Original Article

Perception of electronic medical records (EMRs) by nursing staff in a teaching hospital in India

Naveen Kumar Pera, Amrit Kaur¹, Raveendra Rao²

Department of Hospital Administration, Kasturba Medical College, ¹Department of Public Health, ²Department of Management, SOM, Manipal, Karnataka, India

ABSTRACT

Background: Currently, in India, many healthcare organizations and their managements appreciate the advantages of electronic medical records, but they often use them. The current push for universal health coverage in India with National Rural Health Mission (NRHM) and National Urban Health Mission (NUHM) helping toward healthcare reforms highlights the importance of implementing information technology as a means of cutting costs and improving efficiency in healthcare field. The quality of documentation of patient care rendered at healthcare destinations is very important to showcase the growing stature of healthcare in India. Aims: As maintaining the medical records is very important, storage and retrieval of the information is also important for future patient care. In this regard, implementation of electronic medical records in hospitals is essential. Through this study, we wanted to highlight the perceptions of healthcare personnel, who are in the core team of delivering healthcare, toward implementation of electronic medical records. Methods: A cross-sectional study was carried out among doctors (post-graduates) and staff nurses. The sample size for post-graduate students and nurses was 164 and 296, respectively, in this study. The study was carried out during the period from January to June 2013, and a survey was conducted with the help of a validated, pre-tested questionnaire in a tertiary care medical college hospital in India. Results: The results showed that 75% of the study population are comfortable working with electronic medical records. They mentioned that display of diagnosis, medications, and allergies of patients on the records was most important. Their perception was that electronic medical records improve timely decision-making and patient care due to immediate access to the patient’s disease history. Conclusion: The major problems faced by nurses, as per our study, are delay in services due to dispersion of records, multiplicity of form types consuming major time, and inability to understand doctors’ notes.

Key words: Acceptance of electronic medical record, electronic medical records, nursing staff, timely access of records

INTRODUCTION

Over the recent years, the quality of documentation in medical records has become an important issue, which is not only to promote better healthcare but also to reduce healthcare costs by the governments. In some countries, when funding began to be based on medical record data, it was found that more attention should be paid to the quality of the medical records and documentation of the original healthcare data. In many countries, some problems facing administrators and government authorities include: Poor medical record documentation, large backlogs of medical records waiting to be coded, poor coding quality, and poor access to, and utilization of, morbidity data. To address these problems and improve the quality of data collected,
and the information generated from these data, quality control measures need to be implemented. Sometimes it is difficult to achieve coordination with various other departments, and the most efficient medical records department makes mistakes or huge costs are incurred in employing personnel for maintaining the quality of practice. Therefore, there is a need to implement a good electronic medical record (EMR).

**Electronic medical record**

The electronic record of health-related information of an individual is created, gathered, managed, and consulted by licensed clinicians and staff from a single organization, who are involved in the individual’s health and care. These systems are being sold by enterprise vendors and installed by hospitals, healthcare organizations, clinics, etc.

**Benefits of EMR**

1. It is most beneficial to an individual physician, perhaps because of the changes it brings about in the following areas:
   a. Patient safety: Intelligent e-prescribing, in conjunction with an EMR, improves patient safety by eliminating the need to interpret handwriting and by checking prescriptions against the patient’s medication list for any potentially harmful interactions or allergies before sending the prescription to the pharmacy.
   b. Quality improvement: Enables the physician to build evidence-based protocols, and enables physicians to view their practices and evaluate their own performances in the context of the aggregate population they treat.
   c. Pay for performance reimbursements.
   d. Improved practice efficiency: By substituting the technology for manual work, there is avoidance of delay in services because practice office staff no longer need to pull charts for every patient visit, every patient phone call, or every request for a prescription renewal, and nobody has to search for lost charts.

Many physicians report that using EMRs would take more time for each patient than using paper as, in some situations, it might be more convenient and efficient to use paper records during the clinical encounter. For using EMRs, physicians may have to stop halfway through a consultancy in order to enter information on patients or type a prescription, and this will disrupt the flow. Also, the fact that physicians are slow in typing and entering data would cost more time for each patient visit than before. Keeping these viewpoints of physicians as problems in implementing EMR, a questionnaire-based study was conducted among other major group of healthcare personnel in a tertiary care hospital, the nursing personnel, whose support has been equally important in the delivery of patient care from time immemorial. This, in turn, would help managers or administrators of healthcare organizations to fulfill their needs of implementing EMR. Other groups of people like post-graduate students (PGs) and medical record department personnel were also included; the results of those parts of this study will be coming to print as and when they are completed in near future.

**Acceptance of EMR**

Acceptance is defined as the demonstrable willingness within a user group to employ information technology to the tasks it is designed to support.

Many researchers have stressed the importance of acceptance study. For example, Kirk urged urgent actions on providing legal and social framework for acceptance and introduction of EMR. Past experiences show that the effort to introduce EMR would result in failure and unanticipated consequences if its technical aspects are overemphasized and the social and organizational factors such as the user acceptance and the diffusion of information system are overlooked. We wanted to study the perceptions of nursing staff about the conventional medical record system and EMRs, and to assess the acceptance of EMRs among the nursing staff.

**METHODS**

A cross-sectional study was conducted in a tertiary care medical college teaching hospital over a period of 6 months from January to June 2013. The methods used for data collection were:

1. Observation: The workflow and the existing policies and procedures in the medical records department and IT department of the hospital were observed.
2. Questionnaire: A structured questionnaire was prepared with the objective to know the problems with respect to the manual medical records and acceptance and awareness of the EMRs by the doctors and nursing staff.

Assumptions were made for the acceptance levels for PGs and nurses to be 70% and 45%, respectively, based on which the sample size was calculated from a population size of 335 and 1206, respectively. The sample size for PGs and nurses was calculated to be 164 and 296, respectively, using convenient sampling. The data were compiled and analysed using SPSS. The material related to doctors (PGs) is not under the purview of this paper, it would be released in near future. This paper details the information about staff nurses only.
RESULTS

A cross-sectional study was carried out among doctors (PGs) and staff nurses. A sample of 164 and 296, respectively, was included in the study. The study was carried out during the period January–June 2013 and a survey was conducted with the help of a validated, pre-tested questionnaire.

Table 1 shows that 93.2% of nurses in the sample population were females and 6.8% were males. The majority (70.9%) of nurses in the study population were working after obtaining their respective educational qualifications; 71% were diploma holders in nursing, 25.3% were graduates in nursing, 2.4% were post-graduates in nursing, and 1.4% were having other degrees such as a certificate program. Hence, all the respondents were of good educational background to have knowledge to answer the questionnaire.

Profile of maximum respondents

The maximum respondents were females of age 20–24.9 years, having 1-5 years of experience, and had a Diploma in Nursing.

Section A of the questionnaire to nurses contained questions that could reveal their perception about the problems in the existing system of record keeping and their effects on patient care. The results of the section are presented in Table 2.

Section B of the questionnaire contained questions related to their acceptance level of EMR, paper medical record, or a combination of both, and their perception about the reduction in workload after EMR implementation. This data is shown in Tables 3-5.

Results showed that 25% were comfortable working on paper records, whereas 75% were comfortable working on EMRs. Out of total respondents, those who were comfortable with both paper and paperless records formed 48%. Those who were comfortable working only on electronic systems formed 27% and those who were comfortable only on the paper records and did not want the record to be digitalized formed 21%. Also, 77% thought that patient-related data, if entered by all the healthcare providers in the computer, can reduce the work of managing the records, form types, and provides easy and timely access. This data is shown in Table 4.

DISCUSSION

Simon et al.\(^6\) stated that whether a practice is affiliated to a hospital is an important determinant of EMR adoption.
According to Burt and Sisk,[7] physicians who are employed by or contracted to a medical practice are more likely to use EMRs than those who have their own practices. Stand-alone physicians are most likely to cite high start-up and ongoing costs, lack of technical training, lack of uniform standards, lack of time, lack of belief in EMR effectiveness, and confidentiality concerns as the major barriers to EMR adoption. Of the 22 studies included in a review, only 2 relate to “organizational type” in the adoption of EMRs and have given their apparent influence.[6,7]

In our study at the tertiary care hospital, where all physicians and nurses are employed on regular payrolls, the perceptions of the staff nurses about the EMRs are as follows:

1. 45% of nurses highly agreed, 30% agreed, and 22% were neutral to the perception that EMR can provide timely access to the patient records.
2. 25% of nurses highly agreed, 44% agreed, and 23% were neutral, and 5% disagreed that EMR can improve the quality of decision-making.
3. 33% of nurses highly agreed, 47% agreed, and 15% were neutral to the perception that EMR can improve the quality of patient care given by the healthcare provider.
4. 29% of nurses highly agreed, 48% agreed, and 18% were neutral to the perception that EMR can improve the quality of practice because of concentration of effort on the patient care.
5. 25% of nurses highly agreed, 42% agreed, and 26% were neutral to the perception that EMR can improve the efficiency and productivity of the practice by which more number of patients per day can be seen, whereas 1% and 4% disagreed and highly disagreed with the perception, respectively.
6. 23% of nurses highly agreed, 38% agreed, and 32% were neutral to the perception that EMR can reduce the frequency of medication errors, whereas 4% and 3% disagreed and highly disagreed with the perception, respectively.
7. 32% nurses highly agreed, 49% agreed, and 9% were neutral to the statement that EMR can improve the communication with other healthcare providers.
8. 92% of the study population highly agreed that they require periodical training in the EMR, as there

### Table 3: Acceptance of paper medical records and electronic medical records by nurses

| Questions were on                                                                 | Yes (%) | No (%)     | No response (%) |
|-----------------------------------------------------------------------------------|---------|------------|-----------------|
| Acceptance of paper medical records                                              | 74 (25) | 221 (74.7) | 1 (0.3)         |
| Acceptance of electronic medical records                                         | 222 (75)| 73 (24.7)  | 1 (0.3)         |
| Data entry in system (into EMR) can reduce the workload                          | 228 (77)| 67 (22.7)  | 1 (0.3)         |

### Table 4: Perception of nurses about the features to be introduced in EMR (in %)

| Important features required in EMR                                             | Most important | Important | Neutral | Unimportant | No response |
|--------------------------------------------------------------------------------|----------------|-----------|---------|-------------|-------------|
| Display of clinical notes and reports                                         | 41             | 38        | 10      | 0           | 1           |
| Entry and display of diagnosis medication and allergies                       | 43             | 50        | 6       | 0           | 1           |
| Display of physical findings                                                   | 26             | 57        | 10      | 5           | 2           |
| Prescription writing                                                           | 33             | 52        | 13      | 2           | 0           |
| Decision support system                                                        | 17.8           | 61.6      | 19.2    | 1.4         | 0           |
| Display of structured documentation                                            | 28.8           | 56.2      | 11      | 1.4         | 2.7         |
| Display of demographics                                                        | 26             | 50.7      | 17.8    | 4.1         | 1.4         |
| Display of lab/imaging reports                                                 | 43.8           | 45.2      | 8.2     | 1.4         | 1.4         |
| Privacy of information                                                         | 42             | 34.2      | 15.1    | 8.2         | 1.4         |

### Table 5: Perceptions about the usefulness of features of EMR among nurses

| Usefulness criteria                                                                 | Highly agree (%) | Agree (%) | Neutral (%) | Disagree (%) | Highly disagree (%) | No response (%) |
|-------------------------------------------------------------------------------------|-------------------|-----------|-------------|--------------|---------------------|-----------------|
| Timely access to medical records                                                   | 45                | 30        | 22          | 0            | 0                   | 3               |
| Improved quality of decision-making                                                | 25                | 44        | 23          | 5            | 0                   | 3               |
| Improved quality of patient care                                                   | 33                | 47        | 15          | 4            | 1                   | 0               |
| Improved quality of practices                                                      | 29                | 48        | 18          | 4            | 1                   | 0               |
| Improved efficiency and productivity                                               | 25                | 42        | 26          | 1            | 4                   | 2               |
| EMR usage can reduce medication errors                                              | 23                | 38        | 32          | 4            | 3                   | 0               |
| Better communication with other healthcare providers                                | 32                | 49        | 9           | 7            | 1                   | 3               |
| Is periodical training of the staff on EMR required?                                | 42                | 50        | 7           | 0            | 0                   | 1               |
would be a constant turnover of nurses in large hospitals, so that they get updated with the system. Non-comprehensive EMRs, therefore, create confusion among users. Server failures, time to enter data because either the script is long or security considerations involve longer processes, use of non-standardized versions, conflicting needs of clinicians and other stakeholders, insufficient technical support, time lag between the date of report and scan of lab report are all different formats of non-comprehensive EMRs. Restrictions to access because of security reasons failing the purpose of EMR and because of hardware malfunctions.

A national survey conducted in the USA to know the adoption trends reveals that the adoption levels are more among physicians of age <50 years than those of age >50 years. The adoption levels increase as the size of the practice increases, i.e. the practices having more than 11 physicians had 86% adoption levels. The ownerships show the maximum adoption in health maintenance organizations, followed by community health centers, academic health centers, and physician-owned centers. Physicians who are adopters are very satisfied and active users, while others are in the implementation stage, the dissatisfaction levels are relatively very low.[8]

Majority of the hospitals in Asian countries such as India, China, Thailand, Malaysia, and Indonesia are still in the early stages of IT adoption. These hospitals are far behind in terms of IT adoption, when compared to USA. The most important barrier of EMR adoption in India is lack of awareness among medium- and small-scale providers about the benefits and advantages of EMR. Resistance to adoption, lack of compatible technology with the existing systems, lack of user-friendly interface, high cost of implementation, long implementation process, decrease in productivity during implementation, and lack of domicile knowledge in healthcare among vendors are the key barriers of adoption in India.[9,10]

The EMR integrates patient information systems, so that patients’ demographic, financial, and medical information can be collected, accessed, transmitted, and stored in a readily available digital format.[11,12] EMR technology represents a movement from paper-based care activities toward outcome-focused, evidenced-based processes.[13] Future researchers might consider how technology adoption by physicians is affected by other factors such as culture. For example, perceived usefulness appears to be more important to Western cultures, while ease of use is more important to non-Western cultures in determining intention and actual use.[14] Given the diversity of the Indian sub-continent, with urban–rural divide in terms of percolation of information technology, and given the diverse specializations and superspecializations that are seen in the physician population, the effect of speciality that a physician is trained for acceptance of electronic records has to be studied in future, if they are important contributors.

**CONCLUSIONS**

With the increasing number of multi-speciality hospitals coming up in India in the private sector, it is imperative that hospitals adopt the EMRs. The major problems faced by nurses, as per our study, are delay in services due to dispersion of records, multiplicity of form types consuming major time, and inability to understand doctors’ notes. The awareness of nurses about EMR is impressive and is dependent on their educational qualifications. Most of the nurses in the study sample were enthusiastic about EMR implementation and perceived that they have great utility and value.

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