

Pervasive Observation Medicine: The Application of RFID to Improve Patient Safety in Observation Unit of Hospital Emergency Department

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Abstract

Over the past decade, observation medicine has become an important component of emergency medicine. There are several settings in which observation medicine has been useful and valuable.(1) RFID as the patient identification, not only generates the on-line laboratory data and radiology report via hand-held wireless PDA, this RFID system help physician stream-line patient admission to acute bed or ICU in the emergency department more effectively.

Keywords:

Radio Frequency Identification (RFID); Observation Unit (OU); Patient Safety

1. Background

As part of an interdisciplinary study of patient safety and quality improvement, we implemented the RFID framework in the observation unit of emergency department, defined as a real-time observation utility by medical management, and of the informatics framework enhancement that resulted from patient safety of quality improvement.

METHODS. We are applying RFID technology into emergent medical setting then reviewing 10,000 patients in the observation unit and its records from the emergency department of selected acute care, non-psychiatric hospitals in Taipei, Taiwan in 2004. We then developed wireless web-based RFID framework to implement the real-time safety reminders such as the laboratory and radiology reports to the physician who can make decision promptly to the patients in the observation unit.

RESULTS. The waiting time for physicians to make clinical decision according to

laboratory and radiology results is largely reduced within 30 percent due to the RFID system. Observation hours is reasonably decreased by the physician who could actively receiving patient's updated clinical data to make clinical decision via web-based informatics system.

CONCLUSIONS. We are planning to monitor the effectiveness of pervasive RFID system from these factors, such as length of waiting for acute bed admission, and the potential delayed diagnosis.(2) When these common ER factors can be greatly improved from the adoption of RFID and many practice emergency department quality issues will gain a better result as the application of RFID.

2. Introduction

Emergency medicine in Taiwan is in the face of major change and overcrowding. National Health Insurance (NIH) reimburse emergency department (ED) services as 30% lower pay out-patient basis, as the results, The phrase 'pervasive Observation Medicine' describes the use of pervasive RFID technologies in emergency department of observation unit(OU), including making clinical diagnosis more effectively while patients' diseases on progressing.(3) These observation areas cater for certain categories of patients with surgical, medical, psychosocial and/or medical specialist consulting needs who can be discharged within 24–48 hours. OU has tended to be condition specific need to outpatient follow up or inpatient but tailored to local needs and interests or more often, lack of alternative pathways within the hospital.(3)

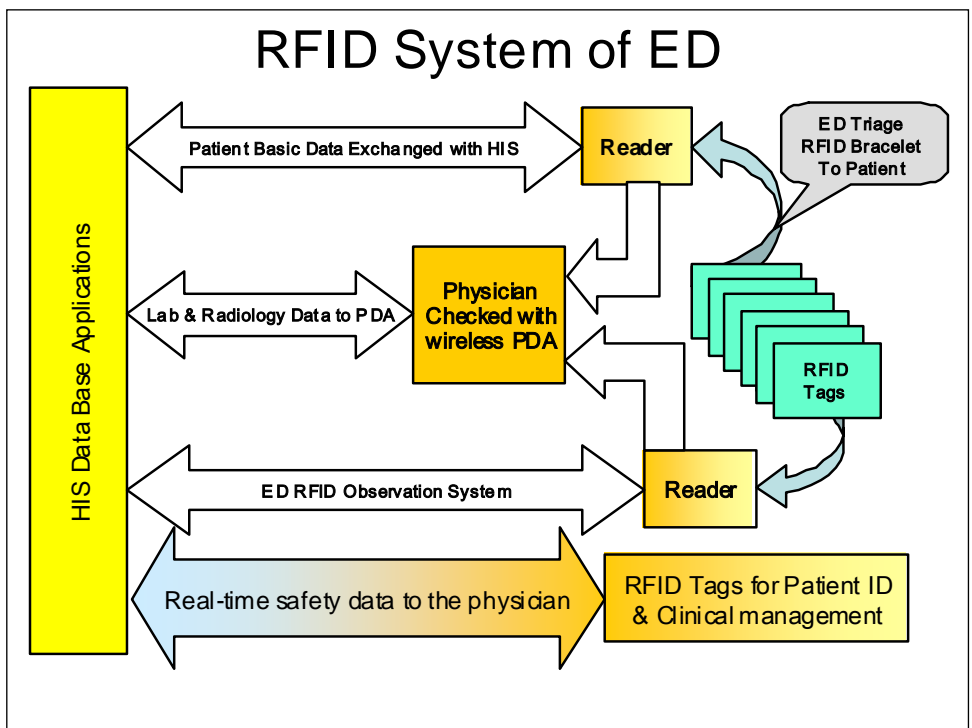
RFID technology is already being deployed across the pharmaceutical and many healthcare industries to improve patient identification of patient safety.(4) The focus on this study is the patient care centered, in which the RFID technology will be used to remind in charge physician to track patient's medical instruments as well as patients and hospital personnel. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) has recently stated new safety goals that should further expedite the process of RFID implementation in this field.(5) It is not difficult to conclude that RFID technology should become a critical success factor for the medical center of the 21st century in terms of both improved patient safety and improved ED clinical decision on the real-time data can be obtained by the physician via wireless PDA.(6)

3. Results

On the monthly ED patients around 5,500, we are applying RFID technology into emergent medical setting then reviewing 5,000 patients in the observation unit on the eight-month period, and its records from the emergency department of selected acute care, non-psychiatric hospitals in Taipei, Taiwan in 2004. We then developed wireless web-based RFID framework to implement the real-time safety reminders such as the laboratory and radiology reports to the physician who can make decision promptly to the patients in the observation unit. Radio frequency identification (RFID), which has focused for its application to inventory control and supply management, can also be implemented in a patient ID wristband system as a substitute in conjunction with, wireless PDA scanner for real-time data collection such as medication administration. (7) The good news is that emerging technologies are available to tap into these potential benefits for improving patient safety.

Using these devices for quick but secure access to essential data can enhance timely clinician decision-making and save lives, improve the flow and ensure security of patient information at the point of care. Wireless technology can provide approach to clinical

information further reducing barriers to safe medication delivery.(7) Compared to bar coded bracelets in use at many hospitals today, RFID bracelets are welcomed by patients because they are far less interfering.



Upon admission, patients receive a paper-thin bracelet embedded with a small RFID chip containing information such as the patient's birth date, ID number, blood type, allergy, doctor's name, medication and other essential medical information.

The application of new technology RFID to improve the patients safety of OU of emergency department had been used from the Sept. 2004.

Table 1 show the 5,010 patients of the length of waiting for acute admission patient used new medical devices RFID from the September, 2004. to the April, 2005 and versus another 3,923 patients not used medical technology RFID from the Jan. 2004 to the Aug. 2004.

Table 1 - Differentiate the used RFID from not used RFID Length of waiting for acute bed admission

Characteristics	Not used RFID	Used RFID
Patient No.	3,923	5,010
Length of waiting (LOW) for acute bed		
Mean	303.6	77.2
SD	225.3	48.8
Not used RFID vs Used RFID P Value = 0.014		

It has been shown that the patients using the medical new device RFID has decreased length of waiting (P=0.014) Medical new technology RFID can make process effectively.

Table 2 shows the 1,096 patients of the length of waiting for ICU used new devices RFID from the Sept. 2004 to April, 2005 which compared with 537 patients not used RFID from the Jan. 2004 to the Aug. 2004.

Table 2 - Differentiate the used RFID from not used RFID Length of waiting for ICU admission

Characteristics	t used RFID	Used RFID
Patient No.	537	1,096
Length of waiting (LOW) for ICU		
Mean	236.7	73.1
SD	166.0	76.9
Not used RFID vs Used RFID <i>P Value = 0.026</i>		

It has been shown that the patients using the medical new device RFID has decreased length of waiting for ICU(P=0.026). Medical new technology RFID can make clinical decision process effectively. Physicians or clinician decision can improve patient safety and medical delivery on well-ordered.

4. Discussion

On this study, ED patients who may need short-term observation and /or treatment. There are patients who may not be very reliable in follow-up who might fit into a brief diagnostic work in an observation unit (OU) or get initial therapy in the OU. About 5-7% of all emergency department patients could benefit from an observation unit.(8) The OU may help improve relations with the medical staffs, and improve public relations by improving emergency department(ED) efficiency and turn-around times. The setting of the RFID systems may be used to track patients, doctors and expensive equipment in hospitals. RFID tags can be attached to the ID bracelets of all patients or just patients requiring special attention, or in predictable critical conditions of patients treated in the observation unit of the emergency so their location can be monitored continuously.(9)

Improvements in emergency department patients' safety are the most importance work, and will improve staff training, and depend on a combined access including regular monitoring of practice, a better understanding of the causes of errors, a reduction in the complexity of routine procedures taking advantage of new technology.(10) Further development of the systems is needed to enable staff to carry out bedside caring procedures efficiently and accurately.(11)

A small number of studies using new technology RFID for the patient safety in hospitals have shown promising results in preventing errors. Although the effectiveness of RFID system shown a significant improvement on the basis of length of waiting for acute bed (P=0.014) and ICU (P=0.026) respectively. There are several other factors which may contribute the change such as the High Risk Reminder (HRR) on the critical value of lab. test and radiology report, computerized consulting system, these should perform further study to find out the correlation with RFID.

5. Conclusion

The use of new technology RFID to improve the patients' safety of ER is very promising. (8) Supporter of the RFID system believes RFID tag will improve rapid access to vital medical information on unconscious or uncommunicative patients. RFID will eventually replace bar-code technology at the bedside. But RFID can provide safety in so many ways

because it can present so much more information than a bar code.(12) Above all, early studies suggest can cut medical error rates greatly.

With the application of RFID system, emergency department(ED) based observation unit are becoming effectively evaluated for the assessment and treatment of patients whether who may require inpatient or ICU management or monitoring.(13) The RFID based observation unit can be of great value to patient care. Although the concept of the OU is considered good practice especially in minimizing clinical risk, within the framework of RFID, it introduce the concept of wireless medical informatics environment which combined the safety mechanisms of high risk reminder (HRR), pervasive observation management (POM), and there has been significant progress to further develop and improve the quality which is safety centered of OU in ED practice.

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