

## Chapter 6

# Medi-Rings for Senior Citizens: Distributed EMR System

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### ABSTRACT

*In this chapter, the authors propose Medi-Ring, a compact system to carry all the medical records for senior citizens to avoid improper medication, delay in treatment in emergency situation. The three main aspects of Medi-Ring are NFC technology, system memory, and a controller. NFC technology is used for transferring the data, the system memory is used to store the medical records which includes patient's details, doctor's prescription, and all other medical details. A controller is used to control the whole system. As the proposed Medi-Ring is wearable, compact, and flexible, it can be used as a medical companion for senior citizens.*

### INTRODUCTION

Mostly in medical emergency, a patient can be treated with a proper medication if and only if the previous medical records of the patient are available. In developing countries such as India such records are not accessible during medical emergency because of the lack of infrastructure. In western countries, several Electronic Medical Record [EMR] options such as object storage systems, compliance WORM storage, IBM's Hippocratic databases etc [Hasan R.,2007] are available to maintain the medical records where the data is loaded into a centralized network. EMR is a real time transaction processing database for clinical patient information [Hasan R.,2007]. EMR is a record in digital format which requires resources such as internet to synchronize with central network and needs technical persons to maintain it. In developing countries such as India, medical records are mostly handwritten. Handwritten paper medical

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records have their own set of advantages and disadvantages. The main advantages are that they are very cost effective, gives more leeway for the doctor to represent the symptoms in form of diagrams etc for easy understanding, to increase speed of diagnosis common elements can be typed and can have boxes for selecting etc [Hasan R.,2007]. Along with the advantages they have disadvantages such as storage problems, accessibility issues, fragmentation of manual medical records if the patient visits different Doctors for multiple ailments, difficulty in transfer of medical records from one hospital to another and also manual records can be associated with poor legibility which can contribute medical errors [Boumstein, J. 2013]. In India medical records in most of the hospitals are manual in nature. 50% of medical records in India are unusable or partly usable as they are not properly stored or the handwriting of the medical practitioner is not legible. As mentioned in article of Times of India, World Health Organization lists India among the top 10 killers in the world due to medical errors. While a British National Health system survey in 2009 reported that 15% of its patients were misdiagnosed [Malatha Iyer, 2011].

Due to the manual medical records, during medical emergency, patients in India have to be taken to the same hospital for treatment. If patient is taken to another hospital, physician or doctor will have no access to patient's previous medical records leading to re-simulate all the treatments which consumes lifesaving minutes. To overcome the problems associated with manual medical records, some hospitals have migrated to electronic medical records to serve patients better. Some of the challenges faced by the hospitals in India due to electronic medical records are high installation cost, need for reliable internet facility, and need for uninterrupted power supply [Hasan R.,2007]. Due to high patient to doctor ration in India EMR implementation which requires a centralized network, becomes very expensive in terms of cost of installation. In addition to this EMR are associated with another problem –data security. An article from NDTV gadgets beta, “Your medical Record is worth more to hackers than your credit card”, The FBI warned health care providers to guard against cyber-attacks after one of largest U.S hospital operators, community Health system Inc., said Chinese Hackers had broken into its computer network and Stolen the personal information of 4.5 million patients[Reuters,2014]. This article clearly states that the centralized networks are more prone to security threats and very expensive for implementation. To address the problems discussed, the medical records can be stored locally than global, which can be accomplished with a wearable gadget “Medi-Ring”. As every person in his life has to visit the hospital for a regular check-up, each time it is required to carry necessary report or previous check-up report. There may be chance that some patients may forget to carry reports and some may have lost the report. In such case the patient as well as doctor will face a problem, and this may insist them to take another check-up which will be burden to the patient. So in order to avoid such problems, proposed medi-ring, which can store the file and transfer the files to other system.

## **BACKGROUND**

In historical convention, keeping medical files and medical prescriptions throughout the India was manual and medical records in papers and some books. There are many disadvantages of keeping the records in manual format- large storage area, maintenance, retrieval, legibility of practitioner's hand writing etc. The retrieval system is complex as the index has to be maintained separately for ease of access. Maintenance is difficulty as the records have to be regularly inspected and protected from termites, moisture, water seepage etc. To overcome these problems many hospitals are converting their manual records into computerized patient records and storing them in the digital form. The records are stored

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