



On a health kick with **CONNECTED HEALTHCARE**

The most challenging issues facing healthcare today include legacy systems, the uneven distribution of medical resources, non-transparent resources, and low patient satisfaction. But digital transformation promises a healthier future for all based on two pivotal advancements enabled by mobile networks: remote healthcare and IoT.

By Ding Jiangbo, Huawei

In poor health

The current system is designed for sporadic and acute diseases. It doesn't apply to the treatment and management of chronic diseases, which incur more

than 70 percent of medical costs. Moreover, the uneven distribution of medical resources, especially in emerging economies, concentrates the best resources in a few cities or hospitals. In China, for example, most first-class hospitals are located in tier-one cities. A lack of transparency

with medical resources also means that it's hard to quickly find suitable doctors. Another factor lowering patient satisfaction is waiting times. In Spain, for instance the average wait for surgery is more than 100 days. Healthcare is also costly. It currently accounts for 10 percent of global



GDP. And in the US, it's projected to reach 23 percent of GDP by 2023.

Always-on healthcare

Eliminating these issues through digital transformation is an industry-wide goal. IoT, for example, can connect people to healthcare. Monitoring devices, smartphone apps, wearables and implantable sensors – all with access to real-time information – will create a new era in how health is managed.

As a part of eHealth, m-Health is supported by mobile devices like phones, monitoring devices, digital assistants, direct care devices, and other wireless devices.

These devices address healthcare challenges in three ways:

Reduced costs: GSMA estimates that m-Health can save US\$18 billion in existing healthcare systems in Brazil and Mexico, and create 200,000 jobs in the emerging m-Health sector by 2017. The FCC predicts that remotely monitoring patients could save US\$197 billion in the US over the next 25 years if it focuses on the four following **diseases:**

heart disease, diabetes, pulmonary disease, and skin diseases.

Higher efficiency: M-Health solutions enable healthcare practitioners to diagnose, treat, and monitor more patients than face-to-face consultations, thus freeing up time and resources for complex cases. In 2011, trials in Nordic countries found that M-Health could reduce overnight hospital stays and re-hospitalization for chronic obstructive pulmonary disease (COPD) by 50 to 60 percent.

Better long-term healthcare: M-health enables comprehensive healthcare through real-time data capture and analyses, better accessibility to information, enhanced patient ownership and understanding of their own conditions, and support with diet and lifestyle changes. Patients can more easily manage their own health.

It can also bridge the gap between urban and rural healthcare disparities. For example, the Philips and Huawei partnership, which aims to provide cloud-based and IoT solutions, focuses on China's tier-two cities, which tend to lack equipment and qualified doctors.

Home is where the heart is

Pollution and unhealthy lifestyles are disastrous for global health. For example, WHO reports that obesity more than doubled between 1980 and 2016. In 2014, nearly 1.9 billion adults – 39 percent of the global total – were overweight. Of these, over 600 million were obese, causing an explosion in diabetes and hypertension. The ageing population is another challenge – perhaps the most pressing of all. The UN estimates that the number of senior citizens aged 60 or over will increase by 56 percent from 2015 to hit 1.4 billion in 2030.

It's uneconomical to keep all patients in hospital until they fully recover, especially those with chronic diseases who need extended, even lifelong, monitoring and treatment. This means that health monitoring will gradually move the hospital to home. For specific groups like the elderly or children who require carers, an online device that provides real-time data would be invaluable. For healthy people, the constant stream of biomedical data would preempt health problems and help respond to emergencies.



Monitoring technology can vary in complexity from tracking simple physiological data such as blood pressure, pulse, blood sugar, and body weight, to implantable devices like pacemakers and defibrillators, whose running status can be monitored remotely. In 2015, an astonishing 165,000 mobile health apps were available on the iOS and Android platforms – about twice as many as just two years earlier.

All types of monitoring services rely on mobile connectivity, which is great news for mobile network operators (MNOs). According to EY, the addressable market of remote monitoring for MNOs will reach US\$69 billion in 2022. Chronic disease management will be the biggest sub-segment in remote monitoring services, especially for target groups like the elderly, children, and athletes. By 2022, these sub-segments will account for 40 percent of the remote monitoring market.

Innovation drivers: Wearables

Wearables include embedded sensors, wireless communications, multimedia and other tech in eyewear, watches, bracelets, clothing, footwear

Healthcare accounts for

10% OF GLOBAL GDP

M-Health can save

US\$18 BILLION

in healthcare costs in Brazil and Mexico

165,000

mobile health apps were available in

2015



and other daily wear. For example, clothing can monitor oxygen supply and posture, shoes can calculate calories consumed and distance moved, while glasses can record the surrounding environment.

According to Ovum, 277 million units of wearables will have been purchased by 2020, up from 97 million in 2015. Better battery and component design should help boost sales from 2017 onwards, as previously most wearables were alternatives to phones that people didn't view as necessary.

Soon, however, wearables will cause a healthcare revolution. As well as recording blood sugar, blood pressure, heart rate, oxygen content, temperature, respiratory rate and other health indicators, they will also treat diseases. Several MNOs are exploring the wearables market, including NTT DoCoMo, which launched Moveband health trackers with the electronics manufacturer Omron. Automatically transmitted to DoCoMo's app, the data collected enables full health management and, by year-end 2015, the service had attracted two million users in Japan.

For enterprises like Omron, the



Estimates hold that the global market for medical robots will reach US\$11.4 billion by 2020, up from US\$4.2 billion in 2015.

consumer healthcare space is wide open, as currently no iconic company is leading the way.

Remote care

Remote care aims to leverage ICT to use information for researching, diagnosing, treating, and preventing disease and injuries in a place other than where the patient is located. GSMA forecasts that the remote care market is expected to be worth US\$5.7 billion in 2017.

While remote healthcare can overcome geographical and time barriers between healthcare providers

(HCPs) and patients, several barriers hinder its mass deployment. First, remote schemes are usually non-profit programs designed for underdeveloped regions where ongoing investment isn't guaranteed. Second, no international legal framework exists to protect privacy or set out liability, so both patients and HCPs face risks. Third, language and cultural differences mean that patients and HCPs often can't communicate effectively, particularly in underserved regions such as Africa. Rural hospitals also lack critical maintenance support for the high-tech equipment used for remote care.

5G, the enabler

In the 2020s, 5G will take healthcare into a new world. Advanced robotics like the AI surgeon STAR – which surpassed human capabilities in 2016 – and remote care will continue to develop.

Estimates hold that the global market for medical robots will reach US\$11.4 billion by 2020, up from US\$4.2 billion in 2015. The pioneering da Vinci System uses a magnified, high-res 3D vision system to translate a surgeon's hand movements into precise





movements by micro instruments inside the patient's body. Currently, surgeons operate robots via a control platform located near the operating table. In the future, it's likely they won't even need to be in the same hospital thanks to next-gen mobile networks and real-time data transmission.

MNOs in m-Health

MNOs have unique advantages that enable them to thrive in the m-Health ecosystem, including stable and secure mobile networks that cover wide areas. They also operate legacy call centers. These two advantages enable E2E value-added emergency services and extend the reach of healthcare into underserved regions. Beyond technology, a huge customer base and close relationships with governments will help attract other stakeholders.

For example, MNOs could use the open door strategy for developing platforms for device providers. On specialist SIM cards, customers could activate tracking and emergency services, and MNOs could cooperate with governments and hospitals to promote emergency remote diagnosis and in-ambulance treatments

enabled by robust networks.

MNOs' analytics capabilities on big data could contribute to health risk control and disease prevention, while cooperation with key stakeholders could persuade governments to position m-Health as a regular treatment solution for chronic disease management.

In the mid-term, highly reliable, high-performance next-gen networks will contribute to some exciting advancements in healthcare, while the long-term aim is remote care for all.

2025 and beyond

By 2025, it's likely that a lot of the healthcare bottlenecks that exist now will have vanished, with primary care accessible to all citizens, including the world's large rural population, thanks to the increased availability of broadband, mobile devices, and apps.

Other exciting advancements will also have been made. Biofabrication, which involves growing living tissue, will have advanced considerably, as specially designed 3D printers will replace prohibitively expensive legacy

machines. Based in Philadelphia, the biotech startup BioBots has developed a 3D printer that can print living tissue by using a special ink that combines with biomaterials and living cells, offering the potential to grow mini human organs. Its immediate application potential includes replacing animals for drug testing and researching cures for rare diseases.

3D manufacturing robotics and artificial biology will improve tech like exoskeletons and mind-controlled prosthetics. AI will be able to spot subtle trends through massive datasets segmented into sub-populations and sub-geographies, encouraging research into diseases that were once felt to be too rare to research. Sensors will extend past wearables and begin monitoring health 24/7: your bathtub may screen you for tumors; the steering wheel in your car could warn you you've put on too much weight; and your home drug dispenser will remind you to take your medicine.

However, the most exciting advancements aren't necessarily medical advances; they're more to do with breaking down barriers and ensuring healthcare for all. [WINWIN](#)