The COVID-19 pandemic has impacted patients’ willingness and ability to engage with healthcare systems. To adapt to the “new normal,” healthcare providers have implemented processes that add more complexity to the process of making an appointment with our physician and entering the office to receive care. We can all agree that the purpose is to keep people safe and reduce the potential for exposure to COVID-19. However, the messaging about COVID-19 and the risk to people with heart disease has created fear and uncertainty for patients.

There are 30.3 million adults in the United States currently diagnosed with heart disease. I know from personal experience that it is vital to be proactive in managing my condition, as this is the key to living a healthy and active lifestyle. However, findings from a study published September 2020 in the CDC Morbidity and Mortality Weekly Report indicated that by June 30, 2020, because of concerns about COVID-19, an estimated 41% of U.S. adults had delayed or avoided medical care, including urgent or emergency care (12%) and routine care (32%).

I understand this response because, as a heart patient, I have avoided going in for routine medical care. My reasons are less about fear of COVID-19 and more owing to the new guidelines to access care because of COVID-19. Today going to an appointment includes more obstacles (mask, face shield, COVID-19 test, etc) that I need to overcome just to arrive at the office for a check-up that I don’t enjoy doing in the first place. If I am honest, COVID-19 guidelines have been a justifiable excuse to postpone my annual device check-up. My cardiologist is a 90-minute drive from home, and I feel fine, so I think that the risk of my device having an issue in the next 6 months is low. It is worth noting that I am in contact with my cardiologist at Mayo Clinic through my Mayo Clinic Patient Portal. I also use a remote device monitor in my home that provides data updates to the pacemaker clinic. My decision to defer physical clinic appointments is personal and not recommended by my doctors, nor is it the correct decision for other people.

I use data insights to inform my healthcare decisions and to manage my wellness daily. As an athlete, I started using wearable data more than 15 years ago to improve my cycling performance. It turned out that the insights around heart rate were valuable in understanding how my first implanted device managed my heart. These insights became an essential communication tool when explaining to my cardiologist what I was feeling. Fast forward to 2020, and the wearable devices have matured in the types of data collected and insights presented on mobile apps to make better health choices. Now I can leverage data from my wearables, implanted devices, and environmental sensors to improve my athletic performance and manage my heart issues. These data have allowed me to continue to train for endurance cycling and IRONMAN events and to feel comfortable that I am training within my limits.

I was initially diagnosed with a rare heart arrhythmia in 1982 and had an experimental atrioventricular ablation procedure in 1983 that left me 100% pacemaker dependent. Currently, I am on my seventh implanted pacemaker. In addition to the implanted devices, I suffer from heart failure; and owing to scar tissue from lead extraction, I had open heart surgery in 2010. The many years of collecting and using data have taught me to identify anomalies from my baseline data that validate the symptoms I am experiencing. I have a recent example of using my Apple Watch wearable heart rate data to confirm that I experienced an episode of extended premature ventricular contractions. Because I live in rural Idaho and am hours away from a cardiologist, I have learned to proactively check in with a doctor to prevent an emergency life-flight to the hospital when I feel something strange is happening. The electrocardiogram at the hospital validated the data from my Apple Watch. The local emergency room does not have an interrogator for my implanted pacemaker, so the staff requested access to my remote monitor from home for information to determine if the heart rate irregularities are pacemaker device related. Heart arrhythmias are associated with COVID-19, so after a negative COVID-19 test, I explained that my data are not showing changes in...
respiration and pulse oximetry data collected with my Garmin wearable. I also did not have a fever.

Based on this experience, would access to a telemedicine appointment with a cardiologist have been more impactful than a trip to the emergency room? I can generate useful and actionable insights from my wearable devices, and my implanted device data are collected as needed using home-based remote monitoring. Telemedicine is on the cusp of offering multiple benefits to patients by providing healthcare access without the fear of COVID-19 exposure and removes reasons to delay receiving care and managing chronic diseases through convenience.

Other opportunities to leverage wearable, mobile apps and virtual care programs are cardiac rehab and health coaching. Patients often need a process to envision what a successful outcome means to them. When COVID-19 closed many cardiac rehab facilities, patients did not have guidance on regaining strength and an active lifestyle. According to preliminary research presented at the American Heart Association’s Scientific Sessions 2020, remote or virtual cardiovascular or cardiac rehabilitation programs using tele-counseling with specialists provided via telephone or mobile apps and web-based technologies were found to be as effective as on-site programs offered in hospitals.3

It is essential to understand the growth of the wearable and mobile app user base. The report “Smart Wearable Market – Growth, Trends, Forecasts (2020–2025)” states that wearables have gained significant traction, owing to the boom in the fitness trend across consumers. According to Cisco Systems, the number of connected wearable devices is expected to increase from 593 million in 2018 to 1105 million in 2022.4 There are wearable device users who are like me in

![Digital tools that I use in my day-to-day care.](image1)

![My Apple Watch electrocardiogram showing premature ventricular contractions.](image2)
that we are people that happen to have healthcare issues. Over time, we learn that the data we use to reach our fitness goals also provide useful insights in managing our health. It was my background as an athlete in training that introduced me to the power of data. In 1998 I began looking at the data from my Polar Heart Rate/Cycling device and sharing it with my cardiologist to optimize my pacemaker for better performance. I have continued to research and adopt wearable and digital health tools to improve my athletic performance and monitor my health.

Conclusion
The silver lining to COVID-19 is that the healthcare ecosystem is open to new care delivery channels. Consumers who are also patients are using wearable devices to improve their fitness and wellness. There will be many opportunities to collect wearable, environmental, and mobile app data that present actionable insights empowering the patient to co-collaborate with the physician in managing chronic disease. This new doctor/patient relationship will drive innovation in wearable and implanted sensors to improve telemedicine and patient engagement with healthcare. Patients will need to be responsible for understanding their unique situation and how wearable devices can benefit them, and engage their physician in discussing the best digital health tools for reaching their goals.

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Figure 3 Data of respiration and oxygen from Garmin wearable device.