



# TELEMEDICINE: BENEFITS AND DRAWBACKS

Text by Dr Kenneth Lyen

Wikipedia defines telemedicine as “the use of telecommunication and information technology to provide clinical health care from a distance.” It is particularly effective in helping patients who face difficulties physically accessing direct medical contact.

## A brief history of telemedicine

You could say that telemedicine started with the invention of the telephone and one could consult a doctor via a mere phone call. Some of you might remember carrying a pager – once a phone number appeared on the screen, you had to scramble around looking for a land line to return the call. All this changed with the invention of the mobile phone, but the earlier models could only communicate voice messages. Later phone models could transmit text messages and photographs. As the speed and volume of transmissible information increased, you could send larger files which carried greater clarity, send videos and do videoconference calls. Then came cloud storage, enabling everybody to store and simultaneously view and alter materials sent into the cloud.

## Techniques of telemedicine

Telemedicine is generally practised from a hub, where a distant practitioner delivers service and advice through a telecommunications system. Current communication devices include mobile phones, computers and teleconferencing webcams. Currently, nearly all medical, nursing and allied health professionals are incorporating telemedicine into their operations.

Wireless networking (eg, Wi-Fi) using mobile phones is probably the most popular data transmission system used in telemedicine. Devices with sensors can emit signals that are transmitted to the mobile phone and in turn sent to distant healthcare facilities. Such sensors are getting increasingly sophisticated, allowing greater accuracy and a wider range of measurable parameters. Currently, the more popular devices in medical use include devices that measure heart activity (eg, the Holter monitor), blood pressure, oxygen saturation and temperature, as well as noninvasive skin glucose patches, global positioning sensors (for Alzheimer patients), activity/step trackers, and sensors embedded into pills that can check if you are adhering

to prescribed medication. The list of health-related technological advances lengthens every year. I am intrigued by a new wearable device developed by Takeda Pharmaceutical Company and Cognition Kit that can sense psychological depression and is currently on trial. If this device really works, suicide rates could be reduced.

## Benefits of telemedicine

The march of technology is unrelenting and, like it or not, we are powerless to resist or ignore it. On the positive side, the improved communication between doctor and patient can benefit patients, especially those who live in remote areas, and those who have difficulty with mobility, such as the elderly and disabled.

## Reduces travelling time

Currently, telemedicine is used for patients who have received or are receiving treatment by a doctor – either recently discharged inpatients or regular outpatients with chronic diseases like diabetes or hypertension. The monitoring of blood pressure, ECG, oxygen saturation and blood glucose can be done at home, and medical consultations can be carried out via videoconferencing, preferably

on a secure network. Follow-up consultations conducted remotely at home save the patient from making extra trips to the clinic or hospital.

### **Allows initial management of emergencies**

Some acute emergencies require prompt management, especially when rescue services take too long to arrive. Using videoconferencing to instruct patients or bystanders on basic first aid could make a difference between life and death.

### **Facilitates opinion-seeking**

Telemedicine can be used to manage unusual disorders, especially if the pertinent subspecialists are not available. These include rare dysmorphic or genetic disorders, certain congenital heart diseases, atypical skin conditions and unusual movement disorders, among others. Even some common disorders can be managed using telemedicine. For example, I occasionally receive a photo or video sent to me by a patient who is travelling in a country that does not have good medical services, and I am asked to give an opinion. I always preface my remarks by saying that looking at a photograph or video is never as good as seeing the patient in the flesh, and therefore my diagnosis may be subject to a degree of error. Another scenario that I have encountered is when I have a patient with a difficult diagnosis or management issues; I can now discuss the problem online (without divulging the patient's identity) with

a close colleague whom I know has the appropriate specialist knowledge. This is an extension of the old hospital corridor consultation, except that now it is a more distant consultation.

### **Minimises cross-infection**

During the Severe Acute Respiratory Syndrome (SARS) epidemic in 2003, there were 238 reported cases, of which 33 patients died. Other regular patients were frightened to visit a doctor. I received numerous phone calls from patients seeking medical advice. Some of the patients sent me photos of their child's skin rash or diarrhoeal stools. I made diagnoses and gave medical advice on the phone, where appropriate and within my capacity.

### **Enhances medical education**

Several medical schools, including the NUS Yong Loo Lin and Lee Kong Chian Schools of Medicine, videotape their lectures and allow students to watch the lessons using mobile phones or computer tablets. These schools also conduct their assessments and tests online. Medical books can be downloaded for reading on tablets and mobile phones, and YouTube is a great resource for video instructions on medical topics and surgical procedures. Students find these additional sources of information extremely useful, and some have stopped attending lectures and instead watch the recorded videos at home. Even interviews for some overseas medical school admissions are conducted via Skype.

In summary, telemedicine has many benefits, including reduced doctor visits, reduced waiting time at clinics, access to subspecialist opinions, avoidance of catching infectious diseases, home monitoring of several medical parameters, and enhanced online learning. The bottom line is that there is overall improved quality of healthcare and medical education, and ultimately it has reduced overall costs of healthcare.

### **Problems and limitations of telemedicine**

However, even with all the benefits mentioned above, something is missing when doctors and patients do not meet face to face.

### **Underlying conditions**

Let me illustrate this with a personal example. A mother brought her three-year-old son to see me because of a slight cough and runny nose. There was no fever and thorough physical examination was normal. I then asked the mother if there was anything else on her mind. She then told me about her worries about her son's development – that he was only saying a few single words, and he was not playing with the other children in his playgroup. The boy turned out to be on the autism spectrum, and her suspicion was the main reason why the mother brought him to see me. Quite often, the ostensible reason for consulting a doctor may not be the real reason. It is only with direct contact that the real reason for the consultation surfaces.

### **Overlooked diagnoses**

Once, while examining a one-year-old baby boy who had diarrhoea, I noticed that he had squint eyes and an undescended testis. Both of these conditions would have been missed if his mother had only communicated with me over the phone or via the Internet. The consequences of missing these diagnoses include amblyopia with loss of visual acuity, and a risk of future testicular cancer. Direct human contact may be vital in the diagnosis of some medical conditions.

### **Clinical judgement**

Another reason why direct contact with patients can be extremely



Photo: Philips

important is in the evaluation of the severity and urgency of a condition. Assessment of pain is a good example. I have had patients who are extremely sensitive to what I consider to be mild pain, and I have also seen the opposite where a rather stoic patient can withstand severe pain without batting an eyelid. The art of medicine is the art of judgement. This includes the ability to judge the gravity of an illness, and to discern a “phoney” patient looking for a medical certificate from a genuine patient. A balanced judgement assessing what is the optimum management strategy is best made through direct interaction with the patient.

### Bad news

One of the grave duties that we have to perform as a clinician is the breaking of bad news. This is a serious moment when a great deal of sensitivity is needed. We need to assess whether or not the person to whom we are breaking the news fully understands the gravity of the information. There may be denial, guilt, anger, tears and depression, and one needs to deal with each of these reactions delicately and diplomatically. The road to acceptance may take a long time and sometimes more than one session. By listening and talking, we try our best to help the patient or his/her relatives weather the sadness. I think this is where the personal touch of face-to-face interaction transcends remote telemedicine.

### Medico-legal issues

Consulting patients from a distance using mobile phones or the Internet is not the same as face-to-face evaluation of a disease, and potential errors in diagnosis and treatment could arise. Who is to blame if things go wrong? If the doctor and patient are residing in different countries; how does international law view legal disputes? What if the overseas doctor consulted has a medical degree not recognised by the country from which the patient is seeking advice?

It is often claimed that a patient's online information is secure, but the recent hacking of hospital medical

records reveals that there is no such thing as absolute security in computer technology. Who takes the blame for the breach of patients' confidentiality?

While it is inevitable that telemedicine will continue its march into the healthcare domain, it is important to remember its limitations. While technology allows you to do distance monitoring of blood pressure, ECG and oxygen saturation, there are still areas in which humans can do better. These include palpating for swellings and lumps, examining a crying baby, and the early detection of subtle signs. Moreover, medicine must address not just the physical, but also the emotional aspects of disease. We must not forget that we also have a duty to be healers of the mind.

## The future of telemedicine

### Artificial intelligence

The future of telemedicine is already here. Some of my patients try to self-diagnose on the Internet. There are several online self-diagnosis programmes, including the Mayo Clinic Symptom Checker, WebMD, Isabel Symptom Checker, Symptomate and many others.

Some computer programmes can even more accurately differentiate skin conditions (eg, benign and malignant melanomas) as compared to human dermatologists.

### Robotic surgery

The advent of robotic surgery opens another door for telemedicine. A surgeon does not need to be operating in the same hospital, or even in the same country!

## Conclusion

Telemedicine is rapidly increasing its foothold on all aspects of medical practice and education. We have no choice but to embrace it. However, we do not wish to displace the human interaction baby by filling the bathwater with high technology. The evolution of medicine obligates us to use telemedicine and technology with intelligence and wisdom.

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### Further readings

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### Legend

1. Patient using a tablet to monitor his blood pressure and other vital health statistics in the comfort of his own home

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