The Growing Potential of Connected IoT

▶ In healthcare, IoT is being investigated in a wide range of areas — remote monitoring, the use of smart sensors, within medical devices, and in many pharmaceutical applications, such as smart pills and treating disease.

T here are few hotter or broader topics than the Internet of Things (IoT). According to Deloitte, the market for Internet of Medical Things (IoMT) will be valued at $158.1 billion by 2022, and $45 billion in North America alone.

The life-sciences industry is increasingly looking to smart IoT solutions to improve the production process, streamline the supply chain, decrease costs, and find new ways to treat patients.

Understanding the IoMT

Medical technology, or medtech, is realizing huge advances thanks to the IoT. Increasingly, connected medical devices are generating, collecting, analyzing, and transmitting data, and that data, together with the device, is creating the IoMT, which essentially brings together the devices, the software applications as well as health systems and services.

The purpose of IoMT, as it relates to medtech, is to help improve patient outcomes, reduce healthcare costs, drive greater efficiencies, and find effective ways to engage patients.

According to Deloitte, while medical device companies are expecting an increase in the number of devices embedded with IoMT, there are several challenges. A big issue is interoperability, which can best be solved by moving to open platforms based on open standards that will make it easier for all stakeholders to share data. Security is another issue, since the more devices and the more extensive the capabilities of those connected devices, the greater the risk of data breaches. Experts advise several strategies to protect the security of connected devices, including two-factor authentication, access logging, encryption, anti-virus tools, as well as stringent policies around personal device authorization.

Other key considerations are whether there is the skill set available to deploy these connected solutions, the risks involved from innovators and the issue of funding, and ensuring that these solutions are used at scale to achieve the overarching objectives of reducing costs and improving outcomes.

Nevertheless, between the clinical trials, manufacturing plants, supply chains, delivery routes, and patients, there are many sources of data rich with information and an increasingly broad selection of tools for collecting information.

Patients, pharmaceutical companies, and supply chain operators all have a lot to gain from adopting the IoT on a larger scale.

A Clinical Application of IoMT

Given the high costs of clinical trials and the large number of products that fail to win approval, finding ways to reduce costs and improve success is widely sought. Use of cell-in-a-chip or organ-in-a-chip technologies can be used to understand whether a formulation has an impact on a disease.

By way of example, BioLines Laboratory worked with the University of Pennsylvania to create a lung chip and a bone marrow chip and then launch them into space in order to understand the physical and biological effects of space travel on humans.

It's also hoped that IoT can help with the oversight of clinical trials by tracking the health of subjects in their day-to-day lives. This would help to reduce the need for frequent check-ins, potentially making it easier to recruit patients who might find the burden of traveling to a trial too onerous.

Smart technology has been shown to be highly beneficial to patients by enabling physicians to better monitor their patients and potentially even help reduce symptoms during treatment. For example, a randomized trial of 357 patients being treated for head and neck cancer used several IoT-enabled technologies, including a Bluetooth-enabled weight scale and blood pressure cuff, to send updates to the patients' physicians on the responses to treatment. Those patients using the monitoring system, Cycore, had less severe symptoms in terms of both the cancer and treatment than the control group. The technology benefited patients by speeding up the process of identifying and addressing side effects.

Connected Health in Practice

Diabetes is a condition that has benefited substantially from IoT technologies. One such example is OpenAPS (The Open Artificial Pancreas System project), a simplified artificial pancreas system (APS) that has been designed to automatically adjust an insulin pump's basal insulin delivery to keep blood glucose (BG) in a safe range overnight and between meals. The way it works is the system communicates with an insulin pump to gather details of all recent insulin dosing by connecting with a continuous glucose monitor (CGM) to obtain current and recent BG estimates, and by issuing commands to the insulin pump to adjust temporary basal rates as needed. By automating insulin delivery, the APS helps to keep blood glucose within a safe range and allows an insulin-dependent diabetic to sleep through the night without the risk that their blood sugar will drop.

Another condition where smart technology has significant potential is asthma, where connected inhalers can help patients better control their symptoms and treatment.

Advanced Production

IoT has the potential to improve quality in the production process, for example through sensors that monitor the conditions in the manufacturing process by sharing details related to how each item is made through the

EXECUTIVE VIEWPOINTS

Ed Cox
Executive VP, Strategic Alliances and Global Head of Digital Medicine, EVERSANA

IoMT: Game Changer
Across IoMT are systems designed to protect information. Yet, to guide patients to better health outcomes throughout their treatment journeys we need an integrated data strategy with the ability to share analysis across multiple platforms and with key stakeholders. Breaking down silos by supporting technology that provides value across the patient care ecosystem and investing in IoMT that generates data and seamlessly interacts with other systems is game-changing for patients and healthcare overall.

Next Generation of Patient Services Care Models
Plain and simple: The ability to gather more accurate real-world data in real-time is key. Access to health data and the ability to analyze it, gives providers greater ability to generate actionable insights that improve patient engagement, identify trends, monitor treatment progress, intervene earlier, develop personalized therapies, and support patient adherence. This is the next generation of patient services care models designed to drive better health outcomes and experiences for patients.

Gene Fitzpatrick
Senior VP, Engagement Strategy, Ogilvy Health

Rule-Based Automated Responses
The acceptance of automated text and voice chatbots by consumers is nearly ubiquitous these days. We interact with them daily for communication with service providers, shopping assistance, and more. Creating such applications is one of the most fool-proof ways to communicate in pharma. Very specific business rules are created to start to guarantee that an automated response is using proper language, and can solidify perfect communication for any interaction.

Carmine Jichetti
Head of the Innovation Lab, Ogilvy Health

A Data-Driven Approach
Patient diagnostics and treatment rely on data to make informed decisions. Also, with the emergence of AI as another weapon in the healthcare providers arsenal, the need for data becomes even more prevalent as big data is what drives AI algorithms to more accurate conclusions. Connected health tools have the ability to collect a more comprehensive and accurate data set than any patient could ever do manually.

cloud and tracking the history of the entire process. To achieve this IoT sensors monitor temperature, humidity, gas exposure, radiation emission, and so on.

Using AI, the sensor can detect slight degradation, predict the outcome of that development, adjust the environment as needed, or trigger an alert to correct an issue before problems occur. It can even flag a piece of equipment that may be at risk of failing or has some abnormal conditions.

With IoT, companies also have insight into capacity so if there is a shortage of medicines or risk of over-supply in any warehouse around the world they can act accordingly. By using smart warehousing, companies have real-time visibility into the situation in all their warehouses.

But it doesn't just stop at the production line. Indeed, IoT can track a product from the outset to when it is purchased by the patient to determine whether exposure to different conditions affects the medicine. And IoT has the potential to alert the public to counterfeit medicines.

Once the medicine reaches the patient, the next challenge that companies have long faced is compliance. Again, IoT has the potential to address this, using automated pill dispensers that are connected to a smart device that is programmed to release medication at a set time and record the delivery. And to ensure the patient actually takes the medication, digitally tracked pills equipped with sensors send messages to a smartphone that the pill has been taken.

There are multiple ways in which connected IoT can assist life-sciences companies. Many solutions remain a work-in-progress, but many are helping the industry to improve their processes and improve outcomes for patients. **PV**