Chapter 32
Mobile Device Application in Healthcare

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ABSTRACT

Clinical practitioners need to have the right information, at the right time, at the right place, which is possible with mobile healthcare information technology. This chapter will help in understanding the need for mobile device usage across six different roles in healthcare: physicians, nurses, administrative staff, pharmaceutical staff, emergency staff, and patients. Research indicates that even in this advancing digital age, there are more than 98,000 deaths because of preventable medical errors. This can be abated with proper utilization of mobile devices in the healthcare sector. Utilization of technology in the process of sharing information may help in improving the decision making, and thereby reducing the medical errors and costs involved. This chapter illustrates the implementation and the application of mobile devices in healthcare from six different user perspectives, and summarizes the advantages, challenges, and solutions associated with mobile information technology implementation in healthcare.

BACKGROUND

According to June 2011 statistics, United States of America (USA) has a population of about 310 million people, and there are about 327.5 million wireless subscriber connections, i.e. about 1.02 wireless users per person across USA (U.S. Wireless Quick Facts, 2011). This is a huge network and accessing it can help the healthcare practitioners to offer faster healthcare services. Mobile technology can help in solving multiple health problems worldwide (Waegemann & Tessier, 2002). Rapid growth in mobile users (CTIA, 2008) every year stands as a proof that mobile technology has a lot to offer to the healthcare industry. Many nations across the world have identified the usefulness of these mobile devices, and have applied in various general and emergency cares (Ammenwerth, Gräber, Herrmann, Bürkle, & König, 2003; Haux, 2006). The large-scale adoption of mobile technology is taking technology adoption in healthcare on to a whole new level. Research indicates that

mobile devices have direct impact on the process of offering care (Burley & Scheepers, 2002). These mobile devices possess various characteristics that can help users to efficiently document ever changing patient's health condition, allows easy browsing through the records, efficiently maintaining daily schedules, offering software's for almost anything, and clinical information capturing. Any new applications (related to the healthcare) installed into those mobile devices may result in fruitful results in the process of offering care by the healthcare organizations. Utilization of technology in the process of sharing information may help in improving the decision making time, and thereby reducing the medical errors and costs involved (Kinkade & Verclas, 2008). Proper training provided by the hospital staff to the patients before their discharge on how to use their mobile devices (shown in Table 1) to access their health related information and other usage, will help in significantly improving the delivery of quality care. Available mobile devices, technologies used by them, and their applications in healthcare are shown in Table 1.

SETTING THE STAGE

Several different groups of healthcare professional work together in a hospital organization for providing patient care. In this chapter, we focus on the workflows of administrative staff, nurses, physicians, pharmaceutical staff, patient/users, and emergency staff. Let us consider a sample patient workflow in a hospital scenario as shown in the Figure 1. A typical patient workflow may start with a request from a patient for an appointment with a physician. In other cases, it may start by the emergency staff that might find the patient in an emergency situation and is in need of immediate care. The administrative staff (front desk staff) may check for the patient's status, whether he/she is a returning patient or a new one. If the patient is a new comer, his/her demographic information (like the patient's medical history details, social history, etc.) will be entered into the patient management system (any electronic system that may be accessed using a computer on wheels, laptop, etc.). Once the patient is registered, the patient will be given an appointment based on the physician's availability. The patient's record will be forwarded to the physician for pre-checkup analysis. At the appointment time, a clinical staff (nurse) will accompany the patient to visit the physician where the physician will evaluate the patient's current condition. Based on the diagnosis information, the patient may be given a prescription of drugs, or he/she may be suggested to admit into the hospital for further diagnosis, and the patient's record will be updated. Based on the physician's

Table 1. Mobile devices in healthcare (Lakkaraju & Moran, 2011)

Available Mobile Devices	Technologies Used	Use in Healthcare
PDAs	Apps, Wi-Fi, WAP	(Baumgart, 2005; Fischer, Stewart, Mehta, Wax, & Lapinsky, 2003; Lapinsky, et al., 2001; Lapinsky, Mehta, Varkul, & Stewart, 2000)
Laptop/PCs/Tablets	Wi-Fi, Bluetooth, 802.11n	(Ping, et al., 2009; Weitzel, Smith, Deugd, & Yates, 2010; Weitzel, Smith, Lee, Deugd, & Helal, 2009)
Mobile Phones	Apps, Wi-Fi, WAP, NFC, Display Technologies, SMS/MMS, Bluetooth, GPS	(Ivanov, Gueorguiev, Bodurski, & Trifonov, 2010; Marcus, et al., 2009; Wang, Tsai, Liu, & Zao, 2009)
Pico Projectors	Display Technologies	(Inami, Kawakami, Sekiguchi, & Yanagida, 2000; Vijayaraghavan, Parpyani, Thakwani, & Iyengar, 2009)
Bodily Wearable Sensors	GPS, Wi-Fi, WAP	(Espinoza, Garcia-Vazquez, Rodriguez, Andrade, & Garcia-Pena, 2009; Trossen & Pavel, 2007)

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