Health Technology, Consumerism, and the Explosion of Telehealth

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About Initiative 18/11: What Can We Do About the Cost of Health Care?

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What is Initiative 18|11?

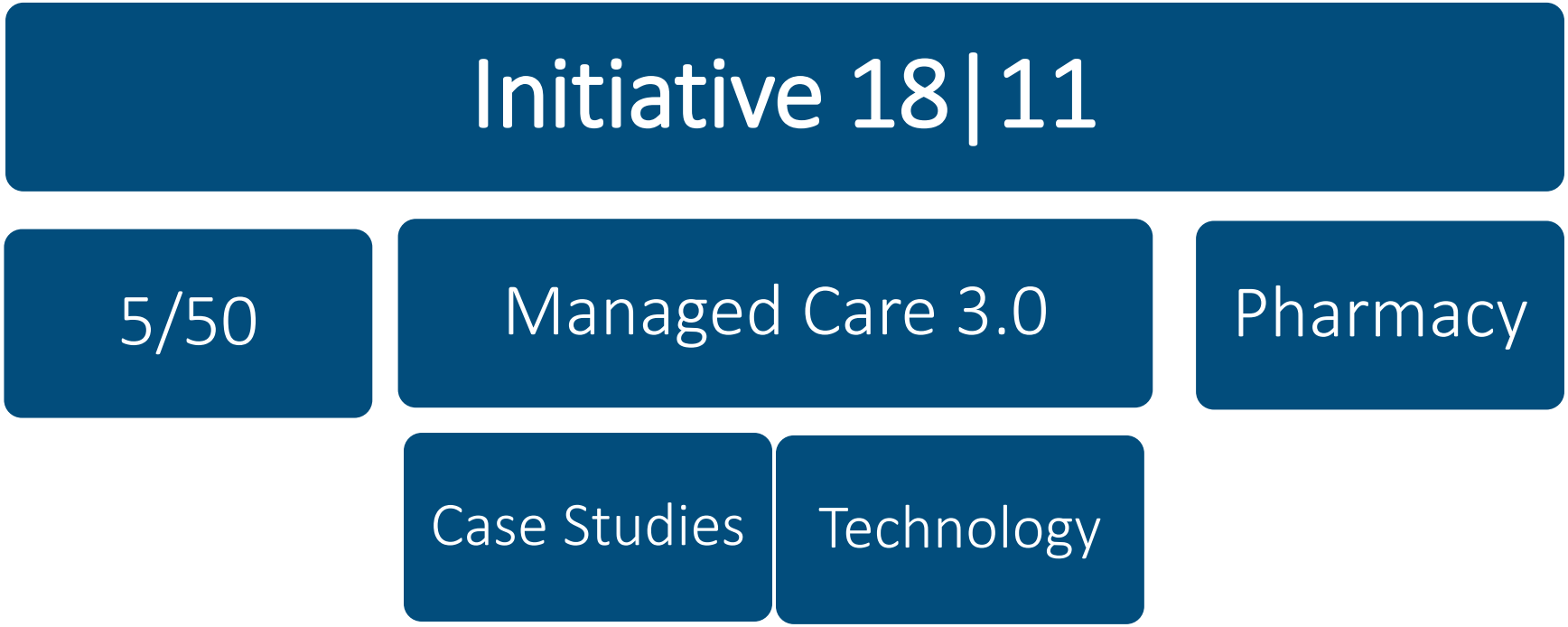
The U.S. spends roughly **18%** of its gross domestic product on health care, while the rest of the developed world spends roughly **11%**.

What can we do about the cost of health care?

To control health care costs, call in the actuaries
BenefitsPro, January 22, 2019

Health actuaries discuss the drivers of health care costs and provide an introduction to the SOA Health Section's Initiative 18|11.

Analysis and Action



HEALTH TECHNOLOGY & CONSUMERISM

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The American public has a love-hate relationship with medical technology

Five facts about new medical technology (1991):

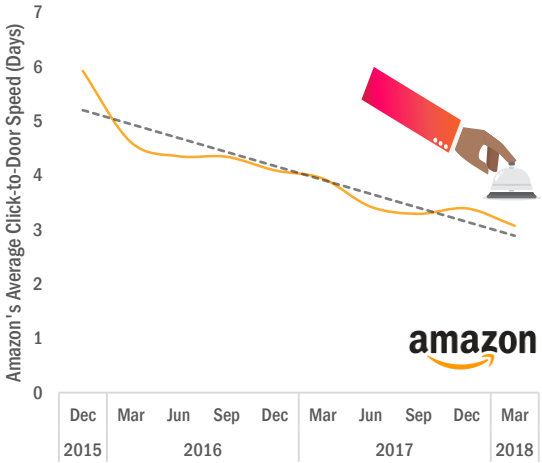
- New technologies do, on average, improve the quality of medical care by improving health outcomes
- Many new technologies are ineffective or redundant and do not improve health outcomes
- New technologies do, on balance, add to health care costs
- The incentives and regulations built into the American health care sector lead to inappropriate diffusion of technologies
- The fifth inescapable fact about new medical technology is that the American public cannot get enough of it

1. The Diffusion of New Technology: Costs and Benefits to Health Care; 1991; PETER J. NEUMANN and MILTON C. WEINSTEIN; https://www.ncbi.nlm.nih.gov/books/NBK234308/

The rise of consumerism means that people expect services on-demand. This is as true of health care as it is of package deliveries

In the Digital Era People Expect Speed and Convenience

Source: Rakuten Intelligence, August 22, 2018



Health Innovation Means Delivering "More for Less"

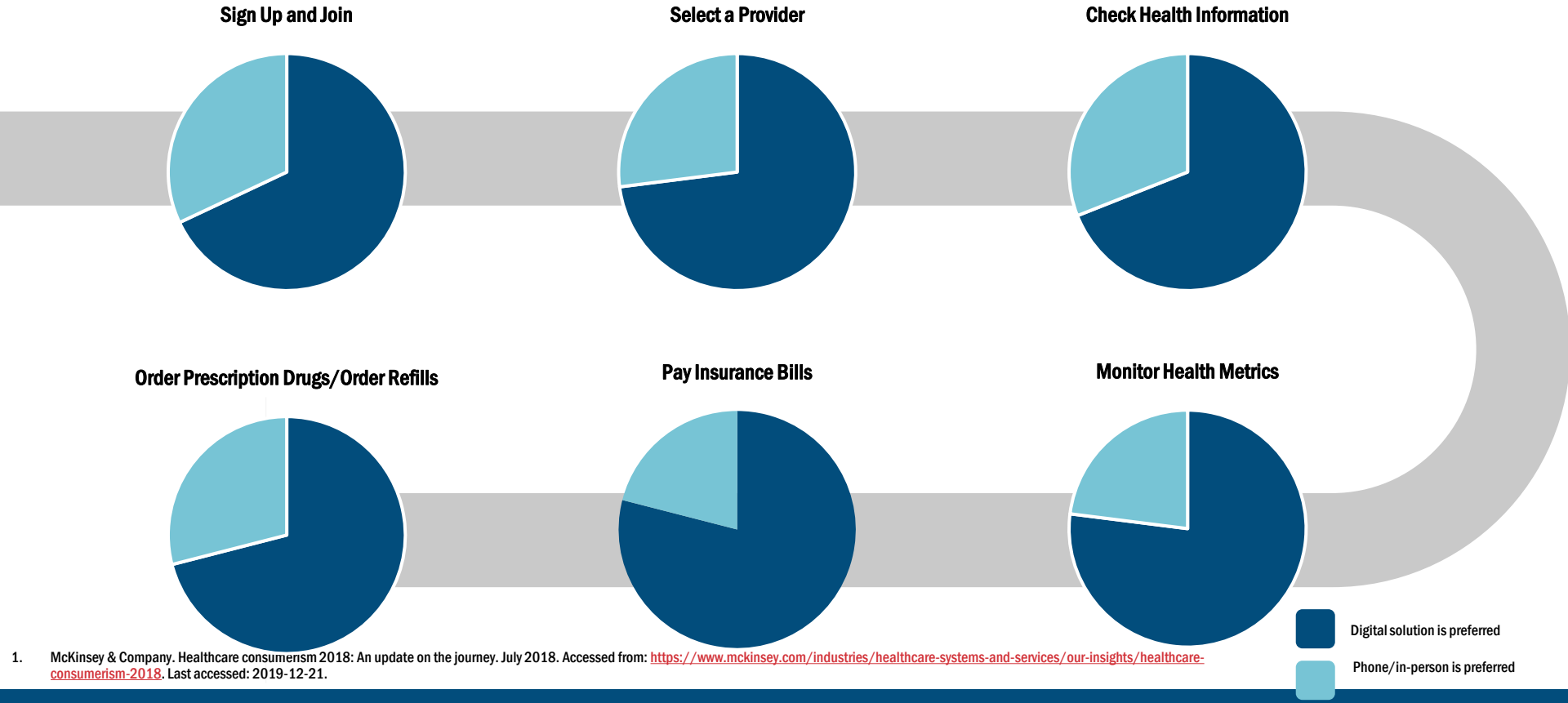
"

Innovation: Any combination of activities or technologies that break existing performance tradeoffs in the attainment of an outcome, in a manner that expands the realm of the possible.

Defined in health care as providing "more for less"—more value, better outcomes, greater convenience, access and simplicity; all for less cost, complexity, and time required by the patient and the provider, in a way that expands what is currently possible.[1]

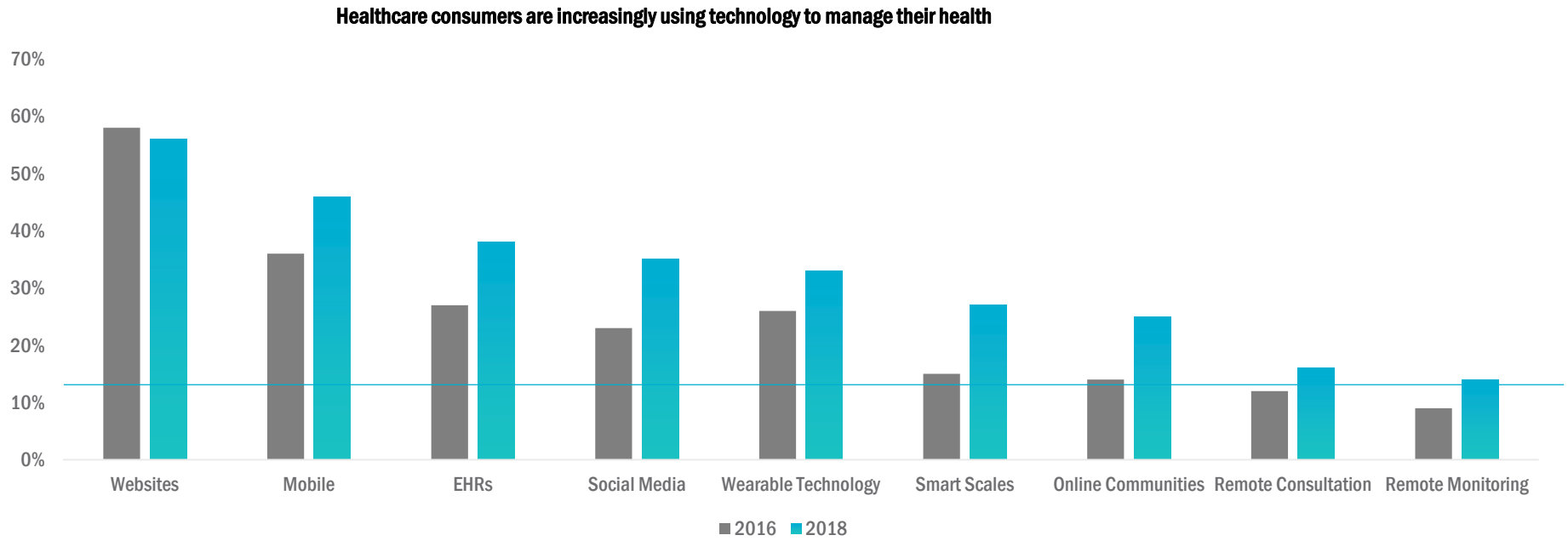
1. Deloitte. Top 10 health care innovations: More value, better outcomes, for less. Accessed from: www.deloitte.com/us/top-health-care-innovations. Last accessed: 2019-12-21.
2. Research 2 Guidance. 325,000 Mobile Health Apps Available in 2017. Accessed from: https://research2guidance.com/325000-mobile-health-apps-available-in-2017/. Last accessed: 2019-12-21.

Given the convenience, approximately 70% of consumers prefer digital healthcare solutions across their healthcare journey[1]



1. McKinsey & Company. Healthcare consumerism 2018: An update on the journey. July 2018. Accessed from: https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/healthcare-consumerism-2018. Last accessed: 2019-12-21.

Healthcare consumers are more plugged in than ever, leveraging the technology to manage their health, but pre-CoVID-19 use remained low[1]



33% of individuals used health apps and wearable devices in 2018, up from 9% in 2014

1. Accenture. 2018 Consumer Survey on Digital Health. Accessed from: https://www.accenture.com/us-en/insight-new-2018-consumer-survey-digital-health. Last accessed: 2019-12-21.

Speed of Change: measuring up to expectations?

Back in 2014, there were bold predictions for the state of health care in 2020. Not all of these dreams of efficiency and empowerment have panned out as envisioned.

		Score?
Wearables and mHealth	• **Wearables shape the quality of life today's consumers**, capturing and tracking how people live and manage their condition. • Consumers and providers **integrate information from multiple devices seamlessly** to create a comprehensive view of the individual. • Wearables are now **adopted widely** (beyond keep-fit and health fanatics) and specialist medical (bio-sensing) wearables are **affordable**. • The new clinician/patient partnership is based on **improved awareness**, **self-management** and **prevention strategies**, replacing the paternalist approach of old.	✓✗ ✗ ✗ ✗
Healthcare Delivery Systems	• The **home is where much of the medical care takes place**. It is no longer confined to clinicians in the clinic or hospital. • The ubiquity of digital communication means that many **doctor-patient contacts are now virtual** and deliver care to the patient in their home. • New funding models include year-of-care tariffs, pooled budgets, capitation or personal health budgets.	✗ A COVID-19 necessity ✓✗

1. Deloitte. Healthcare and Life Sciences Predictions 2020: A bold future? Accessed from: https://www2.deloitte.com/cn/en/pages/life-sciences-and-healthcare/articles/healthcare-and-life-sciences-predictions-2020.html. Last accessed: 2019-12-21.

What is needed is a more integrated experience that drives awareness and appropriate use, facilitated through emerging concepts like the Internet of Medical Things[1]

Internet of Medical Things (IoMT) is a connected infrastructure of medical devices, software applications, and health systems and services.

IoMT brings together people (patients, caregivers, and clinicians) data (patient or performance data) processes (care delivery and patient support), and enablers (sensors, connected medical devices—such as wrist bands and smart clothing—and mobile apps) to deliver improved patient outcomes more efficiently.

1. Deloitte. 2019 Global health care outlook. Accessed from: https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Life-Sciences-Health-Care/gx-lshc-hc-outlook-2019.pdf. Last accessed: 2019-12-21.
More relevant information may be found in the 2017 Accenture Survey Report on the Internet of Health Things. Accessed from: https://www.accenture.com/us-en/insight-accenture-2017-internet-health-things-survey.

It’s not just about technology – effective Engagement Strategies are needed[1]

VIEWPOINT

Wearable Devices as Facilitators, Not Drivers, of Health Behavior Change

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Several large technology companies including Apple, Google, and Samsung are entering the expanding market of population health with the introduction of wearable devices. This technology, worn in clothing or accessories, is part of a larger movement often referred to as the "quantified self." The notion is that by recording and reporting information about behaviors such as physical activity or sleep patterns, these devices can educate and motivate individuals toward better habits and better health. The gap between recording information and changing behavior is substantial, however, and while these devices are increasing in popularity, little evidence suggests that they are bridging that gap.

Only 1% to 2% of individuals in the United States have used a wearable device, but annual sales are projected to increase to more than $50 billion by 2018.[1] Some of these devices aim at individuals already motivated to change their health behaviors. Others are being considered by health care organizations, employers, insurers, and clinicians who see promise in using these devices to better engage less motivated individuals. Some of these devices may justify that promise, but less because of their technology and more because of the behavioral change strategies that can be designed around them.

Most health-related behaviors such as eating well and exercising regularly could lead to meaningful improvements in population health only if they are sustained. If wearable devices are to be part of the solution, they either need to create enduring new habits, turning external motivations into internal ones (which is difficult), or they need to sustain their external motivation (which is also difficult). This requirement of sustained behavior change is a major challenge, but many mobile health applications have not yet leveraged principles from theories of health behavior.[2]

Feedback loops could be better designed around wearable devices to sustain engagement by using concepts from behavioral economics.[3] Individuals are often motivated by the experience of past rewards and the prospect of future rewards. Lottery-based designs leverage the fact that individuals tend to assign undue weight to small probabilities and are more engaged by intermittent variable rewards than with constant reinforcement. Anticipated regret, an individual's concern or anxiety over the reward he or she might not win, can have a significant effect on decision making. Feedback could be designed to use this concept by informing individuals what they would have won had they been adherent to the new behavior. Building new habits may be best facilitated by presenting frequent feedback with appropriate framing and by using a trigger that captures the individual's attention at those moments when he or she is most likely to take action.

Identifying and Addressing the Gaps

Using wearable devices to effectively promote health behavior change is a complex, multistep process. First, a person must be motivated enough to want a device and be able to afford it; this is a challenge, because some devices can cost hundreds of dollars. Perhaps for these reasons, wearable devices seem to appeal to groups that might need them least. In a survey of wearable device users, 75% described themselves as "early adopters of technology," 48% were younger than 35 years, and 29% reportedly earn more than $100 000 annually.[4] The individuals who might have the most to gain from these devices are likely to be older and less affluent. To better engage these individuals, wearable devices must be more affordable, or new funding mechanisms are needed. For example, employers and insurers might pay for advice that helps individuals better adhere to their medications, potentially yielding significant downstream health care savings. Or, devices that demonstrate effectiveness could be financed in a manner similar to that for prescription drugs.

Second, once a device is acquired, a person needs to remember to wear it and occasionally recharge it—additional behaviors required from individuals who may have a difficult time already. Many wearable devices require data to be sent to a phone or computer, adding additional steps and more equipment. According to one survey (n = 62 220, more than half of individuals who purchased a wearable device stopped using it and, of these, one-third did so before 6 months.[5] One potential solution might be to better leverage smartphones; most people with these phones carry them often. Ideally, using a smartphone does not require any effort beyond setup—like an app that gets its power from the phone that people are already accustomed to regularly charging. Because data can be transmitted passively via a cellular connection, there is no need for individuals to actively update their data. Although smartphones are expensive, many people already have them, and the reach of these devices is increasing.

Third, the device must be able to accurately track its targeted behavior. Accelerometers, commonly found within wearable devices, have been well studied for tracking step counts. However, newer technologies, such as those that measure heart rate or sleep patterns, have not been well validated. Similar to mobile health applications, the increase in the availability and types of wearable devices has not been matched by appropriate testing or oversight to make sure they work.[6] Wearable devices are unlikely to have the same capabilities as home devices that measure blood pressure or track medication adherence. However, a smartwatch may facilitate feedback from these devices, forming a better

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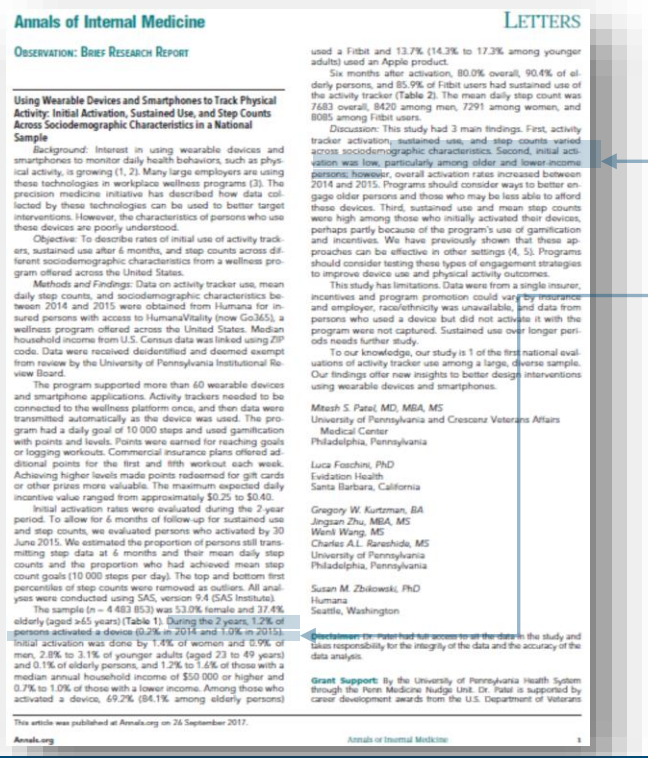
Using wearable devices to effectively promote health behavior change is a complex, multistep process. First, a person must be motivated enough to want a device and be able to afford it; this is a challenge, **because some devices can cost hundreds of dollars**.

Although wearable devices have the potential to facilitate health behavior change, this change might not be driven by these devices alone. Instead, the successful use and potential health benefits related to these devices **depend more on the design of the engagement strategies** than on the features of their technology

1. Patel MS, Asch DA, Volpp KG. Wearable Devices as Facilitators, Not Drivers, of Health Behavior Change. JAMA. 2015;313(5):459–460. doi:10.1001/jama.2014.14781

Also required is an effective funding mechanism for consumer technology is typically costly for the average consumer[1]



Annals of Internal Medicine

OBSERVATION: BRIEF RESEARCH REPORT

LETTERS

Using Wearable Devices and Smartphones to Track Physical Activity: Initial Activation, Sustained Use, and Step Counts Across Sociodemographic Characteristics in a National Sample

Background: Interest in using wearable devices and smartphones to monitor daily health behaviors, such as physical activity, is growing (1, 2). Many large employers are using these technologies in workplace wellness programs (3). The precision medicine initiative has described how data collected by these technologies can be used to better target interventions. However, the characteristics of persons who use these devices are poorly understood.

Objective: To describe rates of initial use of activity trackers, sustained use after 6 months, and step counts across different sociodemographic characteristics from a wellness program offered across the United States.

Methods and Findings: Data on activity tracker use, mean daily step counts, and sociodemographic characteristics between 2014 and 2015 were obtained from Humana for insured persons with access to HumanaVitality (now Go365), a wellness program offered across the United States. Median household income from U.S. Census data was linked using ZIP code. Data were received deidentified and deemed exempt from review by the University of Pennsylvania Institutional Review Board.

The program supported more than 60 wearable devices and smartphone applications. Activity trackers needed to be connected to the wellness platform once, and then data were transmitted automatically as the device was used. The program had a daily goal of 10 000 steps and used gamification with points and levels. Points were earned for reaching goals or logging workouts. Commercial insurance plans offered additional points for the first and fifth workout each week. Achieving higher levels made points redeemed for gift cards or other prizes more valuable. The maximum expected daily incentive value ranged from approximately $0.25 to $0.40.

Initial activation rates were evaluated during the 2-year period. To allow for 6 months of follow-up for sustained use and step counts, we evaluated persons who activated by 30 June 2015. We estimated the proportion of persons still transmitting step data at 6 months and their mean daily step counts and the proportion who had achieved mean step count goals (10 000 steps per day). The top and bottom first percentiles of step counts were removed as outliers. All analyses were conducted using SAS, version 9.4 (SAS Institute).

The sample (*n* = 4 483 853) was 53.0% female and 37.4% elderly (aged >65 years) (Table 1). During the 2 years, 1.2% of persons activated a device (0.2% in 2014 and 1.0% in 2015). Initial activation was done by 1.4% of women and 0.9% of men, 2.8% to 3.1% of younger adults (aged 23 to 49 years) and 0.1% of elderly persons, and 1.2% to 1.6% of those with a median annual household income of $50 000 or higher and 0.7% to 1.0% of those with a lower income. Among those who activated a device, 69.2% (84.1% among elderly persons) used a Fitbit and 13.7% (14.3% to 17.3% among younger adults) used an Apple product.

Six months after activation, 80.0% overall, 90.4% of elderly persons, and 85.9% of Fitbit users had sustained use of the activity tracker (Table 2). The mean daily step count was 7683 overall, 8420 among men, 7291 among women, and 8085 among Fitbit users.

Discussion: This study had 3 main findings. First, activity tracker activation, sustained use, and step counts varied across sociodemographic characteristics. Second, initial activation was low, particularly among older and lower-income persons; however, overall activation rates increased between 2014 and 2015. Programs should consider ways to better engage older persons and those who may be less able to afford these devices. Third, sustained use and mean step counts were high among those who initially activated their devices, perhaps partly because of the program's use of gamification and incentives. We have previously shown that these approaches can be effective in other settings (4, 5). Programs should consider testing these types of engagement strategies to improve device use and physical activity outcomes.

This study has limitations. Data were from a single insurer, incentives and program promotion could vary by insurance and employer, race/ethnicity was unavailable, and data from persons who used a device but did not activate it with the program were not captured. Sustained use over longer periods needs further study.

To our knowledge, our study is 1 of the first national evaluations of activity tracker use among a large, diverse sample. Our findings offer new insights to better design interventions using wearable devices and smartphones.

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Disclaimer: Dr. Patel had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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This article was published at Annals.org on 26 September 2017.

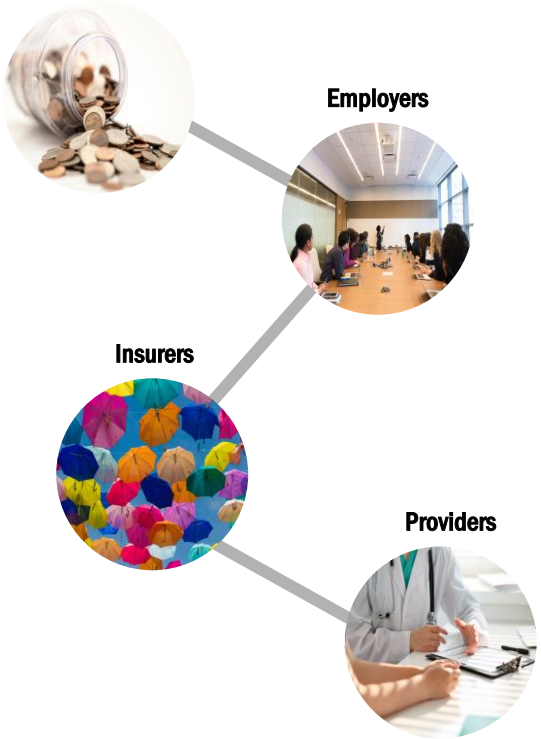
Using Wearable Devices and Smartphones to Track Physical Activity: Initial Activation, Sustained Use, and Step Counts Across Sociodemographic Characteristics In a National Sample

Insight #1: During the 2 years, **1.2%** of persons activated a device **(0.2% In 2014 and 1.0% In 2015).**

Insight #2: Programs should consider ways to **better engage older persons and those who may be less able to afford** these devices.

1. Patel MS, Foschini L, Kurtzman GW, Zhu J, Wang W, Rareshide CA, et al. Using Wearable Devices and Smartphones to Track Physical Activity: Initial Activation, Sustained Use, and Step Counts Across Sociodemographic Characteristics in a National Sample. Ann Intern Med. 2017;167:755–757. doi: 10.7326/M17-1495

This raises the central question of who should fund this technology. If not the consumer, then a mix of employers, insurers, and providers.[1]



Venture capitalists and industry experts we interviewed believe **employers, insurers, and providers—not consumers—are likely to pay for most of the technologies**. They noted that **employers still underwrite a material portion of healthcare spending** and are adversely affected by health-related absenteeism and workers' compensation (all of which would decrease if the technologies show a return on investment). Furthermore, employer support would be consistent with a growing trend: **companies are giving employees help to make better-informed, more cost-effective decisions while shifting an increased proportion of healthcare costs to them.**

Venture capitalists and industry experts also believe that **health insurers and providers will pay for some of these technologies**. In their opinion, **insurers will see the technologies as a way to speed the path to value-based reimbursement**.

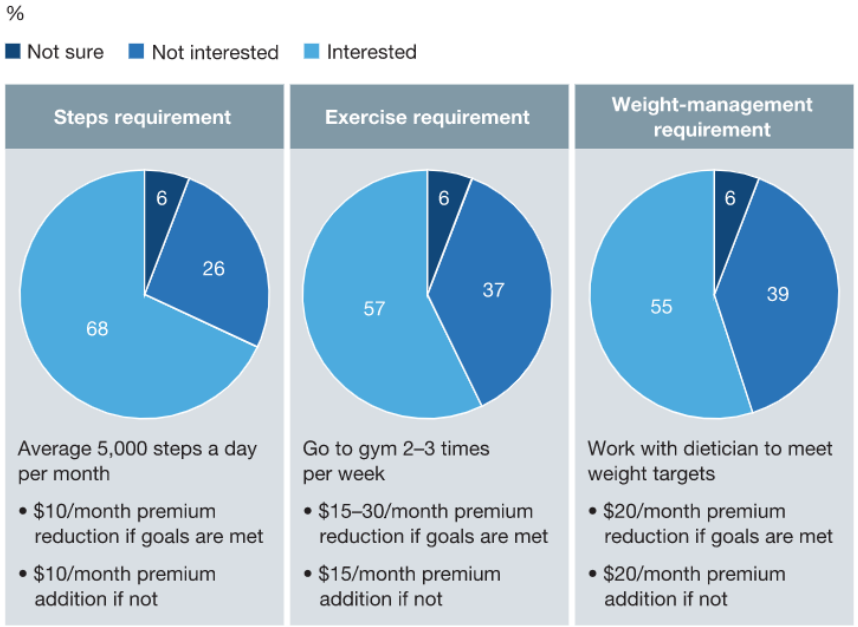
Providers will view them as a way to reduce costs and enhance quality in a fee-for-service world, and to optimize risk and medical utilization under value-based reimbursement arrangements.

In a consumer survey, respondents were more interested in getting digital/mobile health technologies from their health insurers than from their employers or providers.

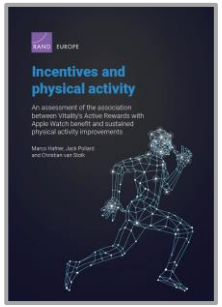
1. McKinsey & Company. How tech-enable consumers are reordering the healthcare landscape. November 2016. Accessed from: https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/how-tech-enabled-consumers-are-reordering-the-healthcare-landscape. Last accessed: 2019-12-21.

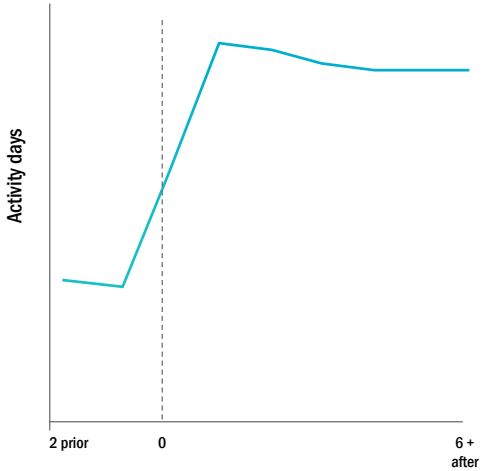
People are willing to change their behavior to reduce health costs. Leveraging behavior-change ecosystems are central to this narrative of sustained behavior change.

Consumers are Open to Changing Behaviors to Reduce Costs[1]



Sustaining Health Improvements from Sophisticated Incentive Ecosystems[2]





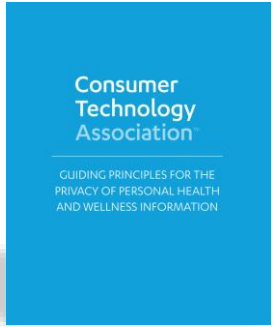
+34% increase in physical activity resulted from a program that leveraged consumer technology (Apple Watch) and behavioral science to increase and sustain physical activity.

1. McKinsey & Company. Healthcare consumerism 2018: An update on the journey. July 2018. Accessed from: https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/healthcare-consumerism-2018. Last accessed: 2019-12-21.
2. Hafner, Marco, Jack Pollard, and Christian Van Stolk, Incentives and physical activity: An assessment of the association between Vitality's Active Rewards with Apple Watch benefit and sustained physical activity improvements. Santa Monica, CA: RAND Corporation, 2018. https://www.rand.org/pubs/research_reports/RR2870.html.

A technological framework necessitates significant governance to protect the consumer and earn their trust in this digital ecosystem

1. Build health technologies informed by **science**.
2. Scale **affordable** health technologies.
3. Guide **interpretation** of health data.
4. **Protect** and **secure** health data.
5. **Govern** the responsible use of health technology and data.

1. Be **open** and **transparent** about the personal health information you collect and why.
2. Be **careful** about how you use personal health information.
3. Make it easy for consumers to **access** and **control** the sharing of their personal health information and **empower** them to do so.
4. Build strong **security** into your technology.
5. Be **accountable** for your practices and promises.



1. Vitality Institute. Guidelines for Personalized Health Technology. March 2016. Accessed from: http://thevitalityinstitute.org/projects/personalized-health-technology/. Last accessed: 2019-12-21.
2. Consumer Technology Association. Guiding Principles for the Privacy of Personal Health and Wellness Information. Accessed from: https://cdn.cta.tech/cta/media/media/advocacy/pdfs/cta-guiding-principles-for-the-privacy-of-personal-health-and-wellness-information.pdf. Last accessed: 2019-12-21.

A deeper dive into Telehealth

Benefits, Obstacles, And the Impact of COVID-19

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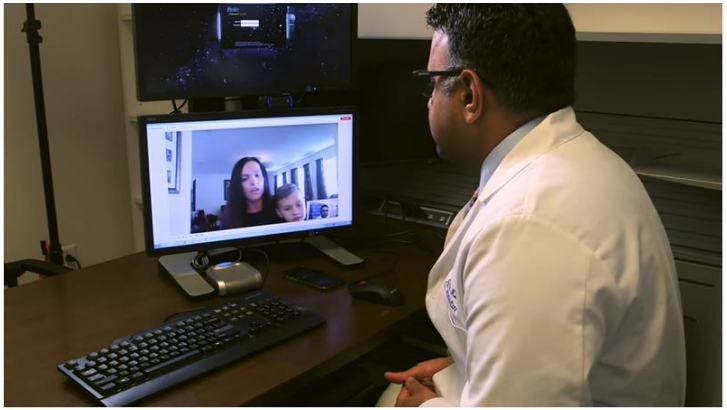
What is Telehealth?

- The use of digital information and communication technologies to access health care services.
  - Patient-to-Provider
  - Provider-to-Provider



Three Primary Delivery Systems

- Live Video

- Remote Patient Monitoring

- Store and Forward

Live Video

- Uses:
  - Virtual Visits
  - Case Collaboration
  - Distance Learning

- Top 5 Virtual Visit Diagnoses (Jan. 2020)
  - Mental Health Conditions
  - Acute Respiratory Infection
  - Influenza and Pneumonia
  - Urinary Tract Infection
  - Eye Irritation or Infection

Live Video

- Virtual Visits

- Case Collaboration
  - ICU, emergency care, neurology, cardiology, psychiatry, orthopedics, pediatrics

- Distance Learning
  - Direct access to continuing education opportunities around the world.

Remote Patient Monitoring

- Uses:
  - Chronic Care
  - Acute Care
  - High-Risk Patients
- Examples
  - Blood Sugar Readings
  - Blood Pressure Readings
  - Medication Reminders
  - Food/Exercise Logs
  - Heart Rate Monitors

Remote Patient Monitoring

- Connected Home Living

  - Provides kits after discharge personalized to each patient, which the doctor can use to monitor vitals remotely.
  - Reports 3-year average re-admission rate of 5.8%, compared to the U.S. average of 14%.

- InfoBionic

  - Wearable cardiac monitor that continuously streams ECG and motion data in real-time for patients with heart conditions.

Store and forward

- Store and Forward is a means of gathering, storing, and sharing patient information.

- Uses:
  - Storing and Sending –
    - Digital Images
    - Health Records
    - Training Videos

Benefits

- Improved Patient Health

- Increased Patient Satisfaction

- Cost Savings

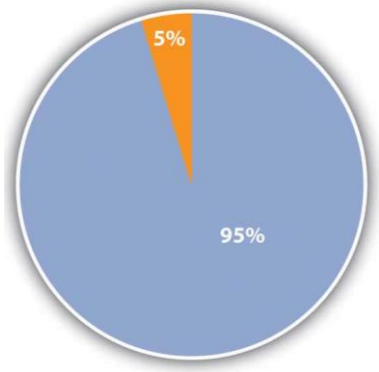
Improved Patient Health

- Easy Access to Care
  - Patient is more likely to seek treatment before condition gets progressively worse.
- Informed Providers
  - Providers are able to access specialty consultations in a more timely manner.
- Care Management
  - Providers can remotely monitor post-op vitals and send reminders to encourage medication adherence.

Improved Patient Satisfaction

- A study published by the Journal of General Internal Medicine cited that 95% of survey respondents reported being “very satisfied” with all telehealth attributes.

- Characteristics that increased the odds of liking or preferring telehealth:
  - Convenience of Care
  - Overall Understanding of Telehealth
  - No Medical Insurance
  - Female Patient



Cost Savings

- Idea behind cost savings:
  - A Telehealth visit is less costly than an in-person physician, urgent care, retail health clinic, or most notably, emergency department visit.

Type of Visit	Low Range Cost	High Range Cost
Emergency Department	$359	$1,595
Urgent Care	$98	$163
Physician Office	$84	$131
Retail Health Clinic	$66	$89
Virtual Visit	$41	$49

Cost Savings

- Concerns regarding this idea:
  - Ease of access increases utilization where care might not have been sought out otherwise.
    - Increase frequency counteracts decrease severity.

  - Diagnosis may not be as accurate when the provider can only assess the patient remotely and, in some cases, follow-up care will be necessary to ultimately properly treat the patient.
    - The decrease in severity is not as impactful as it may seem initially.

Cost Savings

- A recent study published in the American Journal of Emergency Medicine accounted for both concerns by surveying:

  - Immediately following the visit – What would the patient have done if telehealth had not been an option?
    - 16% would have ‘done nothing’.
    - 12% would have gone to the emergency room.
  - 1-2 weeks after the visit – Was any follow-up care pursued?
    - 74% did not pursue any type of follow-up care.
    - 5% went to the emergency room.

Cost Savings

- Even after accounting for increased utilization and follow-up care, the overall net cost savings was calculated as being with the range of $19 to $121 per telehealth visit.
  - Most of the savings was generated from emergency department visits avoided.

Obstacles

- Cost Investment

- Security and Privacy

- Implementation

Cost Investment

- Telehealth systems, staff, etc. can be costly up front.

- State or Federal Grant Funding
  - The U.S. Health Resources and Services Administration (HRSA), an agency of the U.S. Department of Health and Human Services (HHS), offers grant funding for telehealth programs.

HRSA
Health Resources & Services Administration

Security and Privacy

- While most adults acknowledge the concern around security of medical information, the convenience of rapid access to care outweighs concerns.

- Mitigating security breaches:
  - Device/data encryption
  - File authentication
  - Two-Factor login

Implementation

- Includes building infrastructure, establishing protocols, training staff, setting up billing procedures, etc.

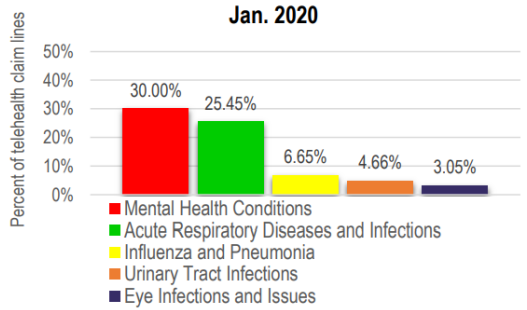
- Recommended to start small and expand over time

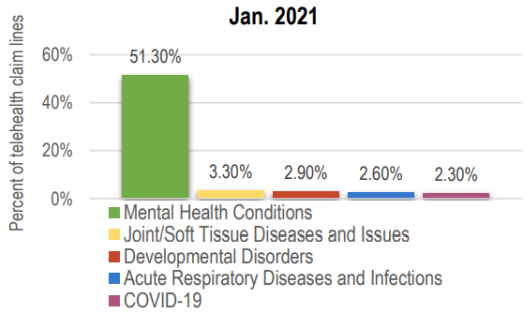
Impact of COVID-19

- The following flexibilities were passed into law, effective March 30, 2020:
  - Telehealth geographical site restrictions for reimbursement eligibility were waived.
  - Waiver on types of devices that may be used to deliver telehealth services. Common platforms such as FaceTime and Skype can be used without breaking HIPPA rules
  - Eligibility for new patients to receive telehealth services and for a wider range of services.
- It is unknown if these waivers will remain in place once the pandemic emergency period ceases.

Impact of COVID-19

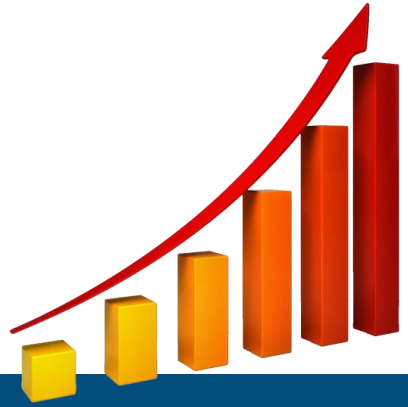
- According to FairHealth Monthly Telehealth Tracker, telehealth accounted for approximately 0.25% of all medical claim lines in January 2020 versus 7.00% in January of 2021; peaking at 13.00% in April of 2020 during the height of the Coronavirus lockdown in the US.





Impact of COVID-19

- Digital Health Funding in the US
  - Reported $1.1 billion in funding in calendar year 2011
  - Reported $7.4 billion in funding in calendar year 2019
  - Reported $14 billion in funding in calendar year 2020
  - Reported $6.7 billion in funding in the first quarter of 2021
    - If trend continues, more than $25 billion will be funded for digital health in calendar year 2021



Actuarial Considerations

- Benefit Design, Value-Based Care, and Provider Risk
  - Telehealth present the opportunity to both save on costs and increase quality of care.

- Pricing and Forecasting
  - Projecting telehealth utilization and unit cost
  - Modeling resulting effects on financial projections

Questions

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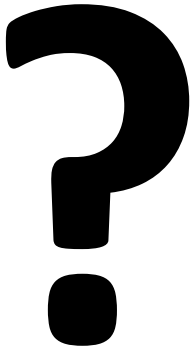
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