Chapter 14
An Intelligent and Secure Framework for Wireless Information Technology in Healthcare for User and Data Classification in Hospitals

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ABSTRACT

Real time data acquisition and evaluation are required to save lives. Such data with utilization and application of the latest technologies in hospitals around the world can improve patient treatments and well beings. The delivery of patient's medical data needs to be secure. Secure and accurate real time data acquisition and analysis of patient data and the ability to update such data will assist in reducing cost while improving patient's care. A wireless framework based on radio frequency identification (RFID) can integrate wireless networks for fast data acquisition and transmission, while maintaining the privacy issue. This chapter discusses the development of a framework that can be considered for secure patient data collection and communications in a hospital environment. A new method for data classification and access authorization has also been developed, which will assist in preserving privacy and security of data. Several Case studies are offered to show the effectiveness of this framework.

1. INTRODUCTION

Radio Frequency Identification (RFID) has been shown to be a viable and promising technology in the health care industry (Finkenzeller, 1999); Glover, & Bhatt, 2006; Mohammadian & Jentzsch, 2008; Schuster, Allen, & Brock, 2007; Shepard, 2005; Angeles, 2007; Pramatari, Doukidis, & Kourouthanassis, 2005; Mickey, 2004) Whiting, 2004). RFIDs have the capability to penetrate and add value to many areas of health care. RFIDs can lower the cost of some services as well as improve services to individuals and health care providers. The real value of RFID is achieved in conjunction with the use of intelligent software systems such as intelligent multi-agent systems. The integration of these two technologies can benefit and assist health care services.

Radio Frequency Identifiers (RFID) have been around for many years. Their current and projected use has only begun to be researched in hospitals (Fuhrer, & Guinard, 2007). This research study considers the use of RFIDs and their potential in hospitals and similar environments. RFIDs can effectively be used to collect data at the source thereby providing the data for monitoring patient's well-being in order to provide a higher level of patient health care. There are four areas where using RFIDs in their data collection role can have significant positive benefits in hospitals. These four areas are:

- **Care Tracking:** This is getting the right care to the right patient at the right time;
- **Quality of Care:** Improving the services given to the right patient at the right time in a timely manner;
- **Cost of Care:** Finding ways to be effective in the use of available resources such that the cost per patient per incident does not adversely increase to the cost of the resources; and
- **Service of Care:** More timely information to enable a more informed decision by providing more knowledge about an individual's need for care. (Mohammadian & Jentzsch, 2007,2008)

RFID tags and readers are commonly associated with inventory and tracking goods in such places as manufacturing and warehousing, but hospitals are starting to apply the technology to new purposes. Unlike bar codes, RFID technology does not require contact or line of sight for communication. RFID data can be obtained wirelessly through clothing and other non-metallic materials. This capability makes RFIDs an appropriate technology to fit into the health care environment.

Both research and practical application of RFIDs in hospitals continues to be of increasing importance. For hospitals this has meant managing inventories in a more efficient manner. Such inventories take on a variety of different roles than those found in manufacturing. The nature of the inventory and assets can include a plethora of expensive and varied equipment, drugs, beds, chairs, as well as patients themselves and staff.

People tracking can be looked at from three perspectives:

1. **Continuous and Full Time:** Often referred to as human chipping. People are tagged as an integral part of the person process 24/7.
2. **Part Time:** In which people acquire some type of tag as part of their work and / or task environment. RFIDs are well suited for this type of tagging by staff in the health care industry.
3. **Casual:** With tags used on and as needed basis.

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