

Mobile technology in health information systems – a review

X.-Y. ZHANG¹, P.-Y. ZHANG^{2,3,4,5}

¹Nanjing University of Chinese Medicine, Information Institute, Bai Xia Qu, Nanjing, Jiangsu, China

²Xuzhou Central Hospital, Xuzhou, Jiangsu Province, China

³The Affiliated XuZhou Hospital of Medical College of Southeast University, Xuzhou, Jiangsu, China

⁴Xuzhou Clinical School of Xuzhou Medical College, Xuzhou, Jiangsu, China

⁵Xuzhou Clinical Medical College of Nanjing University of Chinese Medicine, Xuzhou, Jiangsu, China

Abstract. – Mobile technology is getting involved in every sphere of life including medical health care. There has been an immense upsurge in mobile phone-based health innovations these days. The expansion of mobile phone networks and the proliferation of inexpensive mobile handsets have made the digital information and communication technology capabilities very handy for the people to exploit if for any utility including health care. The mobile phone based innovations are able to transform weak and under performing health information system into more modern and efficient information system. The present review article will enlighten all these aspects of mobile technology in health care.

Key Words:

Mobile technology, Information technology, Health care systems.

Introduction

mHealth is a term for medical and public health practices supported by mobile devices – such as mobile phones, patient monitoring devices, personal digital assistants, and other wireless devices¹. mHealth applications range from the area of point-of-treatment, sensors and body networks for enabling real-time monitoring of chronic diseases to the asynchronous exchange of short messages for follow-up of medication, data reporting, education and capacity building². In developing countries, mobile phones are believed to have a huge potential to transform approaches to addressing the healthcare challenges especially in the areas of accurate and timely data collection and transmission to support healthcare provision and treatment for example through the use of SMS notifications³.

A driving factor for the attention towards mHealth across developing countries is the grow-

ing penetration of subscriptions in the general population. In the developing world, fixed-line Internet connections are rare and paper forms are still the primary mechanisms for public health data collection and exchange. On the other hand, mobile phone penetration in developing countries has grown at staggering rates over the past decade – from a little more than 10% penetration in 2000 to 60% in 2007⁴ and to 79% in 2011⁵. In the recent past, it has been estimated that there are more than 6 billion total mobile subscriptions, out of which 89% are in the developing world⁶. Such rapid increase in subscriptions and coverage has created a great deal of optimism to tap into the mobile phone information infrastructure and brought innovative mHealth applications and services.

Recent Developments in mHealth Care

Mobile applications became immensely popular when smartphones were introduced. The first mobile applications, however, were already developed in 1992⁷. Examples of some early applications are calendars and lists. Allowing the user to keep track of information with their mobile phone. These applications are simple compared with the applications that are developed nowadays; this is due to the constantly expanding field⁸. Mobile phone applications as we know them today are rapidly being developed with the help of technological innovations. One example of such an innovation is the online application stores. These stores are a place for third party developers to sell their applications. The two biggest stores are Google's Play store, with over one million applications, and Apple's App Store, with more than 900,000 applications^{9,10}. Official statistics on the number of mHealth applications are not published by either of the companies. Other sources have collected data on the number

of mHealth apps in the application stores. The website www.statista.com shows that the number of applications in the category “medical” grew with 156% in 2010¹¹. They do not provide statistics about the number of applications. Other websites, such as www.pocketgamer.biz do provide statistics about the number of applications in the Apple app store¹². They state that there are around 35,000 Health & Fitness applications and around 27,000 Medical applications in the US app store in September 2014. In the Google play store, around 8,000 medical applications are available according to an article on www.imedicalapps.com¹³.

Classifications of mHealth

Different papers from the SLR mentioned the classification of mHealth applications. Some of these papers included a classification. Other papers only stated the need for such a classification. This section describes the most popular classifications found in the SLR. A classification with different categories is needed since mHealth applications are used for different purposes¹⁴. Patients would, for example, use applications for smoking cessation, weight loss, treatment adherence or disease management. While medical professionals utilize these applications for monitoring of patients or education.

Classification by Martínez-Pérez

Martínez-Pérez et al¹⁵ included a classification that has three main categories where the applications are divided into the categories “open source”, “commercial” and “research” applications. These three categories all have the same sub-categories, namely “patients” and “healthcare staff”.

Classification by Corral

Corral¹⁶ did not include a classification as elaborate as Martínez-Pérez et al¹⁵ but made a distinction between three types of applications. The distinction made is based on the function of the application within the healthcare workflow. Corral defined *facilitation*, *assistance* and *extension* of care as functions in the healthcare workflow.

Telemonitoring (facilitation of care)

Care is delivered through communication technology instead of a physical visit. It extended the healthcare by expanding and continuing the collection of health-related information at home.

Telemonitoring has the possibility to automate the transmission of vital signs through email, portals or with a phone.

Point-of-Care (Assistance of Care)

Point-of-care are applications that used portable devices to assist healthcare at the bedside or clinic. Providing on-demand information, management, educational material or decision support. Hospitals or clinics can connect to these devices to collect this information.

Telehealth (Extension of Care)

Telehealth collects information from the patient at their home or residence. Information such as blood pressure and blood glucose is collected with computers, webcams or other communication technology. Telehealth enables the patient to send high-resolution video and images.

Another classification is by Free et al¹⁷. The study presented a classification of mobile applications, with three main categories. These categories included, “tools for health research”, “improving health services” and “improving health outcomes”. Further, the (sub) categories are based on the function of the mHealth application in this classification.

The Emergence of mHealth

The area of modern science engaged in the development of e-tools for the efficient management of patients and is involved in providing health services along with information via mobile devices/phones/tabs etc. is known as mobile Health (mHealth)¹⁸. The main reason behind the exploitation of this mobile technology in the health sector is primarily the exponentially increasing numbers of mobile uses worldwide and secondly the convenience it offers in the information management is remarkable both in speed as well as efficiency¹⁹. These growing numbers of mobile technology users have encouraged developers to develop health applications in large number as a result, in the recent study 500 million people have been estimated to have health applications on their mobile devices²⁰. Furthermore, the range of these applications offered by mHealth technology included applications for medical education, health promotion, medical diagnosis and disease monitoring. Also, with advancements of processors in the mobile phones, it is now possible to convert these smartphones to portable medical devices capable of advanced imaging along with biometric data collection abilities². In addition to this, m health

developers are continuously involved in the further improvisations of the technology to offer better and affordable mobile services that might reduce care disparities via efficient and accurate delivery of individualized health care education and services²². Moreover, better mHealth technology might also help in efficient communication with health providers in order to simplify the complexity of care. mHealth technology is a unique platform that offers a bidirectional flow of information between patients and health care providers both quickly as well as accurately²³. So, the creation of such a marvelous medial portable platform for the exchange of medical data instantaneously to and from the health care providers is a definitely boon for patients. Further research is in full swing that will live medical intervention and outcomes evaluation in future.

Significance and Innovation

Chronic disease such as diabetes mellitus, HIV and heart disease affects both the health of the patient as well as the results in poor quality of life²⁴. With rapid developments in the area of mHealth technology, these patients getting benefitted by having access to the quick timely clinical care information that too in their hands in the form of mobile phone applications. The mobile technology advancements, offer these patients improved communication with health providers and provide quick access to care teams for live interactions as well as monitoring.

Conclusions

It is quite evident from the above review that mobile health technology is an emerging technology in the field of health care. The article has highlighted the usefulness of the technique in patient care and management. Further improvements are still required to make it gold standard in health management information systems.

Conflict of Interest

The Authors declare that there are no conflicts of interest.

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