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Factors Affecting the Adoption of Electronic Health Records by Nurses

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Abstract: Electronic Health Record has potential to improve patient care by managing patient's medical and personal information efficiently and effectively. It is easy to maintain patient information electronically compared to paper based records. Many studies have been done in other countries to study the effective use of Electronic Health Record, but a small number of studies exist in Indian situation. This study is a footstep in this route. This study has been done to know the use of electronic health records among nurses in private medium sized hospitals of Tamil Nadu, India. The objective of the study is to explore the use of Electronic Health Records and barriers in using it among nurses. This study also analyzes the factors affecting nurses to adopt electronic health record. Only a third of the nurses (33%) use electronic health record. Lack of training is the major hindrance in use electronic health record among nurses.

Key words: EHR (Electronic Health Record) · EMR (Electronic Medical Record) · HFMA (Healthcare Financial Management Association) · Health and Human Services (HHS) · International Organization for Standardization (ISO)

INTRODUCTION

Electronic Health Records (EHR) and Electronic Medical Records (EMR) are the technologies that are mainly used to manage the patient's health information. However, both are more or less the same with the minor difference being that EMR is mainly used by a single healthcare organization while EHR is collecting the patient information from different sources. EHR has the capability to store patient's health information electronically, support decision making and health information exchange.

Use of Electronic Health Records in healthcare industry is increasing rapidly in order to enhance the efficiency of healthcare. Universal use of EHR by general practitioners was above 90 percent in four nations (the UK, Australia, Netherlands and New Zealand) and 40-80% in Germany [6]. It has been found that "the use of EHRs is increasing in the USA and globally, both in acute care hospitals and in primary care medical practices" [13].

EHR have been used by countries like UK, Australia and Canada. Different countries have adopted different approaches for the use of EHRs. UK made huge financial investments, out of which most of them were derived from government. Germany did not make much investment, but they get benefited from computer systems and software that already existed in their hospitals. Canada focused on both of scope and investment, focusing on narrowing defined goals. The US allows the regional organizations to investigate with their local resources. Overall the factors for the successful adoption for EHR are direct financial support, incentives, quality of care and use of ICTs for basic administrative task [10]. The introduction of new digital tools, frequent information technology support to develop business processes; have allowed ISMETT (Mediterranean Institute for Transplantation and Advanced Specialized Therapies) one of the former model of paperless, digital hospital in Italy [12].

Various factors contribute to the successful implementation and use of use of electronic health record. These factors may be cost, training, time, past experience of user, interoperability, security and privacy, fear, user interface, communication, incentives, leadership etc. A study [1] has been done in Canada on EHR; it is found that computer system's graphical interface design and user's past experience affects the implementation of EMR.

Cost: Cost is a major barrier that affects the healthcare practitioners to adopt EHR. According to Government Health IT in the US, EHR systems are so expensive that makes the physicians face much difficulty to adapt to

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such systems. Cost, physicians practice size and lacks of technical resources are the major barriers for small health care providers. However, large hospitals spend more on technology compare to small hospitals. "Most of the author realized that significant barrier to EMR implementation was related to financial burden and it was difficult to prove the actual cost benefit that could be potentially realized with the implementation of EHR system [14]."

Some countries like South Africa, Sweden, Germany, France and the Netherland face insufficient funding. Sweden, France and South Africa have already moved towards government funded national system. However Germany and Netherlands are still far behind [13]. It has been found that 50% of the implementation plans fails due to poor investment in technology [14].

Cost of EHR involves hardware and software cost. Hardware cost involves the cost of printer, scanner and network to support workflow process while software cost involves the installation and maintenance cost. It will be a better option if EHR providers also share the system maintenance cost. In addition, the cost involves training healthcare practitioners to adopt EHR. The budget of EHR implementation should also include the cost of ongoing training [3]. In recent issues of Cardiology magazine [9], a physician expressed his concerns towards the pressure to adopt EHRs in terms of the cost of EHRs, lack of common equipment standards and concerns of interoperability.

A survey [17] conducted by HFMA (Healthcare Financial Management Association) in 2006 shows that 59% of the respondents stated that lack of available funding is the major barrier. Midsize hospitals are more concerned about funding compare to large and small hospitals. Also rural hospitals are more concerned compare to urban hospitals.

Cost may be an important concern because of uncertainty on return on investments. It was found that there was a "lack of return on investment studies in peer reviewed academic publications" [16]. Financial return was a great concern (38%) for low level adoption hospitals according to HFMA. [17].

Healthcare Financial Management Association believes that the benefits of adoption can be realized only after the full implementation of electronic health records. In addition, it believes that government can play a vital role in adoption of EHR by working with private sectors and by using financial mechanism like tax relief, incentives and grants. The American Recovery and Reinvestment Act of 2009 provide incentives for physicians to adopt EHR technology.

Physicians must realize the value that comes after the implementation of EHR. Past studies found that major saving of about 15-20% can be done for physicians and 20-25% for hospitals after the implementation of EHR. Right approach of implementing EHR definitely increases benefit outcomes [14].

Lack of Time: Lack of time is a concern among healthcare practitioners. A study [5] shows lack of time, lack of financial resources and knowledge of computer skills are the major barriers that prevents the use of electronic record over manual record by general practitioners. Physicians have concerns about lack of time due to their heavy workload. In addition, physicians tend to think that spending more time on training will affect their work schedule and decrease their productivity. Hence, training programs should be planned in such a way that it does not affect their regular work schedule. It is very crucial to understand the various components of EHR system and workflow process. So training can be planned in such a way that specific components of training are given to specific people who would use only that component in their work. But it may also be possible to implement EHR with optimized time planning. However, a time motion study [4] in USA found that during primary care session EHR does not take more time compared to paper based system and EHR benefits can be expected without the physicians wasting their time. Also, a study [7] done in India shows that there was no significant difference in the time exhausted between EMR's and paper records.

Lack of Training: Lack of training among staff also affects the physicians to adopt EHR technology. The use of technology alone will not improve the quality of healthcare. In fact, the employees should be well trained to use the technology. Lack of training may create frustration among healthcare staff. Without proper training, most of the employees are not comfortable with the use of EHR technology. Specialized training [11] is needed for healthcare employees for successful implementation of EHRs. End user motivation and dedication to learn and use EHR is an important factor in the success of EHR.

Fear: Fear is one of the reason that stop healthcare practitioners to adopt EHR. They may have fear that the productivity will decrease during the transition period between paper based and electronic based record. They have fear that their patients have freedom to change their primary care provider easily if they will use electronic record. Also they have fear that patient-physicians

relationship will decrease due to indirect care of patient. Most of the studies found that there is negative impact on physician and patient relationship while using EMR. Nurses also accepted that there is a not a direct patient care while using EMR. But few studies show that there is no effect on physician-patient relationship while using EMR [15].

Security and Privacy: Security and privacy has always been a primary concern in the hospitals. The need for the physicians to have their patient information very secure so that it cannot be accessed by an unauthorized user is very demanding. Privacy improves the reliability of medical data and reduces malpractice by physicians. In US, HIPAA's privacy and security standards is one of the barriers in the deployment of EHR [13]. EHR systems have the capability to increase the effectiveness, accuracy, accessibility, improve the quality of healthcare services and reduce costs but its implementation and acceptance cannot be done unless its privacy and security issues are solved [8]. The privacy and security seems to be major issues in Australia and USA [2]. "The Healthcare Information and Management Systems Society (HIMSS) has created the HIMSS global taskforce which has investigated a battery of EHR components within each country including security, quality, financing sources and barriers."[13].

Lack of Standards: There is a lack of standards that stops physicians to adopt EHR. However many countries have started a set of programs to adopt such standards. The main reason of these standards may be poor government actions and plans. For developing national strategies and healthcare infrastructure, the government of Canada has started a funding program for Canada Health Infoway in 2002 [18].

Objectives:

- Determine the use of EHR among nurses in medium size hospitals in Tamilnadu, India.
- Study the patient related information maintenance using EHR.
- Study the barriers in using electronic health record among nurses.

Methodology: A questionnaire was developed to assess the use of EHR among nurses. Questionnaire was developed with the help of subject experts. The questionnaire was sent to select hospitals in Tamilnadu. Data was collected from nurses in medium sized hospitals. Out of 184 nurses, 71 responded (10 males and 61 females). About 33% of the respondents stated that they use electronic health record in their workplace. A majority of them, about 67% stated that they do not use EHR which indicates that EHR is not being adopted by many medium sized hospitals in Tamilnadu.

Maintenance of electronic health record by the nurses has been shown in Table 1. From the Figure 1 it is clear that 39% of the nurses keep patient related information in paper as well as in electronic format. However 16% nurses stated that they keep the information in paper format but accepted that EHR is more suitable for maintaining the patient record. Only 5% nurses reported that they are maintaining patient information in electronic form.

The percentages of major barriers in use of electronic health record by nurses have been shown in Table 2 and pictorially represented in Figure 2. Findings indicate that need for training is major barrier in use of electronic healthcare record followed by cost. Other barriers include lack of time, past experience of user, interoperability, fear of usage, lack of leadership, communication and the need for incentives.

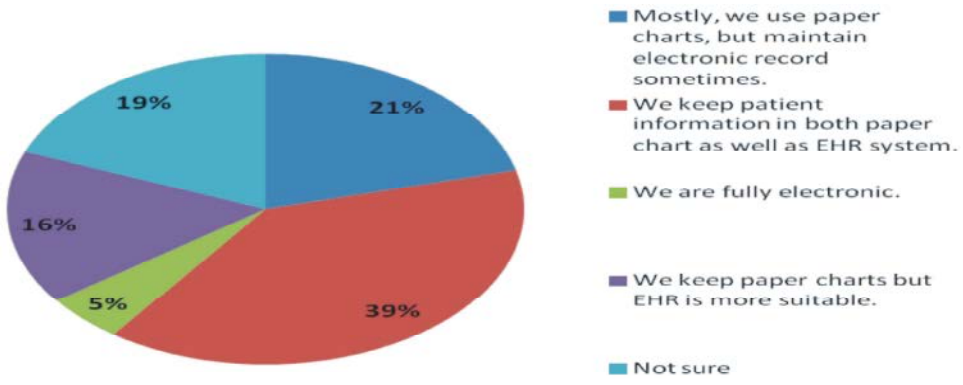

Fig. 1: EHR in Maintenance of Health Record

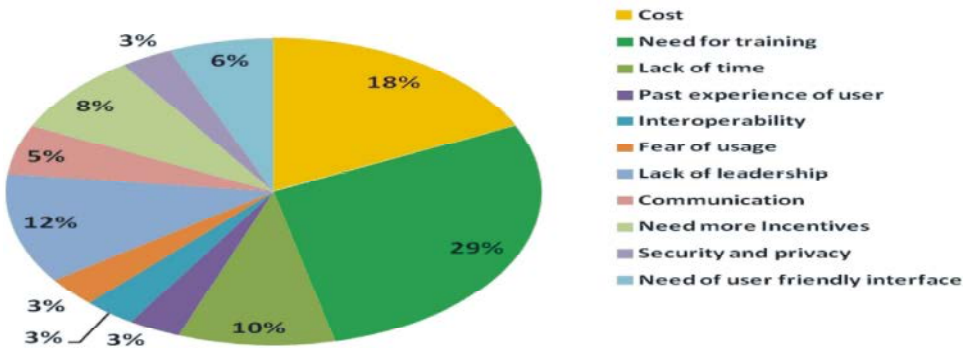

Fig. 2: Barriers in the use of EHR

Table 1: EHR in Maintenance of Health Record

Maintenance	Percentage
Mostly, we use paper charts, but maintain electronic record sometimes.	21%
We keep patient information in both paper chart as well as EHR system.	39%
We are fully electronic.	5%
We keep paper charts but EHR is more suitable.	16%
Not sure	19%

Table 2: Barriers in the use of EHR

Barriers	Percentage
Cost	17.89%
Need for training	28.42%
Lack of time	9.47%
Past experience of user	3.16%
Interoperability	3.16%
Fear of usage	3.16%
Lack of leadership	11.58%
Communication	5.26%
Need more Incentives	8.42%
Security and privacy	3.16%
Need of user friendly interface	6.32%

Training is the key of success for adopting any technology in healthcare. Medical Economics published an article entitled, "*EMR Success: Training is the Key,"* which states that a practice should plan the computer education as carefully as one selects the EHR system.

RESULTS

- Majority of nurses (39%) reported that they maintain patient related information in paper chart as well as in electronic format.
- Need of training (28.42%) is the top most barrier in use of EHR.
- Other barriers were cost (17.89%), lack of leadership (11.58%), lack of time (9.47%), lack of incentives (8.42%), lack of user friendly interface (6.32%), communication(5.26%), lack of past experience (3.16%), interoperability (3.16%), fear of usage (3.16%) and security and privacy(3.16%).

CONCLUSION

There is no doubt that the use of electronic health record will increase the efficiency of healthcare but on the other hand there are many factors like cost, time, training, fear, security and privacy, lack of standards that stops healthcare practitioners to adopt electronic records.

Very few nurses accepted that they maintain patient health related information in full electronic form. Training and cost is found to be the major barriers in the implementation of EHR. Cost includes hardware and software implementation and maintenance including training given to employees. Even though EHR is expensive to implement, its actual benefits comes after implementation of EHR. Training programs should be conducted for nurses in order to use electronic health record comfortably. Proper training leads to successful implementation of electronic health record. Government should start funding programs and give incentives to hospitals to use electronic health records. In addition, hospitals and nurses should realize that the actual benefits come after the implementation of electronic health record and that they have to overcome the fear of loss of productivity.

Training program should be designed such that it takes optimum time to train the employees. Security and privacy issues can be overcome by developing set of standards and strategies with the help of good government plans. Also, in order to improve the efficiency and effectiveness of healthcare, there should be sharing of EHR information globally.

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