Chapter 12
Ubiquitous Use of RFID in the Health Industry

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ABSTRACT

Radio Frequency Identification (RFID) technologies are becoming ubiquitous in a variety of settings and industries. The healthcare industry has adopted the use of RFID as a means of tracking equipment, managing inventory, to locating human resources including controversial applications involving injecting chips into humans as a means of authentication. There are a variety of ethical implications to the use of this technology as well as potential health concerns that will be explored in this chapter.

WHAT IS RFID?

One of the seminal works on Radio Frequency Identification (RFID) technology was first published by Stockman (1948) in conference proceedings for an International Radio Engineers conference. The idea that energy can be reflective and respond to a stimulant is at the root of how RFID works today.

RFID has been around since World War II when it combined radar with radio technology and was used by the British to differentiate friendly aircraft from enemy aircraft. This was accomplished by attaching a transponder to friendly aircraft which could be picked up by the allies. Landt (2005) suggests that following the recognition of how RFID might be made to work, the application of the technology was delayed as much as 30 years by the lack of other supporting technologies including transistors, integrated circuits and networking technologies. It is the integration of RFID to these other technologies that have resulted in the dramatic range of ways that RFID is currently being used or considered for use. The advent of

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these supporting technologies also means that the infrastructure to support RFID is becoming ubiquitous (wireless, satellites, communication technologies etc) creating an environment where the potential use of this technology in different applications continues to grow and expand.

RFID technology is being used in a wide range of activities these days, and there are some basic components that exist in all implementations of this technology. One of these basic components is an RFID tag or sensor that is typically located on a computer chip, although good progress has been made in the development of RFID tags that are printed onto a surface rather than manufacturing an actual chip. Subramanian and et al (2005) review some of the advancements in the creation of printed RFID tags which are thought to be capable of lowering the cost of the tags. It is the cost of tags that are one of the most significant barriers to adoption for large scale applications in areas such as manufacturing and shipping.

These RFID tags, regardless of their format, are programmed with a specific payload in the form of data. When a reader designed to stimulate and discharge the payload is applied to the sensor it transmits this data to the reader. The data that is fed to the reader using back spatter and is then transmitted, generally through wireless networks, to a backend database. According to Clampitt (2006) RFID technology is similar to bar code technology with the exception that, RFID tags are typically smaller and more durable than a typical bar code. The most important differentiator between an RFID tag and a bar code is that the bar code can tell someone in the supply chain that the item on which the code is attached is a certain type of peanut butter. If that same jar of peanut butter was instead attached to an RFID chip, the response would identify that unique instance of the certain type of peanut butter. It is this ability to use RFID to uniquely identify an object to which it has been attached that has created much interest in how this technology can be applied in the healthcare industry. It is also the crux at which privacy experts see the opportunity for serious ethical implications in how the technology is used. For example, imagine a reader embedded in an anti-theft gateway of a high end department store. The customer is scanned as they pass into the store. The reader activates all of the tags embedded in the shoes, the skirt, the jacket, the purse of the customer and sends that information to an expert system database. The system analyzes the data from the tags, compares it with the inventory system and sends a personalized coupon to the customer on their cell phone. There are those who would embrace this kind of interaction and there are others for whom it would be just plain creepy.

Imagine that these same customer tags were sent to the cell phone of the sales rep with an analysis and recommendation that, based on the credit check done by validating the credit card chip in the purse, as to how much time and attention the sales person should spend on them.

These are examples of just two of the many different ethical and legal issues that can be associated with the use of RFID. The society has currently determined that health data is private based on the HIPAA and HITECH legislation (hhs.gov, 2010). The use of RFID within the health industry must include consideration of how these laws impact the security and privacy of the subject of health data.

RFID chips can be combined, as an example, with sensors used to measure temperature. Clampitt (2006) identifies important functionality that can be added to an RFID chip including the ability to register environmental conditions and other measurements that are capable of documenting the environment through which an RFID chip has travelled over space and time. For example, perishable items being transported can have an RFID chip and sensor attached to the packaging and, through the use of onboard memory that is updated along the way, can literally tell the person at the other end to what temperatures that package was exposed along the way.