

Why Does It Take a Pandemic to Realize the Value of Remote Patient Monitoring?

April 21, 2020

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The grim headlines that the COVID-19 pandemic are bringing to us each day serve to highlight the promise of remote patient monitoring. According to the U.S. Centers for Disease Control and Prevention (CDC), 6 in 10 American adults live with at least one chronic disease and 4 in 10 adults have two or more. Conditions such as heart disease, cancer, respiratory disease, diabetes, and kidney disease are leading causes of death and disability in the U.S., and also contribute the most to the country's \$3.5 trillion annual health care bill.

In an unprecedented time like this, when healthcare resources are stretched in ways we've never experienced in modern times, these patients may face challenges in accessing our traditionally centralized healthcare services. In some cases, they may suffer additional discomfort if care gets delayed, or face risks if they visit a facility where care is also being given to COVID-19 patients.

The time is now to embrace and accelerate the deployment of remote patient monitoring to ensure that chronic conditions are managed in a way that can improve outcomes and reduce the need for regular healthcare facility visits. And in the event of pandemics such as COVID-19, remote monitoring can be a valuable tool to help healthcare professionals triage incoming cases based on each patient's condition. We certainly have the technology to support a more decentralized, yet personalized, model of healthcare. From sophisticated sensors to advanced algorithms and artificial intelligence (AI), the underlying technologies are now available to enable accurate wearable medical devices that collect and transmit data to support remote patient monitoring.

There are certainly challenges with deploying technology at the point of use, but as society becomes more technology-oriented, if individuals are not able to apply the solution to themselves, there is often a care network of family members or professionals who can assist. Connectivity challenges and ensuring that data is being collected reliably by the device can be solved with careful product design and simple set-up requirements. Recently, the Centers for Medicare & Medicaid Services (CMS) approved four Current Procedural Terminology (CPT) codes for the reimbursement of remote patient monitoring (RPM). (CPT is a medical code set that is used to report medical, surgical, and diagnostic procedures and services to entities such as physicians, health insurance companies, and accreditation organizations for reimbursement.) So, the incentive is there to move toward more remote monitoring.

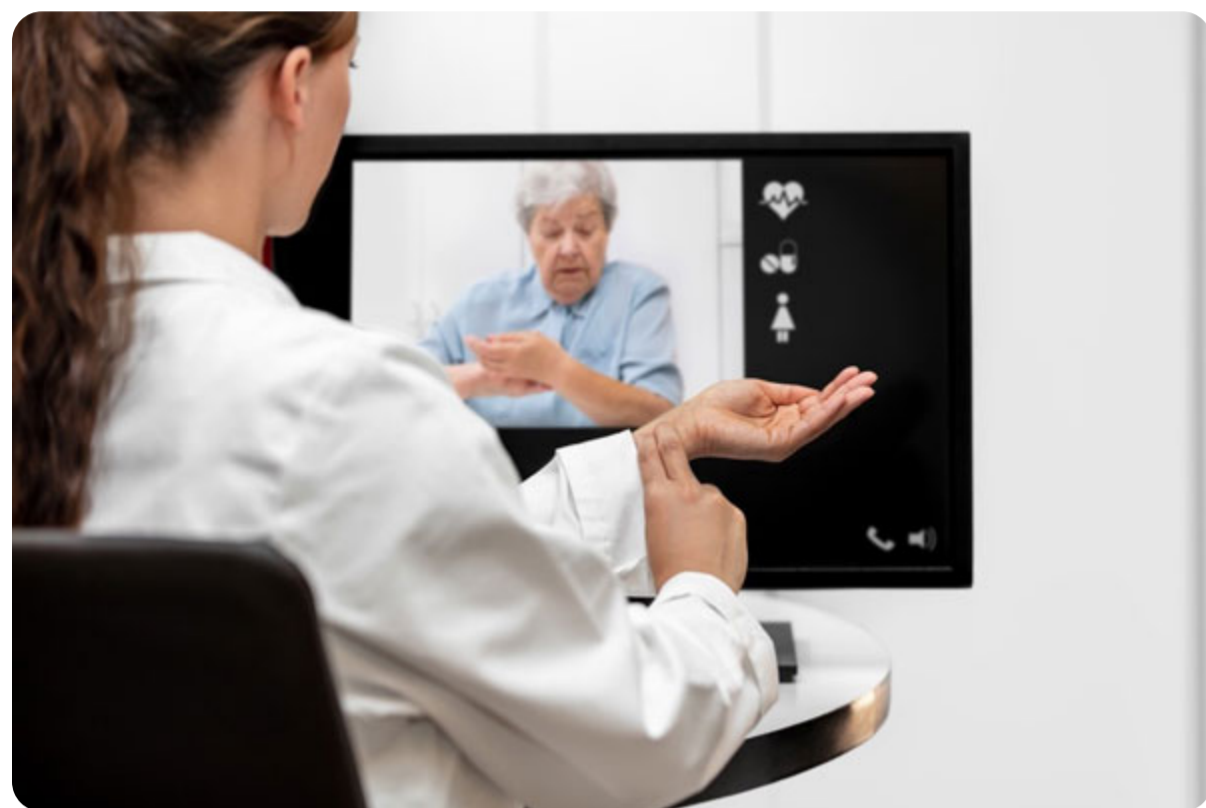


Figure 1. The use of telemedicine tools like virtual doctor visits is increasing during the current COVID-19 pandemic.

Emerging Use Cases for Wearable Remote Patient Monitoring

Wearable devices in their varied forms—rings, wristbands, earpieces, patches—can provide continuous remote monitoring in a convenient, unobtrusive manner. Many of us are accustomed to wearing smart watches that track our daily activities and provide general wellness metrics. It's not at all uncommon now for these smart watches to keep tabs on key biometric signals, such as heart rate, blood-oxygen levels (SpO₂), and body temperature. In the future, blood pressure and blood-glucose levels will likely be added to the list. Monitoring this data has opened new use cases, from assessment of sleep quality to detection of different types of diseases and chronic conditions such as sleep apnea and atrial fibrillation (Afib). This is paving the way for general acceptance of clinical-grade wearables that are prescribed by your primary-care physician.

Already, as the current pandemic unfolds, we're seeing healthcare technology companies pivot in response to the urgent needs. They're accelerating the deployment of the infrastructure needed for remote patient monitoring and also integrating their solutions into the healthcare providers' electronic medical record (EMR) systems. Companies developing remote monitoring patches are receiving a call to action from their local governments to procure and deploy their products that measure cardiac and respiratory parameters for higher risk individuals that have been diagnosed with COVID-19. ECG patches can be designed with very low-power, clinical-grade [analog front-end devices](#) that also provide bioimpedance measurements (a clinically recognized way to assess respiration). Similarly, makers of sleep apnea detection devices are being asked for units to be used in monitoring blood-oxygen levels (SpO₂) in COVID-19 patients. (SpO₂, along with heart rate and heart-rate variability, are key markers used in sleep apnea monitoring.) And, with high temperatures being an indicator of the new coronavirus, not to mention the presence of infection, [devices that include human body temperature monitoring](#) can be essential tools.

Health-monitoring wearables provide another set of eyes and ears, so to speak, to healthcare professionals, enabling them to remotely keep tabs on their patients. This can be useful in a time such as now, when [telemedicine is experiencing a boon](#). Recent news reports note that doctors are, where possible, asking patients to carry out phone and video appointments as everyone tries to adhere to social distancing guidelines. While physicians can provide some level of guidance virtually, their assessment is primarily based on what each patient communicates, which can be rather subjective. Certain conditions are most accurately assessed when there is a continuous record of data—which is where wearables can provide value. Let's consider high blood pressure as an example. The clinically recognized approach is to [measure blood pressure at rest](#), ideally at the same time each day. But various factors, such as anxiety, can cause blood pressure to spike at the doctor's office (the "white coat effect") or even be elevated at home (masked hypertension). By collecting blood-pressure and other vital-sign data continuously and in real time, wearable medical devices can provide insights that are more telling than what is revealed from the periodic measurements performed during periodic doctor's visits. Imagine that after your phone call/video conference, your physician prescribes a patch that monitors vital signs including blood pressure. You receive this patch in the mail and either apply it yourself or have a caregiver do it. You wear it for a week to 10 days before either returning it in the mail or, ideally, uploading real-time data to your healthcare provider's EMR system.



Figure 2. Wearable medical devices can be used by patients at home to monitor blood pressure.

For chronic disease management, a wearable medical device can alert a doctor on whether the patient needs to go to the hospital or can manage the condition at home. Such devices can be used in a similar fashion for prescription drug monitoring—from overseeing whether someone is taking their medication as prescribed, if they're having an adverse reaction from the drug, or if the dosage needs to be adjusted. Going a step further, what if general practitioners, rather than specialists, made it a more common practice to prescribe continuous monitoring wearables? With this approach, insights could be gathered earlier on and the data could reveal whether the patient is doing fine or if he or she does, indeed, need to see a specialist. This could help healthcare providers manage usage of their facilities without impacting the quality of care. Indeed, in a pandemic such as the one we're experiencing, triaging becomes an even more critical activity as healthcare facilities become overwhelmed. Imagine if most patients entering a healthcare facility wore a basic vital-signs wearable medical device. By tapping into the data collected, healthcare professionals could quickly assess each patient's condition and more accurately prioritize them at the point of care.

Summary

While making remote patient monitoring more commonplace does call for a change in our traditionally centralized healthcare model, the time is ripe to do this. Clinical-grade sensor ICs offering low power and small size with the ability to monitor an array of vital signs are [enabling wearable medical devices to deliver accurate, real-time, and continuous monitoring](#). Applying sophisticated algorithms and AI to this treasure trove of data yields insights that can foster a decentralized model of care where patients and doctors can be more proactive about predictive/preventive care, management of chronic conditions, and much more. Ultimately, it's all about delivering more personalized healthcare to improve outcomes and at a lower overall cost—with the goal of creating a healthier world.

Stay safe and be well!

Additional Resources

Learn more about remote patient monitoring by reading these customer testimonials:

- [Spire](#), which produces a wearable device that monitors activity levels, heart rate, sleep quality, breathing patterns, and stress levels
- [Fujitsu Connected Technologies](#), which has created an easy-to-use smartphone with health-monitoring capabilities

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