



Cardiac Wearable Technology

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Disclosures: None



“Each patient carries his own
doctor inside him.”

Norman Cousins

“I know my body, Doc!”

Numerous patients

Health Literacy

- 9 of 10 patients are not proficient in health literacy
- “Improving our nations’s health literacy is critical to creating a system of care based on wellness and prevention”- Regina Benjamin, Former Surgeon General

Wearable Technology

- Increased consumer demand
 - 9% usage in 2014 to 33% in 2018
 - 80% willing to wear fitness technology
 - Growth of 10% annually to surpass 120 million users by 2023
- Increased Device Choices
 - Wearable Fitness Trackers
 - Smart Health Watches
 - Wearable ECG Monitors
 - Wearable Blood Pressure Monitors
 - Biosensors



Wearable Technology

- Increased Demand From Employers and Insurers
 - Defines Healthier Lifestyles
 - 75% of wearers say “wearables help them engage with their own health”
 - Less Employee Turnover: 18% vs 29% average turnover in corporations that offer 5 or more wellness incentives, vs 2 or fewer
 - Reduced hospital visits and readmissions among patients using wearables



Wearable Fitness Trackers

- FitBit
 - Most commonly studied
- Garmin
- Misfit
- Polar
- Withings/Nokia (Acquired by Nokia in 2016)
- Apple



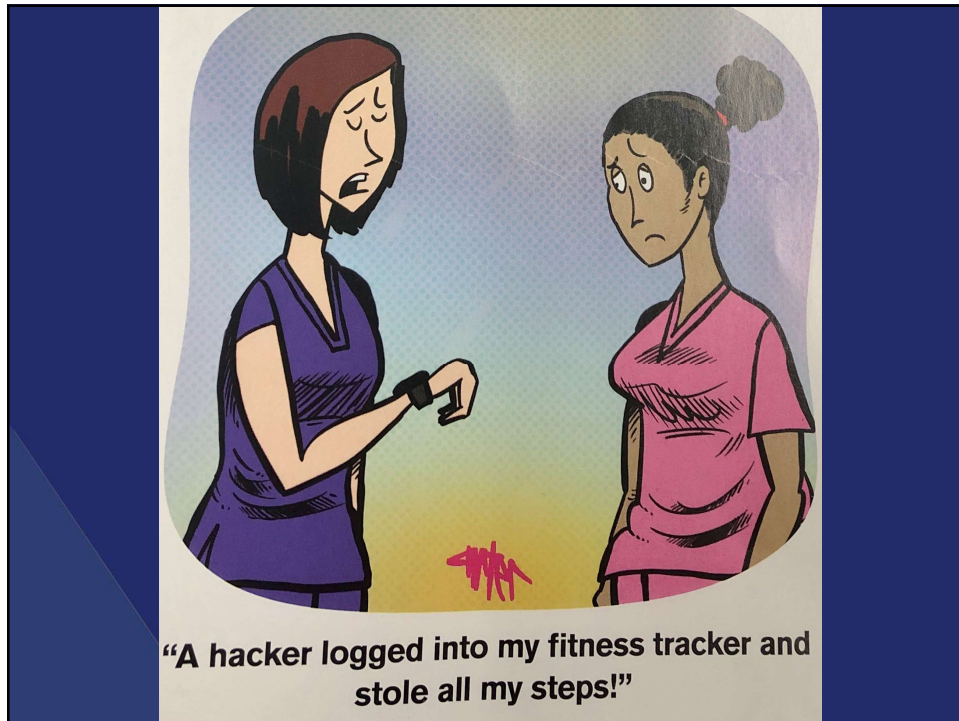
Wearable Fitness Trackers

Brand summary.

Brand	Fitbit	Garmin	Misfit	Apple	Polar	Samsung	Withings	Mio
Devices ^a	9	40	8	3	11	12	2	3
MEDLINE ^b	54	22	12	8	6	5	5	5
Validation or reliability^c	40	18	12	6	6	5	5	5
Steps	21	10	6	1	2	2	4	
Energy expenditure	10	4	3	4	3	1		2
Heart rate	7	4	1	4	1	2		5
Sleep	8	1	4		1		2	
Other	3	4	2		1			
ClinicalTrials ^d	31	3	1	2	4	2	2	3
SDK ^e	✓	✓	✓	✓	✓	✓		
API ^f	✓	✓	✓	✓	✓	✓	✓	
Apple Health ^g			✓	✓	✓		✓	✓
Google Fit ^h			✓		✓		✓	✓

Wearable Fitness Trackers

- Meta-analysis of 6 studies published in the American Journal of Medicine show that fitness trackers do not directly correlate to lower BP, cholesterol levels or significant weight loss
- Fitness trackers do increase motivation for exercise
- Motivation to move does not persist long enough or lead to enough exercise to significantly change outcomes
- A catch 22? Moving enough to change outcomes



Smart Health Watches

- Apple Watch
- Fitbit
- Garmin
- Android (now know as Wear OS)
- Samsung
- Fossil
- Misfit



Smart Health Watch Studies

- Apple Women's Health Study
 - Collaboration between Harvard, and NIEHS
 - Track menstrual periods and risks of polycystic ovarian syndrome, infertility, and osteoporosis.
- Apple Sound Exposure Study
 - University of Michigan and Apple
 - App measures sound exposure levels and how sound exposure levels affect hearing loss
- Apple Heart and Movement Study
 - An extension of Apple Heart Study with Stanford launched in 2017 and attracted 400,000 participants
 - Extended to include Brigham and Women's and the American Heart Association
 - Collect movement data, pace of movement, and stair climbs to study the connection to hospitalizations, falls, cardiovascular health, and quality of life.

Apple Heart Study

- 420,000 subjects enrolled over 8 months
- iPhone with Apple Watch Series 1,2,or 3
- Can a smartwatch identify A Fib using photoplethysmography (Light sensor)?
 - A Tachogram or plot of time between heartbeats. If irregular, then more frequent measurements were taken.
 - If 5 of 6 measurements were irregular then a notification was sent to the patient
 - Patients were sent to a Telehealth study physician via the app and referred for an ambulatory ECG patch for up to 7 days.
 - Follow up Telehealth consultation was performed to study the results.

Apple Heart Study

- 0.52% of patients received an irregular pulse notification
- Apple Watch had an 84% positive predictive value for identification of patch verified A fib. This is comparable to implanted monitors.
- Negatives... 16% false readings both positive and negatives
- 57% of patients receiving an irregular pulse notification also contacted a local physician
- Apple Watch Series 4 has an EKG app.

Apple Watch Series 4 ECG

Charles Caldwell

Date of Birth: Jan 11, 1966 (Age 54)

Recorded on Feb 6, 2020 at 9:22 PM

Sinus Rhythm — ❤️ 82 BPM Average

This ECG does not show signs of atrial fibrillation.



Apple Watch MiCORE Study

- Presented at American Heart Association in April 2019
- 859 Patients randomized, 31% women in active treatment arm
- Older patients with a mean age of 57 years old
- Smartphone Corrie app and Apple Watch used to manage care after STEMI on NSTEMI. Integrated iHealth Bluetooth BP cuff measurements
 - Can you reach older heart attack patients through technology?
 - Significantly Reduced 30 day readmission rates compared to control
 - Increased compliance with medications
 - “We saw older, sicker patients engaged with technology as a critical part of their recovery all the way from the ICU to home.”

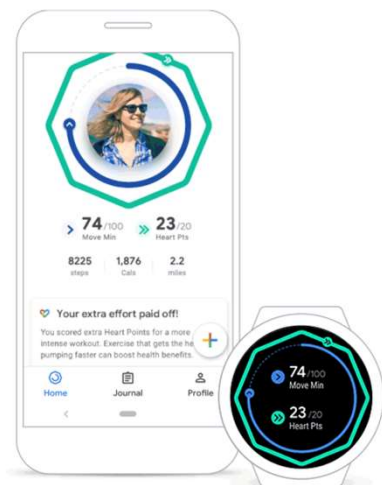
Apple Watch HEARTLINE Study

- Currently underway in the US
- A collaborative study between Johnson & Johnson and Apple
- Assess how the Apple Watch can detect and diagnose A Fib in patients 65 years and older and reduce the incidence of stroke
- <https://www.heartline.com/>

Google Fit: Heart Points

- Collaboration between Google and the American Heart Association
- Move Minutes
 - Earned minutes for the time and intensity of exercise
- Heart Points
 - Points earned for “taking it up a notch” by increased activity for each minute of moderately intense activity.
- Based on guideline goals of 150 minutes a week (30 minutes 5 days a week) of moderate exercise like brisk walking or at least 75 minutes a week of vigorous exercise like running

Google Fit: Heart Points

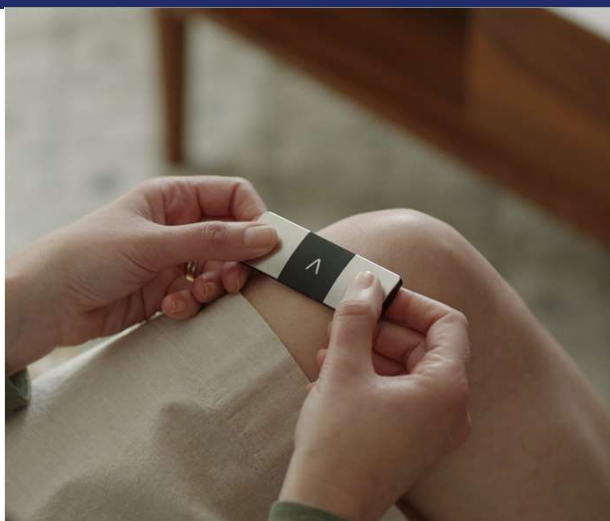


Wearable ECG Monitors

- Apple Watch 5
- AliveCor Kardia
 - KardiaMobile
 - Kardia Band
 - KardiaMobile 6L
- Wellue DuoEK

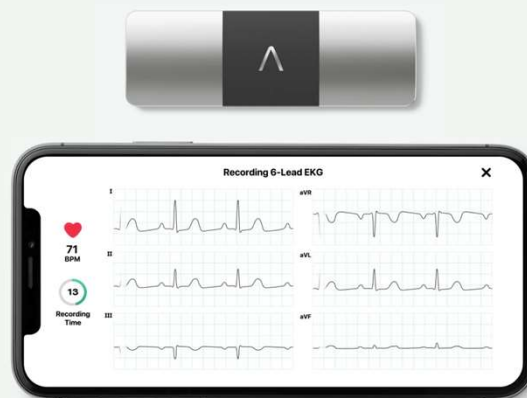


AliveCor Kardia 6L



AliveCor KardiaMobile 6L

Introducing KardiaMobile 6L.
The only FDA-cleared personal 6-lead EKG.



Wearable Blood Pressure Monitors Omron HeartGuide

The image shows two Omron HeartGuide wearable blood pressure monitors. The device on the left is a black smartwatch with a silver case, displaying blood pressure readings: SYS 118 mmHg, DIA 88 mmHg, and PULSE 70 /min. The device on the right is a black smartwatch with a black case, displaying blood pressure readings: SYS 118 mmHg, DIA 78 mmHg, and PULSE 70 /min. The background is dark blue with white text.


HeartGuide™

TAKE YOUR BLOOD PRESSURE ANYTIME, ANYWHERE*

Designed to fit your lifestyle, HeartGuide is the first, clinically accurate, wearable blood pressure monitor. Now, track your heart data and learn how your behaviors impact your heart health. HeartGuide from Omron—the #1 physician and pharmacist recommended blood pressure monitor brand. Be informed. Be proactive. Be healthier.

*See HeartGuide™ instruction manual for details.

Watch Full Video



Biosensors

- Phillips Wearable Biosensor: A self adhesive patch that tracks movement, HR, respiratory rate and temperature
 - 89% reduction in patient condition deterioration in studies



Biosensors

Now, a new, wearable ultrasound patch can measure central blood pressure in the aorta,

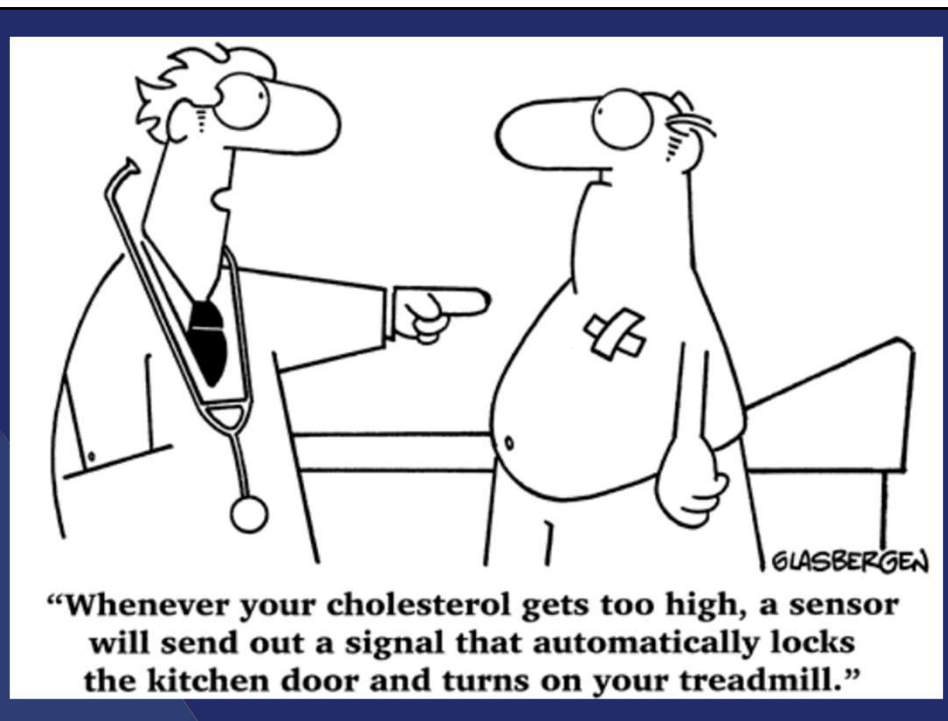
which is more accurate



Biosensors

even overnight

**and can provide
continuous monitoring**



Baptist Health Cardiac Remote Monitoring Pilot



Can I Bill For This?

- Yes! Medicare expanded remote patient monitoring and chronic care management codes in 2019 and further expanded them in 2020.
- Remote Patient Monitoring- Can now be billed "incident to" under "General" physician supervision
 - 99457 (\$51.63). Initial 20 minutes monthly
 - 99458 (\$42.23). Additional 20 minutes monthly
- Chronic Care Management - Two or more chronic conditions expected to last 12 months or longer. Can be billed monthly by physician or qualified provider.
 - G0506(\$63.43) One time assessment and care planning code on initiation of CCM
 - 99490 (\$42.17)
 - 99491 (\$83.97)
 - 99487 (\$92.98)
 - 99489 (\$46.49)
- Principal Care Management-1 chronic condition by specialist
 - G2065 (\$39.70)
- Transitional Care Management- Transition from hospital to outpatient for 30 days. Can be billed once at 30 days by physician or qualified provider
 - 99495 (\$166.50)
 - 99496 (\$234.97)

Thank You

