Chapter 5
Next Wave of Tele-Medicine:
Virtual Presence of Medical Personnel

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ABSTRACT

Information and Communication Technologies (ICTs) are being embedded into healthcare system front-end and back-end platforms both in the developing and developing world contexts in ways unimaginable 20 years ago. This trend has brought about ubiquity culminating into spatial-temporal healthcare delivery models where health practitioners and patients do not need to be simultaneously in the same physical domain in order for healthcare to be delivered. This chapter presents a development projectile of healthcare systems and explores interventions and current trends in pervasive healthcare delivery systems and makes a prognosis of what is to come in future. The first parts of the chapter generally present formulaic concepts about telemedicine. The chapter is hinged on literature and document reviews focussing on innovations in telemedicine and gives a commentary on what needs to be done to achieve true ubiquity in healthcare delivery systems both in the developing and developed world contexts. The chapter posits that pervasiveness will be highly enshrined into healthcare systems to a point where physicians will not have to leave their working space to provide a service. The design of the Defibrillator Drone, for example, provides an opportunity for healthcare application developers to develop information system applications which do not only carry medical supplies from one place to the other, but are able to reason and prescribe medications. With acute advances in the science of robotics and ICTs in general, this is a reality in the foreseeable future.

INTRODUCTION

Because of ever emergence of new forms of diseases due to changing climate and lifestyles, there is need to continuous change healthcare systems so as to overcome new threats and challenges. One of the promising platforms for delivering responsive health care is through technology platforms (*deemed telemedicine*) which enshrines capabilities in healthcare able to overcome infrastructural, cultural and socio-economic challenges. Many of the developed world countries have adopted telemedicine as a

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vehicle towards delivering contemporary healthcare. However, most of the developing world countries, especially African countries, are yet to jump onto the bandwagon. Africa lags behind the level of information systems development worldwide with a very poorly developed health sector. Luckily, this gloomy picture is slowly changing as many of the developing world countries are seriously investing in increasing their capacity to globally use technologies in their healthcare systems. This has seen a significant increase in mobile applications usage in developing countries. Worldwide, majority of mobile phone users (64%) are based in low and middle income countries which points to the likely acceptance of citizens in developing world to use mobile applications in different spheres of their lives. Therefore, chances are that telemedicine can be adopted in the developing world in the realm of mobile health (m-Health) given the proliferation of mobile gadget usage. Conclusively, telehealth and m-Health are potential game changers with regards to healthcare delivery in these countries.

The American Telemedicine Association defines telemedicine as the "*use of medical information exchanged from one site to another via electronic communications to improve a patient's clinical health status*" with communications taking the form of video conferences, e-mail messages, faxes, texts, voice-mail messages, and other applications through smartphones (Malasanos & Ramnitz, 2013). Telemedicine can be used within a wide array of the healthcare continuum: diagnosis, treatment, disease management, rehabilitation, palliative care, and aged care services. Further, telemedicine allows individuals to access healthcare without physically visiting the hospital/clinic. This enables people very far from medical facilities, remote rural areas, geographically disadvantaged areas, etc. to access health care ubiquitously. This possibility brings about convenience on the part of the patient and the medical personnel. Thus, it is without doubt that telemedicine is a good alternative to face-to-face traditional consultations especially in places with attributes described above and with large populations where queues to access medical care are unimaginable (Malasanos & Ramnitz, 2013). Evidently, with the huge potential of telemedicine, it is not surprising that it is becoming part of the business plan of many hospitals (Linkous, 2012). It can, therefore, be posited that telehealth and m-Health are potential game changers in developing world contexts as much as in developed countries.

Despite the perceived 'socio-goodness' of telemedicine, many countries still ignore to implement it and therefore pay a huge opportunity cost. In the contemporary societal setup worldwide, it is unimaginable that humans can ignore the benefits and Return-on-Investment (ROI) that are attributed to telemedicine in as far as improving healthcare is concerned. The break-even-point of national investments in telemedicine applications can be reached quickly although at face value, these investments are perceived as very expensive. It is worth noting that in the immediate short term, telemedicine interventions are not cost-effective owing to huge costs in technology installation and training. However, in the long term telemedicine is worth the cost as the cost of healthcare delivery and access is significantly reduced. The general reduction in overall cost is achieved by utilization of the newest telemedicine platforms and systems which are no longer built on expensive ISDN (phone) lines but on IEEE802.11 which can tap wireless networks through mobile devices.

There are different forms and types of telemedicine access platforms and solutions from the basic 'out-of-synch' applications such as e-mail to 'in-synch' applications such as video conferencing or chat systems. Traditional telemedine applications may involve taking a photo of the ailment, attaching the photo as an e-mail attachment to a physician who then downloads it from the e-mail and analyses it. Contemporary telemedicine applications are usually built on in-synch models offering two-way audio and visual interactions. Within the realm of 'in-synch' models, robotic applications have been used to replace the physical presence of a paramedic where healthcare service is desired. A medical robot should