



TECHNOLOGY & DIGITAL HEALTH: THE FUTURE OF OLDER ADULT HOME-BASED CARE?

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DISCLOSURES

I have no financial interests or relationship with any of the products or companies mentioned in this presentation

LEARNING OBJECTIVES

- Define the platform of digital health and technology in the setting of older adult care
- Identify products, services, and trends that may be integrated with older adult home care coordination
- Explore potential uses and limitations of technology and digital health in remote patient care
- Identify potential roles for pharmacists in digital health

OLDER ADULT ACCESS TO HEALTHCARE

- Growing divide between services available to elders living in urban settings and those in **rural communities**
- **Less densely populated areas = often higher concentration of seniors**
 - Limited access to medical resources and care professionals
 - Increasing risks of untreated disease, leading to higher costs and earlier death
 - Roughly 20% of older Americans, due to a lack of resources, are not fully addressing their health needs
- 87 percent of adults age 65+ want to stay in their current home and community as they age
- Among people age 50 to 64, 71 percent of people want to age in place

Source: AARP PPI, "What is Livable? Community Preferences of Older Adults," April 2014

Improving Access To Health Systems Available To Older Patients

<https://www.pewresearch.org/fact-tank/2014/12/03/health-affairs-among-11-nations-american-seniors-struggle-more-with-health-costs/>

HOW TO BRIDGE THE HEALTHCARE GAP?

- Patients spend more time managing their own diseases versus being managed by a provider
- Can Digital Health/Technology help to address patient needs and to overcome logistical and transportation barriers?
- Yes, there are opportunities...

DIGITAL HEALTH TRENDS AMONG OLDER ADULTS

- Current adoption of digital health in the geriatric population is limited
- But, recent trends may suggest high adoption of digital health by baby boomers



DIGITAL HEALTH ADOPTION Across segments, 2017



	OVERALL SAMPLE	CHRONICALLY ILL SENIORS	VULNERABLE	WORRIED WELL	AGING ADULTS
Telemedicine use—live video	19%	3%	18%	42%	24%
Digital health goal tracking	24%	10%	17%	65%	39%
Wearable use	24%	12%	14%	63%	41%
Searched for online health information	79%	73%	75%	88%	84%
Searched for provider reviews	58%	39%	55%	77%	66%

Source: Rock Health Digital Health Consumer Adoption Survey (n₂₀₁₇ = 3,997)

IS THERE FDA BUY-IN FOR DIGITAL HEALTH?

- Yes!
 - The United States Food and Drug Administration acknowledges and has placed resources into exploring the use of digital health in patient care
 - **The Digital Health Center of Excellence** (DHCoE) is part of the planned evolution of the Digital Health Program in the Center for Devices and Radiological Health (CDRH) and will align and **coordinate digital health work across the FDA**
 - The FDA believes Digital Health will:
 - Reduce inefficiencies
 - Improve access
 - Reduce costs
 - Increase quality
 - Make medicine more personalized for patients

<https://www.fda.gov/medical-devices/digital-health-center-excellence/about-digital-health-center-excellence>

RETAIL HEALTH POISED TO DISRUPT HEALTHCARE?

Managed Healthcare[®]
EXECUTIVE

REFERENCES PUBLICATIONS - RESOURCES - SUBSCRIBE -

Walmart Launches Digital Healthcare Site

September 5, 2019

Tracey Walker



The retail giant looks to disrupt the healthcare industry.



Walmart Health Services

Primary Care

Medical appointments from wellness checks, physicals, sick/injury visits, immunizations, to chronic condition diagnosis, care, and management.

Counseling

Counseling services with a licensed and trained behavioral health clinician for help with depression, anxiety, stress, grief, and relationship issues.

Audiology

Hearing services with a licensed audiologist or hearing aid technician for hearing exams

Optometry

Eye exams, contact lens fittings, and optical refractive prescriptions provided by licensed Optometrists and their trained technicians.

X-Ray

X-Ray imaging services provided on-site.

Classes

Nutrition, fitness, and other classes provided by Walmart Health partners

Dental

Dental services ranging from Dental Exams including X-Rays, Deep Cleanings, Teeth Whitening, Fillings, Porcelain Crowns, simple extractions, and more.

Labs

Diagnostic lab tests including A1C, Lipid Test, Pregnancy Tests, Strep Tests, Flu Tests, Drug Screenings, and more.

RETAIL HEALTH BEGINS...

CVS pharmacy

To plan your visit faster, [sign in](#) or [create an account](#). [Español](#)



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Cold symptoms? Don't wait! Visit a clinic today. >

Still here for your care.

To best serve high patient demand for COVID-19 testing, there may be limited availability for scheduling a MinuteClinic visit in advance. Our clinics still remain open for walk-ins.

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Plan a visit

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MinuteClinic® Visit

Walk-in or schedule a visit at a MinuteClinic location.

Most insurance accepted

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See locations near you

ZIP code, or city and state

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E-Clinic Visit

Video consults with licensed MinuteClinic providers from the comfort of home.

[Request a visit](#)

[Learn about E-Clinic Visit](#)



Insurance: **Required**



Price varies based on service and coverage

[See price list](#)



Services

Most of our non-urgent services, plus monitoring & managing chronic conditions like diabetes.

[Learn more about E-Clinic services](#)



E-Clinic visits are available in

33 states and the District of Columbia

[Available states list](#)

*In times of peak demand, E-Clinic visits may be temporarily unavailable in some states.



Visits **9 AM - 5 PM**

7 days a week, excluding some holidays

[Request an E-Clinic Visit](#)



Video Visit

Our network of telemedicine providers gives you the care you need, when you need it - 24/7.

[Set up a visit](#)

[Learn about Video Visit](#)



Insurance: **NOT Required***

*Limited carriers accepted



All services only \$59 per visit



Services

Diagnosis and treatment of most non-urgent illnesses or injuries, 24/7.

[Learn more about Video Visit services](#)



Video Visits are available in

46 states and the District of Columbia

[Available states list](#)



Visits **24/7**

365 days of the year

[Set up a Video Visit](#)

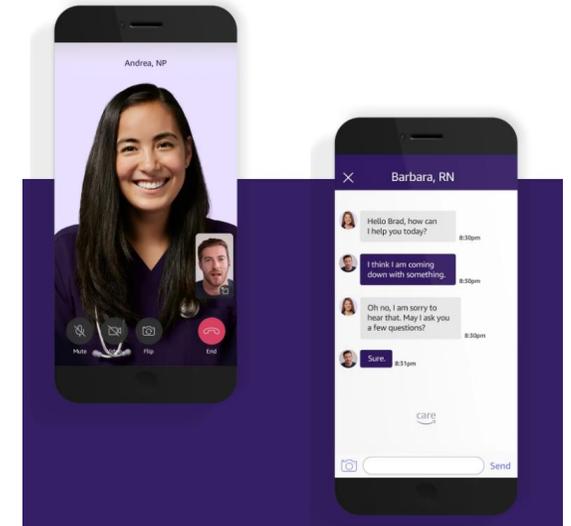


We've earned the Gold Seal of Approval® from the Joint Commission

LOCAL RETAIL HEALTH – WEGMANS PHARMACY

- Telephone MTM – medication reconciliation, review of medication efficacy/safety, vaccine recommendations
- CPS (clinical program solutions) that houses questionnaires and screening tools to help target specific patients for interventions
 - Patients are targeted either when they pick up prescriptions in the store or via telephone
 - Programs include or have included: targeted vaccinations, drug induced nutritional recommendations (B12 with metformin/PPI, vitamin D with bisphosphonate), adherence monitoring, missing therapy (statin mostly)
- Tracking health metrics – mostly for employees who complete health screenings but has been used for certain Excellus contracted patients as well
- An integration with the in-store BP machines existed, whereby patients were able to link their BP account with their pharmacy profile, and receive appropriate counseling on BP control/medication adherence
- However, the program was stopped due to discontinuation of contract with the BP machine company

TELEMEDICINE AND TELEHEALTH – AMAZON CARE



What is Amazon Care?

What services are currently available through Amazon Care?

Amazon Care provides a mobile application that allows you to access virtual and in-person healthcare services from Care Medical. Care Medical provides the following services:

Video Care: Have an in-app video visit with a doctor, nurse practitioner, or registered nurse (“clinicians”) for advice, answers, diagnoses, treatment, or referrals.

In-person care and prescription delivery available for members located in the Greater Seattle area:

Care Chat: In-app text chat connects you to a clinician in moments for health advice.

Mobile Care: Your Video Care clinician may recommend an in-person assessment or treatment by a registered nurse (a “Mobile Care nurse”). With your approval, the clinician will send a Mobile Care nurse to your home, a designated room on the Amazon campus, or other private location within our service area. The Mobile Care nurse may collect lab samples, perform some onsite testing (such as strep tests), administer common vaccines, or perform certain physical examinations.

Care Courier: During a Video Care visit, your clinician may prescribe you prescription medications. At your request, a Care Courier may deliver certain prescriptions to you within two hours.

In-person follow-up care and
prescription delivery available
in the Greater Seattle area



BIG-BOX COMPANIES DELVING INTO DIGITAL HEALTH

BEST BUY Health

Res

Remote Patient Care & In Home Patient Monitoring

Reimagining the model of care.

We're establishing a new model of human-centered care that supports an enhanced experience and better outcomes for health systems and payer systems.



A new care experience for individuals and their caregivers. [See how it works](#)

We're creating a higher standard of home as a site of care.

Each home and each consumer have different needs and want a tailored experience. Our team ensures that each individual is at the center of their personal care model, helping them successfully live and manage their health seamlessly.

- Always-on technology and customized services from Best Buy Health create an end-to-end experience for the home and remove barriers to care while providing transparency and guidance. With our national retail-powered infrastructure and local in-home services, we support people where they are, at home and in life.



Companies that have traditionally had no association with healthcare are jumping into the digital health mix to assist with remote care of patients

The power of Best Buy Health.

Best Buy Health's new model of accessible care is rooted in an end-to-end experience of real-time data, accessible technology and around-the-clock support for every individual. Our expertise, industry relationships, reach and capabilities are unmatched, enabling us to offer a best-in-class experience that helps you focus on delivering the best clinical care.

Accessible and proactive, 24/7.

With a nationwide infrastructure of service and support at scale, our Geek Squad® and Caring Center services ensure support is accessible and local.

Smart technology integration.

Customizable API integrations support workflows with intelligent, evidence-based protocols while maintaining data connectivity.

Brand-agnostic.

People can use the technology they choose, including devices they may already own. Platforms can stand alone or integrate directly into provider, payer and electronic health record systems.

Easy learning curve.

Ready-to-use technology and tech support are designed with specific users in mind to accommodate a range of clinical, physical and emotional needs.

Modular design.

Solutions can serve a variety of needs and evolve as needs change.

Customizable add-ons.

Technology and services can be added to address unique needs, including passive and active monitoring, triage-to-care teams, family caregiving support, social determinants of health, and marketing consultation and support.

The Best Buy Health remote patient monitoring experience.



Senior-friendly consumer app.

Bluetooth and cloud connectivity capture vital readings via optical character recognition while providing patients with customized notifications. Patients can use their own smartphones, or the app can be pre-loaded on mobile devices from Best Buy.



Choices in hardware.

Patients can select from a broad suite of connected medical devices customized for their unique needs. Devices are available pre-activated and pre-activated, or patients can use their own mobile device and vital monitoring devices.



Care team platform.

Patients are digitally enrolled into the platform, which provides real-time data flow to the care team. The platform integrates into care management systems, making electronic health records available. Devices and notifications are customizable through the platform's dashboard.



Trusted services.

Sensitivity-trained Geek Squad Agents provide in-home and remote support as well as a support line for device and connectivity questions. Agents ensure each patient feels comfortable with the app and their chosen devices. Behind the service experience, Best Buy Health offers a scalable health care platform with HIPAA-compliant back-end systems.

↑ Top

TELEMEDICINE AND TELEHEALTH

- Expanding push for medications to reach patients directly at home
- Direct-to-Consumer Prescription Services

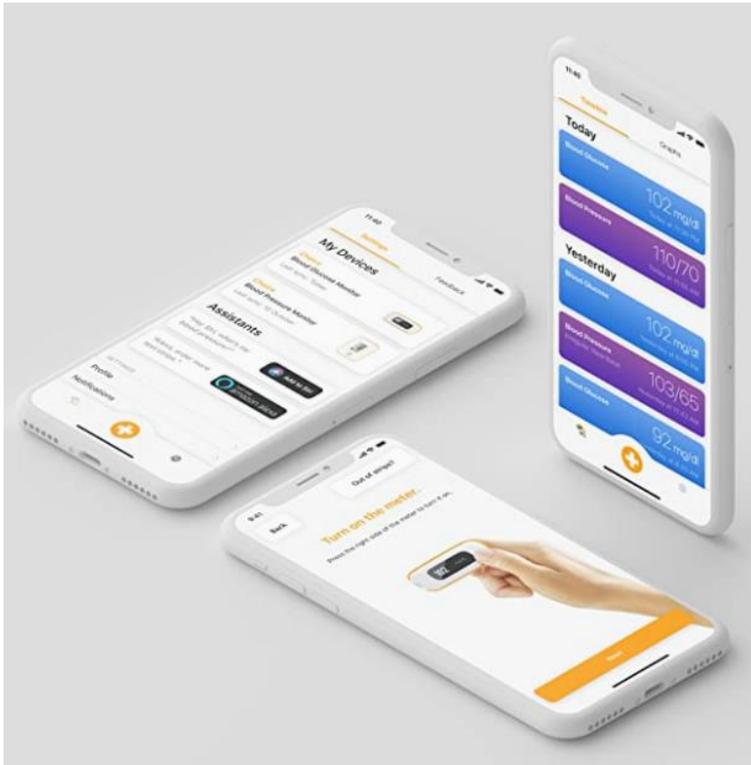
<https://www.thedigitalapothecary.com/pharmacy-innovation-news/2019/10/6/direct-to-consumer-prescription-services-a-rundown-of-these-health-startups-and-online-pharmacy-services>

DIRECT-TO-CONSUMER PRESCRIPTION SERVICES: A RUNDOWN OF HEALTH STARTUPS AND ONLINE PHARMACY SERVICES

DIRECT-TO-CONSUMER PRESCRIPTION SERVICES
What areas are being targeted by health startups?

Category	Startups/Services	Medications/Conditions
BIRTH CONTROL	LEMONAID, GoodFi, nurx, hers, pill, Simpleleaf, twentyeight, ponds health, alpha	Contraceptives, IUDs, birth control pills, and Plan B.
INFECTIOUS DISEASES	nurx, LEMONAID, GoodFi, YO	Antibiotics, antivirals, antifungals, and other infectious disease treatments.
MENTAL HEALTH	kick, hers, LEMONAID, GoodFi, MAVEN	Antidepressants, anxiety medications, and other mental health treatments.
SMOKING CESSATION/SUBSTANCE USE DISORDERS	GoodFi, LEMONAID, YO, RORY	Nicotine replacement therapy, bupropion, and other smoking cessation treatments.
METABOLIC & OTHER CHRONIC CONDITIONS	GoodFi, LEMONAID	Diabetes medications, blood pressure medications, and other chronic condition treatments.
SEXUAL HEALTH	YO, LEMONAID, GoodFi, BLINK-HEALTH, hers, RORY	Erectile dysfunction medications, birth control, and other sexual health treatments.
DERMATOLOGY*	alpha, Curology, GoodFi, hers, Dear Brightly, Apostrophe	Acne treatments, hair loss treatments, and other dermatology treatments.
HAIR LOSS/EYELASH GROWTH	YO, LEMONAID, hers, Keeps, BLINK-HEALTH, GoodFi, hers, RORY	Minoxidil, prostaglandin analogs, and other hair loss treatments.
MICRAINES	COVE	Acute migraine treatments and other migraine medications.

DIGITAL HEALTH IS ALREADY HERE...



Choice

Digital Care Solution

Xealth enables healthcare teams to order digital content and services as easily as they do medications today. Patients can then access these digital health tools from the provider's portal, so that they can actively manage their health.



Centralize

Activate all digital tools from one location to easily manage and change assets



Order

Easily order relevant digital tools from existing clinical workflow



Deliver

Send orders directly to patient via email and patient portal



Analyze

Measure utilization and impact across all digital health programs



Monitor

Quickly access data and usage for an individual patient, or across all solutions



xealth

APP-BASED DIGITAL HEALTH



COACHED PERSONAL CHRONIC DISEASE MANAGEMENT

Livongo for Diabetes Program Reduced Medical Spending by 22% for Members, Study Finds

by Fred Pennic 05/10/2019 2 Comments



Weight Management

Connected smart scale, automatic weight and steps tracking, food logging, healthy habits challenges, expert coaching

5.5%

Year 1 average weight loss

Diabetes

Connected blood glucose meter, unlimited strips, personalized insights, 24/7 expert support, shareable reports, custom alerts

0.8_{pt}

average HbA1c reduction

Hypertension

Connected blood pressure monitor, personalized insights, shareable reports, expert coaching

10mmHg

average systolic blood pressure reduction

Behavioral Health

Evidence-based support including interactive programs, tracking tools, and coaches

55%

of Members on average achieve clinical improvement

THE “NEXT-LEVEL” SMART HOME FOR OLDER ADULTS

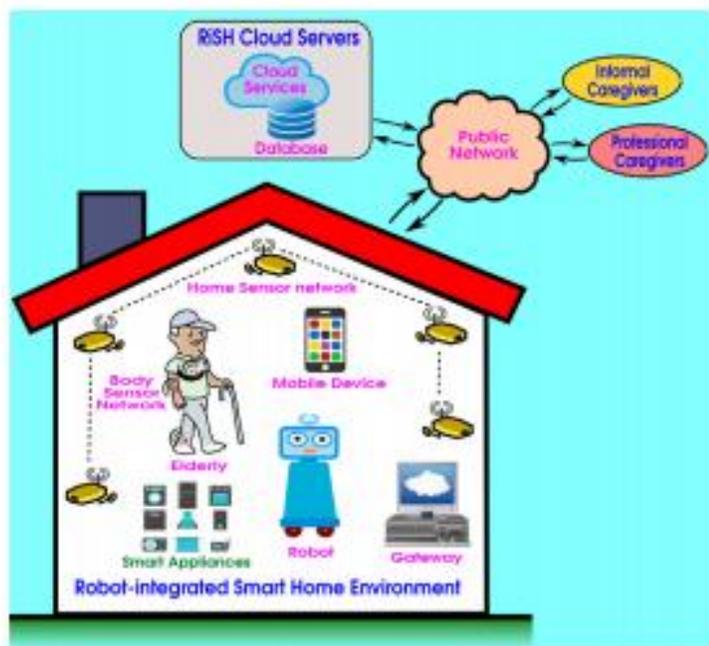
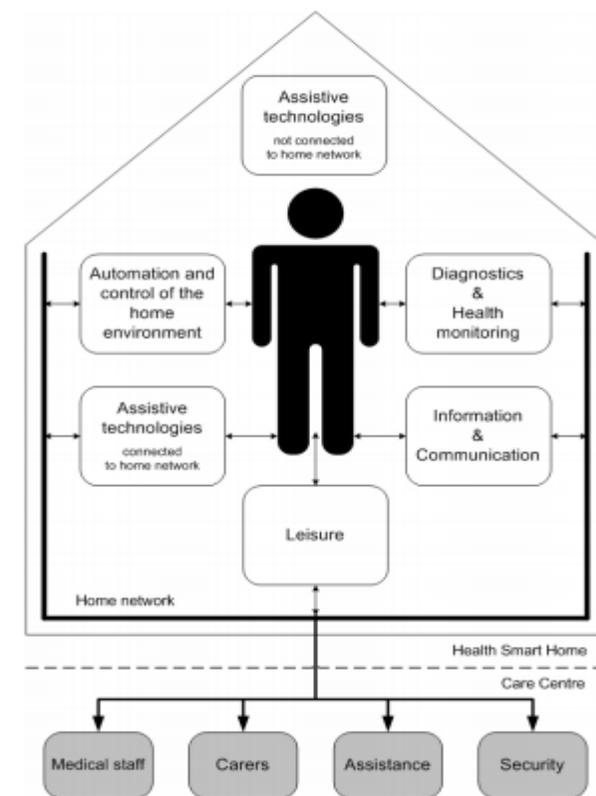


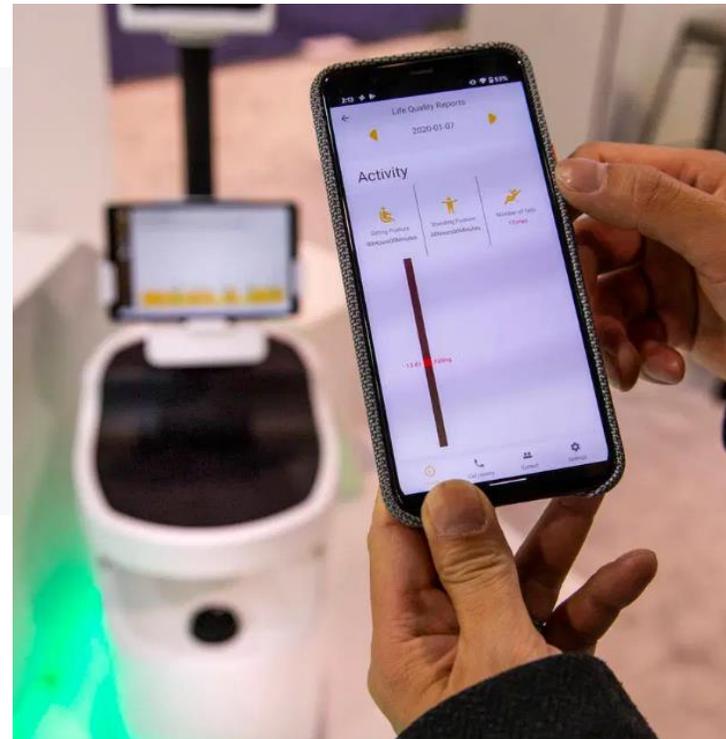
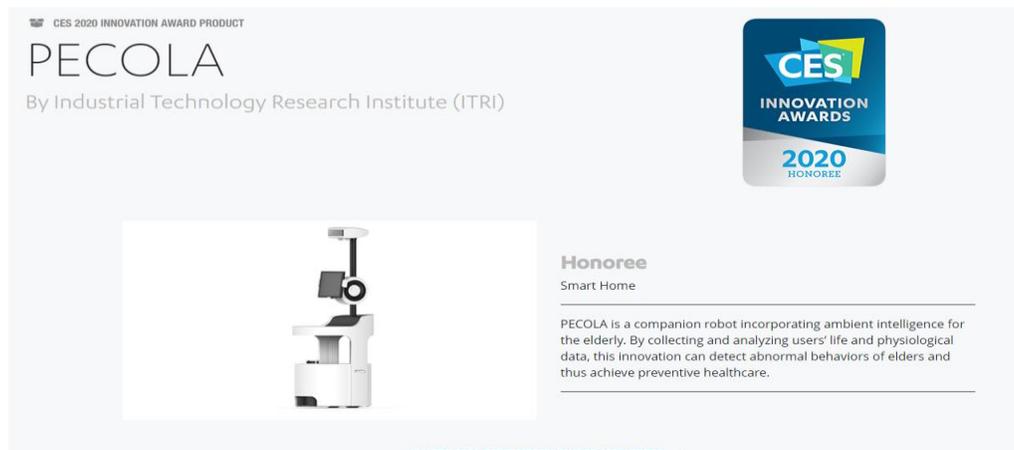
Fig. 1. The overall concept of the RiSH for elderly care.

Do HM, Pham M, Sheng W et al. RiSH: A robot-integrated smart home for elderly care. *Robotics and Autonomous Systems*. 2018;101:74-91.

F. van Dijken, J. van Hoof, H.S.M. Kort(2006) Healthy buildings for older adults. In: E. de Oliveira Fernandes, M. Gameiro da Silva, J. Rosado Pinto (eds.) HB2006: Proceedings of the 8th International Conference Healthy Buildings, 4-8 juni, Lissabon, Portugal. Volume III, pp 127-130. ISBN 989-95067-1-0



NOT AN EPISODE FROM STAR TREK...ROBOTS ARE IN USE...



- Uses ambient Intelligence Technology to collect daily life and physiological data and analyzes lifestyle, sleep, diet, and physical activities as well as emotions with a high degree of specificity
- WiFi Sleep Apnea Detection System
- Compiles and sends information to family members to help spark topics for discussion and bolster communication between them

- Uses image recognition to record changes in food portion and carry out **diet analysis to understand the individual's food intake**
- **Utilizes deep learning technology to detect fall incidents - once a fall is detected, the robot immediately calls the individual's family members to initiate a video session for home safety**

REMOTE NEURODEGENERATIVE DISEASE MONITORING VIA ARTIFICIAL INTELLIGENCE

Remote Parkinson Monitoring:

- nQMedical has created an AI-based neuroQWERTY software, which is designed to monitor brain health and Parkinson's disease progression
- Measures how fast a person is typing on a smart device and how much pressure they apply to each key

FDA Grants Breakthrough Device Designation for nQ Medical's neuroQWERTY

FEBRUARY 11, 2020 BY CHARLOTTE BAKER IN NEWS.



- Can be used with any keyboard, tablet or smart phone
- Round-the-clock monitoring of disease progression and treatment effectiveness without going to the clinic
- Artificial intelligence method called machine learning can detect small changes in the typing movements, which it can associate with different diseases such as Parkinson's
- Significant improvement from the current standard of care where patients see movement disorder specialists only once or twice a year
- More trials are planned in mild cognitive impairment, amyotrophic lateral sclerosis multiple sclerosis, and concussion (mTBI, or mild traumatic brain injury)

Matarazzo M, Arroyo-Gallego T, Montero P, et al. Remote Monitoring of Treatment Response in Parkinson's Disease: The Habit of Typing on a Computer. *Mov Disord.* 2019;34(10):1488–1495. <https://parkinsonsnewstoday.com/2020/02/11/nq-medical-neuroqwerty-fda-breakthrough-device-designation/>. Accessed on December 24, 2020.

LOCAL INNOVATIVE WORK IN DIGITAL THERAPEUTICS: DELIVERING WEB AND APP-BASED CARE TO PD PATIENTS



Ray Dorsey, M.D., M.B.A., URMIC

July 2018

Using Smartphones and Machine Learning to Quantify Parkinson Disease Severity The Mobile Parkinson Disease Score

Andong Zhan, MS¹; Srihari Mohan¹; Christopher Tarolli, MD^{2,3}; Ruth B. Schneider, MD²; Jamie L. Adams, MD^{2,3}; Saloni Sharma, MD³; Molly J. Elson, BA³; Kelsey L. Spear, MPH³; Alistair M. Glidden, BS³; Max A. Little, PhD⁴; Andreas Terzis, PhD¹; E. Ray Dorsey, MD^{2,3}; Suchi Saria, PhD^{1,5,6}

[» Author Affiliations](#)

JAMA Neurol. 2018;75(7):876-880. doi:10.1001/jamaneurol.2018.0809

LOCAL INNOVATIVE WORK IN DIGITAL THERAPEUTICS

Current UR Health Lab Projects

“Data science will give us a much better understanding of how we can help the people in our community—and yours—live healthier lives.”

—Danny Wegman

President and Chairman of the Board of the Wegman Family Charitable Foundation,
University Trustee, and honorary chair of the Medical Center Campaign.

The Foundation committed a transformational gift to the University’s new Institute for Data Science.



- UR VOICE 2.0 – Judy Baumhauer, URMFG (Patient-reported outcomes)
- George Mobile App - Ray Dorsey, CHeT (Huntington’s)
- cCBT Mobile App - Michael Hasselberg, Psychiatry + Computer Science + Eastman School (Anxiety)
- TurboTPN - William Maniscalco, Pediatrics + Pharmacy (Hyperal)
- Bone Age Prediction – Jim Sanders, Orthopaedics (Bone Age)
- Osteoporosis Prediction – Warren Hammert, Orthopaedics (Osteoporosis)
- Tendon Scar Tissue Segmentation – Alayna Loiselle, Orthopaedics
- Word Count Analysis – Ray Dorsey, CHeT (Alzheimer’s)
- SNF Prediction – Tom Myers, Orthopaedics (Total Joint Replacements)
- Cone Beam CT Project – David Waldman, Imaging Sciences + Computer Science

VIRTUAL REALITY TECHNOLOGY AND OLDER ADULTS

Rendever offers the most expansive library of experiences, features, and customization options - including through the involvement of family members.



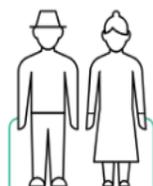
Relive

Customized [reminiscence therapy](#) tools allow your residents to take a stroll down memory lane by revisiting their childhood home, wedding location or anywhere else from their past.



Reinspire

Provide opportunities for residents to virtually leave the four walls of their community to [check off bucket list items](#) and engage with the world in ways they never thought possible.



Reconnect

Create [new friendships](#) through the power of shared experience, all while providing unforgettable moments and stories that residents and their families will remember forever.



Syed-Abdul S, Malwade S, Nursetyo AA, et al. Virtual reality among the elderly: a usefulness and acceptance study from Taiwan. BMC Geriatr. 2019;19(1):223.

<https://www.ageinplacetech.com/blog/five-vr-offerings-older-adults-and-patients-2017>

<https://rendever.com/>

FALL DETECTION USING WEARABLES



- If Apple Watch Series 4 or later detects a hard fall while you're wearing your watch, it taps you on the wrist, sounds an alarm, and displays an alert
- You can choose to contact emergency services or dismiss the alert by pressing the Digital Crown, tapping Close in the upper-left corner, or tapping "I'm OK"
- If your Apple Watch detects that you're moving, it waits for you to respond to the alert and won't automatically call emergency services
- If your watch detects that you have been immobile for about a minute, it will make the call automatically
- After the call ends, your watch sends a message to your emergency contacts with your location letting them know that your watch detected a hard fall and dialed emergency services. Your watch gets your emergency contacts from your Medical ID

ROBOTICS - ELLIQ

Pros:

- Voice-controlled tabletop assistant that encourages a more healthy, active lifestyle
- Specially designed with older adults in mind
- Suggests various activities, entertains, and assists users in managing and improving their health and wellness
- Just needs a power source and WiFi connection



Conversation



Health reminders



Music streaming



Curated videos



Wellness



Morning motivation



News, sports, and weather



Cognitive games



Calendar appointments



Interesting facts

This Robot Will Keep Your Grandparents Company When You're Too Busy

ElliQ will tell an older adult to take their medicine, or go for a walk, or call their loved ones.



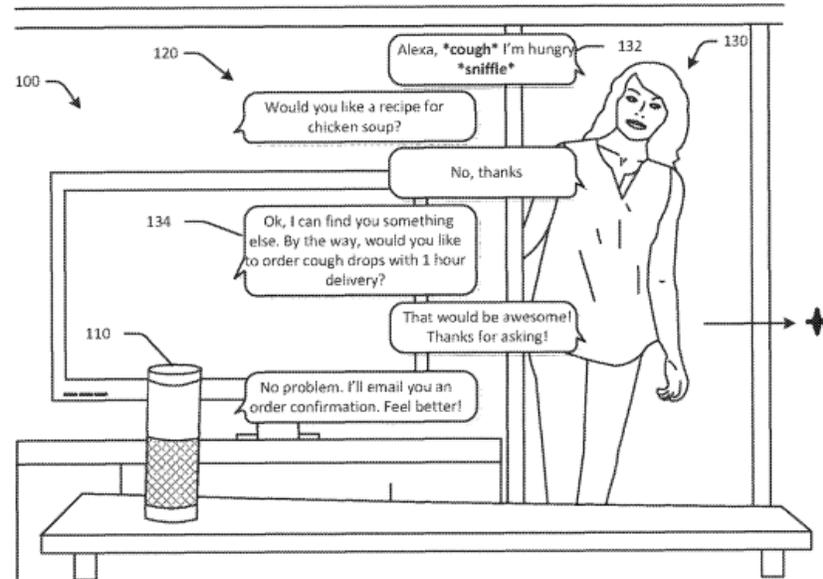
Cons:

Expensive - \$1,499 initial cost; \$35-\$50/mo, subscription thereafter depending on tier of service chosen
Still has some kinks in it – under beta testing

<https://www.fastcompany.com/40564323/this-tiny-robot-will-keep-your-grandparents-company-for-you>

<https://elliq.com/>

SMART HOME AND VOICE-ASSISTANT PROGRAMS



Credit: Amazon

Amazon's Patent – Alexa detects illness based on patient's verbal cues and recommend possible treatment



<https://www.apple.com/homepod/>

https://store.google.com/us/magazine/compare_nest_speakers_displays?srp=/us/product/google_home

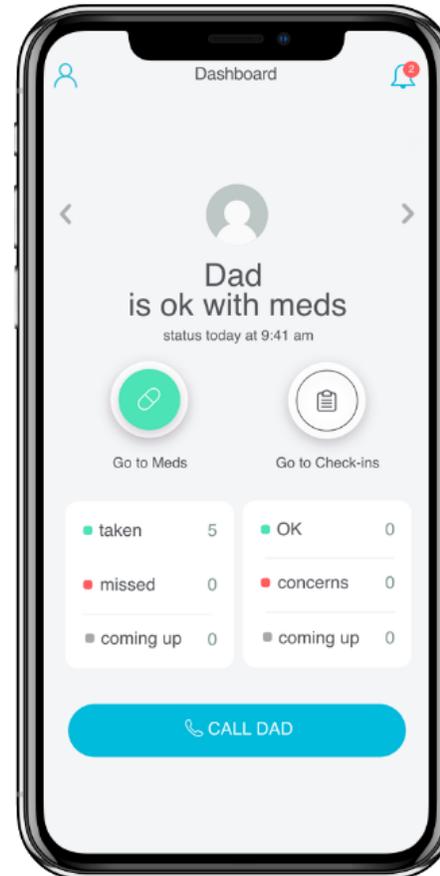
<https://thenextweb.com/artificial-intelligence/2018/10/15/amazons-new-patent-will-allow-alexa-to-detect-your-illness/>

<http://patft.uspto.gov/netacgi/nph->

Parser?Sect1=PTO2&Sect2=HITOFF&u=%2Fnetacgi/nph-PTO%2Fsearchadv.htm&r=1&p=1&f=G&l=50&d=PTXT&S1=(Amazon.AANM.+AND+voice.TI.)&OS=aanm/(Amazon)+AND+ttl/(voice)&RS=(AANM/Amazon+AND+TTL/voice)

SMART PILL DISPENSERS - PRIA®

- Facial recognition or PIN code verification
- Medication reminders
- Daily check ins
- Dosage control
- Voice activated feature allows users to easily interact with the device to set up reminders and alerts
- Caregivers can check in on taken and missed doses from the mobile app and connect with loved ones through two way video calling or the drop in feature
- **Cost: \$299.99 + \$9.99/mo subscription**



SMART PILL DISPENSERS - HERO



- Use the Hero app to program any pill regimen, simple or complex
- stores, sorts and dispenses up to a 90-day's supply of 10 different medications
- Manage both scheduled doses and medications taken as needed
- Push button for auto sort and dispense when Hero alerts you it's pill time

Visual & Audible Notifications	✓
Caregiver Notifications	✓
Automatic Adherence Tracking	✓
Lifetime Warranty	✓
24/7 Human Support	✓

SMART PILL DISPENSERS - MEDACUBE



Co-founded by Michel J. Berg, MD
URMC

- No App – cloud-based tracking and notification
- Stores, sorts and dispenses up to a 90-day's supply of 16 different medications
- Manage both scheduled doses and medications taken as needed
- Push notifications

Visual & Audible Notifications	✓
Caregiver Notifications	✓
Automatic Adherence Tracking	✓
Lifetime Warranty	No – 1 year only
24/7 Human Support	No

MEDICATION DISPENSER COMPARISON

Company	Doses	Upfront Cost	Monthly Fee
MedaCube	Up to 20x/day	\$1,399 (New) \$1,199 (Refurbished)	\$0
Pria	No limit	\$299.99	\$9.99
Hero	Up to 10x/day	\$99	\$29.99
Philips	Up to 6x/day	\$0	\$59.95
Livi	Up to 24x/day	\$49	\$99

EFFECTIVENESS OF SMART HOME DISPENSING SYSTEMS

- Small studies to date
- Rantanen et al: 2-phase study –
- Methods:
 - Phase I aimed to verify under controlled conditions in a single nursing home (n = 17 patients) that no robotic malfunctions would hinder the device's safe use
 - Phase II involved home-care patients from 3 sites (n = 27) who were on long-term medication
 - On-time dispensing and missed doses were recorded by the robotic system
 - Patients' and nurses' experiences were assessed with structured interviews

EFFECTIVENESS OF SMART HOME DISPENSING SYSTEMS

- Findings:
 - The 17 nursing home patients had 457 total days using the device (Phase I; mean, 26.9 per patient)
 - On-time sachet retrieval occurred with 97.7% of the alerts, and no medication doses were missed.
 - At baseline, Phase II home-dwelling patients reported difficulty remembering to take their medicines (23%), and 18% missed at least 2 doses per week
 - Most Phase II patients (78%) lived alone
 - The device delivered and patients retrieved medicine sachets for 99% of the alerts
 - All patients and 96% of nurses reported the device was easy to use

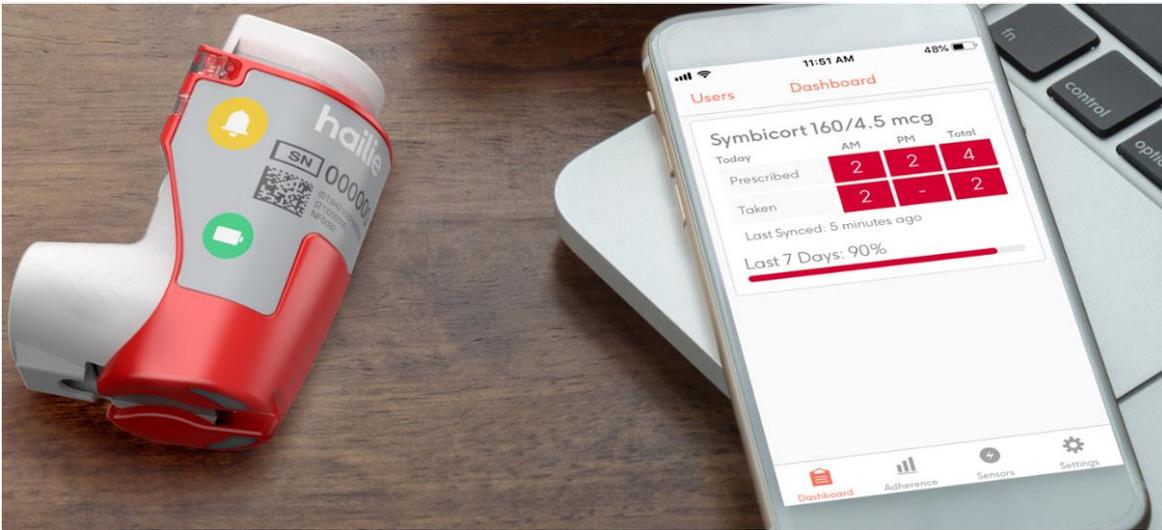
BIOINGESTIBLE SENSORS

- Novel pharmaceutical tech: oral drugs embedded with small sensors that when dissolved, send an alert to the patient/caregiver/provider that the medication was taken
 - **Pros:**
 - Theoretically can track adherence with 100% accuracy (but does it, really?? – see con below)
 - Can also track other data, such as temperature, Heart Rate, Blood Pressure, etc
 - **Cons:**
 - \$\$\$ - Does cost justify use? (Abilify MyCite is priced at **\$1,650**, while generic Abilify costs \$20)
 - Technology starts getting involved – requires patch to detect when the sensor dissolves
 - What if the patient throws the drug into the toilet and flushes it???
- Approved Drug: Abilify MyCite
 - 30 other drugs in pipeline

SMART INHALERS

- Sensors add-ons to detect actuation
- Market is moving towards inhalers manufactured with built-in sensors
- Can detect inhalation inspiratory flow
- Almost all commercially available inhalers have sensors available for use

SMART INHALERS



Cloud-based platform which captures medication use data from FDA-cleared Bluetooth[®] enabled sensors which wrap around patient inhalers and provide real-time feedback to patients via the Hailie[®] app and to their physicians via the Hailie[®] portal

Specific Remote Patient Monitoring and Telehealth reimbursement codes offering a path to payment for physicians, accelerated by the challenges presented as a result of the COVID-19 pandemic

<https://www.adherium.com/>

SMART INHALERS



ProAir® Digihaler®
(albuterol sulfate) inhalation powder

From using your inhaler to using the information

Each inhaler connects to your Digihaler app using Bluetooth® wireless technology



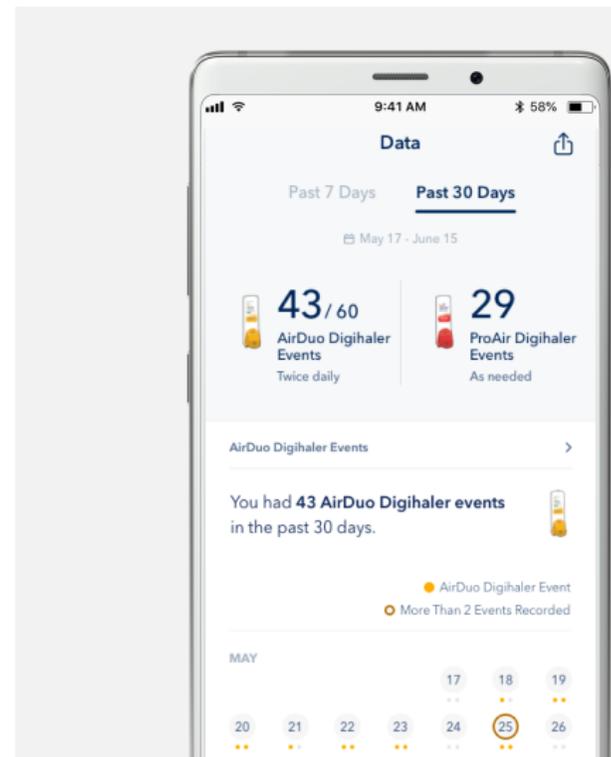
When information is collected, it's sent to your Digihaler app



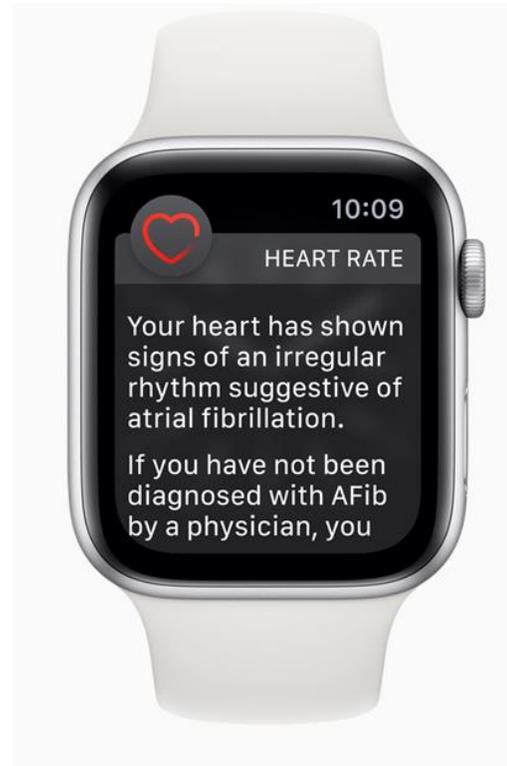
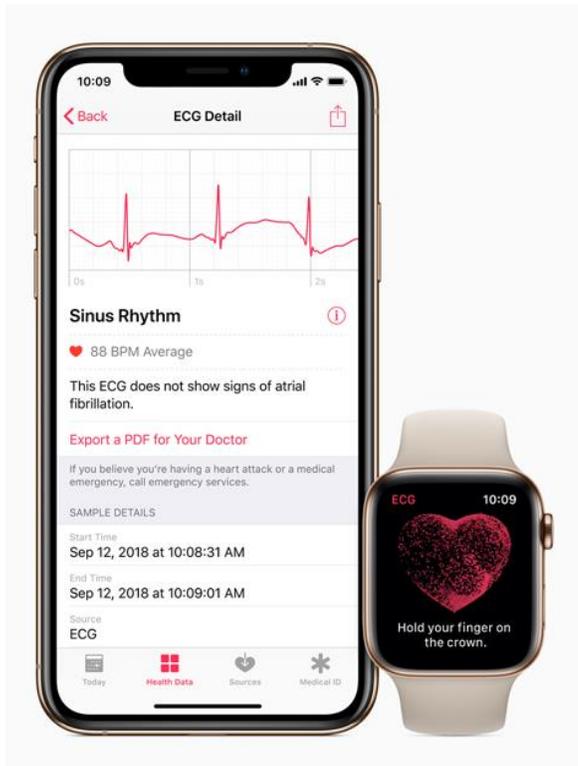
You get reports that help you see how you're using your inhaler



You can choose to share this information with your doctor digitally or at in-person visits



CARDIAC AND CONTINUOUS GLUCOSE MONITORING



GLUCOSE MONITORING

- Makes personalized insulin dosing recommendations based on BG checks and glycemic status
- Gives explanations for specific dose recommendations
- Tracks BGs and automatically sends data to provider so they can oversee and adjust Tx accordingly



- Remote patient coaching/counseling
- Quick data collection
- Continuous support

DIGITAL THERAPEUTICS

- What is the Digital Therapeutics Alliance?
 - Founded in 2017, the Digital Therapeutics Alliance is a non-profit trade association of industry leaders and stakeholders engaged in the evidence-driven advancement of digital therapeutics
 - DTA maintains an international industry focus and is headquartered in the United States

Mission:

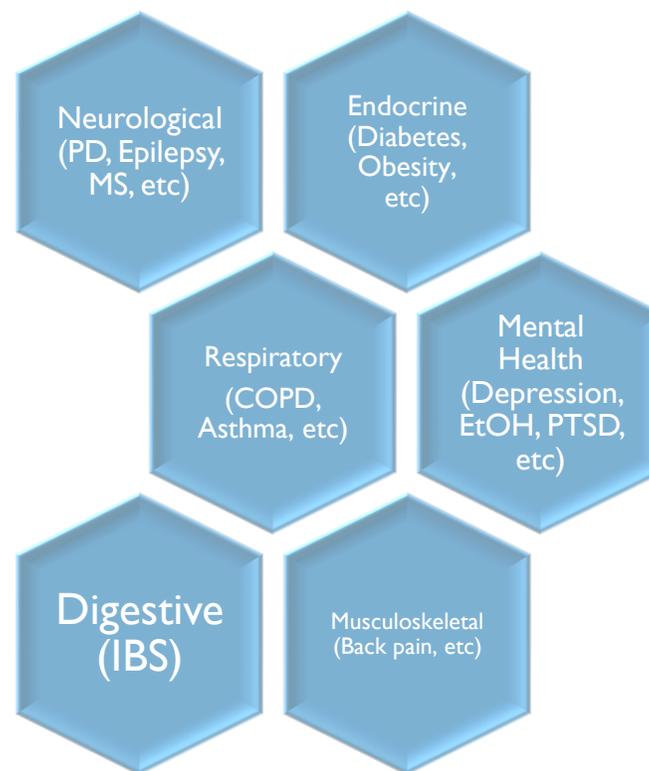
- Seeks to broaden the understanding, adoption, and integration of clinically-evaluated digital therapeutics into healthcare through education, advocacy, and research

Vision:

- Work to enable expanded access to high quality, evidence-based digital therapeutics for patients, healthcare providers, and payers in order to improve clinical and health economic outcomes

DIGITAL THERAPEUTICS - THERAPEUTIC AREAS COVERED

- Digital therapeutics (DTx) deliver clinical-grade therapeutic interventions to patients
- DTx products may be used independently or in tandem with in-person or **remote clinician-delivered therapy** to optimize patient outcomes



- Increase remote access to therapies that are clinically demonstrated as safe and effective
- Provide care independent of a patient's schedule and in the privacy and safety of their home environment
- Are easily scalable and often accessible through patient-owned devices (e.g., smartphones, tablets)
- Generate actionable, real world insights that enable intelligent data-driven care management and clinical decision making

EXAMPLE OF DTX PLATFORM – OPIOID & SUBSTANCE ABUSE



- **For individuals with opioid use disorder,** reSET-O® is the only FDA-authorized prescription digital therapeutic that's proven to help patients stay in treatment longer
- Patients prescribed reSET-O download it to their phone for secure, discreet, convenient access to therapy, interactive learning, and support

- **For individuals with substance use disorder,** reSET® is the first FDA-authorized prescription digital therapeutic that's proven to increase abstinence and treatment retention
- Patients prescribed reSET download it to their phone for secure, discreet, convenient access to therapy, interactive learning, and support
- Lets patients practice what they've been taught anytime, anywhere, and report daily triggers, cravings, and substance use—so they feel more engaged and supported between appointments



Experience FDA-authorized prescription digital therapeutics.

Support outpatient therapy using clinically-proven, evidence-based techniques such as cognitive behavioral therapy, contingency management, and fluency training.^{2,4}

[SEE THE EVIDENCE](#)

www.Resetforrecovery.com

LEVERAGING TECHNOLOGY TO MANAGE COVID-19



Sensors or wristbands applied to identify changes in a patient's condition



May help detect ill patients early, evaluate any progression in severity, and monitor spread of disease



Many work with currently available apps or software



Some may help with contact tracing in a facility with staff and residents



Reduces clinician exposures



Some Evidence of success in other infections 2020 study evaluated 47,000 Fitbit users over 2 years and detected a cluster of influenza-like illnesses correlated with increased heart rate



COVID Alert NY 17+
Stop COVID Spread in NY
[New York State Department of Health](#)

★★★★★ 4.7 • 513 Ratings

Free

Wearable Technology to Identify Patients Early

WEARABLE TECHNOLOGY TO IDENTIFY PATIENTS EARLY

Pulse often elevated hours or days before symptoms appear



Heart Rate

Detection of subtle changes in pattern of breathing may indicate progression to more severe illness. Increases in respiratory rate is not as common in other viral illnesses



Respiratory Rate

Uses light to measure changes which may indicate more severe infection or inflammatory response



Blood Volume



Oxygen Saturation

May indicate need for higher level of care

Arrhythmias cited as one of the leading complications of COVID-19

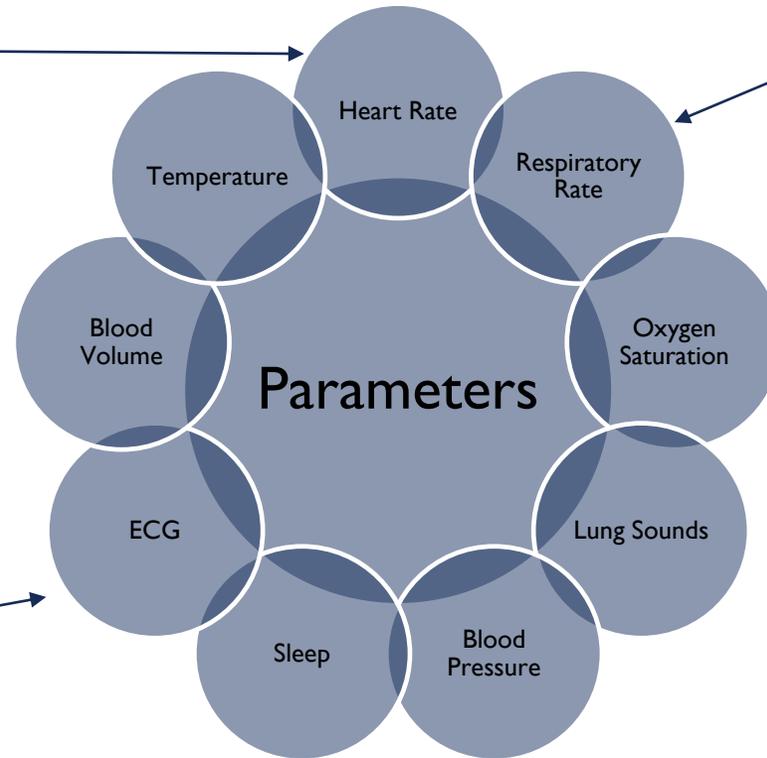


ECG

Lung Sounds

Sleep

Blood Pressure



OTHER FDA APPROVED REMOTE PATIENT MONITORING DEVICES

	Design	Heart Rate	Respiratory Rate	Temperature	O ₂ Sat	ECG	Activity	Other
Apple Watch Series	Wrist Watch	+				+	+	
BioBeat	Wrist Monitor Chest Patch	+	+	+	+	+		Blood Pressure
BioIntellisense	Epidermal Patch	+	+	+				Coughing Sneezing
Empactica Embrace	Wrist Monitor	+		+	+			Early Detection Algorithm for Virus
Equival LifeMonitor	Chest Belt	+	+	+				
VivaLNK Fever Scout	Epidermal Patch			+				

Credit: Marilyn Novell Bulloch, Pharm.D.

Weizman Y, et al. Public Health. 2020;185:221-22; Seshadri DR et al. Front Digit Health.2020;doi:10.3389/fdgth.2020.00008 Food and Drug Administration. Available at: <https://www.fda.gov/medical-devices/coronavirus-disease-2019-covid-19-emergency-use-authorizations-medical-devices/remote-or-wearable-patient-monitoring-devices-euas>. Accessed December 23, 2020; Kim B. The Points Guy. (July 27, 2020). Available at: <https://thepointsguy.com/news/travelers-can-now-wear-a-button-to-avoid-government-quarantine-at-cayman-islands/> Accessed December 23, 2020.

FDA APPROVED OR EUA REMOTE PATIENT MONITORING DEVICES FOR COVID-19

BioButton™



- Coin-sized, FDA-approved disposable device
- Continuous measurement of temperature, heart rate, and respiratory rate for 90 days
- Sensors connect to app and monitor location as well as proximity and duration of contact with other devices

VitalPatch®

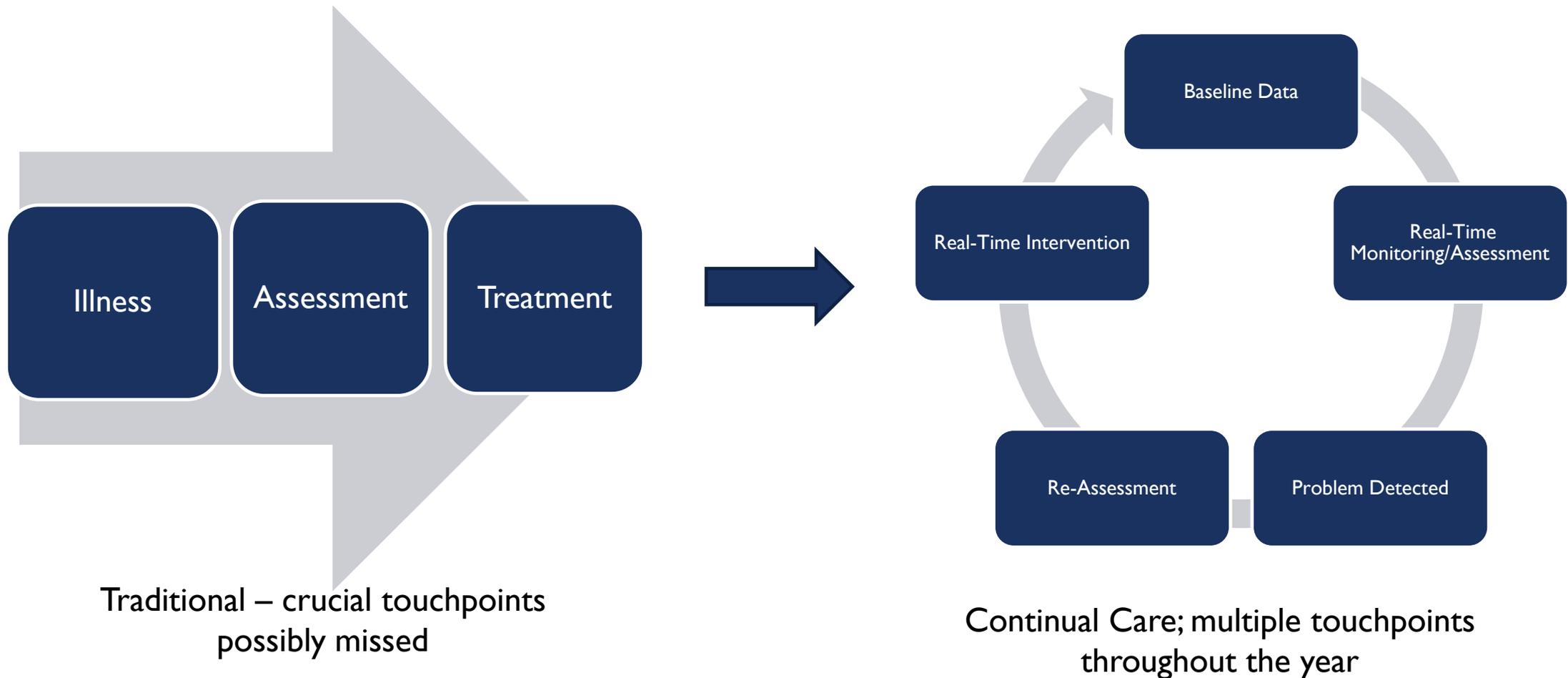
- Wireless biosensor worn on torso
- Continuous monitoring of vital signs, ECG, fall detection, activity/step count, and posture for up to 7 days
- Data transmitted to handheld mobile device that uploads data to a cloud which can be accessed via a software system
- Pacemakers may affect monitoring



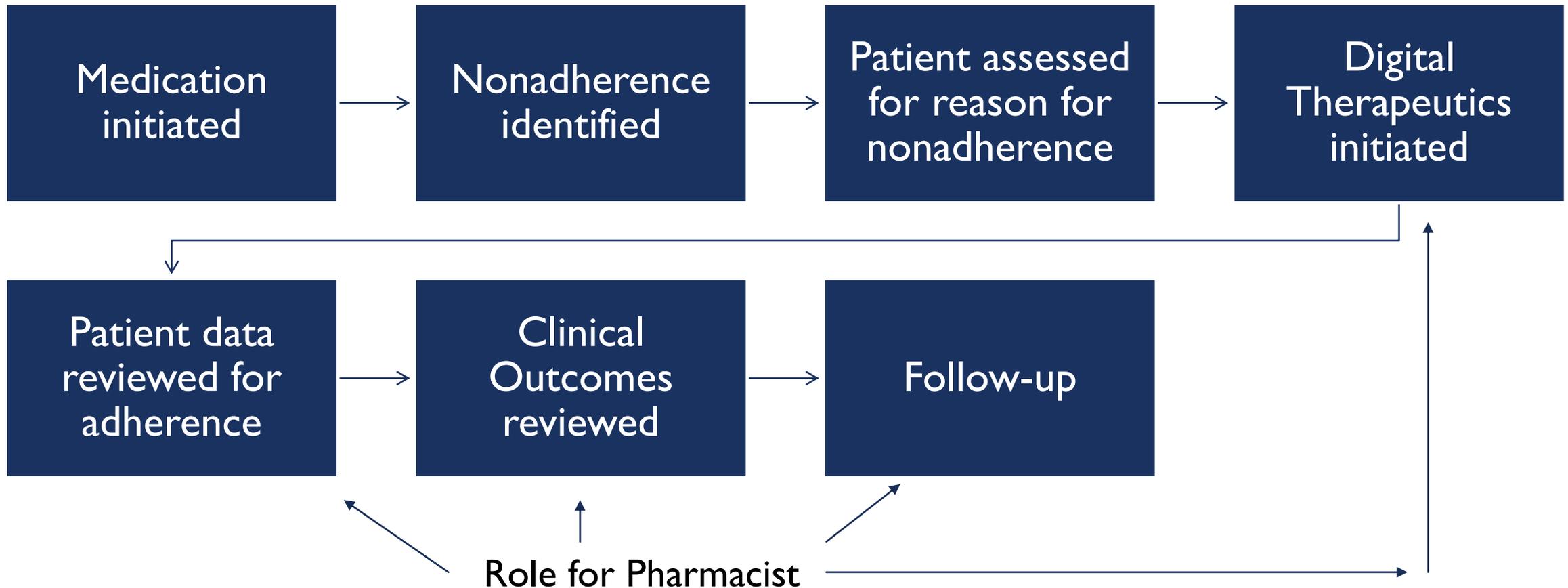
Credit: Marilyn Novell Bulloch, Pharm.D.

Weizman Y, et al. Public Health. 2020;185:221-22; Seshadri DR et al. Front Digit Health.2020;doi:10.3389/fdgth.2020.00008 Food and Drug Administration. Available at: <https://www.fda.gov/medical-devices/coronavirus-disease-2019-covid-19-emergency-use-authorizations-medical-devices/remote-or-wearable-patient-monitoring-devices-euas>. Accessed August 12, 2020; Kim B. The Points Guy. (July 27, 2020). Available at: <https://thepointsguy.com/news/travelers-can-now-wear-a-button-to-avoid-government-quarantine-at-cayman-islands/>. Accessed August 12, 2020.

BENEFITS OF DTX



IS THERE A ROLE FOR THE PHARMACIST IN DIGITAL THERAPEUTICS?



Ideal Role for Pharmacists

“Low” Risk Conditions

Examples: Self-Care: Eg., Colds, Coughs; Other self-limiting illnesses

Opportunities: Some opportunity for Collaborative Drug Therapy Management (CDTM)

Challenges: Direct-to-consumer marketing from companies will diminish role of pharmacists and providers

“Intermediate Risk”/Chronic Conditions

Examples: HTN, Hyperlipidemia DM/Wellness

Opportunities: CDTM -Telemedicine and digital health products! High scalability via artificial intelligence

Challenges: Startup/Tech Comp. have identified a highly profitable market share and are already moving very quickly into this area.

“High Risk” Conditions

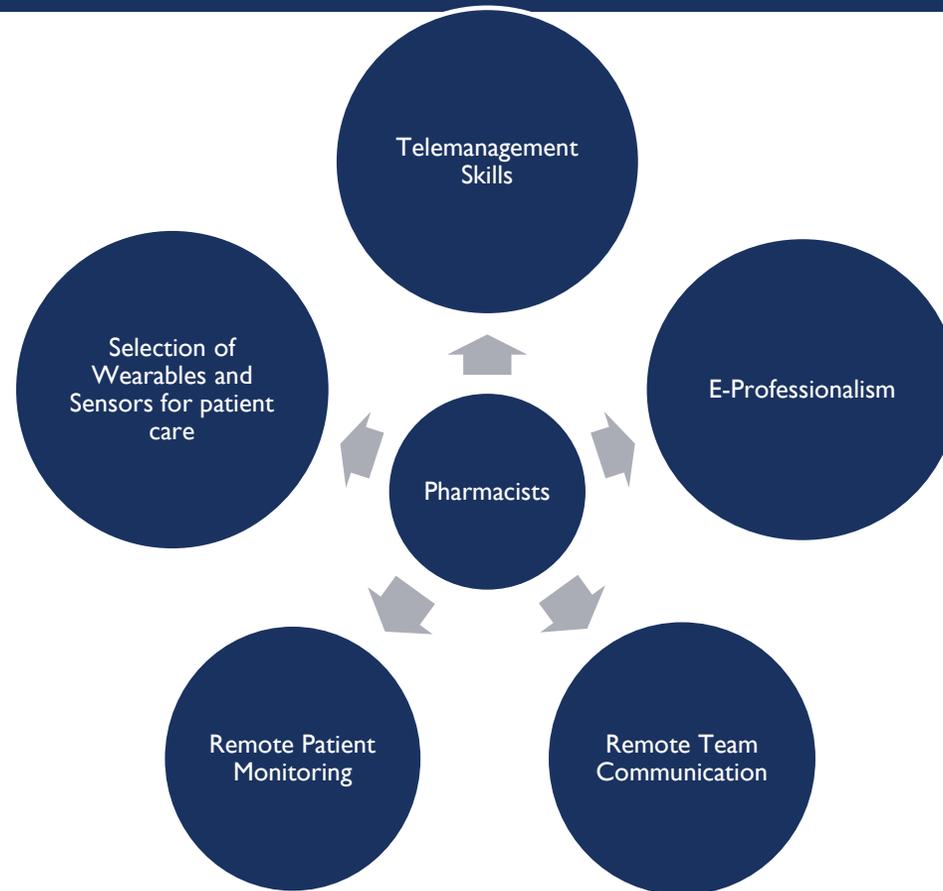
Examples: subspecialties - HIV, Oncology, Neurology, etc

Opportunities: Not currently

Challenges:

Current Practice/Convention: Specialists may likely retain oversight and follow-up with their patients (rightfully). But, there is definitely a place for PCPs/pharmacists to participate in post-acute care therapy management (e.g., sub-acute rehab)

REMOTE PATIENT CARE AND PHARMACISTS' ROLES DEFINED



Murry LT and Kennelty K. Opportunity for Pharmacists in Telehealth, Team-Based Care: Clinical Inertia. Telemedicine and e-Health. 2020. <https://doi.org/10.1089/tmj.2019.0242>

UNINTENDED CONSEQUENCES – WHAT ABOUT PATIENT PRIVACY?

- Facebook's machine learning algorithm to identify potentially suicidal individuals
- Sought to proactively address this serious problem following a string of suicides that were live-streamed on the platform
- But, following a wave of privacy scandals that brought Facebook's data-use into question, some major concerns were raised by privacy experts:
 - Idea of Facebook creating and storing actionable mental health data without user-consent
 - Can Facebook can be trusted to make and store inference about the most intimate details of our minds without consent?

Inside Facebook's suicide algorithm: Here's how the company uses artificial intelligence to predict your mental state from your posts

Benjamin Goggin Jan 6, 2019, 11:19 AM



Facebook automatically scores all posts in the US and select other countries on a scale from 0 to 1 for risk of imminent harm. Hollis Johnson/Business Insider

- Facebook is scanning nearly every post on the platform in an attempt to assess suicide risk.
- Facebook passes the information along to law enforcement for wellness checks.
- Privacy experts say Facebook's failure to get affirmative consent from users for the program presents privacy risks that could lead to exposure or worse.

<https://www.businessinsider.com/facebook-is-using-ai-to-try-to-predict-if-youre-suicidal-2018-12>

TAKE-AWAY POINTS

- Digital health and technology platforms have already started making inroads into older adult home care
- There are several products and service choices already available for integration into older adult home care and many more in the pipeline
- As with any technology and digital health product, we need to be aware of their benefits and limitations, and the practical/realistic implications of their use
- There is potential for pharmacists to be seamlessly integrated into digital home care – best fit may be in chronic disease management



Questions?