Chapter 9
RFID Technologies in the Health Sector

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ABSTRACT

RFID technologies are increasingly acquiring a considerable relevance in the field of patients' assistance. This contributes to independent living and quality of life for many patients by reducing the need of caretakers and private nursing. In this chapter, the authors present an analysis of the use of RFID technologies for three different purposes: (i) collection and access of all patient records; (ii) tracking the movements of medical equipment; (iii) monitoring the health of patients. Moreover, the authors discuss the privacy implications and existing solutions. Privacy issue represents an obstacle to the acceptance of this technology. Transmitting unprotected signals, compressed in a standard format, through the RFID technology, is associated with the risk that someone might monitor these transmissions, accidentally or intentionally. Patient-monitoring applications require exceptional performance and quality of service to provide accurate, live information to the monitoring side.

INTRODUCTION

The increased attention to patients' assistance has guaranteed the development of Radio Frequency Identification (RFID) technologies in the healthcare environment. The RFID technologies have the potential to transform healthcare services by enhancing the quality of care. Today, the health sector presents serious problems in the management of resources for disease prevention, and the cost of healthcare is increasingly creating problems (Correa et al., 2005). Many people have to measure different signs at regular intervals or have to visit the hospital. As a result, people who require monitoring but are not at immediate risk are obliged to wait for long periods in hospital so that routine measurements can be taken. This

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results in high costs for hospitals and low morale of patients. The RFID technologies change this scenario, since they provide better healthcare to an increasing number of people using limited human resources.

Considering the collection and access of all records, patients may receive RFID wristbands or even digital implants, securely storing their medical and treatment data – such technology eliminates problems with handwritten, paper medical records, which may be misread, damaged or lost, especially in medical emergencies, and as a result of physical damage. Moreover, RFID tags can be attached to the ID bracelets of patients, so their location can be tracked continuously. The application of RFID technology on people tracking enables a fully automated solution for information delivery, thus reducing the potential for human error, while increasing productivity. Through the use of RFID technologies, patients and medical equipment can be located and identified, while by tracking the data, the daily routine of medical equipment can be observed. This will effectively improve the quality of life for patients and reduce the cost of healthcare services. Finally, the RFID technology can also be used to monitor the health of patients. Currently, patients with chronic disorders, such as cardiovascular and diabetes, often have to be hospitalised for monitoring of their vital parameters. The RFID technology proposes a solution to this obtrusive, high-cost approach to patient monitoring.

The aim of this chapter is to examine the advantages and disadvantages in using RFID technologies in the healthcare sector by analyzing in particular three different uses of this technology the:

- Collection and access of all patients records;
- tracking of movements of medical equipment;
- monitoring of patient's health.

BACKGROUND

The RFID is a developing technology that uses radio waves for the collection and transferring of data. The introduction of RFID technologies in the healthcare environment has led to increased accessibility for healthcare providers, more efficient tasks and processes and higher quality of healthcare services. According to Podaima et al. (2010), two different generations of RFID technologies have been developed. The first-generation of RFID technologies was developed twenty years ago. They were based upon identification, for improving the patient point-of-care, and reducing adverse drug events and errors, while based on barcodes and RFID (Rao & Dighe, 2004). The second-generation of RFID technologies called 'smart' RFID-enabled healthcare technologies offered an expanded functionality beyond conventional RFID tagging alone. These technologies incorporate the functionality of control facilitated by advancing microelectronics technologies such as system on chip, while the conventional RFID was typically reserved to incorporate supply chain management, identification, asset tracking and locating (Glabman, 2004). The use of Smart RFID technologies has the advantage to encompass medication prescription, transcription administration and pharmacological preparation, improve fail-safe medical devices and monitor physical and biological sensor-based functionalities. Examples of Smart RFID technologies are the following:

- **Smart Coupler:** is a medical channel that consists of a female and male subminiature plastic connector containing an integrated RFID reader and RFID tag respectively, used to connect surgical and medical equipment, including analytical instruments, blood analyzers, blood-pressure cuffs and infusion bags.
- **Smart Implantable Devices:** are Smart RFID medical technologies extended with various actuators and sensors to be widely