The Future of Wearables and Older Adults 2021

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EXECUTIVE SUMMARY

Older adults in 2021 are at the same point of awareness and adoption of wearables as was the case with Voice First technology in 2018. According to AARP's recent tech survey, most have not adopted wearables – and they may be particularly unfamiliar with those that capture and track health-related status. But that will change in the coming years as broad market acceptance drives interest among the 65+ population. Adoption will grow as the price points become more affordable; and most important, as the data from wearables becomes more actionable, informative, and predictive of future change.

Within five years, doctors will see benefits in guiding older adults to their usage. Chronic disease monitoring by consumers using wearables will see the most substantial growth. And stigma-free and lower cost hearables will provide customizable sound improvements to a far broader population than current hearing aids.

Predictive analytics approaches that incorporate Big Data plus personal information will enable insights about individual and general population wellbeing. Privacy concerns will be addressed with clearly described protections and well-understood permissions. Technology firms will examine ways to incorporate voice interfaces to get health status changes from a device in an ear, on a hand, or strapped to a wrist. The next generation of wearables will have reduced dependency on the wearer's smartphone, instead supporting remote configuration by caregivers and family.

As we try to keep up with advances, the next wave of technology is here, and we're wearing it. – Guidance for Wearable Health Solutions Consumer Technology Association – January 2020

WHO SHOULD READ THIS REPORT?

- Investors and funds that focus on consumer and medical wearables
- Healthcare providers
- Retail health care (pharmacy chains, technology retailers)
- Senior living organizations and professional home and health care companies
- Vendors within or considering the market of wearable technology and health
- Integrators and service providers helping enterprises deploy health offerings
- Technology platform providers (hardware, software)
- Telecommunication carriers supporting wearable interactions
- Retail health care (pharmacies, walk-in clinics)
- Retailers selling consumer wearable devices, smartphones, health technologies

ACKNOWLEDGEMENTS

Particular thanks to those interviewees (company links are on last page) who suggested ideas and made introductions to other interviewees – these include Jane Sarasohn-Kahn of THINK-Health, who also reviewed the document in detail; Rene Quashie of the Consumer Technology Association; Jessica Longly of CDW Healthcare; Kelly GoTo of GoTo Media; and finally Arthur and Daniel Jue of LiveFreely who offered the insightful quote on this page.

"Wearables will populate the broadband of healthcare – like Wi-Fi – connecting everyone. – Arthur and Daniel Jue, ***LiveFreely***

WEARABLES CAN CHANGE THE LIVES OF OLDER ADULTS

The Wearables Adoption Trend Is Driven by Fitness, Health

Wearables are nothing new – except in how they are used. The Quantified Self movement, coined as a term by two Wired Magazine writers in 2007, simply described the growing interest in tracking those personal characteristics that could be useful in managing health and wellbeing. From activity trackers that gained popularity in the past decade, to introduction of smartwatches by Apple in 2015, interest has exploded, and capabilities have blossomed.

Forecasts of purchases are rising. eMarketer forecast the numbers of adult users out to 2024 (see **Figure 1**), and IDC forecast growth in shipments of wearables out to 2024 (see **Figure 2**). According to one Apple Watch insider, at least 3-5 million Apple watches have been purchased by adults age 65+. Gartner's January 2021 forecast of $81.5 billion in growth was driven by increased consumer interest in tracking health status during the pandemic (on smartwatches) and the growth of remote work (purchases and upgrades to headphones and ear-warn devices).

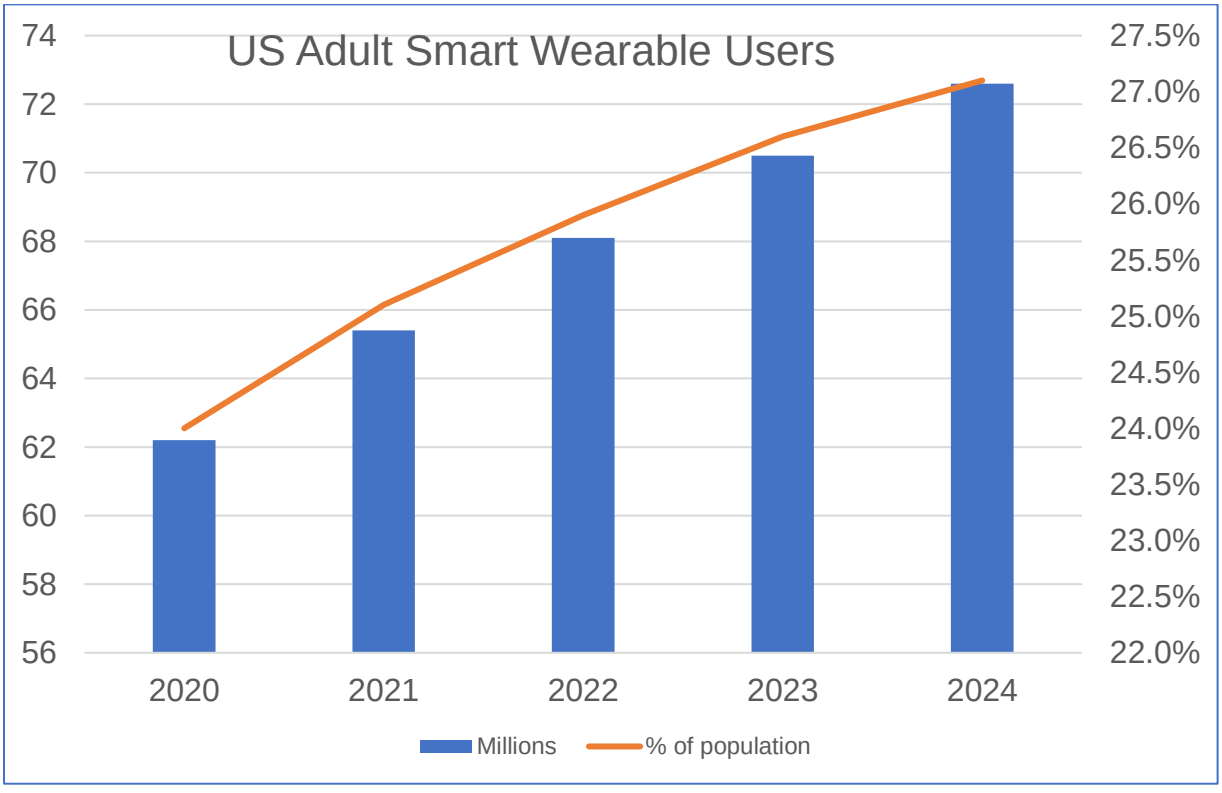


Figure 1 US Adult Smart Wearable Users 2020-2024 **Source: eMarketer**

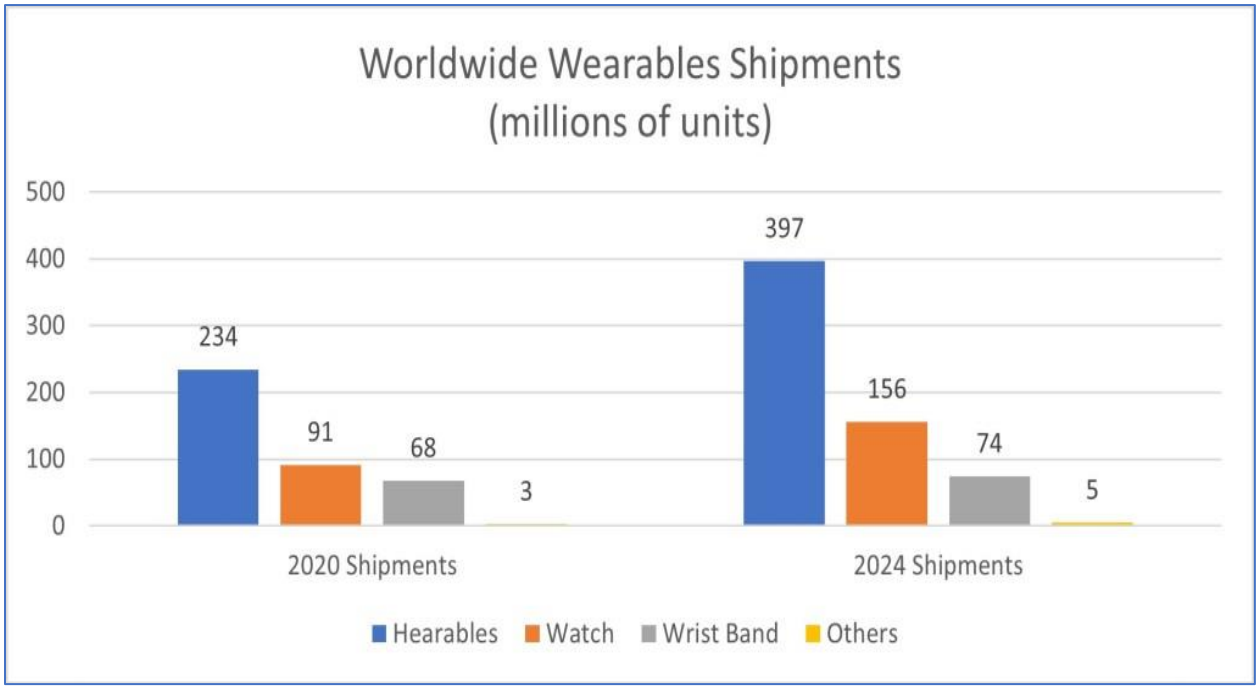


Figure 2 IDC shipment forecast of wearables in units to 2024

Views on the patient's role in their own medical care has changed. In 2013, Leroy Hood published a paper, "Systems Biology and P4 Medicine: Past, Present, and Future," which introduced the idea that patients had a role in their own care, saying that medicine should be 'predictive, preventive, personalized, and participatory.' That concept helps explain the growing interest in wearables as capable of assisting in all four attributes. And researchers are seeking new ways to use wearables to detect problems that may be unnoticed, as with impending stroke.

"Most people having a stroke do not recognize when it is happening and ignore the changes as unimportant. Our goal is to detect symptoms and alert." Sandra Saldana, **Alva Health**

Guidance is emerging suggesting may be important to track. Even before the Covid-19 pandemic, as of January, 2020, the Guidance for Wearable Health Solutions white paper noted that users of wearables are beginning to show preferences about what to track, specifically about tracking changes in blood pressure and other aspects of heart health.

"As physicians we represent 15% of the positive outcome. The rest is genetics and behavior change. To impact outcomes, that will only happen if we know who a person is. I predict that these wearables will become a walking medical device over time – and will change the practice of medicine." – Dr. Hon Pak, Chief Medical Officer, **Samsung Electronics**

Consumers have begun to indicate their preferences. Because individuals want to participate in their own health, they not only want to track, but also to share data with their doctor to help with a more accurate diagnosis. The Consumer Technology Association has been surveying consumers, noting that even in February of 2019, 58% of consumers were willing to share health

data with their doctor to gain a more accurate diagnosis and effective treatment. But wearable innovations are appearing daily – and can still outpace the ability of physicians to keep up. At 2020's CES event, responders identified specific areas of interest (see **Figure 3**).

What consumers wanted to track next (CES 2020)
55% Would like to monitor blood pressure, up from 46% in 2016
49% Would like to monitor heart health
33% Would like to monitor blood sugar levels
50% Would like to monitor stress, down from 55% in 2016
SOURCE: Consumer Technology Association 2020

Figure 3 What consumers wanted to track next as of January 2020

Health-tracking devices and usage grew in 2020. According to Rock Health, 66% of those who started using a wearable did so to manage a diagnosed health condition. And more than 51% of wearables owners use the device to manage a diagnosed health condition. Specific health attributes included weight, heart rate, blood pressure. It should be noted data was collected prior to the 2020 Covid-19 lockdowns (See **Figure 4**).

"Physicians can drive adoption, but they have their day jobs -- how do they know what works and what doesn't? Given the pace of technological change, we should be looking seriously at more comprehensive development of industry standards and perhaps accreditation for health technology to help properly guide clinicians. – Rene Quashie, VP, Policy and Regulatory Affairs, Digital Health, **Consumer Technology Association**

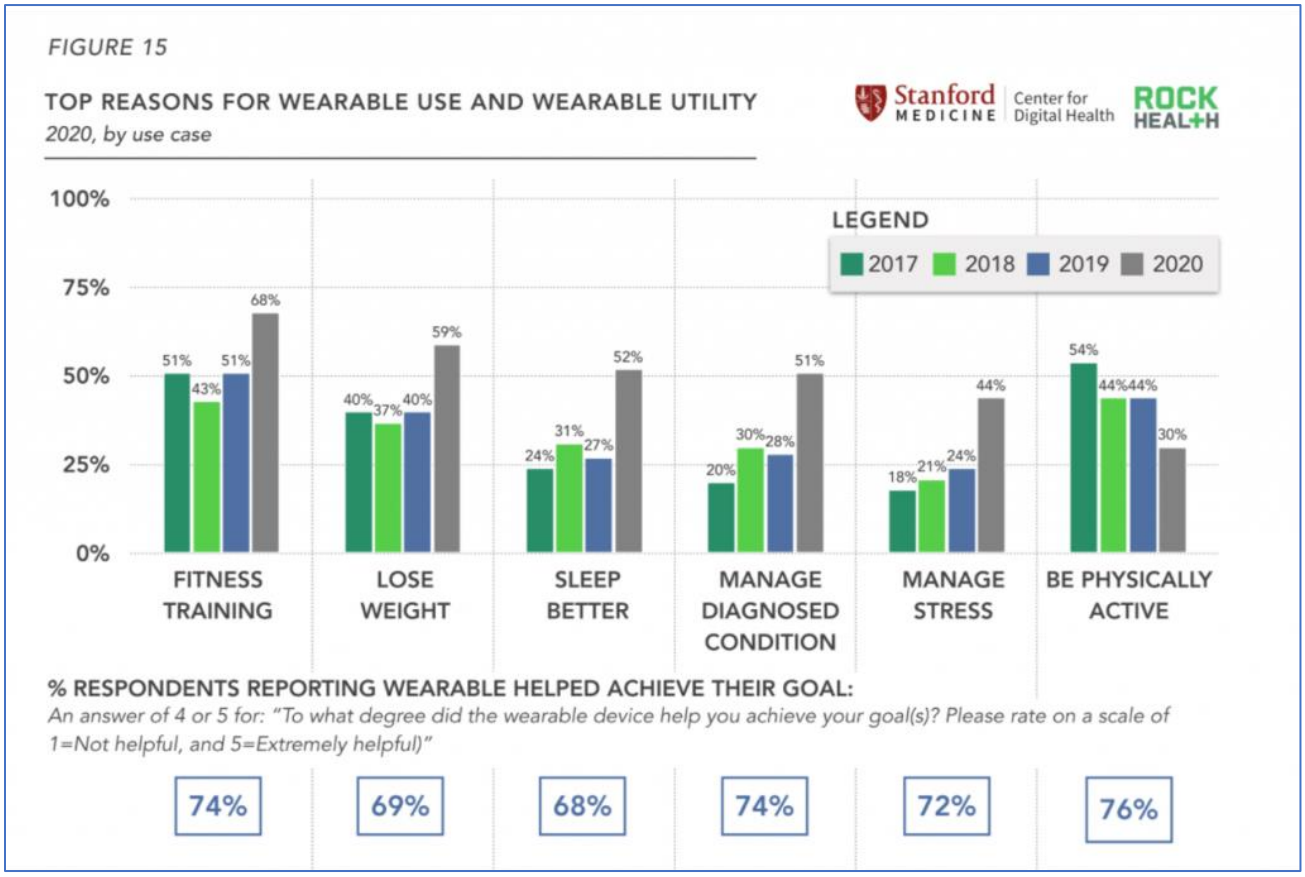
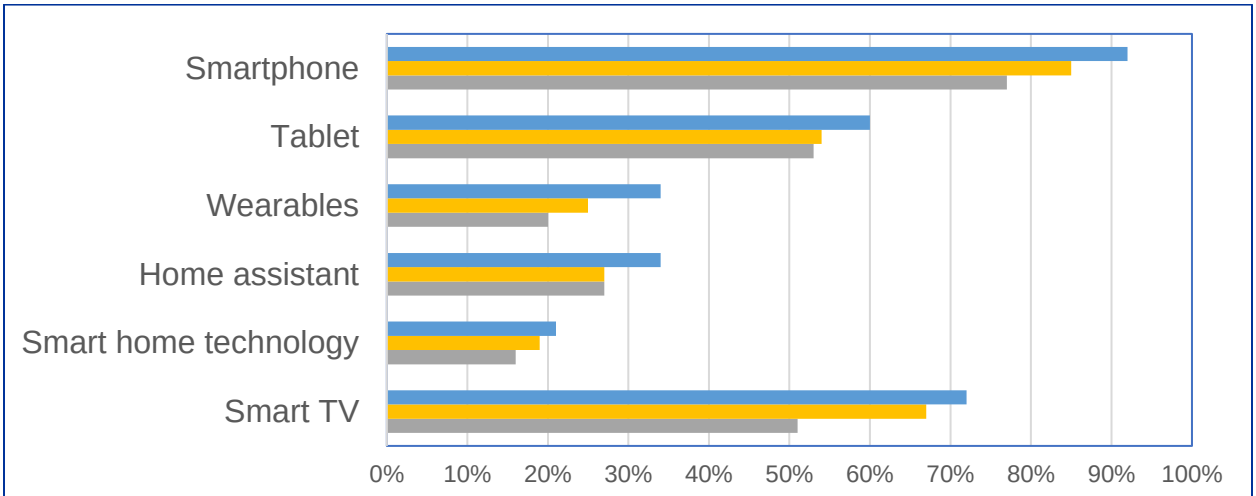


Figure 4 Reasons for Wearable Health Use **Source: Stanford, Rock Health**

"Wearables help establish a personalized baseline by getting validated signals as an early warning to seek other testing – such as cognition, hypertension, arrythmia, or atrial fibrillation."—Ryan Kraudel, VP Marketing, **Valencell**

What about older adults and their usage of wearables?

In 2019, HIMSS published a literature review about wearable technologies in medicine, observing from its research that medical-grade wearables had potential, but that it might be difficult to get seniors to wear them, perhaps due to lack of awareness. But just two years later, attitudes have changed. The smartwatch was legitimized as an alternative to the Personal Emergency Response Service (PERS) pendant on the day that Apple announced fall detection in 2018. And in fact, Apple dominates the smartwatch category, though Samsung and Fitbit are competitive and being recommended for seniors. And AARP's newest technology adoption report notes that 20% of the 70+ age range own a wearable. Also notable, considering that most wearables are still paired with them, smartphone ownership has risen most sharply among the 70+, with 77% of survey responders indicating they own one (See **Figure 5**).



	Smart TV	Smart home technology	Home assistant	Wearables	Tablet	Smartphone
50-59	72%	21%	34%	34%	60%	92%
60-69	67%	19%	27%	25%	54%	85%
70+	51%	16%	27%	20%	53%	77%

Figure 5 AARP Device Ownership 2021 by Age

Now women AND men are acquiring Apple watches. Initially it was a guy-thing – an Apple Watch was perceived to make one look cool. While Apple product purchases in 2015 were largely made by older men, by 2019, women liked them too – and nearly half of the watches are purchased by women. Though the absolute percentage is still low, older adults represented greatest growth, up 15% in 2019.

Gaining control of your own aging. The Apple Watch also was a pioneer in offering health-related information. Today health advice or guides is available on other products, like watches which can take blood pressure readings correlated with a cuff. And with some devices today, correlation is unnecessary. Wearables with actionable health information will increasingly appeal to the 80% of older adults who have at least one chronic condition (See **Figure 6**).

"A person used to walk 5 miles and now walks only one. Regardless of frailty level – people want to be in control of their own aging." – Jean Anne Booth, Founder, **UnaliWear**

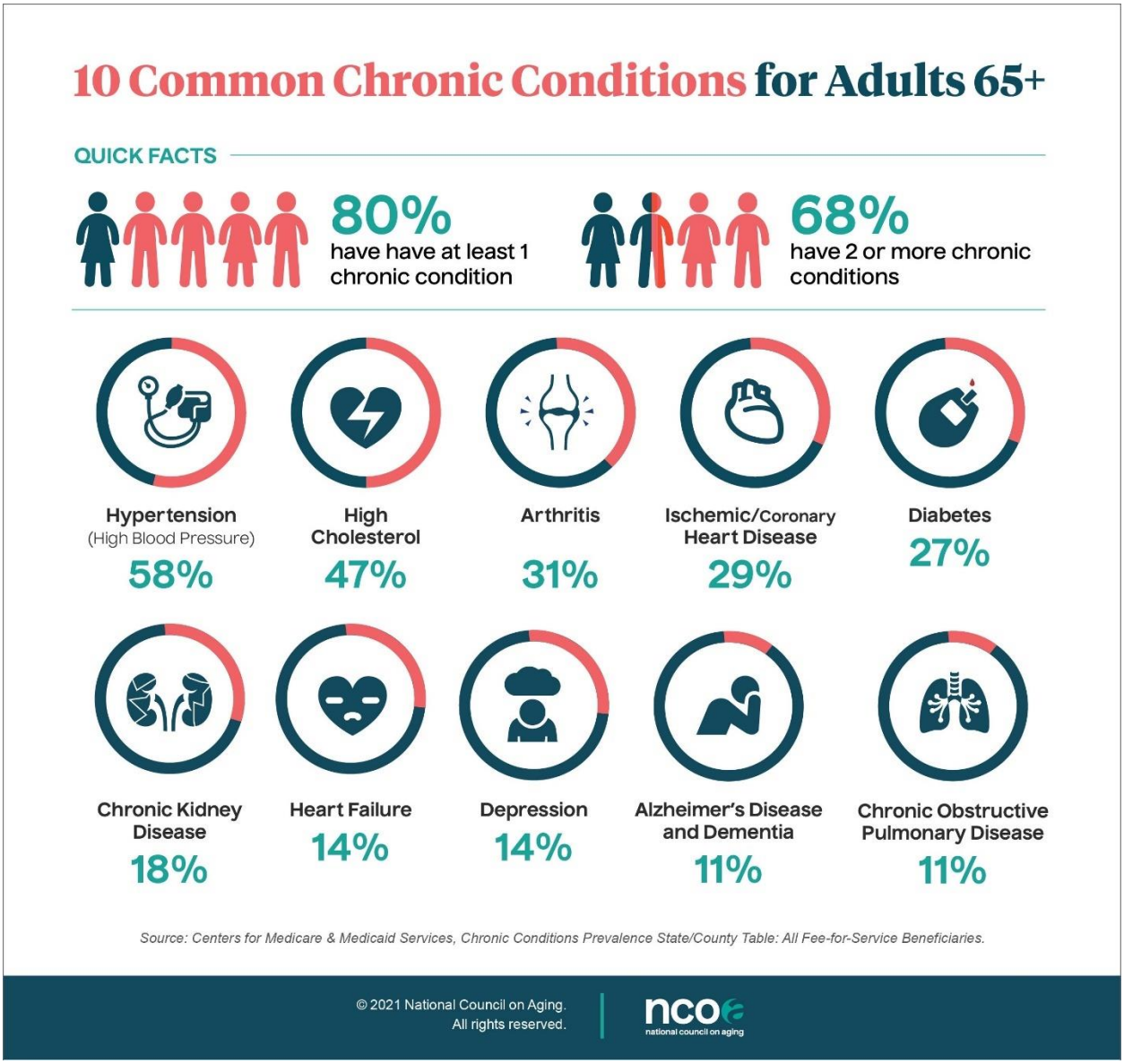


Figure 6 Ten Common chronic conditions for Adults Aged 65+ **Source: NCOA**

What trends made wearables for older adults viable now?

Not long ago, it would have been impossible to imagine the growing use of wearables overall, let alone by older adults. Specific market trends converged to enable the change, as:

Self-service hearables have made hearing improvements cool – and cheap. Just as the smartwatch disrupted the medical alert world, so too have hearables jostled the world of hearing aids. The amplification technology inside earbuds and Bluetooth headsets is much like that inside audiologist-fitted hearing aids. Firms like Nuheara and Bose have produced self-fitting hearables which are FDA-approved and can be bought online. And the overt style of ear-worn devices is popularizing hearables across a broad spectrum of users – Apple sold 100 million AirPods in 2020. And Alango combines a hearable with self-service or retail hearing tests to enable a person with loss to make their own smartphone-based adjustments. The big change is the price differential, a fraction of the price of an audiologist-prescribed single hearing aid device.

Becoming a 'Quantified Self' appeals to well-educated older adults, starting with fitness. From the days of the first clip-on Fitbits, enthusiasts emerged in 2007 that may have seemed odd at the time, declaring a new era of the 'Quantified Self'. Tracking every step and activity from the first "I got up at 6:20 this morning" to measuring mood, sleep, heart rate, food, exercise – has become mainstream by 2021 – with wearables market size projections exceeding $100 billion by 2027 (see **Figure 7**). Device makers like Apple and Samsung saw the trend and seized on it to galvanize business in the face of slowing phone sales – Apple alone had sold 43 million smartwatches by the end of 2020 (**See Figure 7**).

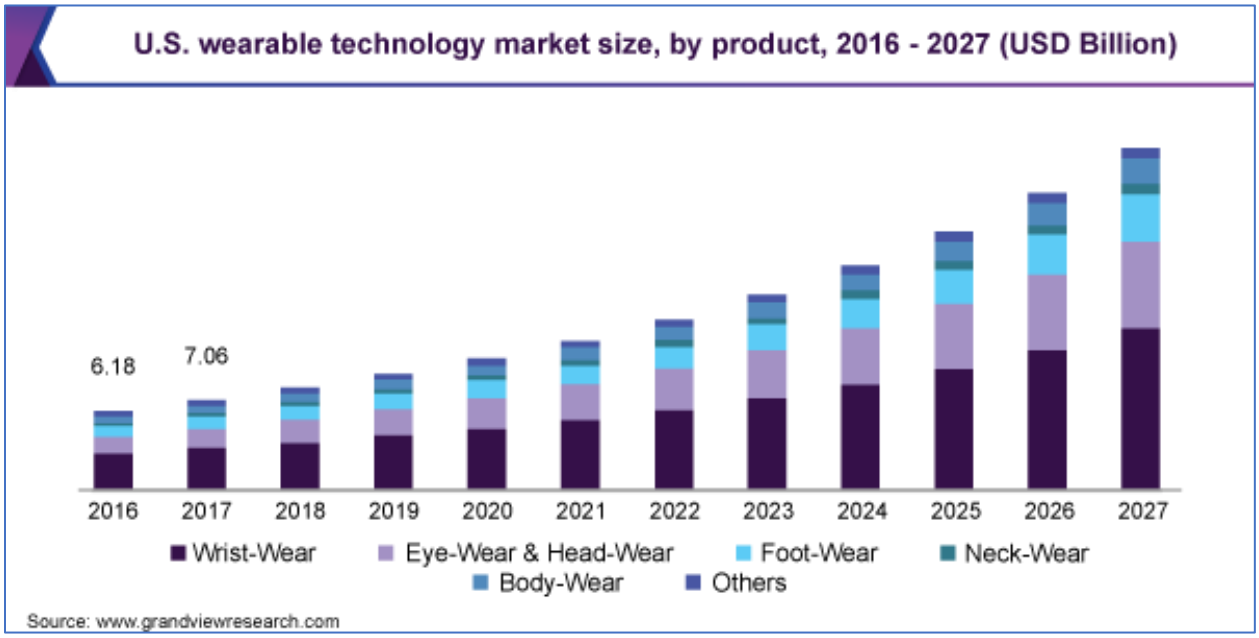


Figure 7 US Wearable Technology Market Will Pass $100 billion by 2027 Source: IDC

Seniors want to look cool – **the Apple Watch made cool PERS wearables possible.** This one device galvanized a stagnant industry that was stuck in a 30-year cycle of selling bulky medical alert pendants to 82-year-old women living alone. Within a year or two of Apple Watch launching, PERS vendors began offering a personal emergency response services in a wrist-worn and unobtrusive wearable. These smartwatches eliminated the stigma of wearing a pendant that declares 'You're Old.' And app makers like Fall Call Solutions and Best Buy crafted apps to run on the watch that offer the fall detection service connected to a needed 24x7 response center.

Senior living tech interest grows – Smartwatches may replace pendant there too. In the post-Covid era, some senior living companies are promoting technology for residents, and some are touting the benefits of wearables. Those with fall detection, RPM and a 24x7 notification process are being described by senior-focused websites as useful to older adults and caregivers.

"We are on a journey into Remote Patient Monitoring (RPM) in senior-living – co-developing a watch with Harvard. This is funded through a Covid grant." – Nick Patel, CEO, **ThriveWell**

Wearables monitor poorly monitored conditions

Given the preponderance of chronic conditions among the 65+ population, the opportunity to detect, intervening at the right time, may be one of the most significant digital health advances in recent years. As studies confirm accuracy and benefit, their role in healthcare will grow because:

Wearables can augment and potentially inform the annual checkup. Instead of the one-time annual blood pressure check, perhaps elevated in the presence of a nurse, monitoring blood pressure at home provides a level of accuracy that could help avoid over-medicating. Instead of periodic finger sticks to determine blood sugar levels, a blood sugar patch can indicate both the impact of certain foods and provide a timely warning.

"Wearables can provide a longitudinal view of the patient's health. At the doctor's office, weight and height are useless – what were they in between visits, what were sleep patterns? The problems between intervening visits could be solved." – Rene Quashie, VP, **CTA**

Wearables can be useful for specific diseases and health issues. Research is underway about the role of wearables to trigger a conversation with a healthcare team about medication dosage or timing for Parkinson's patients whose activity level has changed. Or using a wrist-worn wearable, perhaps a provider could be able to detect a sudden change in body temperature, spiking blood pressure or the onset of a stroke – seeing events that are otherwise unnoticed.

Digital therapeutics and wearables could be very useful for monitoring the health of patients. There is an opportunity for a middleware provider of software that uses AI to assess whether a particular issue is important or not to alert a health care provider or call 911 for a medical emergency. – Rick Robinson (Innovation), Michael Phillips (Technology Strategy), **AARP**

Health-status wearables – who benefits and when?

Advances in wearable technology, vendor excitement, and growing consumer adoption might lead one to think that the integration into healthcare processes is a given. But while some leaders are excited by possibilities, other health professionals express doubt about near-term data integration of consumer wearable data. Yet clearly researchers and investors don't believe it – innovation is accelerating, and huge streams of money pour into new companies as:

Miniaturization now enables multi-function wearables. The same device can track your steps, tell you to stand up, detect if you have an irregular heart rate and take your blood pressure. And that is just the minimum capability of devices and software today. When data from these devices is transmitted to end user health profiles, insights and predictions about future change will become mainstream. And when it is aggregated with other data sets, expect further insights about population health. In the meantime, these multi-function and relatively tiny devices – with their alerts, nudges and trend reports – represent possibilities just for the Apple Watch alone that six years ago could not be imagined. But as with other tech changes, skyrocketing adoption of one vendor's offering has created a market opportunity for many others.

Research is pouring into new uses – spinning out ideas and companies. Researchers today are looking at the possibility of wearables being used to predict strokes (based on motion changes) before they occur – or to guide a Parkinson's patient to get a new prescription (based on gait changes). In early 2021, Boston University selected Shimmer wearables for a brain-heart health study; Scripps Research launched a study about wearables and precision medicine; and Penn State is studying the medical application of wearable antennas.

Investments into wearable health offerings are staggering... Investors see a New Era for Virtual Health that includes both in-home technology and wearables. The Series C announcement for the Ōura Ring is a case in point – $100 million of investment as of May 2021, with multiple research initiatives underway in the context of chronic and acute diseases. As the founder, Harpreet Singh Rai noted, the wearables market is now measured in trillions of dollars worldwide. Hinge Health just raised $300 million for its health-coaching offering that has a wearable sensor, and Kaiser Permanente and Mayo Clinic just put $100 million into Medically Home. In 2020, health measurement startup Whoop raised $100 million.

…All this is despite denial that doctors don't need or want the data. Because consumer interest is growing, so surveyed doctors today use and/or recommend wearables. But according to a 2020 survey by Deloitte, while interest in wearables has increased, the actual integration of data from patient wearables has grown little in the past two years – from 5% to 10% of surveyed physicians. And Forrester's survey of 40 physicians and patients concluded that wearables today are for consumers, not physicians – asserting that "doctors don't need the data." But that may change if worried well consumers walk into the office with higher quality blood pressure data than the physician can obtain during intermittent visits.

Purpose aligns with needs of older adults

Wearable devices and what they can track may be the key to the much-repeated concepts of aging well or successful aging. While the measurements that wearables yield may be fun and motivating for the young, their purpose closely aligns with the needs of an aging population – especially 10,000 baby boomers turning 65 each day. Either older adults already see these benefits or those who care for and about them will. As wearables improve in quality and accuracy over time, they will enable asking questions that invite longitudinal understanding and proactive interventions – for example:

How fit are we over time? Is activity, mobility, energy improving, remaining the same or declining? As one interviewee noted after recovery from Covid how proud he is to 'close all the measurement rings on the Apple Watch 108 days in a row' and if one isn't closed, he will get up, go out and take another walk.

"My wearable can pick up data from my bike, putting heartrate or general fitness status on my watch. It keeps me healthy and paying attention to that information." – Rob Flippo, CEO **MobileHelp**

How is our health in the context of chronic conditions? Are measurements of body signals showing that all is well? When tracking metrics ourselves – such as blood pressure, blood sugar, heart rhythm, heartrate variability, heart rate recovery after exercise – is everything okay? For those at risk of stroke recurrence – is there a way to know in advance and get the right treatment?

"I am interested in resting heart rate – I had Covid in October, so I began using more measurements. Today I am lifting heavier weights and my recovery time is down from five minutes to one minute." – Paul Barter, Managing Partner, **Paul Barter & Associates**

What is happening to those we care about? Will wearable remote patient monitoring technologies help them recover after illness and avoid repeat hospitalizations that result from mis-managed medications? Will the data from wearables help a family member know whether an older adult is adhering to physician regimens following hospital discharge?

"We are rapidly approaching a point where aspects of "hospital-at-home" will become viable with a combination of wearables, robotics and passive sensors. At a post-clinical level, these tools will provide actionable data that support post-acute recovery, communicate changes in condition and influence behaviors which would improve health management over time." – Michael Skaff, COO, **Jewish Senior Living Group**

Wearables follow a person across location, time, and health

Despite the presumed low probability of integrating data from wearables directly into the health system, their utility may make a significant difference in wellbeing for an older individual. Unlike a computer, smartphone or camera, wearables (such as a Bluetooth headset, a smart wristband or ring, smart jewelry, or glasses) are worn on the body. They can assist, even when an older adult doesn't ask, as with fall detection, whereabouts, or heart issues.

"We are selling a smartwatch with a heart rate monitor, a pedometer and immediate contact with a monitored call center. One customer family bought it for their Mom who likes to garden in the yard." -- *Kelly Johnson, Co-Founder and COO,* ***Hands-Free Health***

What types of wearable devices offer potential for older adults? Depending on their health status (or chronic conditions), devices below can be useful, engaging, informative, lifesaving or predictive. Given options in each category, the guides listed in the Resources section at the end of this report may also be worth a look. For specific wellness categories, there are also websites specific to that condition (or device) that can offer more guidance. In addition, experts expect that more FDA-described Combination Devices will emerge over time that track several metrics, noting that today, it's an early market. Category examples include (see **Figure 8**):

Category	What it is	Examples
Hearables/earbuds	An amplification ear-worn wearable	Apple AirPods, WearandHear, Dime
Smartwatches	Smart watches monitoring activity, health metrics	Apple, Samsung, Fitbit, Garmin, Adapt
Headsets – AR/VR	Internet-connected glasses enable alternate views	MyndVR, Embodied Labs, Rendever
Fitness trackers (no watch)	Step counter, heart rate	Amazon Halo, Vivo, Whoop Strap 3, Fitbit One
Continuous diabetes wearables	Scans detect blood sugar level, patch injects insulin	FreeStyle Libre, Dexcom G5,
Sleep trackers	Wearables noted for sleep tracking	Ōura Ring, Whoop, Fitbit Versa
Wrist-worn Health	Low-sleep indicates risk of dementia	Omron HeartGuide, Amazon Halo, Whoop
Smart jewelry	Ring, Necklace	Trelaware, ADT invisiWear
Dementia zone trackers	Set a range – track movement outside range	MindMe Locate, PocketFinder
Medical Grade wearable, data collection	Blood pressure, mobile EKG, Diabetes patch	Omron HeartGuide, AliveCor, Tidepool
Medical Alert/PERS/Safety	Emergency call, fall detection – in home or out	Medical Guardian, Lively Wearable, UnaliWear

Figure 8 Examples of wearable categories and some of the offerings

Smartwatches with health features. For Apple Watch owners, it takes a bit of work to get the device to stop making suggestions or change the advice – *"I think you are taking an outdoor walk!"* But like other smartwatches, the feedback about steps and patterns, is useful – even addictive. *"You walked more last month than this month!"* New research is underway to develop wearables to assist patients with Parkinson's notice the signs of movement and behavioral issues.

"We are working with people with Parkinson's. Our technology can facilitate a meaningful interaction between the wearer and care teams. The wearable can offer an understanding if a new medication is working or not." – Nicholas Constant, **EchoWear LLC**

Hearables. A small number of people relative to the numbers with hearing loss are helped by hearing aids. According to the World Health Organization, 430 million people worldwide have disabling hearing loss and do not use **ANY** hearing solution to mitigate. Aside from a sizable price differential, hearables could, according to experts, provide them with some relief:

"Most cases of mild-to-moderately-severe hearing loss can be managed by users themselves, if all the tools work well. The hearing aid advantage will not last more than two years from now." – Alexander Goldin, Founder and CEO, **Alango Technologies**

Diabetes technology. Continuous Glucose Monitoring (CGM) capabilities have been in the market for years, gradually replacing the 'finger stick' method of checking blood sugar. It requires a prescription today and can be used by the 88 million diabetics, (25% of them aged 65+) – and even by 'quantified selfers' who want to monitor their diet and make adjustments.

Sleep tracking. Tracking sleep may be the ultimate aspect of the self to be quantified – the sleep deprived represent a sizable ($32 billion by 2026) market. Experts agree that sleep (quality or lack) is a significant health indicator – and for older adults, low-sleep can heighten risk of dementia.

"We started with sleep. The impact it has, from cognitive function the next day, fasting glucose, hormones, T-cells that fight cancer – these are all linked to our sleep." – Harpreet Singh Rai, CEO**, Ōura Ring**

Fall detection. Fitness devices prompt older adults to exercise. But one in four of the 65+ population fall each year. Tools like UnaliWear, FallCall Solutions, MobileHelp or Medical Guardian have technology that can detect a fall and contact a 24x7 response center.

"Apple launched a revolution in the wearable industry and mainstreamed the device. The "smart" fall detection system that we built is a patented API. It can go into any wearable." – Shea Gregg, CEO, **FallCall Solutions**

Wearables populate the Internet of Behavior for Aging

The Internet of Behavior (IoB) collects and makes sense of sensing wearables. In its October 2020 annual conference, Gartner observed a trend – the population of the Internet of Behavior, as adjacent and complementary to the Internet of Things. What is it and why is it important for older adults?

"The Internet of Behavior collects the digital dust of people's lives from a variety of sources, and public or private organizations can use this information to influence behavior." - *Gartner*

Gartner described it as recognition of a phenomenon that already exists, in which everything you do on your smartphone or wearable is tracked and used to show you (or sell you) other items or locations of interest near where you are, what you are looking at, or what you are doing. That is certainly a realistic, if somewhat cynical observation. But the Internet of Behavior of aging adults can help manage health, notify caregivers of adverse incidents, or even save their lives.

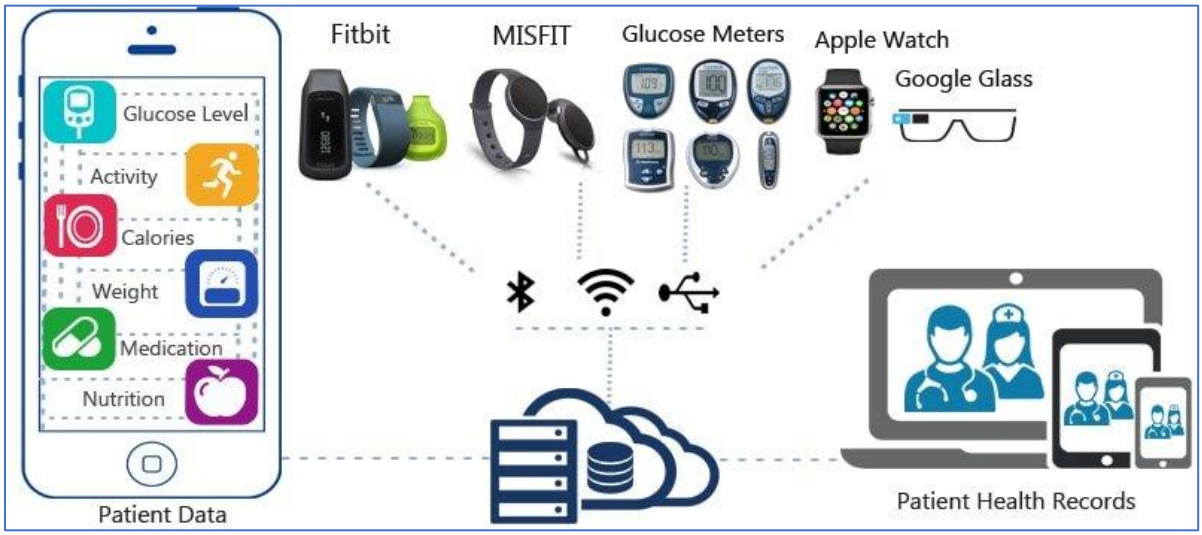


Figure 9 NextGen healthcare wearables will solidify today's tenuous data connections

IoB will play a role in senior living communities, healthcare settings and at home. Of course there may be negative implications that we already can see from the existing collection of 'digital dust.' We are startled when an IoB message pops on our phone to tell us something we have looked up only once is sold on the street where we are standing. But consider how an **IoB for Aging** could be remarkably useful. Imagine that Mrs. Smith has not gone near the refrigerator all day and its 6:00 pm. Tracking movement and motion are already components of senior technology today – but with an Internet of Behavior, patterns in Mrs. Smith's life will be collected and correlated with her other behaviors – like medication adherence, exercise, and social interaction. And these data points could be correlated with fall risk, prompting a notification of her son or other caregiver.

IoB will enable software to be more predictive about behavior changes. With the troves of 'big data' accumulating about behavior and wearables, this IoB enables the ability to predict future issues will become more sophisticated. Software associated with them will be able to correlate personal characteristics (like age, conditions, location) with environment, changes in individual behavior, device accuracy (and/or failures). There will then be reasons to consider wearables across multiple older adult groups and needs. Marketing of these offerings will fit into the decade-old Design for All paradigm, promoting and enabling software customization based on user profile.

Barriers to Wearables Adoption by Older Adults

As has been the case with many technology innovations that could benefit older adults, the concept may be good, but the implementation and/or data integration may be lacking. What might be the impediments limiting adoption of wearables? These include:

Usability of the device and the data. What stands between the data from a wearable and its use by providers and seniors? The Electronic Health Record (EHR) and the lack of interoperability among health systems present major obstacles – to date, the industry has not built the capability to capture data sent their way. And physicians, as the Forrester report noted, may not be interested in acquiring that data (or even worrisome alerts or signals from it) until systems can accommodate it and benefits have been proven. Usability also applies to text legibility on smartwatches; hearables and their dependency on smartphones; virtual reality technology and its dependency on headsets; and wearables that must be finely tuned for the individual.

"When you think about user design and experience, any friction in the interface should be removed. Tech that removes the screen is the best way to approach the digital divide." – Kyle Rand, CEO, **Rendever**

Skepticism and concerns about health-related wearables. Not just physicians – the older adult population may be cautious. Consider the unanswered questions about wearables, including the need for calibration with other devices, the doubts expressed the medical community, and the confusion about privacy defaults, it is not surprising that while vendors and experts are excited about the possibilities, there is a lack of awareness about them. And even if aware, there may be a lack of enthusiasm among the intended users. As with the "I'm Old" stigma about PERS devices, there may also be a stigma associated with health conditions.

"We're tackling the stigma associated with monitoring blood pressure. Education is a centerpiece. Half of U.S. adults are in the hypertensive range and the most significant rise in this condition is under the age of 45." – Jeff Ray, Executive Director of Business and Technology, **Omron Healthcare**

Accuracy of measurements. As noted, remote Patient Monitoring (RPM) is one example of a wearable combined with other technologies to remotely monitor patients with chronic (or post-discharge) conditions. While telehealth took off during the pandemic, for example, it has returned to being just one tool in the toolkit for physicians, depending on the willingness of the patient and difficulty of getting to in-person appointments. Wearables will similarly be incorporated into processes with some caution on the part of healthcare providers.

"With a wearable, data is available 24x7, but it must be filtered and managed properly to make actionable. - Rod Cruz, GM Healthcare **AT&T Business**

Actionability. The healthcare industry has deployed systems that produced so many alerts, practitioners began to ignore them, complaining of alert fatigue. As a result, it is no surprise today if they resist data integration from wearables. But personalized consumer wearables are different. Looking down at a wrist worn device that says 'Stand!' may prompt movement from a chair. Given the opportunity to respond to a nudge, we may or may not act, but at least a visible suggestion is made that enables action.

"The digital convenience in our consumer lives doesn't make it into health and care. Yet we want to participate in our care – and wearables enable co-producing data that could lead to better outcomes." – Karsten Russell-Wood, Portfolio Leader, Post-Acute and Home, **Philips**

Willingness and ability to use. As devices evolve into lighter and simpler form factors, will older adults, including the oldest, wear them? They just might, armed with information and encouragement from peers, families, physical therapists, or caregivers. With the emergence of rings, bands, patches, and cheap smartwatches like the $20 Wyze band announced in December 2020, unobtrusive wearables may become a symbol of high quality self or professional care.

""The future of healthcare is here. Today's super-watches are complete smart phones on our wrists – with fall detection, health and wellness tracking, communications, news, weather, and more, in beautiful stylish designs." – Mark Gray, CEO, **Constant Companion**

Privacy concerns. As with the advent of always-listening smart speakers, all ages should be concerned about what is done with the data from wearables – who gets it, how is it monetized, and what steps can be taken to rein in the tech company instinct to add or deploy features without informing users. Consider the YouTube guidance about their policy, scrolling down to changing terms of service to see how little access or leverage an older adult has who is just watching a video sent by a home care aide, and how there is even less leverage for the home care provider.

"There often is a lack of transparency and inability of people to tailor how data are shared – consumers frequently don't have those kinds of choices and can't always count on tech companies alone to protect the information" – Deven McGraw, Chief Regulatory Officer, **Ciitizen**

FUTURE OF WEARABLES AND OLDER ADULTS

Personalized, Predictive, Proactive

It's a bright future for the wearables market – predictions are optimistic, and interviewees for this report agreed with assertions that wearables are likely to become ever more:

SMART: Tracking behaviors that can predict decline or health status. The monitoring capabilities of wearables are only now beginning to be used in caring for older adults – with tech offerings from multiple firms, either as research experiments or actual usage. In the future, the identification band worn in senior living communities and nursing homes could be a smart band with ID information, medications and allergies, all part of a GPS-trackable tag, particularly useful in dementia care. Firms that provide care for older adults will evaluate health-related wearables for care recipients that have specific health conditions, and some will provide their services as a subscription offering that could include personalized advice or alerts.

"We are going to be a cloud of data points – and it will be aggregated onto a wearable because it is an all-in-one device. Ultimately this will be a data play and the model will evolve to a monthly subscription, perhaps combining various elements of care like concierge services with health & wellness coaching." – Satish Movva, CEO & Founder, **CarePredict**

INTEGRATED: With other devices, fed into health profiles. For the time being, those health profiles may be Personal Health Records (PHRs). Or a report could be printed, as one interviewee noted is happening today, and attached as a PDF to the record. One way or the other, data that is not captured someplace else, like blood pressure trends, blood sugar levels, gait, or history of falls will all need to find its way into health-related guidance or into a data set that is queried with AI tools looking for trends or issues that the patient did not mention.

AFFORDABLE: For lower income seniors needing hearing help or smart watches. The change in prices of hearing assistance will come from availability and quality of hearables, the rise of self-service hearing assessment tools, and the long delayed FDA approval of Over-the-Counter hearing aids. Worried users will take one of many online hearing tests or walk up to an in-store kiosk. The range of easily purchased and no-stigma in-ear hearables will be widespread. And the next generation of low-priced smartwatches of the future, coupled with a 24x7 service subscription, will replace the low-priced PERS offerings sold in retail stores.

PROTECTIVE: Of your privacy. Wearables transmit the most personal (and personalized) information tech users have. The ability to protect privacy – requiring an explicit opt in permission for data or Amazon network sharing – means that information protection principles known as Privacy by Design, should and will be expected by users, even where it is not mandated by law. And changes in terms about that privacy will be communicated in easy-to-understand terms, requiring the user to again acknowledge that they have seen the change.

PRESCRIBED: Utility of wearables will transcend practitioner reluctance to prescribe. More Medicare Advantage plans could reimburse the cost of a wearable for certain patient groups. For example, Fitbit devices are currently included in Medicare Advantage plans offered by insurers. Devoted Health was the first Medicare Advantage plan to subsidize an Apple Watch, though Aetna Attain provides a health incentive for an Apple Watch -- others will follow. With health insurer pressure, eventually the 'doctors don't want your data' mantra will end.

WHAT	From	To
Mode of wear	Predominantly wrist, ear, device specific, user-integrated	Multiple body areas, patches, rings, data-integrated
Interaction method	Primarily touch	Touchless, voice
Chronic disease management	Diabetes, hearing loss, cardiac	Integrated across diseases
Safety Monitoring	Falls, user-signaled, with/without location	Multiple risks, location tracked
Intervention feedback	Episodic, when checked	Continuously available, alerted if out of range
Role of sleep	Device-specific monitoring	Multiple monitors, in combination
Hearing health, Measurement	Hearing aid, Audiologist serviced	Hearables centric, Self service
Cost/Availability	Consumer-paid	Insurance-covered
Physician recommendation	Suggested	Prescribed
Privacy management	Default opt in assumed	Required opt in
Location of health monitoring	At healthcare provider location	At home, self-monitoring, alerting

Figure 10 The Future of Wearables and Older Adults – Within Five Years

"As older adults become more comfortable using technology, senior living providers see that they may need to add "tech concierge" support staff to handle tech support needs from residents and staff."—Jessica Longly, **CDW Healthcare**

Beyond Five Years: What Wearables will Mean for Seniors?

Smartphone link requirements will be optional. The out-of-the-box wearable will offer choices for registration and continued data collection. Caregivers can set them up on behalf of an older adult -- who will confirm that permission to collect data has been explicitly provided. The wearer can deny access to the data (steps and heart rate, for example) to family – but subscribe to spoken advice from the wearable itself. "You walked much more today, maybe you'd like a piece of chocolate as a snack!" The wearer is intrigued – and signs up for MyFitnessPal to begin tracking exercise plus food calories and weight.

Voice interaction with wearables will be a required feature. The wonder of wearables is that they are unobtrusive AND have multiple uses, thus less likely to be left behind on a bedside table. Individuals with vision limitations or dexterity issues will find wearable interaction daunting, even annoying without voice-based access. Bulky wearables with touchy glass surfaces will give way to slimline form factors with voice links. Senior living marketers will get it – and offer seniors with Parkinson's tremor or arthritis these just-for-them devices when they decide to move in. Home care companies will use 'free' wearables as an enticement to caregivers as well as prospective care recipients.

"Based on an individual's physical limitations, the best products will have an option for voice or even voice-only access and AI within a wearable that can assist with verbal presentation." – Ray Spoljaric, CEO, **Aloe Care Health**

Identity wearable tags in the senior living industry will all be smart tags. GPS tracking of seniors with dementia will enable more freedom on senior living properties. Health information will be stored as well, scannable in emergency rooms, transmitting a list of conditions and allergies for those with cognitive impairment who may arrive alone in an ambulance. Seniors who fall will have instantaneous notification of caregivers or emergency services, eliminating disabling or fatal long lie times. Gait analysis of older adults will be available to an individual's care circle, enabling well-being interventions to begin before frailty level worsens.

Integrated health-aware wearables will make suggestions to coach, improve outcomes. In addition to piping up with suggestions, smartwatches will be able to prompt about food choices and medication reminders. Seniors will see/hear a suggestion to request a prescription refill on the appropriate date. Medication non-adherence will decline for smartwatch owners. Related adverse health incidents will decline. Insurers will take notice and reward the consumer with gift cards or rate discounts.

"Imagine – Mrs. Jones takes a statin. If a technology you took to the grocery store 'knew' you were taking a statin, it would scan products and say, 'don't buy that grapefruit juice.' People plus data – give away the device. The real value is in the data. Get the consumer's opt-in, provide a value exchange." – Jane Sarasohn-Kahn, **THINK-Health and Health Populi blog**

Resources

AARP 2021 Tech Trends and the 50+
Advances in Healthcare Wearables, April, 2021
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Pew Research FactTank: One in Five Americans Use a Smart Watch or Wearable
PubMed: Using Fitness Trackers and Smartwatches to Measure Physical Activity
RoboticsBiz: Smart Sensors, Key Components and Advantages, May, 2021
TripleTree: A New Era of Virtual Health, April, 2021
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About Laurie M. Orlov

Laurie M. Orlov, a tech industry veteran, writer, speaker, and elder care advocate, is the founder of Aging and Health Technology Watch, which provides market research, trends, blogs, and reports that provide thought leadership, analysis and guidance about health and aging-related technologies and services that enable boomers and seniors to sustain and improve their quality of life. In her previous career, Laurie spent many years in the technology industry, including 9 years at analyst firm Forrester Research. She has spoken regularly and delivered keynote speeches at forums, industry consortia, conferences, and symposia, most recently on the business of technology for boomers and seniors. She advises large organizations as well as non-profits and entrepreneurs about trends and opportunities in the age-related technology market. Her segmentation of this emerging technology market and trends commentary have been presented in the Journal of Geriatric Care Management. Her perspectives have been quoted in Business Week, CNBC, Forbes, Kiplinger, NPR, the Wall Street Journal, and the New York Times. She has a graduate certification in Geriatric Care Management from the University of Florida and a BA in Music from the University of Rochester. Advisory clients have included AARP, Argentum, Microsoft, Novartis, J&J, United Healthcare, CDW Healthcare, Bose, Cox Communications, and Philips. Her latest reports include the **2021 Market Overview of Technology for Aging**, The Future of Remote Care Technology and Older Adults 2020, **Voice, Health and Wellbeing 2020**, and **The Future of Voice First Technology and Older Adults (2018)**. Laurie has been named one of the **Top 50 Influencers in Aging by Next Avenue** and one of the **Women leading global innovation on Age Tech**.

Firms that provided insights for report -- with website link:

- AARP
- Alango Technologies
- Aloe Care Health
- Alva Health
- AT&T Business
- CarePredict
- CDW Healthcare
- CIITIZEN
- Consumer Technology Association
- Constant Companion
- EchoWear
- Fitbit
- Hands-Free Health
- FallCall Solutions
- Jewish Senior Living Group
- LiveFreely
- MobileHelp
- Omron Healthcare
- Ōura Ring
- Paul Barter & Associates
- Philips Healthcare
- Rendever
- Samsung
- THINK-Health
- Thrive Well
- UnaliWear
- Valencell