Chapter 84
The Collaborative Use of Patients' Health–Related Information:
Challenges and Research Problems in a Networked World

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ABSTRACT

The advancement in the field of information and communication technology has generated a great deal of information that was not possible to access earlier. Healthcare systems are one of the most beneficial applications using wireless medical sensor technologies, which can facilitate patient care within homes, hospitals, clinics, disaster sites, and the open environment. The integration and sharing of such information can contribute significantly to a better understanding of patients' health conditions and therefore to improving the quality of healthcare provided to them. However, in order to achieve sufficient levels of collaborative use of information among healthcare-related practitioners, there is a need to overcome a number of issues such as privacy and interoperability, among others. This chapter discusses two of the main challenges encountered before healthcare information systems can collaboratively share patients' records, namely privacy and interoperability.

INTRODUCTION

With the advancement in information and communication technologies (ICT) it has become easier for healthcare providers to collect and make use of patients' information promptly. These advancements have created new methods to manage patients' information through the digitization of health-related information, and have contributed significantly towards improving the health care provided to patients at lower costs. Recently, the healthcare sector has shown a growing interest in information technologies. The amount of health-care records is rapidly growing in detail and diversity and it is increasingly collected outside traditional medical record-keeping systems such as within mobile devices, wearable sensors and home wireless networks (Mamlin & Tierney, 2016). Almost half (48 percent) of healthcare providers polled in a PricewaterhouseCoopers survey said that they had integrated consumer technologies such as wearable health-monitoring devices or operational technologies like automated pharmacy dispensing systems with their IT ecosystems (Compton & Mickelberg, 2014). For instance, IoT and WSN technologies nowadays are considered as a potential solution for healthcare applications. Different researchers focus on designing wireless sensor networks for healthcare monitoring system (Vo, Nghi, Tran, Mai, & Le, 2015).

The Internet of Things (IoT) is another technology paradigm which is becoming adopted in various applications in the healthcare domain (Islam, Kwak, Kabir, Hossain, & Kwak, 2015). IoT refers to an enormous number of sensors and sensor-enabled devices deployed to collect data about their environment, which frequently includes data related to people. IoT is fundamentally a network of networks with the internet as a backbone. It associates diverse sensors, actuators, and computing systems and communications to provide intelligent services to society (Bandyopadhyay, Balamuralidhar, & Pal, 2013). The automatic exchange of information between two systems or two devices without any manual input is the main objective of the Internet of Things (Borgohain, Kumar, & Sanyal, 2015). The adoption of the IoT concept grants significant help toward collecting and accessing information that was not accessible before in real time. Areas, which are fast adopting this technology, include industrial monitoring, structural monitoring, environmental monitoring, vehicle telematics, home automation and healthcare (Rghioui, L'aarje, Elouaai, & Bouhorma, 2014). Healthcare systems are one of the most beneficial applications using wireless medical sensor technologies, which can assist with patient care within homes, work at hospitals, clinics, disaster sites and the open environment(Kumar & Lee, 2012; Yang et al., 2014). Several research groups and projects have started to develop health monitoring systems using wireless sensor networks such as CodeBlue (Karla Felix Navarro & Lim, 2009), LiveNet (Sung & Pentland, 2004), CareNet (Jiang, et al., 2008), and Lifeguard (Montgomery, et al., 2004). Such applications generate massive amount of patients' health-related data forming leading to a field of big data analytics. The term "Big Data" refers to a large amount of data that traditional database systems cannot process. Big data is a large amount of data that requires new technologies and architectures so that it becomes possible to extract value from it by capturing and analysis process (Katal, Wazid, & Goudar, 2013). Data from various sensors, hospitals and social networking sites are rich source of information for big data (Victor & Lopez, 2016). The healthcare sector has generated huge amounts of data that has huge volume, enormous velocity and vast variety. Such data also comes from various new sources, as hospitals today tend to implement electronic health record (HER) systems (Patel & Patel, 2016). Big data analytics have started to play a vital role in the evolution of healthcare practices and research. It provides tools to accumulate manage and analyse huge volume of patients' health-related information

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