What it takes to treat a patient 3,000 miles away

Robots can perform surgery operated by a doctor 3000 miles away. Credit: Thinkstock

Increasing demands on medical health professionals and shortfalls in specialists could be addressed with a surge in new types of “telemedicine” technology that links experts with patients remotely.

Huawei's strategy focuses on close cooperation and integration with partners to deliver a range of customer-centric ICT solutions and services that are based on an understanding of customer needs. We offer a portfolio of ICT solutions that cater to global vertical industry and enterprise customers across government and public sector, finance, transportation, energy, large enterprises and SMEs.

MaLea Fox was just seven months old when, on a summer’s day in 2011, she woke with a dangerous temperature of 39°C (102.4°F).

Local doctors near her home in the US state of Oregon had earlier diagnosed a common virus. But when MaLea’s mother found her unresponsive, she was rushed to a nearby hospital for a second opinion.
Dr Jennifer Needle, a specialist in paediatric intensive care, was working at a clinic 100 miles (160km) away at the Doernbecher Children's Hospital in Portland, when she made a diagnosis that would save MaLea’s life.

Using a laptop with a fast internet connection and a mobile videoconferencing unit at MaLea’s bedside, Dr Needle spotted a rash that she quickly diagnosed as meningococcemia, a life-threatening bacterial infection known for causing meningitis.

The remote and timely intervention meant MaLea was given the antibiotics that would help save her life. It also meant that Dr Needle could tell nurses to insert a breathing tube – something that became critical when, without warning, the helicopter transporting her to the hospital had to turn back due to fog.

The case was another success for the Oregon Health & Science University (OHSU) Telemedicine Network – a system that electronically connects 10 hospitals across the state with the organisation’s expert neonatologists, stroke neurologists, neurosurgeons, trauma surgeons and other specialists.

This ability to connect patients with experts is invaluable, explains Dr Miles Ellenby, medical director of the network. "In a time of crisis, a telephone call is helpful. A picture is worth a thousand words. But live interactive video is priceless. We can actually see what's going on."

Remote diagnosis like this is just one example of the growing field of telemedicine – a broad term covering various ways healthcare can be delivered remotely. Back in 2001, for example, a team of surgeons in New York successfully removed a cancerous gall bladder from a 68-year-old woman 3,000 miles (4,828km) away in Strasbourg Civil Hospital, France.

The procedure, using a fibre optic communications link and a “robotic surgical system”, marked the first ever example of remote surgery, or “telesurgery” – a now well-established field.

Elsewhere, the US Army is using telemedicine to treat soldiers for medical and psychiatric conditions. Videoconferencing systems used by the Tripler Army Medical Center in Honolulu, for example, are flexible enough to allow treatment of former soldiers across America suffering with Post Traumatic Stress Disorder (PTSD) along with providing psychotherapy for serving soldiers deployed in remote war zones.

Meeting demand

But this kind of technology is not just useful in emergencies. Increasingly, it is helping solve one of the main problems afflicting global healthcare: too few doctors for too many people.
According to the World Health Organization (WHO), 47% of its member states have fewer than one doctor per 1,000 inhabitants. For example, in the last decade Niger and Liberia had just two per 100,000 while Tanzania had just eight per one million people. The countries stand in stark contrast to the wealthy principality of Monaco – which boasted more than seven doctors per 1,000 inhabitants in 2011.

There are also huge imbalances in concentrations of doctors per country. In Malawi, for example, 87% of its population lives in rural areas but almost all of the country’s doctors are based in cities. Likewise in Canada, the isolation of some northern communities severely limits the availability of professional medical help.

In practice

China, which currently averages 14 doctors for every 10,000 citizens, is attempting to address its own shortfall with the help of a new telemedicine project at the First Affiliated Hospital of Zhengzhou University in Hunan Province.

The project connects consultation rooms, classrooms and operating theatres via telepresence systems – high definition real-time videolinks – installed by global information and communications company, Huawei Enterprise.

The system helps spread the expertise available at Zhengzhou University by connecting the hospital with 118 county-level medical units across 18 cities. By using 3G mobile connections, fibre optics, fast-speed cables known as DSL, satellite and other communication technology, experts in Zhengzhou can now interact with colleagues across the province – even in rural areas with extremely slow internet speeds.

Data from medical instruments like dialysis or ECG (electrocardiogram) machines can be streamed in real-time while the system’s panoramic cameras help patient consultations feel as much like a face-to-face meeting as possible.

Moreover, different types of telemedicine terminals mean that healthcare professionals in multiple locations can collaborate on a patient’s treatment – with devices portable enough to be used by doctors whether they are at a desk, inside an operating theatre, or even inside a moving car.

DIY health

But these examples are just the tip of the iceberg, says Dr Patrice Cristofini, the executive vice president of vertical healthcare for Huawei in Western Europe.

As the technology improves further with the onset of smaller and cheaper wireless transmitters that can process larger amounts of data, such as 4G LTE, it will become accessible on a wider scale.
Already companies like Huawei Enterprise are working on devices compact and simple enough to be kept at a patient’s home that can track their health 24 hours a day.

Small portable “telehealth” units, designed to be kept on a bedside table, have been created for high-risk groups such as the elderly, the chronically ill, pregnant women or post-op patients. The devices can measure everything from blood pressure and heart rate, to ECG and dialysis data via attachments to the patient’s body. Information is collected by the unit’s wifi sensors and sent to a central server, which alerts the healthcare management team to any anomalies.

As with most new technologies, there are arguably downsides. New equipment costs, extra training for staff and the absence of a reassuring physical presence that patients are familiar with, could meet resistance. However, with increasing medical needs and growing populations, pressure on medical resources will become more intense. Around the world, for example, there are already one billion hypertension sufferers and 250 million diabetics and by 2050 the number of people aged over 60 will outnumber those under 15 for the first time in history.

“The enormous social demands will compel policymakers to invest more to facilitate technology growth so as to address the shortage of doctors. We hope that the widespread adoption of telemedicine may soon be a reality,” says Dr Cristofini.

*Huawei Enterprise’s telemedicine solutions have enhanced medical facilities’ services by providing new forms of video terminal for different scenarios. Three-screen telepresence systems enable doctors more efficient consultation experiences; multi-function remote consultation enables a unified network for voice/video conferencing; and integrated 3G/4G terminals within ambulances can help hospitals receive patient data faster.*