

# RFID as the Critical Factor for Superior Healthcare Delivery

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## INTRODUCTION

Innovations in information and communication technologies (ICTs) have transformed the manner in which healthcare organizations function. Applications of concepts such as data warehousing and data mining have exponentially increased the amount of information that a healthcare organization has access to. Work flow and associated Internet technologies are being seen as instruments to cut administrative expenses. Specifically designed ICT implementations, such as work flow tools, are being used to automate the electronic paper flow in a managed care operation, thereby cutting administrative expenses (Dwivedi, Bali, & Naguib, 2005, p. 44; Latamore, 1999).

These recent innovations in the use of ICT applications in a healthcare context have altered the manner in which healthcare institutions exploit clinical and nonclinical data. The pendulum has shifted from the early 1980s, wherein the emphasis of ICT solutions for healthcare was on storage of data in an electronic medium, the prime objective of which was to allow exploitation of this data at a later point in time. As such, most of the early 1980s ICT applications in healthcare were built to provide support for retrospective information retrieval needs and, in some cases, to analyze the decisions undertaken. Clinical data that was traditionally used in a supportive capacity for historical purposes has today become an opportunity that allows healthcare stakeholders to tackle problems before they arise (Dwivedi et al., 2005).

However, simultaneously, a number of studies have noted that most information in healthcare is stored in silos, which do not interact efficiently with each other. Kennedy (1995, p. 85) has quoted Kever (a healthcare management executive) who notes that "Healthcare is the most disjointed industry ... in terms of information exchange.... Every hospital, doctor, insurer and inde-

pendent lab has its own set of information, and ... no one does a very good job of sharing it."

This problem is being further exacerbated by the fact that healthcare managers are being forced to examine costs associated with healthcare and are under increasing pressure to discover approaches that would help carry out activities better, faster, and cheaper (Davis & Klein, 2000; Dwivedi, Bali, James, & Naguib, 2001; Dwivedi et al., 2005; Latamore, 1999). Consequently, the expectations from modern IT applications in healthcare are for applications which support the transfer of information with context. This, in turn, has led to the emergence of clinical information systems that are led by mobile computing technologies (Dwivedi, Bali, & Naguib, 2007; Dwivedi, Wickramasinghe, Bali, Naguib, & Goldberg, 2007; Meletis, Dwivedi, Gritzalis, Bali, & Naguib, 2006).

## BACKGROUND

The last decade has seen the rapid emergence and acceptance of healthcare information systems that support the concept of telemedicine and use technologies like Personal Digital Assistant (PDA), Radio Frequency Identification (RFID) and other mobile computing technologies.

This trend has also been supported by a longitudinal survey (see Table 1) of over 200 U.S. healthcare organisations carried over a three year period, from 2000 to 2002 (Morrissey, 2000, 2001, 2002). As seen in Table 1, clinical information systems in conjunction with mobile computing have become priority areas for healthcare institutions (see Table 1).

Modern day IT applications in healthcare, centred on mobile computing devices like PDA, RFID, and wireless local area network (WLAN) products, have already demonstrated their potential and financial vi-

*Table 1. Adapted from Modern Healthcare's annual survey of information system trends in the healthcare industry (Dwivedi, Wickramasinghe et al., 2007; Meletis et al., 2006; Morrissey, 2000, 2001, 2002)*

Year	2000	2001	2002
Number of healthcare organizations surveyed	224 healthcare organizations	212 healthcare organizations	255 healthcare organizations
Clinical Use of Web technology (Intranets)	60% - felt that could IT could facilitate data exchange among caregivers, that is, physician ordering of tests and access to test results	Low interest in maintaining a patient's personal health record accessible via the WWW and matching patients with clinical research.  However there is renewed importance of addressing changes in this area due to regulatory obligations	Despite acknowledging that medication interaction and dosing alerts are possible within most IS - implementation has not commenced  The few organizations who had made big investments in different HIS (EPR and pharmacy) are reporting substantial returns
General Uses of Web and Intranet technology	Limited use as shown by the following  15% - to share clinical guidelines  13% - to access multiple databases simultaneously  33% - as a bridge to other information systems  40% - for network wide communication of any kind	Some early success from linking "billing and insurance-query operations to payers via the Web"  "Significant interest ...in using the Web to improve data exchange with physicians and their office staff"  About 50% indicated that they had no plans to try anything Web-related in the care-management area	33% - Using existing clinical and financial information sources to construct data repositories so as to that help spot trends and improve decision-making  Further 22% are working to implement such practices whilst about 13% plan to start implementation of similar activities within a year

abilities in a healthcare context (Dwivedi, Bali et al., 2007; Dwivedi, Wickramasinghe et al., 2007; Meletis et al., 2006). Recent studies by Meletis et al. (2006) have noted that WLAN-based mobile computing allows healthcare workers to interact in real-time with the hospital's host computer system to enter, update, and access patient data and associated treatments from all clinical departments (Meletis et al., 2006).

A survey of WLAN healthcare installations found that 97% of customers indicated that "WLANs met or exceeded their expectation to provide...a competitive advantage" and that "if the productivity benefits are measured as a percentage return on the total investment ... the return works out to be 48%" (McCormick, 1999, p.13). The use of PDAs by physicians has witnessed rapid acceptance in recent times. Today, about 40% of all physicians use PDAs (Serb, 2002). However, the majority of physicians are using PDAs to perform static functions. Most of them use PDAs to collect reference material with:

*the most popular method being ePocrates - a drug reference application physicians can look up drugs by name or diagnoses, cross-reference similar medications or generic alternatives, and receive alerts on interactions...and which the Journal of the American Medical Association has described as indispensable.* (Serb, 2002, p. 44)

A few pioneering physicians have started to use PDAs in an interactive way, that is, to write prescriptions, to keep a record of all daily clinical patient interactions, and for bedside charting. This trend was confirmed by another study by Martin (2003), who noted that more than 50% of physicians working in developed countries and under the age of 35 used a PDA in 2003.

Similar findings were also reported in other studies. In a related survey, it was found that between 40-50% of all U.S. physicians (including junior doctors, i.e., residents) were either using a PDA or had the ability and the knowledge to use a PDA in healthcare settings (Miller, Hillman, & Given, 2004).

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