Wearables: Contributing to Improved Clinical Outcomes and Better Workflows
Wearables: Contributing to Improved Clinical Outcomes and Better Workflows

Wearable devices for health and medical applications have the potential to transform the healthcare industry by offering doctors, nurses and other staff effective tools to enhance clinical care and improve workflow efficiencies while cutting costs.

In its research, IHS found wearable technology in a wide range of products including blood-pressure monitors, continuous-glucose-monitoring devices, defibrillators, drug delivery products, echocardiogram monitors, hearing aids, insulin pumps, smart glasses, patches, personal emergency response systems and pulse oximeters.

Healthcare providers can use information gathered from wearable devices to remotely track and monitor patients with real-time data available on smartphones, personal computers, laptops and tablets. Wearable devices can be used in a hospital setting or at home to keep people healthy and to manage chronic medical conditions.

The adoption of wearable technology for health and medical applications—although still nascent—has created a global market valued at $6.8 billion this year.

Revenue in 2016 is expected to reach $7.3 billion, and will reach $8.7 billion in 2019, equivalent to a compound annual growth rate of more than 6 percent starting from 2013.
Looking ahead, IHS expects revenue will continue to increase beyond its forecast period due to the anticipated growth in the use of patches. Patches are designed to adhere directly to the user’s body to gather continuous physiological measurements, and may be disposable. Although revenue from patches represents a small portion of the total market being analyzed through 2019, IHS views the next few years as a ramping-up period for this niche market.

While the use of wearable technology in the healthcare industry is just emerging, IHS predicts interest will increase through 2019 as clinicians come to realize these devices have the potential to impact clinical outcomes and workflow efficiencies.

Better clinical outcomes: the first major benefit

Wearable devices collect and analyze data that healthcare providers can use to make informed decisions that lead to better patient outcomes. These devices enable clinicians to easily and efficiently access real-time patient data from remote locations on multiple devices, including smartphones, personal computers, laptops and tablets.

Information derived from wearable products can help clinicians improve individual and population health by tracking trends, identifying warning signs and triggering intervention before a problem reaches an acute state. Access to data allows healthcare providers to deliver preventive care and manage chronic medical conditions—such as diabetes, heart disease and hypertension—to avoid serious and costly complications, encourage adherence to medication regimens and decrease the need for hospital admissions and readmissions.

In its research, IHS discovered that the need for value-based care under the Affordable Care Act is fueling a growing interest in wearable technology. Payment reforms that base reimbursements on the quality of care rather than the quantity of services reward healthcare providers who keep patients healthy. Hospitals and providers who fall short of these goals face government fines for readmissions and longer hospital stays.

Obstacles for implementing wearable technology include getting patients to commit to long-term use of the devices. Moreover, integrating non-standardized data from wearable devices with a provider’s information technology can pose challenges if the systems are incompatible. Some clinicians also want remote monitoring systems to include video, but patients are hesitant to have cameras in their homes. Other barriers include regulations on medical devices and perceptions that the clinical value of wearable devices isn’t worth the investment.

Despite these hurdles, IHS expects to see more developments in this arena during the next three to five years as hospitals, health systems, accountable care organizations and other healthcare providers with a financial stake in the delivery of patient care services strive to manage large at-risk populations with wearable devices.

Smartphone applications

So far, IHS has found that combining smartphone apps with activity and vital signs data from wearable devices remains a budding sector in the healthcare industry. Even so, a few trial programs are currently underway that allow healthcare providers to retrieve data generated from wearable devices that can be added to a patient’s electronic medical record.
Activity monitors

The use of prescribed activity monitors by healthcare providers has the potential to improve patient outcomes, particularly among individuals who need assistance managing a chronic illness and those committed to staying healthy. Some hospitals already use Pebble, by FitLinxx, as part of their employee wellness programs. But others are looking for ways to integrate the device into their clinical workflow.

For example, a doctor could write a prescription for an activity monitor to assist patients who need to exercise because they are overweight. The prescribed activity monitor has a single app shared by the hospital, clinician and patient. Patients leave the hospital with the monitor, which begins communicating daily progress via lights on the device and sends data directly to the electronic medical record.

One possible snag with using activity monitors is the large number of patients who lack smartphones or personal computers. This is why FitLinxx is enabling data uploads via smartphones, PC dongles and sync points that are Wi-Fi access points, where the monitors automatically retrieve data when the user passes through.

Continuous monitoring of patients

Devices that continuously monitor a patient’s vital signs represent yet another form of wearable technology that can enhance clinical outcomes. These devices use patches or body sensors to measure heart rate, respiration rate, oxygen saturation, blood pressure, body temperature and more. Patches—which include disposable types for outpatient use—are designed to adhere to the body for extended periods of time.

Some healthcare systems such as Palomar Health have deployed Sotera, a wireless vital signs monitoring system that uses patches to provide staff with immediate access to vital signs so they can intervene early, respond rapidly and improve patient safety. Clinicians access real-time data on Google Glass, smartphones, tablets, desktops and other devices.

Patches known as biostamps represent an emerging technology that may eventually warrant its own category. The technology, embedded in stretchable fabric that conforms to the body, involves super-thin sensors placed on or inside the body to continuously monitor and upload data to multiple devices. The development of biostamps will play a significant role in the increased use of patches during forecast years 2016 through 2019 and beyond, IHS predicts.

Improved workflows: a second major benefit

Wearable technology in healthcare settings can improve workflow efficiencies by making it easier for healthcare providers to quickly retrieve and analyze critical patient data when needed, comply with regulatory standards and legislation, and follow industry best practices for delivering patient care.

Smart glasses

For example, smart glasses have the potential to greatly streamline the workplace. Doctors can use smart glasses such as Google Glass to simultaneously monitor a patient’s vital signs without taking their eyes off a medical procedure or patient, while working in the operating room or conducting hospital rounds. Clinicians can use their voice to retrieve critical content—such as a patient’s medical history or the
results of a recent imaging study—that appears on a small screen in front of one eye. One Google Glass platform automatically populates a patient’s electronic health record based on conversations during doctor visits. Some hospitals are using smartwatches in similar ways.

**Portable hand sanitizers**

Wearable hand sanitizers make it more convenient for staff to follow best hand-hygiene protocols that, if ignored, can lead to serious health and financial consequences. An estimated 100,000 people die each year from hospital-acquired infections at an annual cost of $28.4 billion. Under the Affordable Care Act, hospitals face financial penalties for poor sanitation. The federal government no longer reimburses for certain hospital-acquired infections, and poor-performing hospitals face additional penalties.

Despite the potential cost in human life and financial resources, adherence to hand-hygiene practices remains low even in well-equipped facilities. Reasons cited by healthcare workers include inconvenient location of sinks, busy work schedules, understaffing and skin irritation from constant washing. Providers must often wash their hands multiple times while caring for a single patient.

Wearable hand sanitizers, however, address these barriers. Products such as SwipeSense combine personal dispensers to ensure point-of-care hand hygiene with real time usage data to increase compliance with infection-control procedures. Small sensors in dispensers and personnel badges automatically capture hygiene activity that can be analyzed for individual and unit compliance levels to promote a culture of patient safety. A similar wearable hand sanitation device, Hansure, is scheduled to launch in 2016.

**Wearable radio frequency identification**

Another blossoming use of wearable technology that improves workplace efficiencies includes radio-frequency-identification (RFID) devices to pinpoint hospitalized patients. RFID is a wireless system that uses radio waves to transfer data from wearable tags embedded with sensors that provide automatic patient identification and localization. RFID devices do not require direct contact or line-of-sight scanning, making it convenient for healthcare providers to identify patients regardless of their medical status.

**Radiation dose monitoring**

One emerging application involves the use of real-time monitoring systems with dosimeters worn by technologists to track radiation dosages in medical imaging. In most cases, the benefits of advanced medical imaging including computed tomography (CT) and fluoroscopy (X-rays) outweigh the consequences of exposure to ionizing radiation. But long-term risks remain involving repeat exposures, exposures in young patients and exposure to certain parts of the body.

Wearable dosimeters address these concerns by feeding exposure estimates to a monitor based on the individual’s proximity to the radiation source, in order to provide an immediate visual reference point. Staff can use the system to query dose data via information technology, including indicators of high-dose events, tracking dose-per-type of exam, setting dose-alert parameters and checking staff protocols based on repeated higher-dose events.
IHS anticipates the industry will place more attention on wearable dose monitoring systems through 2015 and 2016. Efforts to limit exposure by attaining as low as reasonably achievable (ALARA) radiation safety standards have gained traction, due to heightened interest from educated patients who question the need for repeat tests and concerns raised by regulators and industry organizations, including the U.S. Centers for Medicare and Medicaid Services, The Joint Commission, the American College of Radiology, the U.S. Food and Drug Administration and the Nuclear Regulatory Commission.

Furthermore, passage of new laws in California and Texas requiring medical facilities to use software to record the amount of exposures that patients receive from imaging studies has galvanized interest in wearable radiation dose monitoring. This year’s annual conference of the Radiological Society of North America, for example, drew technology companies such as Philips, GE Healthcare, Bayer, Siemens and RaySafe.

Although technology alone cannot reduce radiation exposure, wearable devices can serve to reinforce protocols, help facilities meet benchmarks for reducing exposure and serve as a long-term data repository for staff and patient, IHS notes.

Data-capture platforms occupy center stage

To capture, analyze and transmit data from wearable products, companies like Validic, Apple, Google and Samsung have taken the lead in creating digital health platforms.

Validic’s digital health platform services providers, pharmaceutical companies and payers. Validic can upload data from wearable devices to multiple sites, including the electronic medical record.

Many hospitals are interested in Apple’s HealthKit, which collects data from sources such as glucose measurement tools, food and exercise apps and Wi-Fi-connected scales. Ochsner Medical Center in New Orleans is working with Apple and Epic Systems, its medical records vendor, on a pilot program tracking patients with high blood pressure. HealthKit captures blood pressure measurements and sends the data to the Apple Health app on Apple phones and tablets. Apple Watch, set to debut this spring, promises to offer additional options.

Some hospitals want to try pilot programs with Google’s Fit platform— which blends data from apps and wearable devices—because Google’s Android software powers most smartphones.

Another company creating digital health platforms is Samsung, which has relationships with leading medical centers to develop mobile health technology.

While efforts to develop digital health platforms move forward, IHS has identified one practice that could derail progress: Companies are working in silos, creating platforms that are incompatible with competitors. This poses a problem when a patient switches devices and can no longer communicate with a provider’s information technology system.

The solution to this challenge, IHS believes, is increased interoperability among vendors to ensure that all clinicians and patients reap the full benefits of wearable technology.

Shane Walker is director for medical technology at IHS, while Roeen Roashan is an analyst for medical technology at IHS.

For more information on this white paper or on IHS research relevant to this topic, refer to the Wearable Technology Intelligence Service from the Industrial, Security and Medical research service of IHS Technology.

Follow the conversation @IHS4Tech