An Overview about the Use of Healthcare Applications on Mobile Devices

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INTRODUCTION

Smart mobile devices have emerged as a significant communication technology in the current society provided by advancements in technology and spread of data connectivity. It is estimated that over 85% of the world's population is now covered by a commercial wireless signal, with over 5 billion mobile phone subscriptions (WHO Global Observatory, 2011). Such a rapid progress in mobile technology has transformed many aspects of human's life including healthcare. Mobile technology used in providing healthcare is referred as mobile health or m-health. The Global Observatory for eHealth (GOe) within the World Health Organization (WHO) defined mobile health as "medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices". m-health involves the use of voice and short messaging service (SMS) as well as more complex functionalities, for example 3G systems, global positioning systems (GPS), and Bluetooth technology (WHO Global Observatory, 2011), which enable smartphones offer advanced applications to assist people with disabilities and long-term chronic diseases. A mobile application (or mobile app) is a software application designed to run on smartphones, tablet computers and other mobile devices. They are usually available through application distribution platforms, which are typically operated by the owner of the mobile operating system, such as the *Apple App Store, Google Play* (Android), *Windows Phone Store*, and *BlackBerry App World* (Wikipedia, 2013). M-health includes consumer- and provider-oriented medical apps which provide easy and cost effective healthcare anywhere anytime (Furht, 2013). A wide variety of m-health applications are being developed which will facilitate patient remote monitoring, diagnostics, personal wellness, prevention, m-prescriptions, follow ups and access to patient records (Furht, 2013). According to Research2guidance (2013), there are 17,000 m-health apps in major app stores, presently. We will perform a relevant review in the literature concerning the state of the art and evolution of mobile devices and apps, fundamental concepts, and benefits focusing in the field of m-health. Authors will review relevant work described in the literature concerning the scientific evidence about impact of m-health apps interventions in promoting and maintaining health behaviours' on patients. Some relevant health apps available in United States of America and platforms used to develop them will be addressed. Lastly, research opportunities, open problems and deliberations about the regulation of mobile medical apps will be reported.

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BACKGROUND

The increasing propagation of smartphones, as well as the 3G and 4G networks, provides a significant boost to the use of mobile platforms for providing healthcare services (GSMA, 2014). Mobile technologies have a number of key features that give them an advantage over other information and communication technologies, in particular, activities within healthcare and public health. Firstly, many mobile electronic devices have wireless cellular communication capability. Secondly, the devices are portable because of their small size, low weight and rechargeable, long-life battery power. Finally, many mobile electronic devices have sufficient computing power to support multimedia software applications (Free, 2010). In the field of health, for example, mobility enables health professionals to use them in a clinical setting for patient care (Romana, 2007). Accordingly, many software applications have been produced for healthcare professionals in order to facilitate the practice of evidence-based medicine (EBM) at the point of care (Mosa, 2012). With a mobile device information can be quickly exchanged between patient and healthcare provider and even connect the patient monitoring device to a healthcare provider (Furht, 2013). Documented m-health interventions and programmes include: mobile phone text messaging to support management of diabetes, hypertension, asthma, eating disorders and HIV treatment, smoking cessation, body weight loss, reducing alcohol consumption, sexually transmitted infection prevention; and to support medical education and clinical practice (Free, 2010). Not all apps that have been developed are widely available or designed to target general consumers. Some of the most advanced medical apps already approved by the Food and Drug Administration (FDA) were designed for healthcare practitioners, others require a prescription, or are intended for only a small subset of the population (Free, 2010). On the IMS (Institute for Healthcare Informatics) analysis of all apps presented in *Apple Store* to June 2013 showed 23,682 apps considered genuine healthcare apps. The categorization revealed 7,407 apps as healthcare professional (HCP) oriented, and the remaining 16,275 apps as consumer/patient oriented (IMS, 2013). The most common capability of widely available consumer healthcare apps is the ability to provide information - approximately 2/3 of all consumer targeted apps. Fewer apps have other functionalities, for example, 5,095 capture data entered by the user and 1,357 apps have a remind/alert function built into them. About 10% of the consumer healthcare apps reviewed (1,622 apps) have none of these capabilities at all, and include apps such as those to help with relaxation and sleep, and baby monitors. Although there is a subset of apps with impressive functionality (e.g. electrocardiogram readers, blood pressure or glucose monitors) it is clear that most of the healthcare apps available today are only simple in design and do little more than provide information (IMS, 2013). Analysis of the commonly available consumer healthcare apps on the iTunes app store shows that at present there are 159 apps which link to sensors. However these are dominated by fitness and weight apps which monitor pulse rates when exercising and measure weight and body mass index (BMI). Fewer than 50 of these 159 apps are related with actual condition management or provide tools and calculators for users to measure their vitals. There is, therefore, considerable scope for growth in health sector (IMS, 2013).

Trends of Mobile Apps on Healthcare

Mobile health was named by Gartner as one of its top ten consumer mobile applications for 2012 (Sarasohn, 2010). The potential for the creation of simple and easy to download applications (apps) for mobile devices has created a new trend in healthcare worldwide. There are currently 2.6 billion smartphone subscriptions globally. Some sources estimate that the total number of active smartphones in the world will cross 2 billion in 2016 and, in 2017, USA will surpass 200 million smartphone users, or nearly