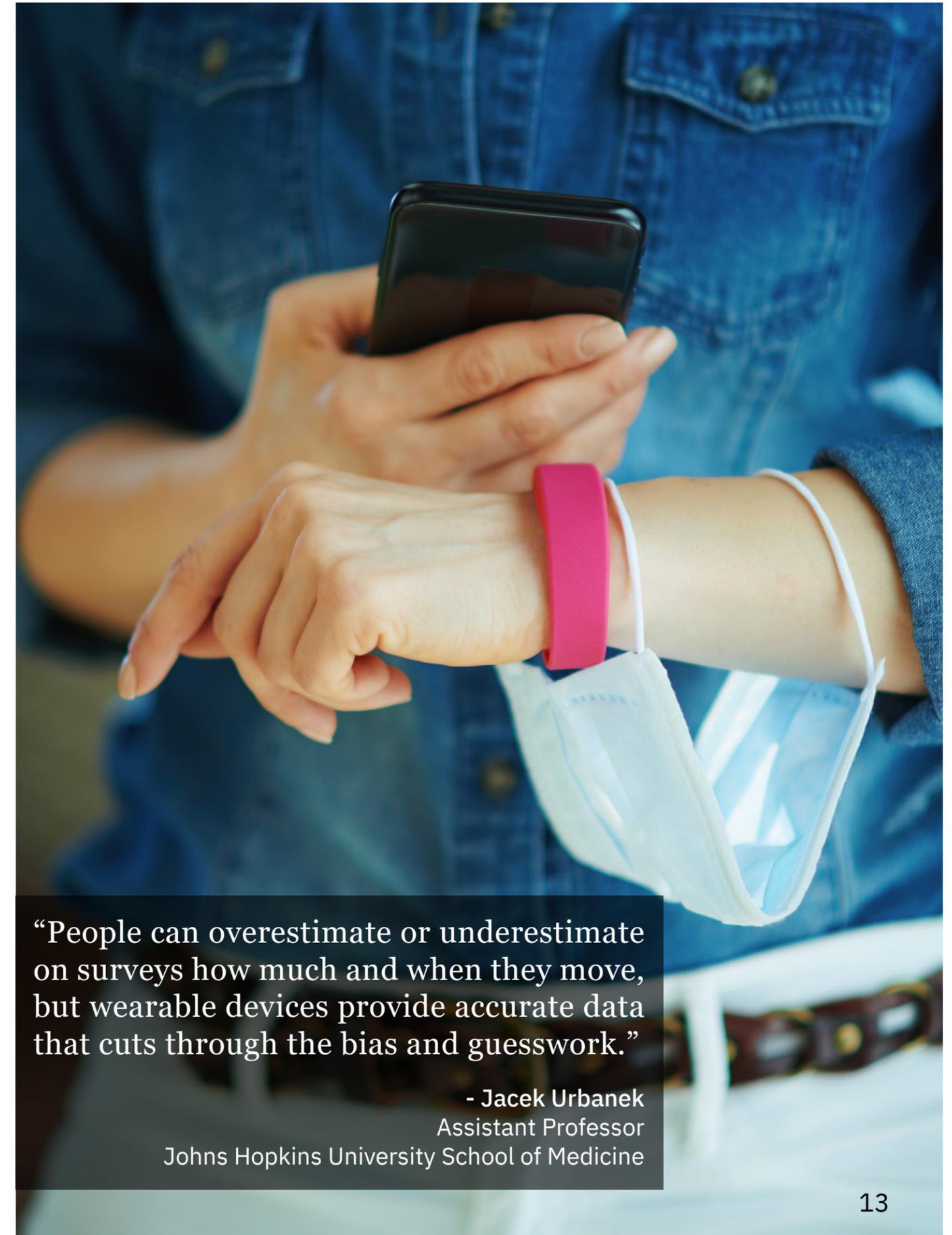
"People can overestimate or underestimate on surveys how much and when they move, but wearable devices provide accurate data that cuts through the bias and guesswork."

- Jacek Urbanek
Assistant Professor
Johns Hopkins University School of Medicine

What are its challenges for health care?

Despite the wider adoption of wearables, there are considerations related to their desirability and usability for health care.

The use of mobile applications for health management was at 35% adoption in 2020 (down from 48%in 2018), according to Accenture's 2020 Digital Health Consumer Survey. Even lower at 18% (down from a high of 33% in 2018) is the use of wearable technology for the same purpose.

COVID-19's unexpected arrival, however, forced a surge as virtual services become a necessity as face-to-face visits with doctors and health care teams sharply declined.

The same report highlights insights from consumers in that:

- 55% say "trusted healthcare professionals" would motivate them to take a more active role in managing their health

- 65% would choose virtual for health and wellness advisories

- 57% are open to remote monitoring of ongoing health issues through at-home devices

With this outlook, consumers' increased investment in wearables as well as their actual intention to heed guidance from more involved health care teams have the potential to positively impact patient-practitioner dynamics, especially in remote circumstances.

Nevertheless, the main challenges of wearable technology include:

- *User Acceptance and Sustainability.* There may be lack of awareness and interest; prohibitive cost; poor user experience for patient and clinician (difficulty integrating tools and services into day-to-day workflows); patient compliance issues (looking to providers for motivation to manage their health).

- *Lack of Accuracy and Predictive Comparability.* Wearable devices and their applications vary on the information provided, as well as the reliability, validity, and accuracy of the data. In general, studies do not support evidence that wearables makes people healthier.

- *Privacy and Security.* Patient confidentiality and data security are major concerns when using wearable devices since it can be challenging to ensure compliance with HIPAA regulations.

- *Ethics and Big Data Concerns.* Wearable devices can collect very large amounts of personal data, including measures of individuals' moods, thoughts, and behaviors in real time, due to their capacity for continuous recording at high frequencies – coupled with potential large population use. Mostly done passively, the capture can be used for personalized intervention and extrapolate for pattern discovery.

- *Digital Divide.* Individuals who have the most access issues are low-income, rural, and/or homebound and would benefit from using wearables. However, their likelihood of doing so may be limited by socioeconomic factors.

What does the future look like?

The future of wearable devices shows no sign of slowing down.

The growing demand for wearables has generated a booming market size, which currently sits at approximately $30B USD and the number of wearable devices forecasted at 1B+ by 2022. In the next few years, the projected increase for the industry is expected to be worth nearly $200B USD by 2027.

Wearable technologies are rapidly moving into the preventative care, diagnostics, and urgent care segment, while the medical device market is crossing over into the general health, fitness, and well-being category at the same time.

These trends have not been lost on insurers and companies, as both can see how providing wearable health technologies to their consumers and employees is beneficial. Consumers themselves are also more open to sharing their wearables-generated data with providers and insurers.

"Wearable devices are here to stay, and they'll only get more sophisticated and effective as they evolve... Advancements in technology – wearables and otherwise – will eventually take much of the guess work out of healthy living."

- Michael Dell
Chief Executive Officer
Dell Techologies

As wearable technology integrates with health care, key issues to consider include:

- *Data Engineering.* With unprecedented access to data for self-care and sharing with providers, it will be important to evaluate how to collect, analyze, and visualize the health-related data for clinical care as well as clinical research.

- *Multidisciplinary Teams.* An influx of wearable device data will require researchers, clinicians, software developers, information technologists, and statisticians to aggregate and analyze the measures in a clinically relevant manner.

- *Workflow Implementation.* Vendors must prepare a framework to implement wearable technologies into clinicians' workflows and allow feedback to measure the impact on clinical outcome.

- *Regulatory Bodies.* As newer and ever-evolving devices can quantify many health-related measures, there are standards in progress for clinical and research applications.

- *Continued Evaluation.* The effect of wearable device-derived measures on health-related outcomes and cost of care is nascent and necessitates further investigation.

SNAPSHOT:
WEARABLES FOR EARLY COVID-19 DETECTION

Our bodies start to signal impacts from COVID-19 before more noticeable symptoms appear. Studies exploring how wearable devices can be used for early COVID-19 detection include:

- Mount Sinai's Warrior Watch Study found that subtle changes in a participant's heart rate variability (HRV) measured by an Apple Watch could signal COVID-19 onset up to seven days before being diagnosed with the infection via nasal swab.

- Fitbit initiated their COVID-19 study aimed at building an early detection algorithm and initial findings include nearly 50% of COVID-19 cases can be detected one day before participants reported the onset of symptoms with 70% specificity.

- WHOOP, with a wearable validated by a third-party clinical trial to accurately measure respiratory rate, published that their model identified 20% of COVID-19 positive individuals two days prior to symptom onset, and 80% by the third day.

"Developing a way to identify people who might be sick even before they know they are infected would be a breakthrough in the management of COVID-19."

- Dr. Robert P. Hirten
Assistant Professor of Medicine
Icahn School of Medicine at Mount Sinai

SNAPSHOT:
COMPARING FOUR POPULAR WEARABLES

Features	Apple Watch 6	Fitbit Sense	Oura Ring	WHOOP
Heart Rate Monitoring	Y	Y	Y	Y
Sleep Tracking	Y	Y	Y	Y
Post Workout Recovery	N	N	N	Y
Blood Oxygen Saturation Sensor	Y	Y	N	N
Fall Detection	Y	N	N	N
Electrocardiogram (ECG)	Y	Y	N	N
Skin Temperature Detection	Y	Y	Y	N
Global Positioning System (GPS)	Y	Y	N	N
Apps	Y	Y	N	N

Table adapted from WearToTrack; Image: WearToTrack

## VA-FITBIT PROGRAM & THE COVID RISKS PILOT

This section includes a general overview, objective, approach, and expectations based on Dr. Goldel's presentation, "Digital Health Innovation: Developing models of patient-centric care," and white paper, "Early Detection and Long-term Impacts of COVID-19: Identifying Risks and Resilience with Digital Health Technologies."

OVERVIEW

COVID-19 has deeply affected the American public for the past year and counting, and its widespread, long-term effects on Veterans and VHA staff are difficult to assess. At the same time, there is significant interest in how wearable health technologies, which are used by over 25 million Americans, can be used to detect and manage the effects of COVID-19 for individuals directly affected and those who might be.

Popular wearables with built-in sensors, such as Fitbit devices, offer data-driven software that enables non-invasive, easy-to-use, continuous physiological monitoring. The readily scalable, low-cost data streams for heart rate, respiration, activity, and so on, tied to contextual, labeled data on smartphones, can help mitigate the impacts of COVD-19 and limit exposure via early warning signals.

Active baselines and long-term monitoring can support affected individuals and health care teams with tracking outcomes, recovery, and resilience, as well as inform pre-symptomatic detection of the virus. Ultimately, cohort and population time series data will test how these technologies increase access to care, reduce costs in dollars and time, and improve clinical outcomes.
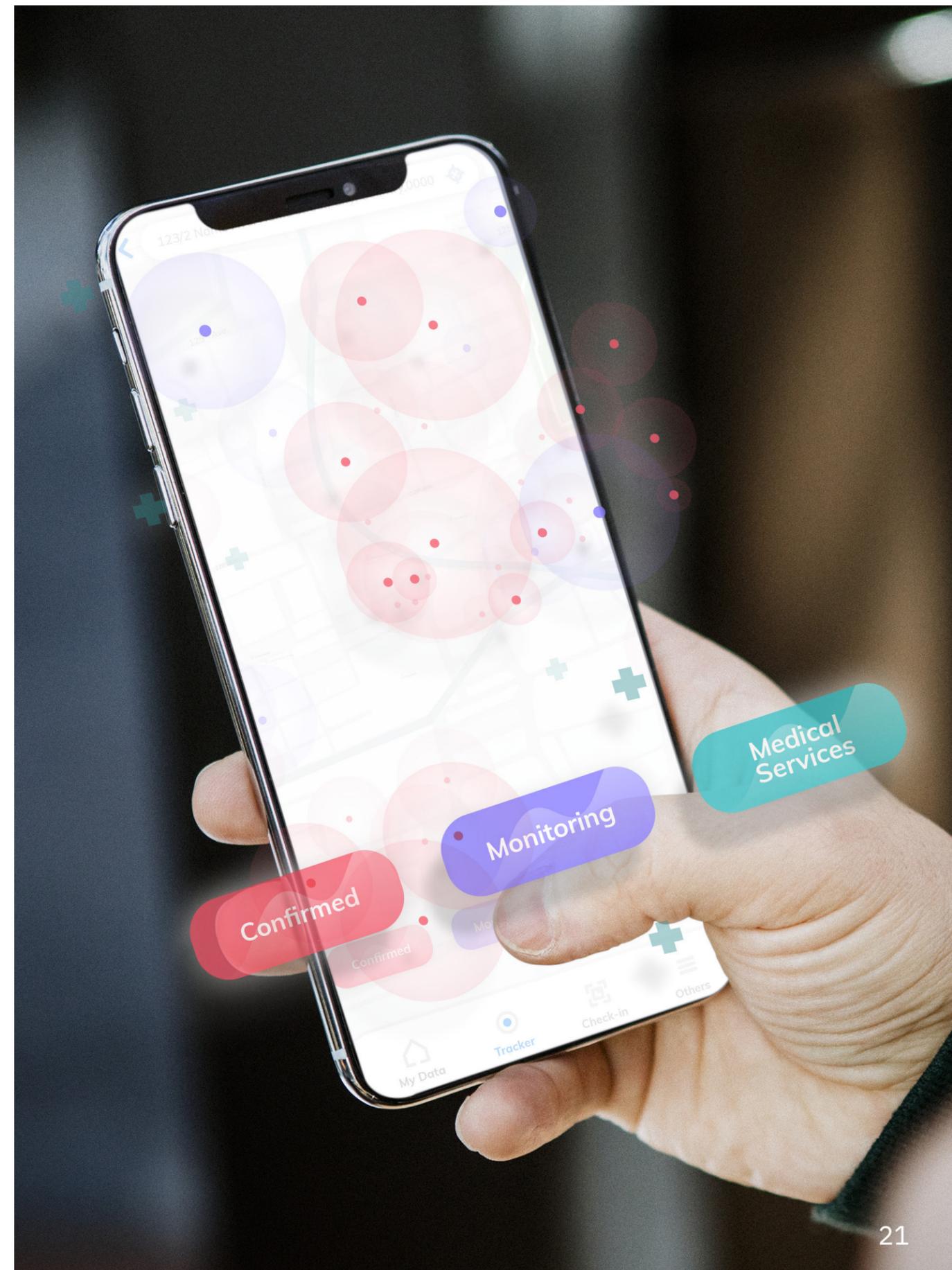
OBJECTIVE

The VA-Fitbit program aims to show how Veterans and VA staff are affected by COVID-19 before, during, and after infection.

With the goal of demonstrating the value of digital health to the VA, the program will be a yearlong. It will start with 10,000 participants from the total of approximately 50,000 participants (of which 58% are existing Fitbit users) who signed up in mid-January 2021.

The four key focus areas will include:

- Identify number of Veterans using Fitbit for self-care
- Make risk predictions for care team support
- Use Software-as-a-Service for recurring care
- Develop digital biomarkers for improving care quality toward better clinical outcomes

"Digital health technologies, with smartphones and cloud computing, will help us to reach more Veterans in much more personal ways."

- Dr. Robert Goldel
Presidential Innovation Fellow
VHA Innovation Ecosystem

APPROACH

As part of their strategic partnership, VA and Fitbit will build a large, observational project of quality improvement capabilities using Fitbit devices that can personalize patient-centric health care on smartphones and scale across VA medical centers.

Operating under a Software-as-a-Service contract, Fitbit will focus on wellness features for COVID-19 risks and resilience and support VA by:

- Sending messages and questions to participants' smartphone to enable group and VA-specific analytic trends

- Providing participants with mobile user experiences tied to daily health and wellness biofeedback loops to show what works best

- Sharing a dashboard of aggregated and cohort results for de-identified Veteran and VA stakeholders, as compared to the general population

VA will work with Fitbit's APIs to help bring in data to support care for new and existing users. New Fitbit users will work with Fitbit for basic referrals into VA care. Existing users can share data that goes back years in some cases to a time before the pandemic.

APPROACH (CONTINUED)

Combined with consumer-centric care, this effort aims to:

- Expedite collection of COVID-19 user-reported test results

- Examine how COVID-19 is affecting Veterans and VA staff before, during, and after symptom onset

- Develop strategies to mitigate the impacts of COVID-19 with software that adapts to user inputs

- Test approaches for reaching Veterans and VA staff by addressing health concerns commonly more difficult to gauge risk factors, diagnostics, and treatments

- Scale quality improvement efforts based on return on investment as compared to traditional personal wellness and population triage models

Cohort data will also be collected during related time periods with the intention of developing algorithms for early detection of COVID-19 and tracking the longer-term prognosis of those affected directly and indirectly.
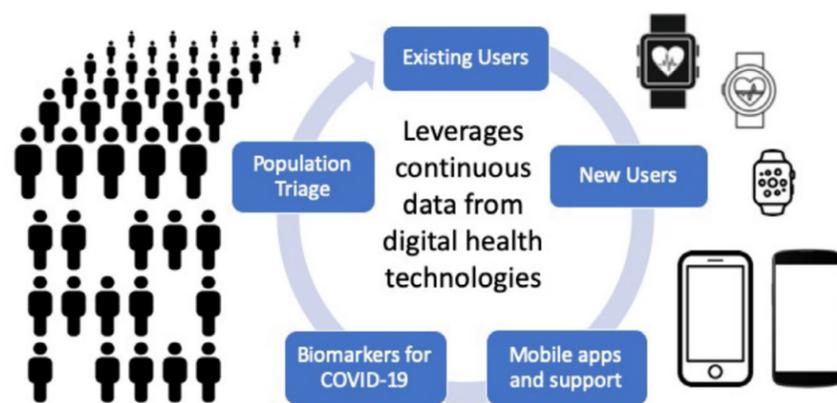

Image: Dr. Robert Goldel

EXPECTATIONS

By leveraging continuous monitoring capabilities from existing and new Fitbit users' devices and smartphone apps, it will be possible to assess how biosensor data can guide personalized care, detect health and wellness trends, and inform current and future chronic care and resilience models —all of which can also pertain to COVID-19 and its effects.

For personalized care, health care teams will better recognize Veterans' attitudes and behaviors, specifically their likelihood for self-management or requiring varying degrees of targeted support or intervention.

For detecting health and wellness trends, patient records and traditional clinical device measurements can be enhanced by including data capture from Fitbit devices. With more information gaps filled in, health care teams can remotely and effectively integrate unctional medicine and prescribe next steps.

Lastly, the VA-Fitbit program's findings will have a multi-dimensional impact, from understanding how wearable technologies'biomarkers provide actionable insights to providing the data necessary to further evolve VA clinical care.
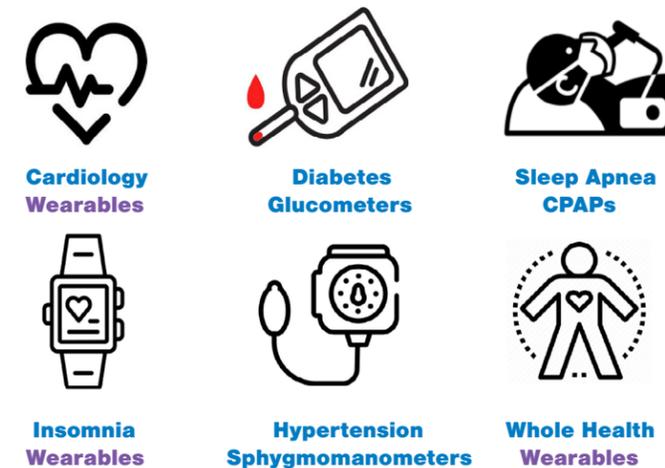

Image: Adapted from Dr. Robert Goldel

QUESTIONS & ANSWERS:
FEAT. DR. ROBERT GOLDEL AND VA CARE TEAMS

The following content was collected from a series of interviews during April 13-20, 2021, and has been organized and paraphrased for format and readability. Contributors are listed in the order of attribution:

1. Dr. Robert Goldel, Presidential Innovation Fellow, VHAIE
2. Dr. Amit J. Shah, Cardiology, VA – Atlanta
3. Dr. Arash Harzand, Cardiology, VA – Atlanta
4. Dr. Scott Fears, Psychiatry, VA– Greater Los Angeles
5. Dr. Smitta Patel, Psychiatry, VA– Greater Los Angeles
6. Dr. Lynn Chang, COVID Long Haul, VA – Greater Los Angeles
7. Dr. Babak Darvish, COVID Long Haul, VA – Greater Los Angeles

Q&A #1 Featuring Dr. Robert Godel

Q1

The VA-Fitbit program will support Veterans and care teams' health and wellness during COVID. Can you briefly share the origin story?

When I joined the Food and Drug Administration (FDA) in 2019, I looked at how industry is trying to solve for health concerns with technologies that live on a smartphone. I got connected with colleagues at the VA who had been thinking about these problems for Veterans and care teams.

With technologies moving towards 24/7 monitoring for health care and, for the VA, identifying Veterans at risk, we asked questions like:

- How can this data be operationalized not just for health care, but also transitioning service members' benefits and risk predictions?

- How can we take what technologies offer and plug that data into VA systems for the individual care of a Veteran, cohort analytics, population health, and triaging a concern within the population?

- Can we create workflows around how teams can follow up with a Veteran based on the data showing from these technologies for sleep, stress, activity, heart rate, ECG?

When COVID hit, we realized that these technologies can be used to detect virus onset and infection, and alert individuals and organizations to an exposure prior to the person testing positive. These also offer opportunities to build communities, do challenges, and address general wellness concerns. So, we framed the problem as risk to exposure of the virus and long-term impacts of mental health and chronic health.
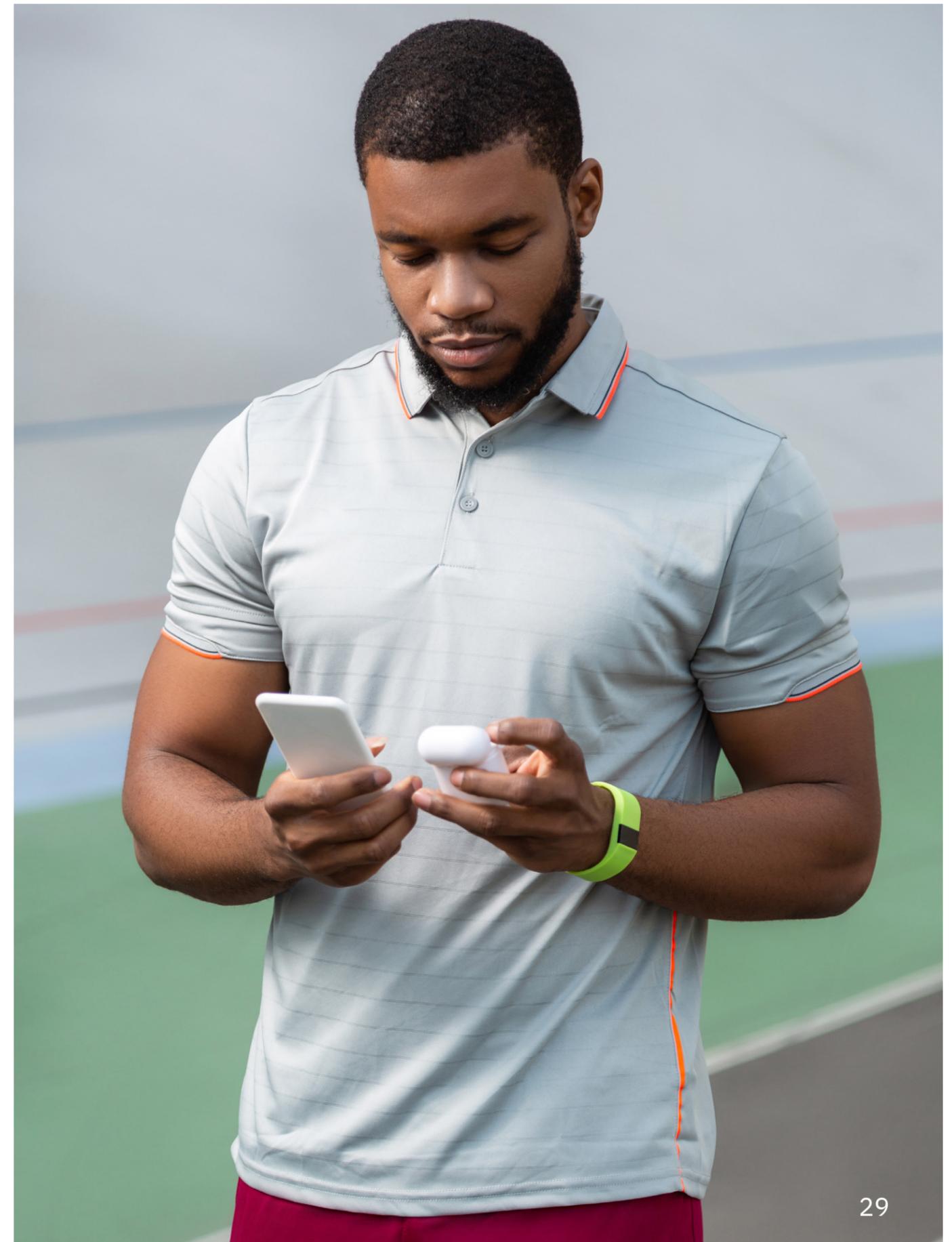
Q2

What is the scope of the pilot?

It's a one-year effort. We had over 46,000 Veterans sign up in two weeks. 26,000 are Veterans who already use the technologies, so we got them going. 20,000 are Veterans who would like to use the technology and are new users. We also have about 1,300 VA staff who are existing Fitbit users and can help us get after questions like burnout.

There are Veterans at every site who are already using these technologies and with about 150 sites, I feel good. We need 50-100 people to get an early understanding of potential differences amongst sites.

With COVID, we acknowledged the virus is going to affect people and its impacts on those directly and indirectly affected are going to create a cascading wave of impacts. This is the challenge that we face when thinking about millions of Veterans. How do we better manage those multi-factorial impacts in a way that data helps us to personalize an experience of care to the Veteran's needs?

This is not about diagnosing or treating disease; instead, it's about supporting an individual's wellness goals. We had to consider integrated care and not any one specialty. For Veteran-focused Solutions, we are exploring technologies for personalized medicine. Out in the field, we have Cardiology in Atlanta and both Psychiatry and COVID Long Haul in Greater Los Angeles connecting everything together.

Wearable technologies have created a tremendous amount of information that's based on every second of every day in most cases. With that level of data, we can ask real questions about fidelity and accuracy.

Q3

Can you talk more about the quality improvement and quality assurance angle?

This is very much a quality improvement and quality assurance effort as part of medical operations. I believe that the data infrastructure needs to be as open to researchers as it is to data scientists because we can do a lot of research. But I'm focused on the challenges that Veterans face on a day-by-day basis. Let's solve for Veterans' needs and then, if we need to use advanced analytic techniques, we can plug those people into the mix. Until then, I want to advocate for better care and then improve workflows.

We first work on showing that these technologies support quality improvement and quality assurance. At a minimum, it fills in those gaps, we're able to capture the wellness of a Veteran during the times when we do not see them for traditional care. Now, we need to resolve how that may or may not inform what's happening when they are in front of a care team. How can we use that data to better inform their care? Did it improve the Veteran's day-to-day life? Did it help them to address their wellness goals or nudge them into care when those wellness goals were not being met?

These technologies are a way that Veterans can be spoken for. We see an opportunity to work with care teams to help get Veterans seen and will rely on the great people across the VA to answer these questions.

Q4

Wearables fit into the "big data" domain because of their capacity for continuous recording. Who owns the data and what are you doing with it?

One of the challenges is that this has not been worked out yet from the perspective of the VA. In my opinion, this data is the Veterans' data, and it belongs to them, so they get to decide what happens with it. The current effort is not structured to get the data in any way other than the Veteran deciding to share it. The problem is, we don't have a way and are working through how hundreds of thousands of Veterans can share data with us.

We need to build the logistics, create operational workflows, and work with care teams in the field to get the data in front of them because one of their Veterans wants to share their data.

The data infrastructure is not in place yet for us to do analytics. So, we are at a very critical juncture and discussing whether we do analytics with third-party vendors. My concern is losing what can make us unique and meaningful for Veterans, since we can support them in a way that nobody else can, but that requires bringing a copy of the data into our infrastructure and looking to integrate that information as part of care.

It's also important for us to be building the data infrastructure to support any way a Veteran wants to share their data with us. We started with one vendor, and we hope to get up to 10-20 in the next year or two. Right now, we have a few thousand Veterans who have gotten started, there are some new Fitbit users being set up, and we are learning as we go.

Q5

What does the ideal future state of this program look like to you?

The future is very personal and it's because we all carry a supercomputer in our pocket. Our capability to do amazing things lies in this computing power and some vendors want to leverage it. Because of privacy concerns, they are building statistical and machine learning models to operate right on the smartphone - they don't want the data to go anywhere else. So, how do we lean into that rather than expect that we are going to need different learning algorithms in the cloud?

We'd love to work with other vendors in the same direction because this is the future of health care. We can also think about comparing devices and services from one vendor to another and revisit quality assurance. It's comparison versus either-or. As for workflows, how do we integrate this care back into what a Veteran would like to be having a conversation about? Imagine us reaching out each day based on who seems to need attention or noticing someone trending over the course of days, weeks, months. A view of the future could include a one-click follow-up and then someone contacts the Veteran or getting reports on data suggesting that it's important to reach out to an individual.

VA should be able to do this in a way that advocates for the needs of all Veterans. When you increase access to healthcare for all Veterans, we improve outcomes and then we're truly a standard of excellence where health care can be based on our integration of these technologies.

Q6

Are there things that the broader VA community can do to support you?

Yes! I have two asks.

First, how do we build a community of Veterans as innovators? This includes: Do we have to use Reddit, Quora, etc.? How do we create a community of Veterans who are helping and supporting each other by answering questions?

Second, how do we create a community of innovators in the field? This topic is open to any clinician who is already or wants to be using these technologies as part of the care that they deliver right now. As our fifth mission at the VA, we are aiming to build innovation and have it integral to everything that we do. This is exactly what these technologies can support, and we are in the position to evolve the standards of care.

Q1

Can you briefly describe the use case that you are working on?

Dr. Harzand: We've been flirting with wearables and health for several years. As a concept, many people see the value in mobile devices, especially in cardiology and heart disease. We have had our virtual cardiac rehabilitation program, unofficially named Smart HEART (Health Education and Rehab Technology), since 2016 and it uses multiple wearable devices, mostly Fitbits like Fitbit Charge 3.

Dr. Shah: We have a different use case than the other teams in that we've been using Fitbit for four years now in home-based cardiac rehabilitation, particularly in our program, which helps Veterans live healthier lifestyles by giving them a wearable to track their activity, heart rate, and other parameters. We also have lifestyle coaches who integrate the data into care plans and goal setting.

Dr. Harzand: We got connected with Dr. Rob Goldel, who had a separate initiative, and realized that there are many areas where we could bring our experience. We are already integrating devices into clinical workflow and Dr. Goldel was looking to give devices directly to Veterans within a specific context. It's two separate projects with overlapping interests and it makes sense for us to come together.

Dr. Shah: There are two things that have changed as a result of the VA-Fitbit program, which uses the newest Fitbit Sense. First, with the Fitbit Sense, we can evaluate whether the electrocardiogram (ECG) can be helpful and address our open question about atrial fibrillation. What extent could it be useful for a group where there may be an additional concern for arrhythmia? We're going to look at this added dimension and see if it enhances our care. Second, the Fitbit Sense has newer built-in tools and offers coaching and lifestyle management via the Fitbit app. We can see if we can reengage our graduates through the VA-Fitbit program and encourage them to continue lifestyle changes that they developed earlier with us.

164 bpm

Q2
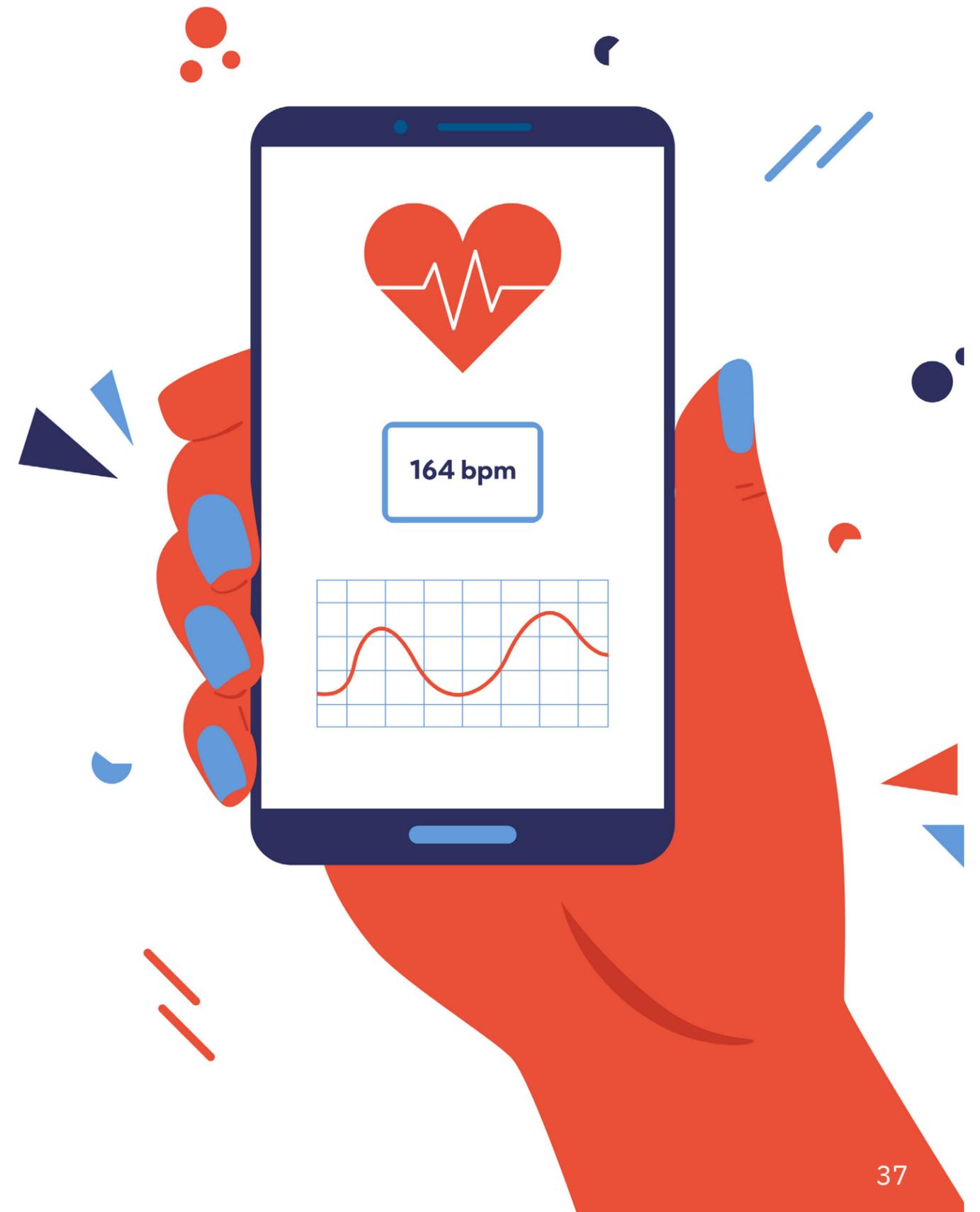
Can you walk us through what your team is doing with the data?

Dr. Shah: We are at the point where we're getting a handful of people unboxing their Fitbit Sense, so it is very fresh. I can tell you anecdotally that Veterans are excited and motivated by this partnership. There's been a lot of interest to start, so that's good. But once they're started, I'm not sure what we're going to find.

Dr. Harzand: One of the parts of the project that we're figuring out is how to unlock the data, how to integrate into the VA, and what exactly happens with it once it arrives. How do we partner with digital health companies and be able to share data back and forth with our system, which has historically been very risk averse when it comes to sharing data? We're hoping to lend our experience using similar devices for heart disease. Getting the data is a challenge that is also an opportunity buried in the design of the VA-Fitbit program.

Dr. Shah: Our program has an agreement with a third-party company, Moving Analytics, made possible by VA Innovations in 2016. Moving Analytics has an API with Fitbit. Our coaches use the Moving Analytics platform via web browser and the patient has the Moving Analytics app where they grant permission to access Fitbit data. So, the coach can look at Fitbit data, namely steps and heart rate, on their dashboard and give feedback on chat and during weekly visits.

Q3

What does the ideal future state of this program look like to you?

Dr. Shah: There are two angles. One, Veteran's self-management, where it's about the device and Fitbit empowering the Veteran by seeing their own data and using the device's built-in features and Fitbit's programming to live a healthier lifestyle. Two, potential engagement of VA providers – cardiology, general care, Whole Health – with the Veteran and that's likely going to depend on our ability to access data. Outside of our program using Moving Analytics, I don't know what Veterans will do other than show numbers when they come to clinic or email reports through secure messaging, but it must be done from Veteran to provider without any support.

Dr. Harzand: There isn't an identified pathway from the VA side yet. Now that we have this strong need with 50,000 Veterans signed up, one of the exciting things that we're hoping to figure out is: How do we get this data back into the VA in a way that's safe and that we can make useful for the Veteran primarily and people on the VA side?

Dr. Shah: I know that the VA is working on that infrastructure. Will that become live within the next year? The answer will change things. At this point, the main slam dunk is going to be Fitbit's programming and however they're empowering people.

Q4

Is there anything else that you would like to share with readers?

Dr. Harzand: We are pushing for an increased awareness of heart disease amongst Veterans. It's the #1 killer in the country, the #1 killer among minorities, and the #1 killer among Veterans. If there's any call to action, it's to keep in mind – Veterans are non-Veterans too. They have the same health problems that everyone else does and heart disease is a very under-recognized cause of morbidity and mortality amongst Veterans. Also, we must be able to target therapies for Veterans in ways that we haven't done historically, by involving data beyond the walls of the health care system and getting at the core of lived experiences to optimize their health.

Dr. Shah: It's great that the VA is investing in lifestyle medicine, broadly speaking, and that we have partners who have great methods to try to engage Veterans. It's refreshing when we think about traditional medicine, which waits for the problem to happen and then tries to fix it with very expensive methodologies. This effort gets at the heart of prevention by being very proactive and trying to catalyze positive health behaviors to prevent problems from happening in the first place, especially heart disease.

Learn more about the Smart HEART Program by Dr. Harzand and Dr. Shah from these publications.

- Harzand, Arash, et al. "Abstract 16831: Effect of a Virtual Cardiac Rehabilitation Program on Functional Capacity and Risk Factor Modification in Veterans With Ischemic Heart Disease," *AHA Journal*, 12 November 2020, https://www.ahajournals.org/doi/abs/10.1161/circ.142.suppl_3.16831?af=R

- Harzand, Arash, et al. "Feasibility of a Smartphone-enabled Cardiac Rehabilitation Program in Male Veterans With Previous Clinical Evidence of Coronary Heart Disease," *The American Journal of Cardiology,* November 2018, https://doi.org/10.1016/j.amjcard.2018.07.028
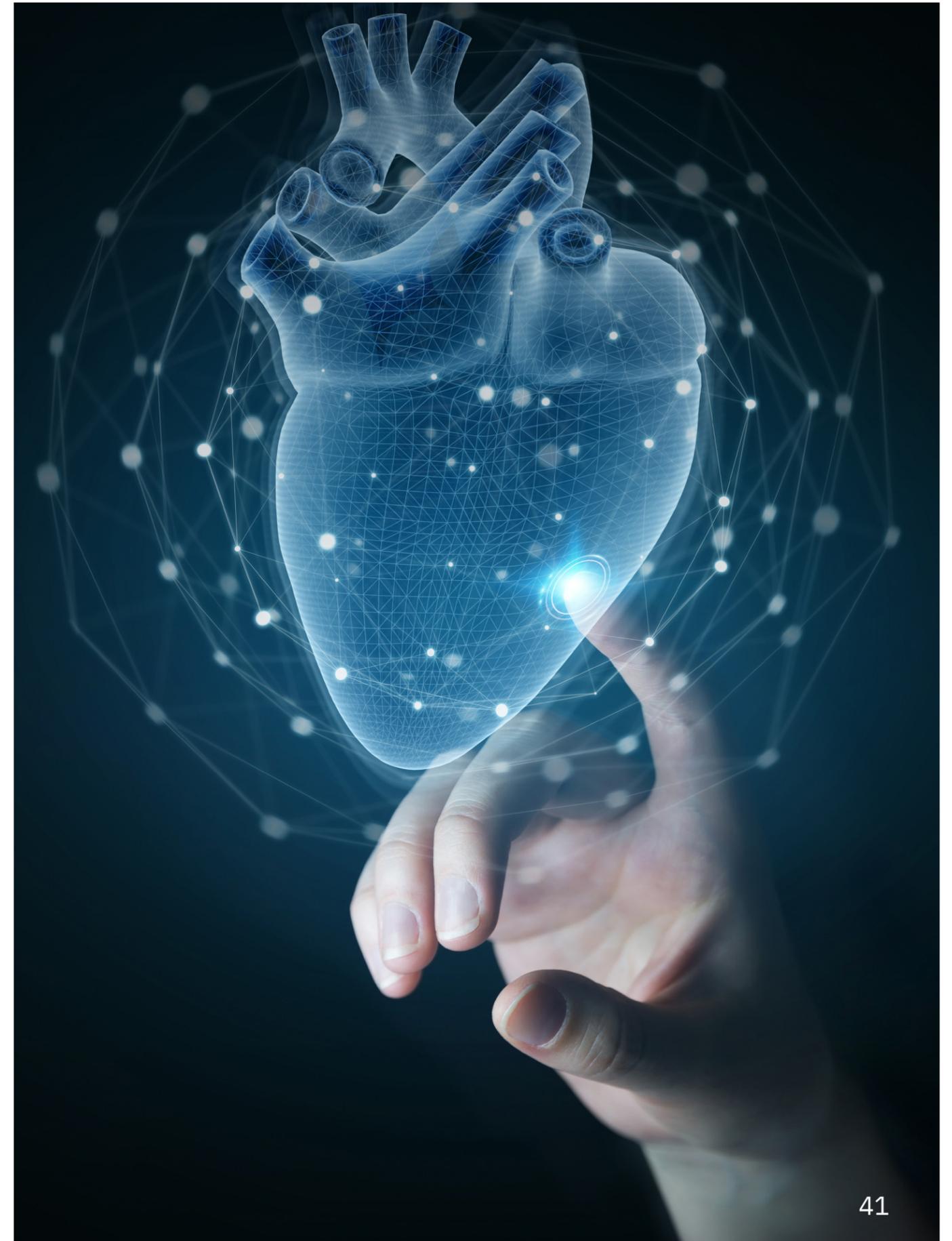
Q1

Can you briefly describe the use case that you are working on?

Dr. Fears: We have two use cases. The first use case is rolling out a care management model into our outpatient mental health clinics that is not just focused on the Fitbit, but also using a digital platform that is able to send patients remote assessments via smartphone technology and use the data to help coordinate care. The Fitbit is the most innovative aspect. We want the Veteran to wear a Fitbit so we can gather objective measures, like sleep duration, to track how they're doing after initiating an intervention.

Dr. Fears: For example, if we were to start a treatment course of therapy or medications, we would want weekly assessments for 4-6 weeks to evaluate how a patient is responding and adjust as needed. Many medications can interfere with sleep and we would be able to track if sleep is heading in the wrong direction much earlier and intervene appropriately compared to what we do now.

Dr. Fears: The long-term goal is integration into a precision medicine program where we can use the Fitbit to watch sleep and activity, and notice a relapse in a mood episode earlier than using a conventional model, which has patients meeting with us once every few weeks or, when well, once every few months. The problem with the conventional model is that if a patient starts to do poorly in between visits, we won't know until they show up, so this is a way to be able to know much earlier if someone is not doing well.

Dr. Fears: Our second use case involves collaborating with the VA's National Artificial Intelligence Institute (NAII) headed by Gil Alterovitz and it has good momentum now. The NAII is helping to identify signals within the digital wearable data that might not be obvious and will require sophisticated artificial intelligence (AI) algorithms. This effort brings the NAII into their own because the massive amount of data needs a group like them to make sense of it.

Q2
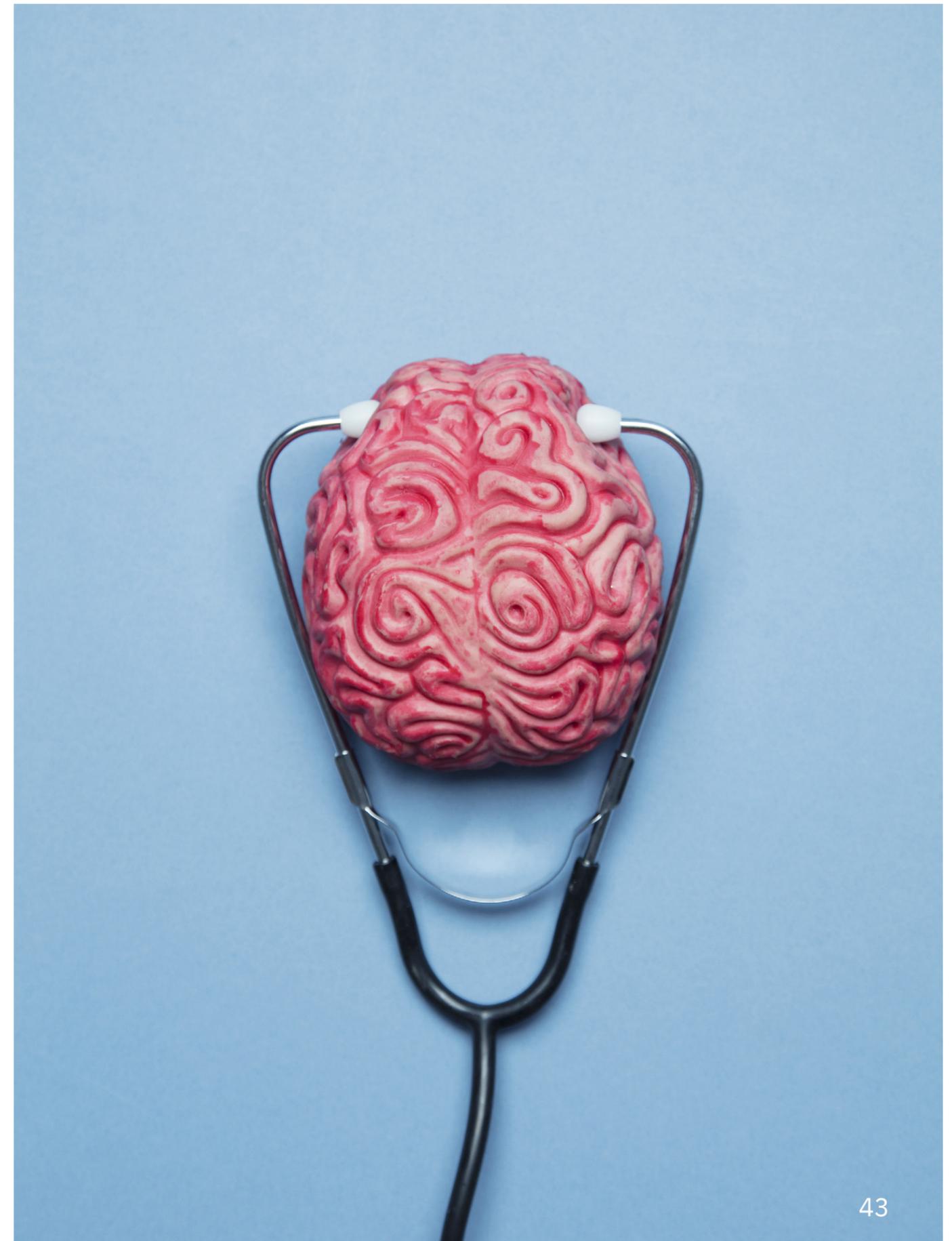
Can you walk us through what your team is doing with the data?

Dr. Fears: Our team uses a local, 3rd party platform called OutcomeMD. We have worked with them for two years and are currently finalizing a 5-year contract. We're 6-8 months into our rollout and are trying to integrate the Fitbits now.

Dr. Fears: For Veterans, OutcomeMD has a slick interface on their smartphones and runs them through an assessment, presents their score, and then it shows them their scores over time. They can also use their laptops or desktops. For example, if we're collecting mood scores once a month, as a patient fills things out, they'll see how they have been trending. We don't have the Fitbit data integrated yet and it's being worked on now. Once it's in, sleep quality will be graphed alongside measurements of mood and anxiety.

Dr. Fears: Similarly, providers see this data and have the option of looking at all patients across time. OutcomeMD allows us to identify anyone whose score is worsening and needs attention, then we can double click and zoom in on that single individual and see how they're doing over time. OutcomeMD is built to organize clinical tasks, so providers are looking at a spreadsheet with a display of patients, what assessments they are doing, and who's doing well versus who's not doing well by filtering.

Dr. Fears: As for the NAII, they're connecting us with collaborators who get the dense data, develop the algorithm, and give us the algorithm. Once that algorithm is vetted, we work it into a clinical decision support process that's happening internally at the VA. The Office of Connected Care is trying to set up these databases and systems. Now, that's five years down the line, where the algorithm is happening in the background as this data is acquired.

Q3
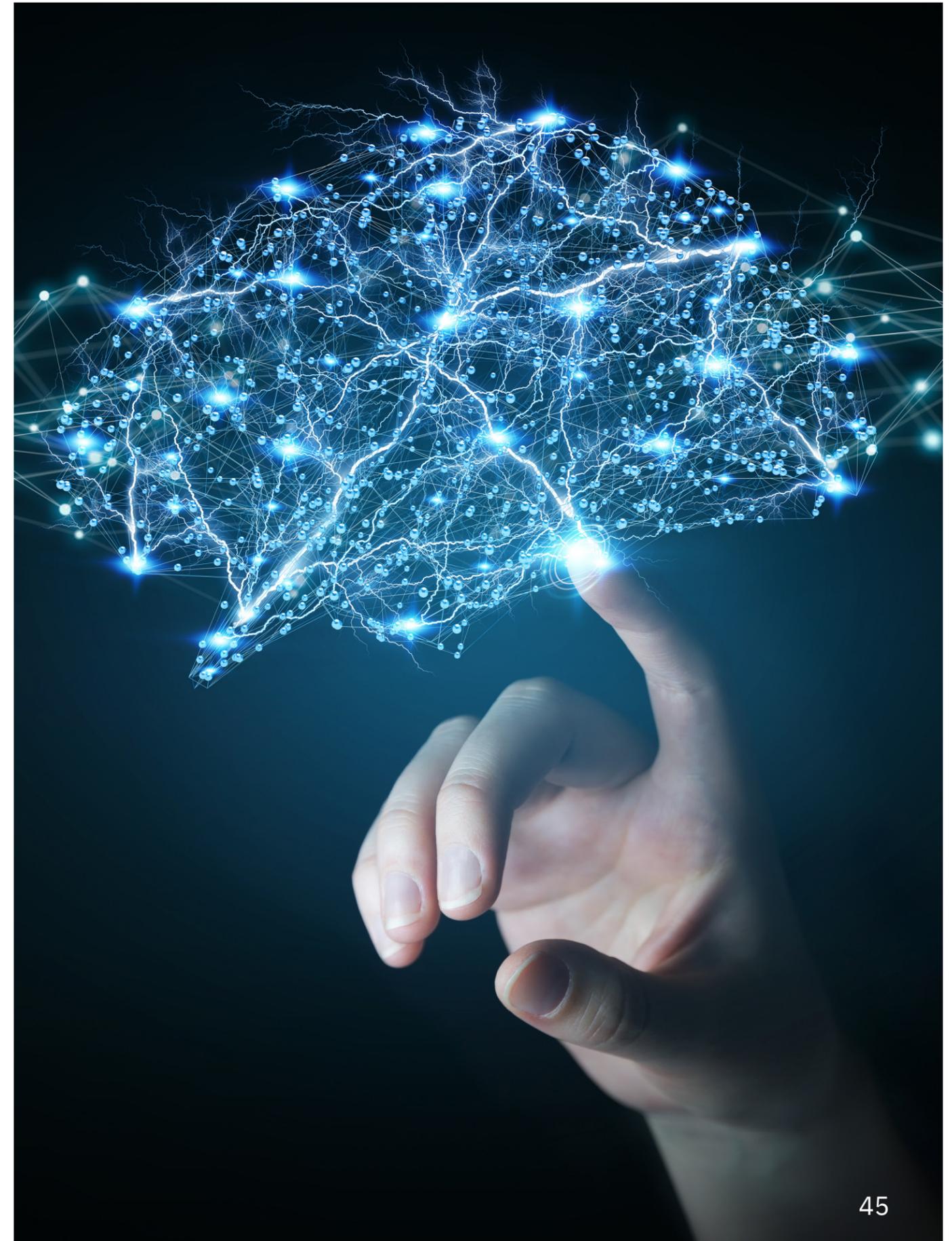
What does the ideal future state of this program look like to you?

Dr. Fears: The dream goal, from the provider and patient's points of view, is to create a very simple way to see the collected and displayed data. For example, a patient will get periodic assessments, maybe monthly, weekly, or daily – depending on how we want to track them. They answer 5-10 questions, see their score, and that's it. Similarly, the providers get wearables' data – perhaps even from remote glucometers, presented on a basic timeline that allows them to look at blood sugars, blood pressure, or mood scores on a single interface. A care manager is worked into this process because, in most cases, a nurse will be checking daily via a dashboard of data an at individual level to see who's doing well and who needs attention.

Dr. Fears: Adding to that dream goal, AI analytics and algorithms on the back end are being organized by a group like NAII to identify signals to convey to the provider, "Hey, pay attention, this person's mood is getting worse." Then, it's a trigger to the care manager indicating, "Let's bring this person back in and do some additional tests." In other words, we have a whole infrastructure that is sending clinical decision support to the provider. We are leaning on the OutcomeMD platform for this work and the Office of Connected Care has also been a great collaborator.

Dr. Fears: Ease of adoption and limiting new learning are essential for providers and patients, but mostly providers because much more is happening on their end. We need to make everything as simple and straightforward as possible. We've realized that is key because providers lack the time to learn a lot of new things. It can't feel like they're learning anything new and instead, they should feel, "Hey, I know all of this is useful," and can see why and how to take action.

Dr. Fears: The ideal future state is to integrate primary care and mental health into a single package. We have a primary care mental health integration team, but even though they're working on the same patient, we're siloed – it's still two different teams. We could get blood pressure, glucometer readings, mental health scores, sleep, weight, and more, on the same page or graph where all things can make sense together and we're thinking of them as issues coming from the same individual, the same physiology.

Q4

Is there anything else you would like to share with readers?

Dr. Patel: We were recently admitted into the Innovation Network (INET), which is part of the National Innovation Ecosystem. So, now that we have this relationship with INET at Greater Los Angeles (GLA), we are aspiring to be the flagship for innovation and AI technology here at GLA. We think it's possible because we have one of the largest facilities with one of the most complex patient populations, bringing technology from primary care, mental health, and even eventually endocrinology and cardiology. Many of our patients must rely on multiple providers and subspecialties caring for their medical needs. How amazing would it be to bring this care onto one platform! It would be incredible and is our long-term goal.

Dr. Patel: We are also aiming to launch two innovation fellowships focused on a new generation of providers who are graduating and providing them with experience in innovation and technology. One innovation fellowship will be on a clinical track and is for young trainees. Our goal is to encourage innovative and integrative approaches to patient care. This means bringing expertise from multiple clinical disciplines including Psychiatry, Medicine, Surgery, Physical Medicine and Rehab, etc. The second innovation fellowship will be on a nonclinical track and is a partnership with GLA-affiliated academic institutions. The hope is that the nonclinical track will recruit talented professionals from technology, business, entrepreneurship, etc. into our innovation ecosystem and work alongside our clinical experts in developing new and efficient ways of delivering healthcare to our Veterans.

Q&A #4 Featuring:
Dr. Lynn Chang & Dr. Babak Darvish, COVID Long Haul, Greater Los Angeles

Q1

Can you briefly describe the use case that you are working on?

Dr. Chang: We are starting to look at wearables with the VA-Fitbit initiative. I've always had an interest in wearable technology with regards to incorporating a patient's data, such as heart rate, oxygen saturation and real-time EKGs into medical decision-making. I started at Greater Los Angeles (GLA) about 7-8 months ago and my Service Chief connected me to Dr. Patel and Dr. Fears [Psychiatry-GLA]. It snowballed from there as using a patient's objective data is a perfect fit with the COVID clinic, especially since a large number of patients have persistent cardiopulmonary issues.

Dr. Chang: We're using the wearable technology for the Interdisciplinary post-COVID clinic, and Dr. Darvish is using it for cardiopulmonary rehab. We drew from our existing programs of TBI clinic and cardiopulmonary rehab as well as from the knowledge of treating patients after complex medical illnesses and prolonged hospitalizations. What's optimal moving forward would be to have real-time virtual monitoring, so patients wouldn't have to come in and this would decrease their burden and increase our reach. We could monitor parameters remotely to see how they function and recommend improvements. This is a general picture of where we're coming from, being with the Physical Medicine and Rehab program, we deal a lot with physical function and quality of life.

Dr. Chang: Wearable technology will be beneficial in the future because we can monitor our patient's cardiopulmonary status as they advance through their physical program. Again we would be able to serve a wider area, alleviate a patient's burden to have to come to the medical center, especially if they are debilitated, have multiple comorbidities, or have transport issues.

Dr. Darvish: The VA-Fitbit initiative was on our radar. There were conversations but we did not have anything formal aside from a Polar Pacer. I do home-based cardiac rehab and pulmonary rehab, a national program rolled out through the Office of Rural Health, and there isn't an element that requires monitoring, so it's a potential area. I've also been doing center-based cardiopulmonary rehab since July 2020. Not all VAs have home-based versions. At GLA, we offer the full spectrum with center-based cardiac rehab,pulmonary rehab, and cardiac pulmonary rehab, as well as home-based cardiac rehab and pulmonary rehab. Given the patient population and pathology, there's an opportunity, but I would say it should be a more interdisciplinary team, which involves cardiology.

Q2

Can you walk us through what your team is doing with the data?

Dr. Chang: It's still being set up. Currently patients are looking at and recording their own data as they exercise. Eventually, the hope is, when the patient performs any physical activity, we have real-time integration of the data from the wearable technology into our electronic health record, CPRS.

Dr. Darvish: For my purposes right now, the value would be on an individual Veteran basis and whatever they self-report back saying, "Hey, my watch said that I did X Y, and Z last week. This week, I did more." Then, I could perhaps integrate that information when modifying their exercise program, intensifying it or adjusting it, based on any reported systems and so forth. As far as looking at aggregate data of cohorts of groups of people, I hadn't thought of that but there could be value in seeing it and then cross-referencing with a critical chart. Are people with a certain diagnosis less likely or more likely to be more active or less active?

Q3

What does the ideal future state of this program look like to you?

Dr. Chang: Real-time integration of the wearable technology data into a patient's electronic health records, so we can use the objective data to track a patient's improvement and to see whether our interventions are helping. If we can then merge this objective data with patient reported outcomes, that would be the ideal.

Dr. Darvish: One of the things that I've heard anecdotally and from therapists is the inaccuracy of various measures from commercial wearables, including Apple Watch, Fitbit, and Garmin. So, what is marketed and what measures patients get from their devices are not necessarily accurate because therapists can cross reference. When patients are exercising, they have a Polar Pacer or some other medical device in the gym. We also have a blood pressure cuff and pulse oximeter on wheels that can be charged and moved away from the wall in the exercise area or to wherever prescribed exercise is in the center. Right now, we're primarily relying on patients reporting whatever data they want to provide us, and we wait and see how and if that correlates with the parallel treatment plan, and what we see medically. So, cross referencing would be the first step to really establish validity and reliability of wearables in relation to conventional devices.

Q4

Is there anything else you would like to share with readers?

Dr. Darvish: For cardiopulmonary specifically, I would also defer to the therapy personnel. Our cardiopulmonary programs have multiple disciplines. We have kinesiotherapists. There are certain programs that are home-based that have physical therapists. On the center-based as well as a hybrid, we have psychologists and nutritionists on the team. So, regarding Fitbit and how we can integrate that into the workflow, or whether there's a research project, it could be worthwhile to have a subgroup or work group of those therapists and huddle with them separately because of what they do.

Dr. Darvish: For Phase 3 cardiac rehab, which is in a gym, our program is somewhat monitored. Patients are really expected to continue what they learned in Phase 3 and that requires heart rate monitoring. Oftentimes, before this VA-Fitbit initiative, Phase 2 therapists would provide a Polar Pacer that is worn around the chest and is a direct measure of heart beats per minute as opposed to a surrogate measure of radio pulse. If they can establish validity, I can see using a Fitbit instead of a Polar Pacer.
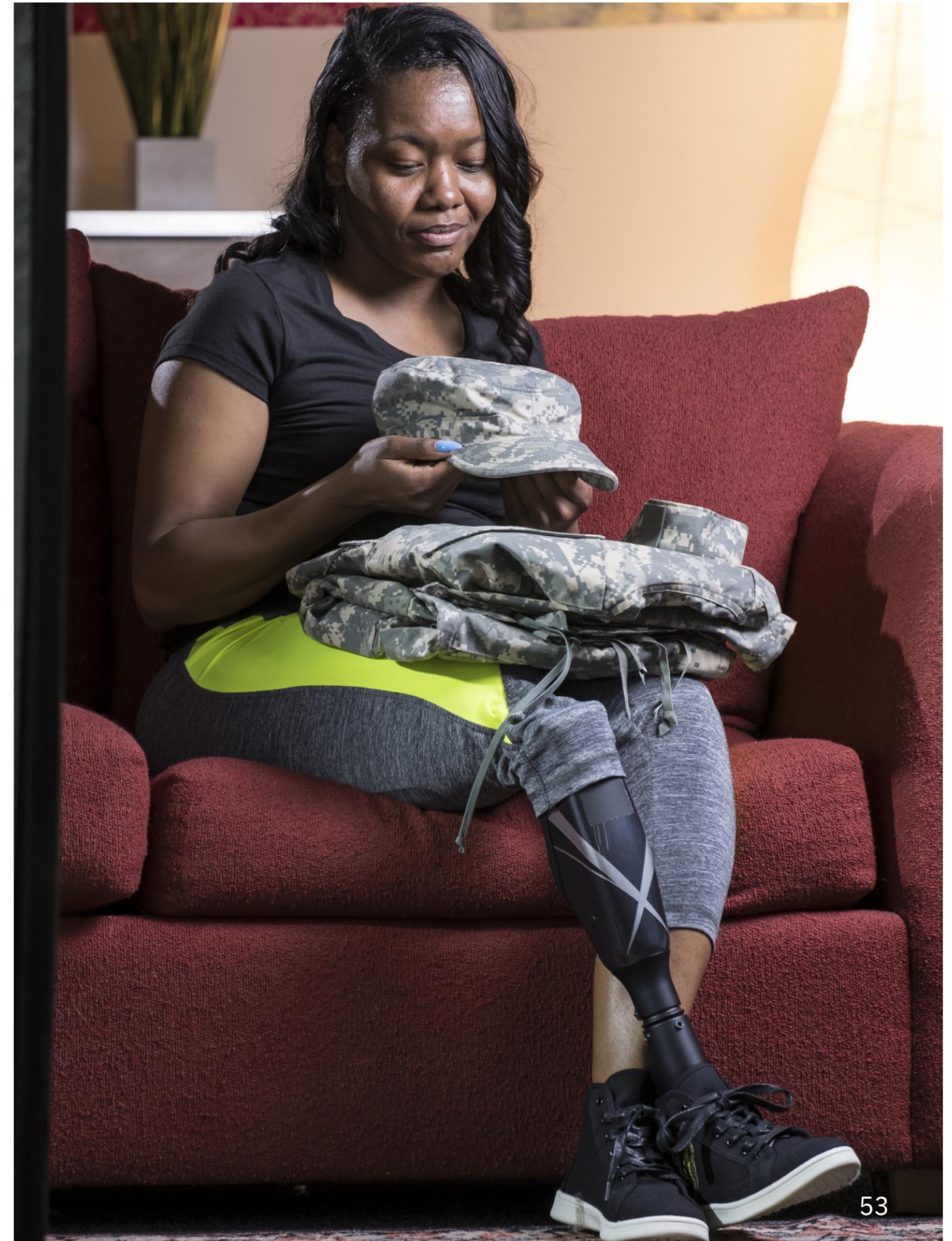
JOIN THE FITBIT EFFORT!

If you want to learn more about the VA-Fitbit program, which is open to receiving additional sites, please contact Dr. Robert Goldel. You can also read about this effort on the VAntage blog.

If you are interested in the Cardiology, Psychiatry, and/or COVID Long Haul care teams' work, please contact the appropriate doctors directly.

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