
Wearable Technology for Cardiology: Barriers to Wider Use



The past decade has seen the emergence of many new wearable medical devices, including several that have been widely adopted by both physicians and consumers. However, absence of useful and validated clinical applications, measurement validation, and data safety concerns are among the additional barriers to the widespread medical application of wearable technology in current practice, according to a review paper in the journal *Trends in Cardiovascular Medicine*.

The consumer-directed wearable technology market is rapidly growing and expected to exceed \$34B by 2020. In the field of cardiology, commercially available devices collect activity, heart rate, heart rhythm, and, more recently, thoracic impedance and thoracic fluid data. Data collection may require active patient engagement with the device to acquire data that may then be transmitted in real time or uploaded from a stored source. Alternatively, some devices do not require active initiation beyond the first step of wearing them. After this step, such devices may passively collect data. In this case, a wearable device would continuously or intermittently obtain data to be transmitted, or to be stored and later uploaded.

Wearable data may be most useful in its ability to inform individuals or caregivers of the effects of patient actions or treatments or underlying clinical status. Ideally, these devices will provide data to offer decision support and even elegantly offer built-in therapies. Even for devices not offering built-in therapy, the data generated can be diagnostic, prognostic, informative of treatment effect, or of uncertain clinical usefulness.

Recently, consumer-directed wearable electrocardiographic (ECG) monitoring devices have become available in the marketplace. The Kardia device marketed by AliveCor Inc. connects with a nearby smartphone and provides analysis and transmission of ECG data for remote interpretation without the need for a physician prescription.

With increasing consumer use of patients' self-initiated ECG recordings, AliveCor has begun applying "big data" analytic methodology and data mining to these data sets. With increased computing power and artificial intelligence methods, wearable data may increasingly inform decision support and assist in predicting clinical changes prior to the development of arrhythmias or other heart disease.

Widespread use of consumer-directed wearable devices is resulting in massive data generation. "Reviewing these data and searching for clues and patterns or signals that may suggest meaningful patient outcomes has to date been an undelivered promise," the article notes. "This could be in part due to varying quality and validity of the real world data being generated."

The problem with unreliable data is that it may not reflect pathology, but instead may indicate only device error, user error, or physiologic outliers, explains the article.

"Although we expect reliability to increase as devices mature, and although we expect more sophisticated analytics to become increasingly robust to unreliable data, more research will be needed to better guide clinicians in their interpretation of abnormal wearable data," the article authors write.

Source: [Trends in Cardiovascular Medicine](#)

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