

Factors to Overcoming Barriers Affecting Electronic Medical Record Usage by Physicians

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Abstract

Background: Hospitals are adopting electronic medical records (EMRs) in larger numbers; however, the barrier to derive its full utility is the low acceptance by physicians. **Aims and Objectives:** This study is done with an objective to identify the factors to overcome the barriers preventing the adoption of EMR by physicians. **Materials and Methods:** This study is cross sectional in nature and a self-administered questionnaire is developed based on the Technology Acceptance Model. **Results:** The four identified factors are positive attitude toward EMR, reliability, difficulty to use, and adaptability, these factors together, have explained 62.54 percent variance in the data set. **Conclusion:** The physician's acceptance for EMRs can be improved by focusing on the identified four factors, which are "positive attitude toward electronic medical records," "reliability of electronic medical records," "difficulty level of use," and "adaptability of electronic medical records."

Keywords: Barriers to use electronic medical records, electronic health records, electronic medical records, technology acceptance model

INTRODUCTION

Electronic medical record (EMR) is the need of the hour in hospital and health-care organizations. Together with electronic health record (EHR), it improves quality and reduces the cost of health care.^[1] The adoption of health-care technology such as EMR or EHR is increasing continuously from the last decade.^[2] Increased usage of EMRs brings enhanced quality care and hence physicians can adapt to quality improvement programs, which is easier to implement and adaptable in comparison to paper-based medical records. However, the implementation of quality improvement through EHRs is neither low cost nor easy.^[2] Usage of EMRs aids in improving quality health care by enabling efficient health-care delivery system. However, the barriers to use EMR adoption by physicians in India are not adequately researched; hence, this study is carried out to identify the barriers affecting the usage of EMRs by hospital physicians.

EMR and EHR are often used interchangeably, but there is a significant difference between the two. Technically, EHR is more comprehensive than EMR; EMR is designed from the clinicians' perspective and is a better option against the paper-based clinical documents. However, EHR is more comprehensive and is designed considering the stakeholders

and the other members of the patient care team, such as laboratories, pharmacists, and the individual himself/herself.^[3] EMR is a computerized database with components of demographics, past medical history, and surgical information of the patient. Along with a family history of illnesses, drug and medication information and treatment regimens are emphasized. In addition, previous studies have proven that health-care technology adoption has resulted in benefits such as improved compliance with guidelines-based care, enhanced surveillance and monitoring, and decreased medical errors.^[4] The important barriers to EMR^[2] use were found to include variables such as high initial cost and uncertain financial benefits, high initial physician time costs, difficult-to-use technology, inadequate support, inadequate data exchange, lack of incentive, and physicians' attitude.

However, the EMRs bring greater benefits summarized as follows:

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- EMR helps in reducing and minimizing medication errors, which benefits the patients and the doctors
- It reduces the transcription errors which are common in handwritten medical records
- It eliminates the concept of missing of the medical files
- Better and faster decision-making and improved clinical care process
- Digital record environment saves space, which is always a huge constraint in hospitals
- Better diagnosis and aided by drug delivery system for patient management and better quality care in terms of treatment
- It minimizes the operational cost by eliminating unnecessary overtime labor costs.

The benefits of EMR are positively perceived by both physicians and patients in earlier studies.^[2,5] However, from the patient's perspective to facilitate information exchange related to health-care processes, EMRs are found to play a pivotal role in enhancing the patient-centric approach. Hence, understanding the provider use pattern of EMRs and its associated relation with the quality in health care is the first step in understanding the better clinical care approaches and experiences. For tracking the patients, understanding the provider's perception has been an evolving component with the rapid usage of EMR, as per the Centers for Disease Control and Prevention data of 2012; it has been found that the physician's adoption of EMRs was highest for cardiology specialty followed by internal medicine specialty.^[6] In addition, it can be said that there are many quality benefits in EMR functions, such as electronic documentation viewing, diagnostic test ordering, reminders and pop-ups for management of medications, decision support systems with the aid of algorithms, and display of standardized International Classification of Diseases along with real-time messaging. In spite of all the advantages in improving the quality of health care, implementation of EMR depends on the physician's practice usage of EMR, which is very few in numbers. The physician's acceptance and active support are vital in the implementation of EMR. Acceptance of EMR by health-care professionals is an essential condition for implementation and for materializing the expected benefits.^[7] Many of the EMR projects have failed due to the lack of support from physicians for the project.

MATERIALS AND METHODS

The study design is cross-sectional. A questionnaire was developed based on the technology acceptance model,^[8,9] which models how users accept and use technology. Initially, the self-administered, semi-structured questionnaire consisted of 15 items [Table 1] and later on after doing the reliability analysis, five items were removed as their removal improved the Cronbach's alpha, and the Cronbach's alpha was calculated again.^[10] These items were items 4, 7, 10, 11, and 13. In the end, the questionnaire consisted of a total of 10 items. The face validity of the questionnaire was ensured by getting it reviewed by three industry experts. The whole physician population of the hospital who were using the outpatient module of the EHR were

selected for the study and were approached for their responses, and all the physicians gave their consent to participate. A total of 145 physician's responses were recorded and further analyzed with the help of factor analysis techniques in the IBM SPSS Statistics 20.0 (IBM Corp., Armonk, NY, USA).

RESULTS

The demographic analysis of the physicians revealed that out of a total of 145 respondents, 78 were male and the remaining 67 were female. Around 40% of the respondents were having experience in the range of 1–3 years and 20% were using EMR for the first time in their carrier. Lastly, 46 respondents fell into the age group of 25–35 years. The questionnaire found to have good internal consistency as the calculated Cronbach's alpha was 0.83, which was higher than the cutoff level of 0.7.

Furthermore, dimension reduction technique factor analysis was carried out to derive the factors, and the extraction method used was principal axis factoring, with the rotation technique direct oblimin. The Kaiser–Meyer–Olkin measure of sampling adequacy came out as 0.771. This meant that the sample was adequate to proceed with the factor analysis. Similarly, Bartlett's test was also found to be statistically significant, $P < 0.01$, implying that the correlation matrix is an identity matrix.

Table 1: Questionnaire and the domains

Statements	Domains
EMR is the right step in making a hospital paperless	Attitude
Decision to use EMR is a progressive step for this hospital	Attitude
To stay competitive, all hospitals should use EMR	Attitude
Our industry is backward and only paper-based system will work here	Attitude
I like using EMR because my peers in different institutions are also using it, and it is the professional norm of the future	Perceived ease of use
I find EMR system easy to use and it also helps me improve my clinical performance	Perceived ease of use
Learning EMR features is easy for me	Perceived ease of use
I feel confident in making clinical decision based on information found on EMR	Self-efficacy
I have the necessary skills for using EMR	Self-efficacy
EMR improves the quality of the patient care process	Perceived usefulness
EMR makes patient care delivery faster	Perceived usefulness
EMR will improve care outcomes for the patients	Perceived usefulness
I intend to use the EMR modules frequently and take active steps in using it completely	Behavioral intention
I intend to be a heavy user of EMR	Behavioral intention
EMR needs a lot of modification to suit my specialty needs	System acceptance
I have no difficulty accessing and using an EMR in the hospital	System accessibility

EMR: Electronic medical record

The factors were derived based on the criteria of having eigenvalues >1, and the identified four factors explained 62.2% of the variance [Table 2].

All the items loaded well on the factors, with factor loadings higher than 0.5, based on the items' common themes, the names were assigned to the factors [Table 3].

The four identified factors are positive attitude toward EMR, reliability, difficulty to use, and adaptability [Table 4].

DISCUSSION

The findings of this study are a solution to the previous study outcomes, which identified barriers such as missing data, interoperability, productivity loss,^[7] and complex technology,^[5] affecting the usage of EMR by the physicians. This study identifies "Adaptability" as a factor, which is the solution for interoperability, as the higher the adaptability feature in the software, higher will be the customization scope, which will also increase the chances that the interoperability problems can be solved. Similarly, the complex technology barrier can be addressed by reducing the "difficulty to use" factor, which can be done by focusing on the user-friendly feature of EMR. In addition, the barrier of missing data can be addressed by improving the identified factor "reliability." This translates

that the higher the reliability of the EMR, lesser will be the instances of the missing data. In the end, it can be said that to increase the usage of EMR by hospital physicians, the identified four factors should be worked upon by the hospitals. Furthermore, hospitals need to take measures to improve the attitude of physicians toward EMR as it is also one of the key factors found in the study, which means that if the attitude of physicians toward EMR is positive, the EMR adoption chances will be better. Improvement in the physician's attitude or managing attitude is also suggested as one of the best practices for EMR implementation in an earlier study.^[11] In the same study, it was suggested that from the preimplementation phase, the users should be involved, which will help in managing the attitude of the physicians toward the EMR. However, in addition to working upon the identified factors in this study from the hospital administration's perspective, to manage the attitude of physicians toward EMR, a monetary incentive to the physicians having high utilization for EMR can be given, as in earlier studies, it was found that incentives are instrumental in changing the attitudes and behavior.^[12] The monetary incentive can work as an extrinsic motivation for the adoption of EMR.^[10] Moreover, in a previous study, it was also found that the monetary incentives can influence the physician's use of EMR.^[13]

Table 2: Total variance explained

Factor	Initial			Extraction sums of squared loadings			Rotation sums of squared loadings Total
	Total	Percentage of variance	Cumulative percentage	Total	Percentage of variance	Cumulative percentage	
1	4.327	43.266	43.266	3.978	39.781	39.781	3.207
2	1.387	13.873	57.140	0.979	9.788	49.569	2.122
3	1.050	10.503	67.643	0.676	6.757	56.327	2.826
4	1.006	10.061	77.704	0.622	6.221	62.548	0.786
5	0.564	5.642	83.346				
6	0.445	4.451	87.797				
7	0.385	3.846	91.643				
8	0.352	3.519	95.162				
9	0.297	2.967	98.129				
10	0.187	1.871	100.000				

Table 3: Pattern matrix

	Factor			
	1	2	3	4
EMR is the right step in making a hospital paperless	0.899			
HIS improves the quality of the patient care process	0.689			
Decision to use EMR is a progressive step for this hospital	0.668			
To stay competitive, all hospitals should use EMR	0.583			
I feel confident in making clinical decision based on information found on EMR		0.827		
I like using EMR because my peers in different institutions are also using it, and it is the professional norm of the future		0.628		
I have no difficulty accessing and using an EMR in the hospital			-0.741	
I find EMR system easy to use and it also helps me improve my clinical performance			-0.663	
I intend to use the EMR modules frequently and take active steps in using it completely			-0.654	
EMR needs a lot of modification to suit my specialty needs				0.655

EMR: Electronic medical record, HIS: Hospital information system

Table 4: Identified factors related to overcoming the barriers to use electronic medical records

Factor 1 (positive attitude toward EMR)	Factor 2 (reliability)	Factor 3 (difficulty to use)	Factor 4 (adaptability of EMR)
EMR is the right step in making a hospital paperless	I feel confident in making clinical decision based on information found on EMR	I have no difficulty accessing and using an EMR in the hospital	EMR needs a lot of modification to suit my specialty needs
HIS improves the quality of the patient care process	I like using EMR because my peers in different institutions are also using it and it is the professional norm of the future	I find EMR system easy to use and it also helps me improve my clinical performance	
Decision to use EMR is a progressive step for this hospital		I intend to use the EMR modules frequently and take active steps in using it completely	
To stay competitive, all hospitals should use EMR			

EMR: Electronic medical record

It is also important to highlight that the patient's perception about the use of EMR by hospitals is associated with the higher care quality provided by the hospitals,^[14] which means more and more hospitals should go for EMR; the only loggerhead they have is the acceptance by the physicians which can be attained by improving the identified four factors in the study. Moreover, EMR can be linked with third party administrators (TPA) modules to facilitate the insurance claim of insured patients.^[15]

CONCLUSION

This study concludes that EMR is the future of patient-centric medical care, and its adoption is going to increase only in the coming times. However, the physicians should be involved from the procurement stage of EMR, and to increase the usage of EMR by physicians, the hospital administration should focus on four factors [Figure 1], i.e., to improve the positive attitude toward EMR, reduce the difficulty level of using the EMR, select a proven and reliable EMR, procure an EMR which can be tailored to the needs and specifications of physicians, i.e., an adaptable EMR.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Tarentino AL, Maley F. A comparison of the substrate specificities of endo-beta-N-acetylglucosaminidases from *Streptomyces griseus* and *Diplococcus pneumoniae*. *Biochem Biophys Res Commun* 1975;67:455-62.
- Miller RH, Sim I. Physicians' use of electronic medical records: Barriers and solutions. *Health Aff (Millwood)* 2004;23:116-26.
- Garret P, Seidman J. EMR vs EHR – What is the Difference? *Health IT Buzz*; 2011. Available from: <https://www.healthit.gov/buzz-blog/electronic-health-and-medical-records/emr-vs-ehr-difference>. [Last accessed on 2019 Oct 24].
- Basit C, Jerome W, Shinyi W, Margaret M, Walter M, Elizabeth R, *et al.* Annals of Internal Medicine Improving Patient Care Systematic Review: Impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care. *Ann Intern Med* 2006;144.
- Kruse CS, Stein A, Thomas H, Kaur H. The use of electronic health records to support population health: A systematic review of the literature. *J Med Syst* 2018;42:214.
- NCHS Data Brief No. 98. Hyattsville, MD: US Department of Health and Human Services, CDC NC for HS. Physician Adoption of Electronic Health Record Systems: United States; 2012. Available from: <http://www.cdc.gov/nchs/data/databriefs/db98.htm>. [Last accessed on 2019 Oct 19].
- Nov O, Schechter W. Dispositional Resistance to Change and Hospital Physicians' Use of Electronic Medical Records A Multidimensional Perspective. *J Am Soc Inf Sci Technol* 2012;4:648-56.
- Saenphon T. An analysis of the technology acceptance model in understanding university student's awareness to using internet of things. *ACM Int Conf Proceeding Ser* 2017;(Pt F1296):61-4. doi: 10.1145/3108421.3108432.
- Gagnon MP, Ouimet M, Godin G, Rousseau M, Labrecque M, Leduc Y, *et al.* Multi-level analysis of electronic health record adoption by health care professionals: A study protocol. *Implement Sci* 2010;5:30.
- Govindaraju R, Hadining AF, Chandra DR. Physicians' Adoption of Electronic Medical Records: Model Development using Ability-Motivation-Opportunity Framework, 7804 LNCS. *Lect Notes Comput Sci (including Subser Lect Notes Artif Intell Lect Notes Bioinformatics)*; 2013. p. 41-9.
- Keshavjee K, Bosomworth J, Copen J, Lai J, Kucukyazici B, Lilani R, *et al.* Best practices in EMR implementation: A systematic review. *AMIA Annu Symp Proc* 2006:982.
- Wang P, Lu Z, Sun J. Influential effects of intrinsic-extrinsic incentive factors on management performance in new energy enterprises. *Int J Environ Res Public Health* 2018;15. pii: E292.
- Moreno L, Felt-Lisk S, Dale S. Do Financial incentives increase the use of electronic health records? Findings from an Experiment September 2013. 2013.
- Finney Rutten LJ, Vieux SN, St. Sauver JL, Arora NK, Moser RP, Beckjord EB, *et al.* Patient perceptions of electronic medical records use and ratings of care quality. *Patient Relat Outcome Meas* 2014;5:17-23.
- Ankit S, Priya R, Kursongmit L. Patient satisfaction factors with in house Third Party Administrator (TPA) department of a tertiary care hospital: A cross sectional analysis. *Int J Healthc Manag* 2019.