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**Original Research Article**

# A study on perception of clinicians regarding use of electronic medical record for patients attending outpatient departments in a tertiary care teaching hospital in northern India

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## ABSTRACT

**Background:** Information technology is increasingly being recognized as an important tool for improving patient safety and quality of care. Use of electronic medical record has the greatest potential for improving quality in healthcare. Use of technology in a highly interactive environment such as the OPD has to be user friendly and acceptable. Therefore a study was carried out to assess the perception of clinicians regarding use of computer modules in clinical care in the outpatient departments of a tertiary care hospital in northern India.
**Methods:** A cross sectional study was carried out over a period of two months in which 70 clinicians in the selected hospital were administered pre-designed questionnaire format for self reporting. It required them to rate their preferences regarding adoption of a computer based module for their OPDs and how this would affect their time and quality of patient care.
**Results:** For a given computer based module in OPD, 81.4% of the clinicians supported its adoption. The mean scores suggested that most clinicians perceive that use of electronic medical record would improve quality of care. The mean scores for any of the parameters did not differ significantly amongst supporters and non-supporters of adoption of the module except on one parameter that it would be easier to follow a patient seen earlier by another clinician ($p<0.05$).
**Conclusions:** Although there might be an initial resistance to change, overall clinicians perceive that introduction of electronic medical records on outpatient department would lead to improved quality of medical information management.

**Keywords:** Barriers, Clinician perception, Electronic medical record, Quality

## INTRODUCTION

Information technology is increasingly being recognized as an important tool for improving patient safety and quality of care. Use of electronic medical record has the greatest potential for improving quality in healthcare.[1,2] Medical/health records form an essential part of a patient's present and future health care. As a written collection of information about a patient's health and treatment, they are used essentially for the present and continuing care of the patient. In addition, medical records are used in the management and planning of health care facilities and services, for medical research and the production of health care statistics. It has been said that the medical record "must contain sufficient data to identify the patient, support the diagnosis or reason for attendance at the health care facility, justify the treatment

and accurately document the results of that treatment" (Huffman, 1990).[3]

Medical records per se gain importance in the hospitals and other health facilities because of their medico legal and research concerns. Many hospitals today realize the adoption of computerization in keeping medical records, although much of it is for the inpatient purpose. For ambulatory patients also, it was envisaged that wide adoption of mobile computing technology can potentially improve information access, enhance workflow and promote evidence-based practice to make informed and effective decisions at the point of care.

Medical education, traditionally has followed a focused approach on medical knowledge alone, so that, most doctors, especially those belonging to the generation that grew up before computers were introduced into school curricula and now hold senior faculty positions in hospitals, are not very handy with computers. On the other hand, use of information and communication technology in health has the potential to improve data collection, provide epidemiological inputs, improve access to quality health care and health information and ultimately lead to formulation of an evidence based health care program and healthcare policy at national level, as has been demonstrated in other countries.[2]

Also, from the global perspective, it is seen that growing advances in healthcare technology and adept skills in India make it a favorite destination for healthcare services in terms of cost and quality of care. All these factors necessitate the use of a reliable and retrievable source of patient data in hospital and other healthcare settings.

Handheld computers or personal digital assistants (PDAs) offer portable and unobtrusive access to clinical data and relevant information at the point of care.

Though a critical tool, technology alone is not sufficient unless all the stakeholders commit themselves to the common platform in achieving the best of health information exchange. Acceptance to electronic medical records has been defined as the demonstrable willingness within a user group to employ information technology to the tasks it is designed to support.[4]

Implementation of newer initiatives makes it imperative for the users to approve or accept the same first. This study was thereby designed to understand the perception of clinicians in an apex tertiary care hospital in northern India regarding the adoption of a computerized module for capturing clinical details of patients attended by them in the outpatient departments.

The study was intended to be carried out in an institution attending to patients from across the country and it was realized that introduction of technology in capturing clinical details of ambulatory patients attending the outpatient departments could offer significant advantage in terms of health information exchange, particularly during multispecialty consultations and referrals within the institute. The institute has already launched a digitalization campaign with all inpatient records being digitalized with the amalgamation of programs such as Picture Achieving and Communication System, Computerized Patient Record System and e-hospital suit into its hospital information management systems. With focused training and a wide level of acceptance towards this digitalization campaign, there was a felt need to venture into the use of technology for the patients attending the OPDs also.

**Table 1: The proposed parameters to be captured.**

| Data to be captured in the OPD module |
|---|
| 1. Patient demographics |
| 2. Weight, height and allergies |
| 3. Clinical notes |
| 4. Results of laboratory investigations |
| 5. Radiology reports |
| 6. Miscellaneous reports (entry of reports performed outside "XYZ" hospital) |
| 7. Clinician orders (e.g. laboratory investigations, referral to other departments, etc.) |
| 8. Prescription entry |
| 9. Plan of management and next visit |
| 10. Counselling notes (if any, e.g. diet counseling) |
| 11. Drug interactions/dosing/allergy alerts) |
| 12. Remarks |

## METHODS

A cross sectional study was carried out in an apex tertiary care institute in northern India which reports an average annual outpatient attendance of over 2.5 lakh patients.

Although there are a large number of clinicians attending to patients in the outpatient departments, it was decided that only those clinicians holding permanent posts would be included in the study as most of the others were resident doctors and thereby a younger and floating population whose preferences would not impact hospital care practices immediately.

The study was carried out for a period of two months (from September 2017 to October 2017) after obtaining approval from the institutional ethics committee.

From an eligible population of 285 clinicians, 70 of them were interviewed to meet the minimum required sample size (proportion of supporters of adoption calculated on pilot and keeping margin of error at 5%). Systematic sampling technique was followed to select the study sample from the eligible population and participation was voluntary after obtaining written informed consent.

In a pre-designed survey format we proposed a computerized module and sought their opinion regarding adoption of the same.

The second part of the format consisted of certain parameters on use of electronic medical records which they were required to rate on a five point Likert scale, followed by their demographic details and a column for suggestion and remarks.

***Statistical analyses***

Statistical analysis of the data was done using software STATA Inc. version 11.1. The Chi square test and t test were used for testing differences between groups. A p-value of less than 0.05 was considered as significant.

## RESULTS

The proportion of clinicians who supported the adoption of use of computer based patient records in the outpatient departments was 81.4%, while 18.6% of them did not support the adoption of the same.

From Figure 1 it can be seen that in both age groups, ≤40 years and >40 years, the proportion of supporters to adoption of the module were much higher compared to non-supporters.

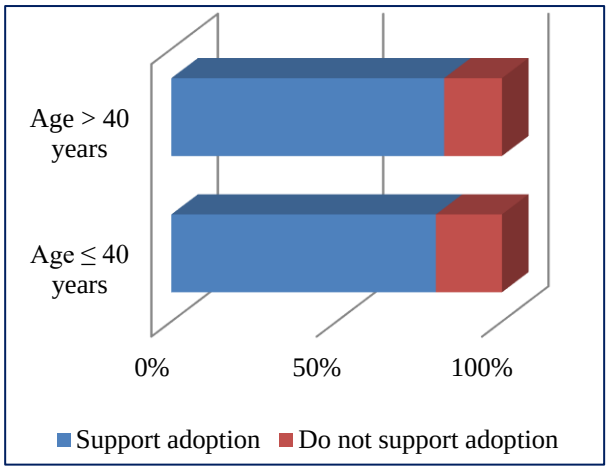


**Figure 1: Age group wise comparison of supporters versus non supporters of EMR.**

The proportion of clinicians who supported adoption of the module was found to be higher irrespective of whether they received any prior formal computer training or not (Figure 2).

It was also observed that the proportion of supporters of adoption was higher in both medical as well as surgical specialties and there was no significant difference between the two groups (Figure 3).

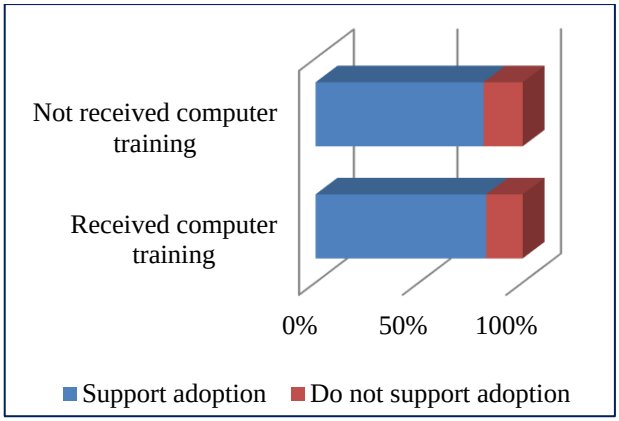


**Figure 2: Comparison of supporters versus non supporters of EMR adoption in terms of computer training.**

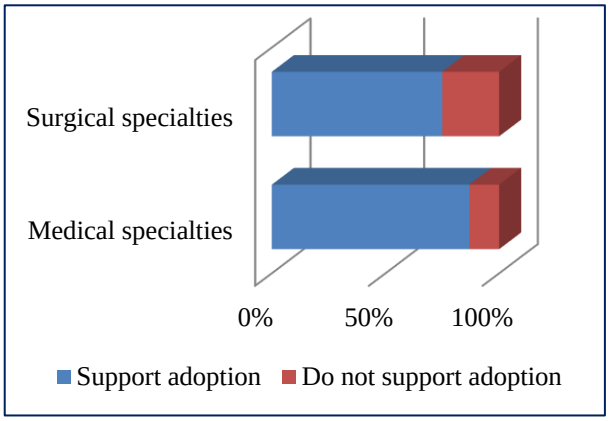


**Figure 3: Comparison of medical and surgical specialties in terms of support for adoption of the computerized module.**

Table 2 shows the comparison of mean scores between clinicians who wanted the use of EMR in the outpatient departments and those who did not want the use of EMR in outpatient departments.

It was seen that there was no significant difference between the two groups in terms of their perception with respect to time utilization if a computerized module was introduced in the outpatient departments. Most of them either agreed or strongly agreed that that introduction of this module would increase clinician time per patient, time needed for data entry, also increase accessibility to patient data and decrease clinician's time to review patient's past records.

Given the introduction of the computerized module, clinicians' perception regarding the quality of patient care was also assessed. Their perception did not differ significantly between those who supported the adoption of the module and those who did not support its adoption except on one parameter that it would help to see the patients seen earlier by other clinicians more easily. Here the mean score of those who did not support adoption of

the module was significantly higher as compared to those who supported its use.

Clinicians were also asked to rate some of the assumed barriers towards adoption of a computerized module in the outpatient department. Most of them rated these barriers to be hindrances to a high or very high extent. However, mean scores of those clinicians who supported the introduction of computer based modules in the OPDs did not differ significantly from those who did not support the same.

There were suggestions from the clinicians' that adoption would be much easier if additional manpower was given to them exclusively for the computerized module entry. Some of them suggested that additional features such as photography and videography should be included while tailor-making the modules to fit their specialty requirements.

**Table 2: Comparison of mean scores of those supporting adoption of electronic medical record system in the OPDs with those not supporting its adoption.**

| Characteristics | Support adoption, Mean±SD | Do not support adoption Mean±SD | P value |
|---|---|---|---|
| **Perception with respect to time** | | | |
| Increase clinician time per patient | 3.63±1.06 | 3.69±1.18 | 0.8 |
| Increase time needed for data entry | 4.07±0.84 | 4.15±0.98 | 0.7 |
| Give rapid access to patient data | 4.28±0.83 | 4.15±1.14 | 0.6 |
| Decrease clinician's time to review past records of patient | 3.98±0.76 | 3.92±1.18 | 0.8 |
| **Perception with respect to quality of care** | | | |
| Increase documentation accuracy | 4.28±0.75 | 4.00±1.22 | 0.2 |
| Reduce clinical errors | 3.94±0.76 | 3.92±1.11 | 0.9 |
| Increase quality of inputs from referral department | 3.82±0.75 | 3.76±1.01 | 0.8 |
| Decrease redundant data | 3.57±0.77 | 3.92±1.11 | 0.1 |
| Help to see patient of other clinician more easily | 3.64±0.83 | 4.15±0.89 | 0.04 |
| **Perception with respect to barriers in adoption of EMR** | | | |
| It is a costly affair (Capital needed) | 3.36±0.97 | 3.38±1.12 | 0.9 |
| There would be resistance to change | 3.92±0.86 | 3.92±1.11 | 0.9 |
| Capacity to select, contract, install and implement the system | 3.63±0.91 | 3.61±1.4 | 0.9 |
| Loss of productivity during transition | 3.68±0.86 | 3.53±1.61 | 0.6 |
| Risk of inappropriate disclosure of patient data | 3.64±0.83 | 3.15±1.46 | 0.1 |
| Concern for record tampering | 3.52±0.94 | 3.23±1.30 | 0.3 |
| The module does not fit the specialty requirement | 3.42±1.05 | 2.84±1.28 | 0.09 |
| Accountability of record entry | 3.59±0.92 | 3.38±1.04 | 0.4 |
| System failure or downtime will affect work | 4.00±0.86 | 3.84±1.06 | 0.5 |
| Training for use of the module would be cumbersome | 3.38±1.03 | 3.92±1.25 | 0.1 |

## DISCUSSION

With an increasing demand for quality medical services, there is a need for innovative hospital information management system including good electronic medical record system. It is widely acknowledged that electronic medical records are a key to improving patient safety and quality of care by drastic reduction in number of medical errors.[5,6] However, achieving quality improvement through the use of electronic medical records is neither low cost nor is it easy.[7] Previous experiences have shown that adoption of electronic medical records would encounter unanticipated consequences if only technical feasibility of the same is taken into account and user perception and organizational culture is overlooked.[8,9]

The incessant demand on clinicians' time and the sheer numbness that they try to beat the system were understandable concerns of the management, due to which they decided to obtain the opinion of the clinicians (users) with regard to the introduction of the suggested computer based module.

To cope with the rapidly expanding facets of healthcare and keep up its quality, there was a need to venture into introduction of electronic medical records for the services of ambulatory patients attending the outpatient departments in the present study settings. However, a success to this could only be achieved if the stakeholders reciprocate to the needs and importance. Our study showed that 81.4% of the clinicians supported the adoption of the module. Their support had the potential to

realize the proposal to digitize OPD records. In another study on perception and attitude of physicians 84.2% of the respondents felt that benefits of an EMR outweighed the costs and that EMR should be implemented.[10] However, Aaronson et al reported that given the choice of adoption of EMR, only 46% of the family practice residents would like to adopt the same.[11] In a national survey of physicians conducted in the United States, adoption of a fully functional electronic medical record system was reported by 4% and a basic system by 13%.[12] This shows that although technology, which is capital intensive, may be available yet it takes a greater drive to put it into use for the benefit which might not be tangible. In 2011, however the reported rates of adoption are at 68% in the United States.[13]

In the present study, although there were 14.6% who did not recommend the ready adoption of any computerized module in the outpatient departments for clinical details, they realized its potential equivocally well as those who did recommend its adoption. Lenhart et al reported that the biggest obstacles in maintaining EMR system was patient care data entry and resistance by the residents or faculty.[14] In the present study also it can be observed that clinicians perceived that adoption of EMR in the outpatient departments would lead to increase in time for data entry related to patients' clinical details with mean scores being 4.07±0.84 and 4.15±0.98 in those supporting adoption and those not supporting so. With an increasing trend of outpatient attendance in the present study settings it may be anticipated well in advance that the initial phase of introduction of a computerized module is bound to perceive increased workload and vehement resistance. This phase of transformation would take its own time to settle effectively. In the long run, clinicians also do appreciate that this would enable ready access to patient data which could be used effectively for clinical decision making apart from ease of research.

Maintaining standards in medical records are a key to upholding the quality of health and medical information. In the present study, clinicians agreed to a great extent that adoption of EMR in the ambulatory settings would increase the accuracy of documentation, reduce medical errors, increase quality of inter specialty referral consultations and decrease redundant data. In a study on resident perspective also it was observed that largely the participants realized the benefits of adoption of EMR although there was ambiguity in acceptance of the same in reality.[11] In another study also, clinicians perceived significant improvement in patient care as a result of using an outpatient EMR system.[15] The reduction of medical errors represents a benefit to both patient and doctor. An electronic medical health records arena of information sharing within a medical practice naturally reduces unwanted hand transcribed errors. The problem of lost or misplaced patient files is also eliminated. These advantages of EMR help produce a marked increase in the health related safety of patients and patient welfare.

Barriers towards adoption of EMR has been a much explored facet of the implementation reality.[10,11,16] In our study also, most of the perceived barriers have been rated high in terms of implementation of EMR for outpatient settings. The mean scores of all the parameters relating to potential barriers such as high cost, capacity to install and sustain, resistance to change, concerns of data accuracy and data security, loss of productivity during transition phase, system failure or downtime and training needed before its adoption was more than average (i.e., greater than 3). There was a consensus belief among the clinicians that implementation of this system is bound to be overridden by numerous obstacles and in spite of this majority were on high to accept this challenge and put forth a joint effort in improvising the quality and safety of patient care in the institute.

## CONCLUSION

With greater emphasis on improving access to and quality of healthcare, there is also an added emphasis on cost optimization. A simple and effective means to achievement of this is by adoption of health information technology in particular adoption of patient centered information such as medical records, appointment scheduling, etc. Despite the perceived benefits of the system, their adoption is still low and meets resistance from clinicians in different settings. Adoption of electronic medical record system requires the user and attributes, support from others and numerous organizational and environmental facilitators. In the present study setting also upkeep of the motivation of these clinicians and generating awareness in terms of its potential benefits to all stakeholders would definitely enable a smoother transition if the module is adopted.

The main limitation of the study is that the study population in this case was limited to a single institution being a short term project and hence further study in this perspective is recommended with a larger population from multiple healthcare institutions in order to generalize the findings of the study.

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