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Efficiency and Safety of New Radiofrequency Identification System in Japanese Hospital

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Abstract and objective

Radiofrequency identification (RFID) uses radio-frequency tags attached to people or objects to provide identification, tracking, and security under the general heading of automatic identification. New RFID system (UHF band, 953 MHz) has been available since April, 2005 in Japan. We tested efficiency and safety of new RFID system in our hospital. Electric fields produced by new RFID had no significant effects on cardiac pacemakers, implantable cardioverter defibrillators (ICD), and other medical devices(ex. Electrocardiogram recorder, cardiac monitor, intra-aortic balloon pumping, infusion pump, and respirator) in our hospital. New radiofrequency tags seemed to provide extensive patient identification and to track capital equipments within our hospitals. Healthcare systems today are increasingly complex and interrelated processes, while new RFID technologies will provide opportunities for enhanced patient care and safety in Japanese hospital.

Keywords:

cardiac pacemaker, implantable cardioverter defibrillators, healthcare, patient safety

Introduction

Radiofrequency identification (RFID) has recently begun to receive increased interest in supply chain, in order to increase the efficiency and visibility of material and information flows. RFID may address to improve safety and increase in productivity. New RFID system (UHF band, 953 MHz) has been available since April, 2005 in Japan. However, there has been no attempt to determine whether electric fields produced by new RFID can influence cardiac pacemakers, implantable cardioverter defibrillators (ICD), and other medical devices in our hospital. We further examined to track new IC tags attached to people and medical equipments in hospitals.

Our data may provide the potential benefits, the area of applications, and the corresponding strategies of RFID in hospital environments.

Methods

We examined effects of RFID system on 7cardiac pacemakers and 5 ICDs in 0.18 % salt solution, similar electric condition to human body. The experimental conditions for interference induced by RFID were between a homogeneous electric field perpendicular to the area formed by the antenna and radio-frequency tags.

We next tested whether Electrocardiogram (ECG) recorder, ECG monitor, intra-aortic balloon pumping (IABP), infusion pump, and respirator in our hospital could work normally under new RFID system.

Furthermore, we evaluated to track new IC tags attached to people and medical equipments in our hospital.

Results

Electric fields produced by RFID had no significant effects on cardiac pacemakers. The RFID systems did not interfere with ICDs.

ECG recorder, ECG monitor, IABP, infusion pump, and respirator were worked normally under operation of RFID systems.

Radiofrequency tags attached to people and capital equipments within our hospitals provide more extensive identification than traditional bar coding can. New RFID tags increased read accuracy, even with the tag placed on metallic objects. However, the read range seemed to be reduced from an average of 2.5m.

Conclusion

RFID may be ultimately used for many of the functions currently carried out using bar coding if the cost of RFID comes down. Healthcare systems today are increasingly complex. RFID is a technology that will have a profound impact on effective and safe patient care in Japanese hospitals in near future.