The future of health information technology and the internet of medical things

Transformation of the MedTech industry through connectivity

Together for a healthier world

Arab Health

By Informa Markets

Transforming the MedTech industry

The United Nations predicts that by 2050, the world will be home to 10 billion people, and two in five of these people will be aged 60 or over, including 434 million over 80 years old. This combination of population growth and demographic changes will seriously accelerate the challenges we face for the delivery of health and healthcare, with global healthcare spend projected to reach 13 % of GDP in OECD countries by 2050.

Unquestionably, a driving force behind access to quality healthcare is the adoption of technology that enables clinicians to provide better and more efficient patient care. Our ability to store, share and analyse health information is directly tied to improved technology, and the use of technology increases provider capabilities and patient access while improving the quality of life for some patients and saving the lives of others.

According to a report by the World Economic Forum, the progress in technology spanning the digitalisation of health and healthcare to social media, healthcare information technology (HIT) internet of medical things (IoMT), wearables, sensors, big data, artificial intelligence (AI), augmented reality (AR), nanotechnology, robotics and 3D printing, will together radically transform society, increasing interconnectivity and breaking the structures of healthcare systems.

Similarly, the advances in the discovery and clinical sciences, data science and medical technology and their convergence are paving the way for exciting new developments and have the potential to bring about transformative effects across all aspects of health and healthcare to become much more connected, efficient, preemptive, precise, democratised and affordable.

There will be two transformative shifts reshaping the healthcare industry, according to the World Economic Forum:

1. Healthcare will be delivered as a *seamless continuum of care*, away from the clinic-centred point of care model and with a greater focus on prevention and early intervention

2. Health and healthcare delivery will focus on each person within their own ecosystem, with a greater impact from people or patients themselves, often referred to as the *consumerisation of healthcare.*

The convergence of medical technology (MedTech) and HIT are pivotal to this transformation.

The future of health information technology (HIT)

The term "health information technology" (HIT) refers to "the electronic systems healthcare professionals – and increasingly, patients – use to store, share, and analyse health information."

According to the Office of National Coordination for Health Information Technology, HIT includes electronic health records (EHRs) allowing doctors to better keep track and share health information, personal health records (PHRs) which gives patients control of what kind of information goes into it, as well as electronic prescribing (E-prescribing), all of which can increase the protection of patient health information. Other technologies beyond EHRs include picture archiving and communication systems (PACS), and vendor-neutral archives (VNAs) which are two widely used types of health IT that help healthcare professionals store and manage patients' medical images.

Allied Market Research estimates that the global HIT market was valued at US$ 125 billion in 2015, and is expected to reach US$ 297 billion by 2022, with a CAGR of 13.2 %. This market growth is attributed to the rising demand for patient safety and data accuracy, need to curtail healthcare cost and implementation of various healthcare policies promoting the use of HCIT in healthcare facilities.

While the push to digitalise healthcare has been going on for over a decade, today, providers are looking for ways to achieve measurable results for the systems that they already have in place.

Health Data Management has highlighted 12 trends expected to dominate Healthcare IT in 2019:

- Using IT to help achieve patient engagement and experience
- Rising efforts to achieve digital health
- Accelerating the use of AI and data visualisation
- Rising importance of population health management
- Growing efforts by payers to provide total care management
- Pressing on toward interoperability
- Pushing to achieve EHR optimisation
- Protecting health information and data security
- The rising tide for value-based care
- Growing the role of virtual care

The power of connected medical technology

A recent report by Deloitte described patient interactions with the healthcare system often involving interactions with equipment and devices – from syringes and bandages, blood pressure monitors and pregnancy testing kits, to surgical instruments, pacemakers, artificial joints, and MRI and CT scanners.

The MedTech industry, predicted to grow by nearly US$ 120 billion between 2017-2022, designs and manufactures a wide range of products to diagnose, monitor, and treat patients and is instrumental in helping healthcare organisations achieve better patient outcomes, lower healthcare costs, improve efficiency and find new ways of engaging and empowering patients.

Major advances in wireless technology, miniaturisation and computing power are driving innovation in MedTech, leading to the development of an increasing number of connected medical devices that are able to generate, collect, analyse and transmit data, the report continues. The data, along with the devices themselves, are creating the Internet of Medical Things (IoMT) – a connected infrastructure of medical devices, software applications and health systems and services.

According to an article published in PharmExec, 'connected' medical devices give patients greater control over their health data, and in turn, enable doctors to use the data to prompt beneficial patient behaviour. As we move closer to an even more advanced age, Medicine 3.0 - which will see artificial intelligence capabilities being integrated into medical devices - companies will need to be nimble in responding to the market's demands and expectations, and regulators will have to be ready to adapt to ever-changing innovation, the article continues.

As a result, medical device companies must find ways to efficiently gather and manage all of this data so they can extract reliable, insightful and actionable knowledge and information for the benefit of patients, for population health, and to overcome potential technological and therapeutic challenges.

MedTech companies and IoMT in numbers:

- 51 % of MedTech companies are implementing new business models to a large extent

- 71 % believe healthcare providers and clinicians are not ready to utilise data generated from connected medical devices

- 67 % believe that the regulatory framework will not catch up with what is possible today for another five years

- 39 % are adopting a value-based approach to pricing to a large extent

Source: Deloitte

"MedTech is transforming from an innovative product supplier…to an insightful partner for patients and healthcare, rewarded for improving healthcare performance."
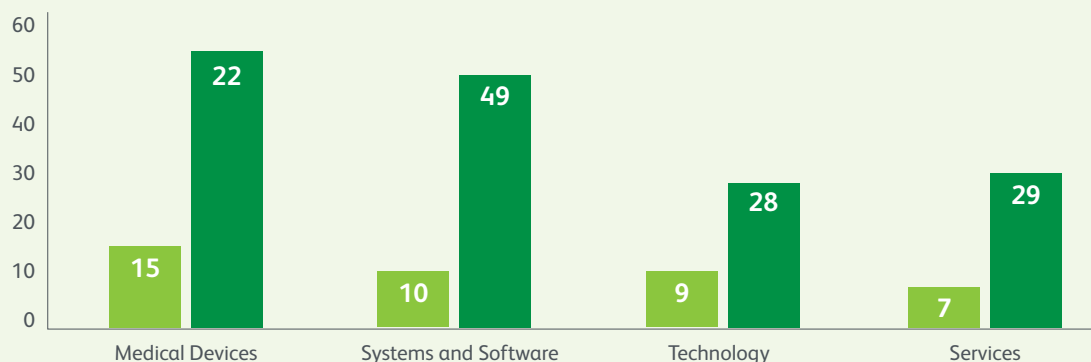
Deloitte, 2018

The rise of the internet of medical things (IoMT)

The rise in the number of connected medical devices, together with advances in the systems and software that support the capture and transmission of medical grade data, connectivity technologies and services, has created the Internet of Medical Things (IoMT).

According to Deloitte, the IoMT brings together the digital and physical worlds to improve the speed and accuracy of diagnosis and treatments and monitor and modify patient behaviour and health status in real time. It also improves a healthcare organisations' operational productivity and effectiveness by streamlining clinical processes, information and workflows.

As the IoMT gains traction on a global level, Markets & Markets have valued the IoMT market at US$ 41.2 billion in 2017 and expects it to rise to US$ 158.1 billion in 2022. The connected medical devices segment (helping to diagnose, monitor and treat patients) of the IoMT is expected to rise from US$ 14.9 billion in 2017 to US$ 52.2 billion by 2022. Meanwhile, the IoMT market in the Middle East and North Africa is expected to grow from US$ 2 billion in 2017 to US$ 9 billion in 2022.

The overall IoMT market is expected to grow from $41 billion in 2017 to $158 billion by 2022

Bar chart values:
- Medical Devices: 15, 22
- Systems and Software: 10, 49
- Technology: 9, 28
- Services: 7, 29

North America from $13 billion to $45 billion

South America from $2 billion to $9 billion

Europe from $12 billion to $44 billion

Asia-Pacific from $11 billion to $51 billion

Middle East & Africa from $2 billion to $9 billion

Source: Markets & Markets 2017

According to Markets & Markets, this growth is due to the rapid digitisation of healthcare systems to aid efficient patient care, the rise in the demand for mobile healthcare technologies and an increase in demand from an ageing population and people suffering from chronic diseases.

A recent article by the World Economic Forum (WEF) highlighted that the IoMT now has an established role in a broad range of healthcare applications to support clinical decisions, reduce incorrect diagnosis, and improve quality of services through the management of chronic diseases and monitoring of hospitalised patients.

The WEF highlights one example of an idea that makes up IoMT - a smart pill that lets you know you have taken it. As patients on regular medication can find it difficult to remember if they have taken the right dose at the right time, a new pill has been created that contains a tiny sensor that records when it is taken. Information is transmitted to a patch worn by the patient and then sent to a smartphone. Patients and doctors can ensure the medication is being taken as needed, an innovation already being used in the treatment of schizophrenia and other mental illnesses.

The article also highlights telemedicine as another application of IoMT where healthcare can be provided at a distance via phones and IT. Patients can use devices to measure blood pressure, monitor glucose levels and test for conditions from blood samples - and send the results in real time to their doctors.
Source: MIT Technology Review

Disruptive technologies in the IoMT ecosystem:

- Medical Devices
- Connectivity Technology
- Telemedicine
- Big Data
- Artificial Intelligence (AI)
- Robotics
- Mobile Applications
- 3D Printing
- Advanced Sensors
- Voice Technology
- Interoperable EHRs
- Virtual Home Assistants
- Medical Adherence Tracking
- Emergency Response Systems

Breakthrough healthcare technologies in 2019

The MIT Technology Review enlisted Microsoft co-founder Bill Gates to help create its list of breakthrough technologies for 2019 and five were healthcare focused:

1. Blood test to predict premature births
A simple blood test can predict if a pregnant woman is at risk of giving birth prematurely. By sequencing the free-floating RNA in the mother's blood, Stephen Quake, a bioengineer at Stanford, has found a way to spot fluctuations in the expression of seven genes that he singles out as associated with preterm birth. That lets him identify women likely to deliver too early.

2. Making it easier to screen for gut disease
A new invention from Massachusetts General Hospital pathologist Guillermo Tearney could make it easier to spot Environmental enteric dysfunction (EED) in the gut. Tearney has developed a swallowable probe, which can image and biopsy the gut without requiring anaesthesia.

3. Personalised cancer vaccines
Conventional chemotherapies take a heavy toll on healthy cells and aren't always effective against tumours. German biotech company BioNTech has partnered with Genentech on mRNA based therapies, which can reprogram the body to attack cancerous cells and manufacture these individualised treatments at scale.

4. EKG-enabled smartwatches
ECG-enabled smartwatches, made possible by new regulations and innovations in hardware and software, offer the convenience of a wearable device with something closer to the precision of a medical one. An Apple Watch–compatible band from Silicon Valley startup AliveCor that can detect atrial fibrillation, a frequent cause of blood clots and stroke, received clearance from the FDA in 2017. Last year, Apple released its own FDA-cleared ECG feature, embedded in the watch itself.

5. Voice assistants in the clinic
The use of these devices in healthcare is still in the early stages. However, that seems to likely to change in the near future. Startups like Suki and Orbita, as well as tech giants like Amazon and Google, will use HIPAA-compliant voice-enabled technology to help guide patients in their care, relieve physician burnout and increase efficiency in the clinical care process.

Conclusion

Cost-effective and purposefully-designed, technology-enabled healthcare solutions can improve the well-being of millions of people and radically change the way services are delivered to patients. According to the World Economic Forum, digitisation is helping to improve the continuity of care, promote improved health and prevent disease. Digitisation is driving the reform of health systems and their transition to new models of patient-centred care, enabling the shift from hospital-centred systems to more community- based and integrated care organisations.

A future where data is secure, aggregated and easily analysed will be a crucial enabler for the digital transformation of healthcare and the health and well-being of people on an individual, national, and global scale. Connected medical devices and the IoMT are pivotal to these shifts to new models.

However, according to the World Economic Forum, there remain many questions that will have to be addressed for emerging technologies to have a positive impact on health and society. Will new technologies, such as CRISPR-Cas9, be used for enhancement purposes? Will healthcare professionals be prepared to appropriately deploy new technologies in clinical care? Will technology disrupt the doctor-patient relationship? Will patient data be adequately protected?

Six predictions for 2022 – both evolutionary and revolutionary

The quantified self is alive and well: The genome generation is more informed and engaged in managing their own health

The culture in health care is transformed by digital technologies: Smart healthcare is delivering more cost-effective patient-centred care

The life sciences industry is industrialised: Advanced cognitive technologies have improved the productivity, speed and compliance of core processes

Data is the new health care currency: AI and real-world evidence are unlocking value in health data

The future of medicine is here and now: Exponential advances in life-extending and precision therapies are improving outcomes

New entrants are disrupting healthcare: The boundaries between stakeholders have become increasingly blurred

Source: Deloitte LLP, 2018

For 45 years Arab Health has brought the latest innovations in healthcare to the MENA region. From state-of-the-art imaging equipment to the most cost-effective disposables; developments in IT systems and solutions Arab Health continues to be at the heart of healthcare in the Middle East. The 2020 edition of the show will take place from 27 - 30 January and will welcome 4,250+ exhibiting companies to showcase their latest innovations to 55,000 healthcare and trade professionals. This year Arab Health is also pleased to introduce that show floor will be divided into 8 sectors including a primary sector for IT systems and solutions. Running alongside the exhibition are 18 conference tracks and a variety of workshops for medical professionals to advance their knowledge and skills. For more information, visit www.arabhealthonline.com.

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