Chapter 1

mHealth: History, Analysis, and Implementation

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ABSTRACT

mHealth systems have been maturing since 1995, yet there remains no common definition. The widest definition encompasses not only mobile devices and digital communication systems, but also the multitudes of apps and add-ons for those mobile devices and systems. Accordingly, mHealth is an indicator of emerging communication-based healthcare and an enabler of participatory health. mHealth implementation and user acceptance vary by geographical region. In the most advanced regions, mobile devices and new communication systems lead to disruptive changes that improve the quality of care and reduce healthcare costs. At the same time, providers and public authorities are challenged with designing and implementing mHealth policies and security measures. Ultimately, mHealth will change healthcare policies and procedures, the structures of healthcare, and the roles of patients and healthcare professionals.

INTRODUCTION

Mobile phones are replacing wallets, credit cards, some printed books, travel and admission tickets, cameras, CDs and DVDs, printed newspapers, magazines, photo albums, game sets, landline telephones, keys, and much more. Yet the biggest change is in the expanded access to knowledge. Ask a smartphone any question, and it will give an answer (in most cases). Additionally, it will help when one has lost her way, and it will provide reminders and support in professional or life tasks. Mobile devices increase intelligence by enabling research or ‘looking up’ what a person does not know, and they help people perform better in their professions. Think of lawyers, engineers, accountants and many other professionals for whom the smartphone is the daily tool that enhances their work and makes them knowledge workers. One obvious sign of expanded knowledge through artificial intelligence (AI) is evidenced in geographical information systems. The navigation system embedded in a mobile device was unthinkable just a few decades ago. Today, people rely on its support wherever they go, drive, or bike.

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In this context, one has to admit that both cultural and technological achievements are not based solely on intellect. Since the beginnings of writing, knowledge (i.e. memory) has had to be supplemented by books, notes, and other written material. Now, digital systems expand the potential range of knowledge beyond that which can be memorized. In medicine, the doctors of the 21st century cannot keep all the information of the scientific body of medicine between their ears. The volume is simply too much. Access to ‘outsourced’ knowledge through the Internet is essential for good healthcare delivery. The mobile device enables this at any time and anywhere. In addition, customized apps for mobile devices expand many professional and medical functionalities.

It is important to remember that intelligence is the main element of all living beings on this planet (Waegemann, 2012). Mobile phones are a means of support to human intelligence. In the past, access to knowledge and information was limited to the books people had available at home, in the office, at a library, or other place. Through the connectivity of the Internet, anyone can access information with a computer device, whether it is a desktop computer, a tablet, watch, intelligent glasses, or a smartphone. For thousands of years, the main human occupation was physical labor. As more and more humans evolve from laborers to knowledge workers, information access and information management defines their work and life. Most industries are changing. Look at education, for example. The smart kid of the past was good in memorizing. The smart kid of the future is good at navigating the digital information system, accessing information, putting it in context, and distinguishing ‘false’ information from that which fits into one’s belief system and is therefore deemed correct. The digital society is leading to dramatic changes on our society and the future of mankind. In healthcare, these changes are currently barely visible. While other industries are experiencing a rapid revolution, healthcare is going through a slow and rocky transition that began with its attempt to convert paper medical records into electronic health records and moved into the beginnings of mHealth in 2002. As mHealth matures, mobile devices and their capabilities are stimulating disruptive changes.

BACKGROUND

mHealth technologies are built on the ‘miracle’ of sending information through the air. Wireless transmission of information goes back almost 150 years when radio transmission was first envisioned, and the first patent for a ‘photophone’ was issued in 1880. The one-to-many wireless communication capability of the radio established it as a major information source during the first half of the 20th century, supplemented soon by TV services. The 20th century was the era of wired communication as telephones and telecommunication advanced.

For thousands of years, people have been trying to develop devices that could process mathematical tasks. With the help of electricity, sophisticated computing devices could process complex mathematical tasks such as deciphering a secret code; hence the term computer for devices that now can do much more than computing functions. For almost 50 years, those computers have been able to perform most human intelligence functions, including converting speech to text and vice versa, decision-making according to algorithms, learning from experience (machine learning), and logical thinking by using data to extrapolate knowledge. Integrated circuits can quickly process information, and software quickly enables most general arithmetic and logical operations and in very small devices. The Internet provides unprecedented connectivity and functional interoperability between these devices, although semantic interoperability between electronic medical record systems and with mobile devices has not yet been fully achieved.