Smart Phone Health Applications

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INTRODUCTION

Mobile health (mHealth) applications are offering new opportunities for patient empowerment as preventive health care and self-monitoring have paved the way for health consumerism. The National Institutes of Health Consensus group provided definition of mobile health (mHealth) as "medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants, and other wireless devices," Such technology is increasingly being used to engage patients in their health and care.'' (Abebe, Capozza Des Jardins, Kulick, Rein, Schachter, & Turske, 2013). Data show that over one-third of US adults have used mobile phones for accessing health or medical information, and nearly one-fifth reported having at least one health related application on their smartphone. The number of people who downloaded a smartphone health application reached 247 million in 2012, which was a double from a previous year in 2011. Portable access to continuous stream of interactive information on the go affect people's intentions to use digital health applications (Rai, Chen, Pye, & Baird, 2013). Diet, nutrition, exercise, and weight applications are found to be among the most popular among a variety of lifestyle, health, and medical applications (Rai, Chen, Pye, & Baird, 2013).

This chapter is motivated by the substantial research and clinical implications in this interesting and emerging field of mHealth with a specific focus on smartphone health applications. Our first goal in this chapter is to map out the current state of knowledge related to upsurge in the adoption of smartphone applications in health or medical research. We addressed how smartphones, as mobile platforms for the delivery of health information and interventions, are altering the face of clinical and behavioral research as well as patient care and service delivery. We also discussed how mobile phones are being integrated into self-care in support of health and chronic illness management.

OVERVIEW

The operation of American health care is changing drastically as a consequence of the widespread adoption of mobile phones and rapid proliferation of digital health applications on smartphones. The Pew Internet and American Life Project indicate 90% of US adults had a cell phone and nearly 60% had a smartphone in January of 2014. Another Pew report also indicate that 80%of US adults used text messaging in 2012. The use of mobile phones permeates all age groups, cultures, and socioeconomic backgrounds, which makes it the most equitable technology. Consequently, there has been a growing interest among academic researchers in applying mobile phone technology to health care and empowering users to take control and play an active role in managing their own health.

Among the earliest pioneers (generally those scholars who published 2010 or before) in this field of research are: (1) Dr. Jennifer R. Shapiro, at the University of North Carolina, whose research focused on the use of text messaging for self-

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monitoring health behaviors in children, with a specific focus on increasing physical activity, and decreasing sugar-sweetened beverage consumption and screen time) (2) Dr. Mihail Cocosila at Athabasca University, Canada who examined effectiveness of text messaging for improving healthy behavior with a focus on adherence to taking vitamin C pill every day for one month for preventive purposes (3) Dr. Alexander G. Logan at the University of Toronto, whose research investigated mobile phone-based remote patient monitoring system for management of hypertension in diabetic patients (4) Dr. Michelle J. Freedman at the University of Alabama, Birmingham, whose research investigated whether cell phones could be used to record experiences of cocaine cravings with homeless crack cocaine-addicted adults in treatment (5) Dr. Suk-Il Kim at the Catholic University, South Korea whose research focused on evaluating whether text messaging intervention would help to decrease body weight and keep blood glucose concentrations close to normal range (6) Dr. Joseph Puccio at Childrens Hospital Los Angeles, whose research investigated effectiveness of a free phone call reminders to assist HIV-infected adolescents and young adults to adhere with HIV medications and (7) Dr. Andrew Farmer at the University of Oxford, whose research investigated transmission of glucose level data and feedback to and from a mobile phone as a means of supporting people with diabetes in the self-management of their condition.

CURRENT SCIENTIFIC KNOWLEDGE IN SMARTPHONE HEALTH APPLICATIONS RESEARCH

Smartphones have been defined as powerful computational devices with increasingly powerful technical features that can access the web and run a variety of powerful applications (Fiordelli, Diviani, & Schulz, 2013). A search in 2012 for health & fitness yielded nearly 14,000 apps for iPhone and nearly 16,000 applications for Android consumers out of 1,500,000 mobile applications (Muessig, Pike, LeGrand, & Hightow-Weidman, 2013). Many of the health applications available for purchase in online stores support a diverse set of data streams that can provide prompted and user-initiated reports of the user's symptoms, or behaviors and a detailed processing of physiological measures (Ramanathan, Swendeman, Comulada, Estrin, & Rotheram-Borus, 2013). Consequently, researchers have begun to use mobile phones as suitable tools for health interventions and clinical research in recent years because they are portable, interactive, and widely adopted (Furlow, 2012; Carter, Burley, Nykjaer, & Cade, 2013; Stockwell, Westhoff, & Kharbanda et al., 2014). Some of the current leading researchers (generally those scholars who published after 2010 in leading journals) whose research we will cover in this chapter below include (1) Melissa S. Stockwell at Columbia University (2) Nithya Ramanathan at the University of California, Los Angeles (3) Lorien C Abroms at George Washington University (4) Yu-Mei M. Schoenberger at the University of Alabama, Birmingham (5) Wanda Pratt at the University of Washington and (6) Kevin Patrick at the University of California, San Diego.

Clinical Applications

Smartphones have begun to revolutionize patient care and health services by offering users computerized functions on the go. Current research shows that the mobile phone health applications may improve treatment compliance, and medication adherence. Some applications that run on the patient's phone are linked with electronic health record systems, alert patients when it is time to take medications, or send a reminder message for the upcoming appointment help users maintain their health goals (Ramanathan, Swendeman, Comulada, Estrin, & Rotheram-Borus, 2013). In fact, the World Health Organization report from 2009 indicated that text message medical appointment reminding systems have been adopted in over 70% of the developed countries and 30 to 40%