THE INTERNET OF MEDICAL THINGS
Everyone Wins in a Connected World

The Internet of Things (IoT) is a term that was coined by a British technology pioneer 20 years ago to describe the way our lives are becoming more and more tied to the internet.

Most people are already web-connected in ways well beyond desktop computers and smartphones. The IoT is made up of computing devices embedded in everyday objects, enabling data transfer between mechanical and digital machines, objects and people without the need for human-to-human or human-to-computer interaction.[1]

More recently, the IoT is opening exciting new vistas in healthcare that could address the industry's toughest challenges. Enter "the Internet of Medical Things" or IoMT, which is making inroads into personal healthcare management and healthcare payment applications.

These applications run on built-in sensors and devices that gather data like heart rate, blood pressure, motion, calories spent and sleep patterns. They transfer this information through mobile applications to the cloud in a number of ways, including via the internet, cellular networks, satellite, WiFi, Bluetooth, low-power wide-area networks (LPWAN), and near-field communications (NFC). Cloud platforms analyze the data using an IP address "safe authentication," and share it with healthcare providers via text or email. This helps clinicians monitor patients and recognize when an intervention is needed. Together, these records and claims help payers calculate risk for a given population.[2,3]

PROMISE AND POSSIBILITIES

The innovations in IoMT are numerous and exciting, with many applications already being adopted and gaining traction. They offer a glimpse of almost unlimited possibilities. Following are some categories winning early adoption:

Fitness Wearables

These wearables are activity trackers in the form of wristbands, smartwatches and smart clothes with sensors attached that capture vital statistics like physical activity and adherence to a fitness regimen. So, where does all that data go? To smartphones, of course, where it interacts with artificial intelligence algorithms for precision tracking. Currently available in the market are wristbands, smartwatches, shorts and shoes. There is even a wearable device attachable to the thumbnail for measuring exposure to UV light![4]

Medical-Grade Wearables

Medical-grade wearables are portable wireless devices that produce consistent, reliable and accurate data so health professionals can monitor vital signs, review diagnoses and manage chronic diseases. For example, wearables like smart belts are being used by elderly patients to detect falls. Also available are sensor-embedded hip protectors and chest straps measuring ECG, heart rate, respiratory rate and temperature. Monitoring devices can track patients following hospitalization and remind them to take medications, while keeping providers updated on their adherence. As the patient recovers, wearables can update treatment plans.[5,6,7]

Smart Pills

Some pills have ingestible sensors that record when a patient has ingested a dose of medication. In one current use, the sensors in the pill activate upon contact with stomach fluids and send a signal to an arm patch the patient is wearing. That notifies the provider or caregiver that the medication has been taken. That information can also be transferred to a mobile app.[8]

IoMT Advantages for Health Plan Members

Health plans members are connected everywhere in their lives and expect healthcare to keep up with the speed of life. As they save money and time using other technologies at their fingertips, they become less patient with systems that have fallen behind. Following are some advantages plan members stand to gain when their plan adopts IoMT:

- Immediate medical attention through telehealth
- Better tracking of their individual patient information on EHRs
- Emergency alerts to their families and healthcare providers
- Reduced hospital and laboratory visits
- Lower costs
- Real-time monitoring supporting their treatment plan adherence
- Proactivity in treatment
- Better health outcomes
- A better experience using the system [9,10]

Payers and Plans Should Adopt This Now

Many payers are already using or exploring ways to put IoMT innovations to work on behalf of members. Consumers are generally friendly to the idea and want healthcare to match the rest of their connected world. Besides pleasing members, health plans can gain these benefits by embracing IoMT:

- Identification of population risk
- Determination of treatment cost
- Reduced hospital stays and readmissions
- Reduced administrative work through automation[11,12]

Point of Care Devices

Kiosks and devices at the point of care bring healthcare closer to users in remote areas. Medical kiosks in community centers help connect patients with providers through telemedicine, providing diagnostic and treatment support that may save trips to the lab, as just one example of improved efficiency. Self-service registration kiosks can also ease the way for patients as they begin a hospital stay.

Devices in Clinical Settings

Smart devices enabled with IoMT are used by providers in clinical settings to digitally track and store patient information in electronic health records, which is then accessible to other providers and specialists. For example, a digital stethoscope can store and save a patient's heart sounds on a mobile app, which could be relevant information for several providers. In hospitals, devices implanted with radio-frequency identification chips help feed data from ECGs and MRI equipment to a patient's EHR. Locator devices help providers keep track of patients during an emergency. Other uses include location-based devices providers can use to track patients during an emergency.[13]
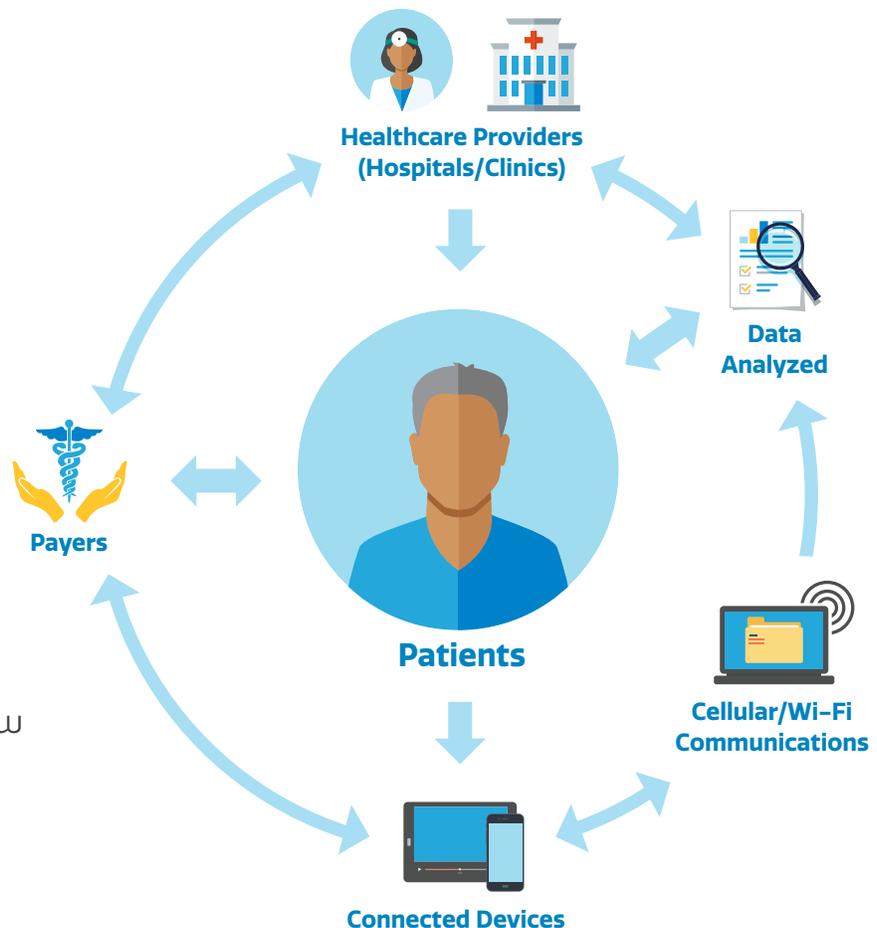
Benefits to Hospital and Health Systems

Hospitals also benefit from adoption of IoMT technologies. A few of their advantages include:

- Better tracking of inpatient and outpatient flow
- Recording and identification of devices in real time, including the location of wheelchairs, defibrillators, nebulizers, oxygen pumps and other monitoring equipment
- Improved staff efficiency
- Better inventory management of pharmacy, consumables and hospital supplies, and regulation of refrigerator temperature and humidity
- Improved storage and ordering of hospital supplies and consumables
- Improved infection control with monitoring of hand hygiene dispensers[14,15]

The Internet of Medical Things

An IoMT world has fewer barriers and a real–time flow of data that is constantly being refined.

Healthcare Providers (Hospitals/Clinics)

Data Analyzed

Payers

Patients

Cellular/Wi–Fi Communications

Connected Devices

Payer Challenges in an IoMT World

Since much of this technology is in its infancy, there are some definite challenges across the industry for this movement to fulfill its potential. Payers have many things to consider. Among the hottest topics are data security and privacy in the handling of health information. There is a well-known lack of interoperability among healthcare data, and the U.S. Department of Health and Human Services is pushing the industry hard to address this, finally issuing mandates with pressing timetables. Part of the interoperability challenge are the lack of standardized and scalable protocols within and among electronic health records (EHRs).

Payers will need to address key issues internally and culturally to be compliant and to compete for plan members. Among these issues are unfamiliarity with the new technologies, data security, competing protocols, and a lack of skilled resources and dedicated revenue. Compounding these challenges is an environment of uncertain business needs and undetermined ROI. Finding the right partners and technologies can make the critical difference when so much is on the line.[19]

Growth at an Ideal Time

With a focus on patient interaction and patient-centric care, the global IoMT is expected to rise with a compounded annual growth rate of 27% through 2024, from a current $55.5 billion to $188 billion.[16] Drivers of IoMT growth include easy access to wearable devices and the decreasing cost of sensor technology. Widespread availability of high-speed internet and government regulation have also contributed to IoMT adoption. This surge of interest couldn't come at a better time, as so many Americans have one or several chronic diseases. Better monitoring and early intervention could help lower healthcare costs.[17,18]

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