

Acceptance of electronic medical records and associated factor among physicians working in University of Gondar comprehensive specialized hospital: A cross-sectional study

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Abstract

Objective: Electronic Medical Records (EMRs) are digitalized medical record systems that collect, store, and display patient data. It is individual patient clinical information electronically gathered and made instantly available to all physicians in the healthcare chain, assisting in the delivery of coherent and consistent care. However, the acceptance of the electronic medical record status of physicians in Ethiopia is limitedly known due to knowledge, attitude, and computer skill gaps. This study aims to assess the acceptance of electronic medical records and associated factors among physicians working in Ethiopia.

Methods: A cross-sectional study was conducted among physicians working in Gondar Comprehensive Specialized Hospital. A total of 205 physicians were included. Data were collected through a self-administered structured questionnaire. Descriptive and Logistic regression were conducted.

Result: A one hundred ninety-eight participants returned the questionnaire from the total yielding a response rate of 96.6%. The proportion of those who have good acceptance for EMR was 72.2% and about 48.5%, 78.3%, and 59.6%, were sufficient computer skills, Good knowledge, and a favorable attitude toward EMR respectively. Age ≤ 30 years (AOR = 0.13 (0.02, 0.57), working experience AOR = 0.15 (0.04, 0.54), working department AOR = 0.09 (0.01, 0.90), good computer skills AOR = 8.42 (6.45, 16.02), Good knowledge AOR = 5.21 (1.22, 12.28), and favorable attitude AOR = 15.24 (12.06, 25.94) were significantly associated towards EMR acceptance.

Conclusion: Generally, in this study, physicians' acceptance of electronic medical records was good. Age, year of experience, working department, good computer skills, good knowledge, and favorable attitude were significantly associated with physicians' acceptance of the electronic medical record. Improving computer skills, enhancing positive attitudes, and increasing the knowledge of the health care professionals are vital interventions to enhance and improve the acceptance of EMR system in the study area

Keywords

Electronic medical record, acceptance, physician, gondar

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Introduction

Healthcare organizations are showing high pressure to serve their customers using electronic platforms, this might be due to the massive growing nature of health information communication, (an experience of sharing health-related information using digital technologies and databases for treating illness), usage by the healthcare personnel and patients/clients.^{1,2} Healthcare organizations are usually indicated by data-intensive units as they generate and compile huge amounts of data and information from their day-to-day activities.^{3,4} Electronic Medical Records (EMRs) are defined as automated medical record systems that collect, store, and display patient/client data. Those automated medical records allow health professionals to create readable and well-organized records as well as improve access to clinical information about specific patients' or clients' outcomes.⁵⁻⁷ Furthermore, EMRs are designed to replace the recent manual (typically paper-based) medical records that practitioners are already familiar with and used for documenting patients' medical information.⁸ Electronic Medical record technologies play a great role for health care providers by providing valuable information in different formats with printed graphs such as; weight cholesterol levels, and blood pressure, and it also tracks changes over time.⁹

Many years ago till now, medical records of patients have been kept on paper, using huge amounts of space and significantly hampering access to effective medical care.^{10,11} EMRs, on the other hand, are a tool to record individual patient clinical information electronically and make it instantly available to all physicians in the healthcare chain, assisting in the delivery of coherent and consistent healthcare delivery.¹² Boosting the documentation of patient encounters, improving the communication of health information to clinical care providers (physicians), enhancing access to patient medical information, possible reduction of avoidable medical errors, optimizing billing and reimbursement for services, forming a data repository keeping in central database for research and quality improvement, and reduction of paper used are some of the perceived benefits of EMRs.¹³

It has been indicated that combining electronic medical records into the healthcare system is about saving lives by enhancing the exchange of health information among healthcare providers and making evidence-based decisions.^{14,15} EMRs have the potential to improve the overall quality of health services including the availability and reliability of health information.^{11,16} Consequently, physicians have a paramount effect on Electronic Medical Record implementation and adaptation, which results in the improvement of health outcomes in the country.¹⁷⁻¹⁹

Worldwide, the use of information communication technology (ICT) is becoming used significantly in the health system. Telehealth, mobile health apps, electronic medical records, the Internet of Things (IoT), and health information management systems are just a few to mention.²⁰⁻²² An

improvement in the physicians' acceptance of the electronic medical record is considered a means to improve the best clinical outcomes in the healthcare environment and is indicated a high impact on the overall acceptance rate of EMRs as they are the main frontline end-users of EMRs, however, their (Physicians') acceptance of the EMR is generally indicated as low.^{12,19}

The World Health Organization supports developing countries to invest in health information systems, showing shreds of evidence on how they improve patient management, clinical evidence-based efficiencies, and better health outcomes.²³ An electronic medical record is one basic component deployed to enhance the quality of health care by improving efficiencies and is used as a fundamental platform both in developing and developed countries.

Similarly, it has been indicated that the use and adoption of electronic medical records by physicians is challenging due to the factors establishing a system that absorbs significant financial resources, requiring the capacity to deal with computers and making changes in physicians' traditional working styles and their being reluctant to implement the EMR service in the health system.^{17,19,24} There are also studies, that examined the obstacles to EMR acceptance, like, Lack of belief in EMR, Legal issues (privacy and security), lack of leadership, lack of incentives, interoperability with other systems, employees' IT knowledge, maintenance cost, and poor users interface.^{25,26}

With similar understandings health care experts are compliant with to use of electronic medical records due to technical obstacles (lack of computer skill, system complexity, system reliability), financial obstacles (initial budgets to fund hardware and software components, maintenance budget to regulate and maintain the system), and time-related factors to choose, buy, run the system are also of a great effects.^{10,27,28}

Findings of different studies tried to indicate users' acceptance, attitude, and computer skills, knowledge are important to the success of EMR systems in the health care system as they are the first-hand users of the system.^{19,29-31}

In Ethiopia, a comprehensive EMR software system has been deployed with the collaborative effort of the Ministry of Health and Tulane University. The system had also been deployed in some regional cities and it had already started working a few years ago.^{32,33} However, the report of the Health Sector Development Program III (HSDP III), showed that lack of timeliness and completeness of health information system reporting remains the major challenge and those delays contribute to the failure (at all levels) to use data as the basis for decision-makers in the health care planning and management.³⁴ To address quality and timely health information at various levels of health system decision-makers, timely and complete HIS reporting plays a vagarious role throughout the country. To acquire a well-organized HIS report and to determine the benefits of the EMR system, physician adoption plays a major role

since EMR acceptance by physicians is a primary condition to ensure that the expected benefits are achieved.³⁵

Nevertheless, Ethiopia has been trying to implement the EMR system at a small-scale level since 2009, with the support of Tulane University Technical Assistance Project in Ethiopia and the Centers for Disease Control, called Smart Care, the system was deployed in five hospitals in the capital and other cities of the regions of the country. The average medical acceptance was not clearly stipulated and did not indicate the physicians acceptance rate particularly at the glance. However, the recent acceptance rate of the electronic medical system is not known. There have been limited numbers of studies done on EMR acceptance among medical practitioners in the country. Therefore, this study aimed to assess physicians' acceptance of electronic medical records and its associated factors among the University of Gondar comprehensive specialized hospitals.

Methods

Study design and setting

An institution-based cross-sectional quantitative study was conducted at the University of Gondar Comprehensive Specialized Hospital Amhara region, Ethiopia, from August 01/2021 to September 01/ 2021.

The University of Gondar Comprehensive Specialized Hospital is located in the central Gondar administrative zone, Amhara National Regional State, which is away from 738 kilometers from Addis Ababa. The University of Gondar Hospital is serving as a teaching hospital as well as a referral hospital. During the study period, the total number of staff was found to be 1915. And with a total of 1049, health care providers, and 866 are administrative staff. Services were provided for preventive, curative, and rehabilitative care and there were three main wards, such as surgical, medical, and pediatrics wards. From the total health care providers (n = 1049), only (n = 205 out of 287) total physicians were eligible to the survey. Hence, the total number of Physicians, therefore, 287. In the Ethiopian context healthcare providers include nurses, medical laboratory technicians, midwives, health officers, Physicians, and others who earned health science degrees with a minimum of four years of study.

Source and study population

There are 287 total Physicians in the University of Gondar Hospital. These physicians were selected using a stratified sampling technique, assigned based on proportionate numbers, and they were able to work in the university hospital both in clinical and nonclinical wards. The physicians were also invited to participate in the study (n = 205). As stated in the eligibility criteria above, those physicians who were not present during the data collection time missed participation. Due to the nature of the shift work in hospitals, we found about 198 total Physicians.

The study population for this study was all physicians (internists, general practitioners, medical specialists, general surgeons, and residents.) working in the University of Gondar hospitals.

Inclusion and exclusion criteria

We included 205 Physicians out of 287 who were working at the University of Gondar hospitals who were available during the data collection period were interviewed. These Physicians on annual leave and who were critically ill got the chance to be excluded. Data were collected from August 01/2021 to September 01/ 2021. We performed a pretest at Ibex General Hospital with 10% (21 samples) who were not part of the study participants and the results of the pretested samples were not included in the final result. The pretested sample results were only used to check the reliability of the questionnaire and to modify the internal consistency of each item accordingly.

Sample size determination

The sample size was calculated using a single population proportion formula by assuming 95% confidence interval, 5% degree of precision, and an 85.9% proportion taken from a study done in Bahir Dar on factors affecting physicians' acceptance of Electronic Medical Records with an acceptable level of physicians. The final sample was 186, and after adding a 10% non-response rate, a total of 205 physicians were enrolled in the study.

$$n = \frac{\left(\frac{Z^{\alpha}}{2}\right)^2 (p(1 - P))}{(d)^2} \rightarrow n = \frac{(1.96)^2 (0.859(1 - 0.859))}{(0.05)^2} = 186$$

None Respondent is $186 * 10/100 \rightarrow 19$

Where n = sample size

p = physician acceptance and associated factor of medical record 85.9% taken from Bahir Dar.³⁶

z = standardized normal distribution value at 95% CI, which is 1.96

d = w = margin of error, taken as 5%.

By assuming the non-response rate of 10% the total sample size.

$$n = 186 + 19 = 205.$$

A structured and self-administered questionnaire was developed to collect data regarding physicians' electronic medical acceptance and its associated factors. An English version a closed-ended questionnaire was used. The questions were developed based on related literature to assess physicians' acceptance of electronic medical records that had previously been pre-tested.^{8,14,17,36,37} Two data collectors were recruited and all were from non-clinical settings. A one-day training were given for data collectors and supervisor to assure the data quality issue.

Before the actual data collection period, the items were pretested at Ibex General Hospital with 10% (21 samples) of the total health workers in the hospital. The results were used to check the reliability and consistency of the questionnaire and necessary modifications were made accordingly. Cronbach alpha was used to check the reliability of the questionnaire and its value was 0.88. Hosmer-Lemshov test were run to check the model fitness and the value was predicted with a score of P value 0.23, showing the model is fitted. The relationship between independent variables was checked using Variance inflation factor. The result showed that VIF was less than 5. This is indicating that there was no

multicollinearity effect among the independent variables of this study.

Sampling procedure

The number of all physicians is retrieved from the human resource department of hospitals and this is used as a sampling frame for the quantitative data. A total sample of 205 subjects are selected from the participants in the study using the Stratified random sampling technique. Then the sample was allocated proportionally to each stratum. Study subjects from each stratum again were selected using a simple random sampling technique. (Figure 1)

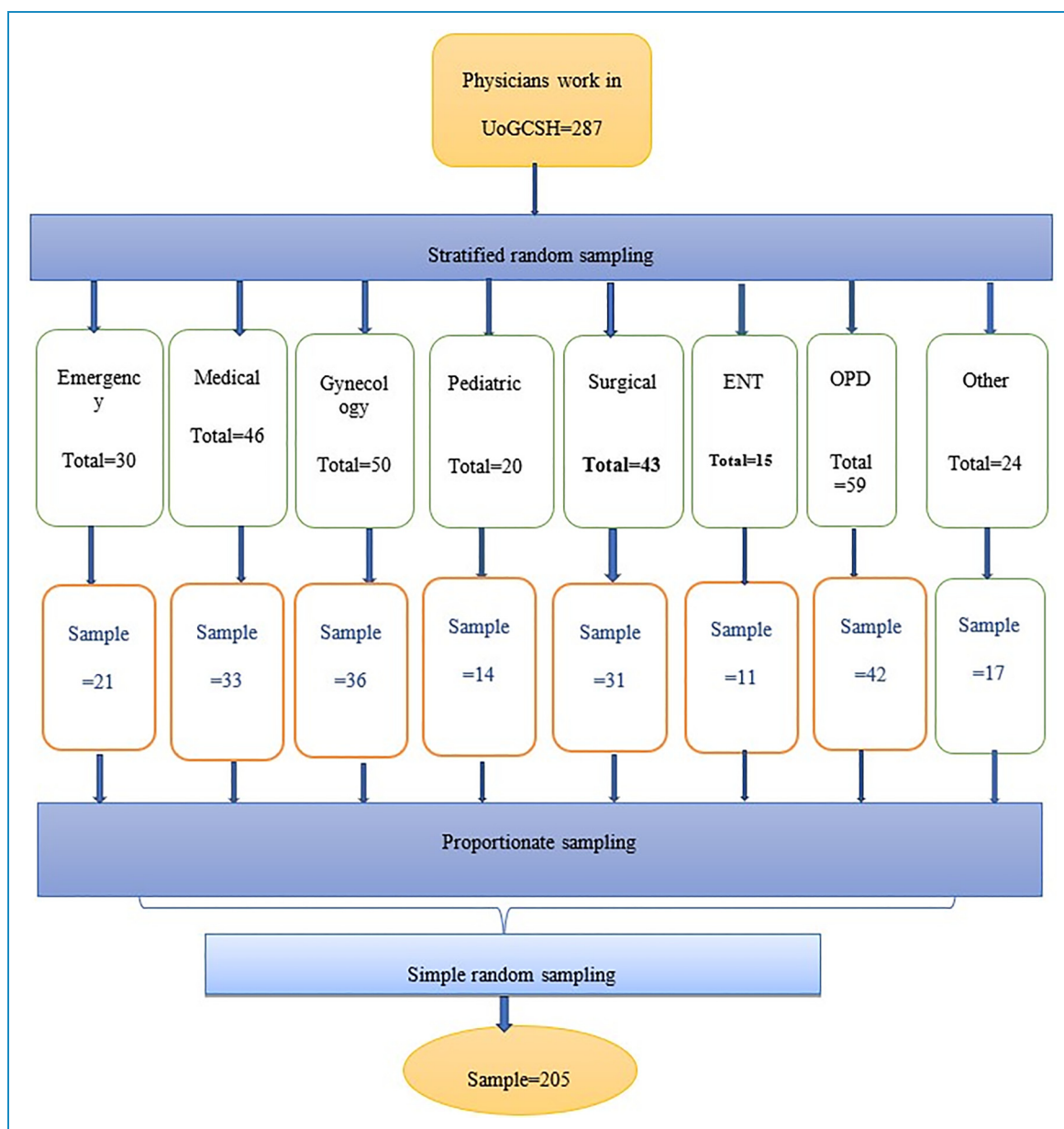


Figure 1. Representation of sampling procedure of physicians acceptance for EMR at University of Gondar comprehensive specialized hospital, 2021.

Operational definitions

Physicians included in our study are internists, general practitioners, medical specialists, general surgeons, and residents.

Physicians EMR acceptance level: To measure the level of electronic medical record acceptance of physicians we used four Likert scale questions and the score was added up and then dichotomized into two categories Good and Poor acceptance. Accordingly, the level of Physicians' acceptance of electronic medical records was measured by the mean 15.95 (SD = ± 3.2) cutoff points.

Computer skill of Physicians: To measure the computer skill of physicians we explore the distribution of the data and it was skewed. To measure the computer skills of Physicians' we used 14 "Yes" and "No" questions. By adding the 14-item computer skill questions, the result was then dichotomized holding the median value 9 with (IQ = 2)). Based on the median value the respondents who scored above or equal to the median score of computer skill questions to be answered were categorized as having Good Computer skills, whereas those who scored below the median value were categorized as having poor computer skills³³

Knowledge of Physicians: Physicians knowledge towards acceptance of electronic medical were assessed using 13 multiple choice questions and the minimum score was 5 and the maximum was 13 out of thirteen knowledge questions. However, the scores were added up and dichotomized into two groups based on the mean knowledge score. Hence data was normally distributed we used mean as a cut point. The mean value was 8.3 with (SD = ± 1.65). Then those physicians who scored above or equal to the mean knowledge questions were categorized as having Good knowledge of EMR acceptance. Participants whose score was below the score of the mean value were taken as poor in knowledge of EMR acceptance.³³

Attitude of Physicians: The level of attitude was measured using 13 Likert scale questions with five responses ranging from "Strongly agree 5," to Strongly disagree, 1. Then the level of physicians' attitude was measured using the mean value, which was 49.19 with (SD = ± 7.71), as a cutoff point. Those physicians who scored above or equal to the mean value were taken as having a Favorable attitude towards EMR acceptance. Whereas those Physicians who scored below the mean value were considered as having unfavorable attitudes.³³

Statistical analysis

Data were entered manually using Epi Data Version 3.1 and exported to SPSS version 20 for analysis. Descriptive statistics were performed. Binary logistic regression was used to identify factors associated with acceptance of EMR. Variables with p-value < 0.2 in binary logistic regression fitted to multivariable logistic regression. Variables that

were significantly associated with electronic medical record acceptance among physicians with 0.2 significant level have been selected for inclusion in multivariable logistic regression. We used a p-value = 0.2, the threshold for univariate selection for the multivariable mode to control the possible effect of confounders. Different Scholars may apply a univariate analysis for selecting a candidate variable for multivariable logistic regression (MLR) and the cutoff point for the P values usually varies from study to study. The most common cutoff point is set to be 0.05. However, this cutoff point is not recommended to select candidate variables for MLR, this because a variable that got a chance for significant individually may not be significant while passing to the final model, and the reverse is true. Therefore, inflating the univariate analysis cutoff point to a P value of 0.2 will minimize this effect. Hence, our model assumed the critics behind this. i.e., we used a univariate cutoff point (P < 0.2), were has been selected to consider the final model to fitted.³⁸ P-values of less than 0.05 at multivariable logistic regression were set to declare statistical significance. Adjusted odds ratio (AOR) and 95% CI were used to determine the strength of association.

Results

Socio-demographic characteristics

After two hundred five questionnaires had been distributed, one hundred ninety-eight questionnaires were returned. The other seven questionnaires were returned but they were rejected because important variables were not filled. Out of the expected 205 study participants, a total of 198 participants were included, with a response rate of 96.6%. Of the total study participants, 104 (52.5%) were males and about 94 (47.5%) were females. The mean age of study participants was 37 years with a standard deviation of 5.124, and the minimum and maximum ages of respondents were 26 and 48 respectively. A majority, one hundred twenty-four (62.6%) of the study participants are in the age category between 31–40 years. Out of the total study participants about one hundred fifteen (58.1%) have working experience of less than five years. Moreover, 77 (38.9%) work in the Inpatient department, Out outpatient department, and emergency departments, whereas 94 (47.5%) of study participants are residents. (Table 1)

Physicians' computer skill towards EMR acceptance

The maximum score was 14 the minimum score was 7 out of 14. All 198 (100%) of the respondent's answers were yes to the questions that can you properly turn on and shut down a computer. Most, 193 (92.4%) of the respondents can manage files including deleting renaming, whereas about 173 (87.4%) respondents can print a document by using a printer. Around 168 (84.8%) of the respondents

Table 1. Socio-demographic characteristics of physicians at the University of Gondar comprehensive specialized hospital, 2021.

Variable	Category	Frequency (#)	Percent (%)
Age	≤30	30	15.2
	>30	168	84.8
Sex	Male	104	52.5
	Female	94	47.5
Profession	Specialist	32	16.2
	Resident	94	47.5
	General practitioner	47	23.7
	Intern	25	12.6
Working experience	≤5 year	115	58.1
	6–10 year	68	34.3
	11–15 year	15	7.6
Physician position	Consultant	19	9.6
	Department Head	20	10.1
	Team Leader	35	17.7
	Instructor	14	7.1
	Other(staff)	110	55.6
Physician Department	Surgery	32	16.2
	Internal Medicine(OPD, IPD, Emergency)	77	38.9
	Pathology	4	2
	Pediatrics	10	5.1
	Gynecology/Obstetrics	37	18.7
	ENT	10	5.1
	Other (Psychiatry, ophthalmology, radiology.)	28	14.1

responded that they can search for information online using a Web search engine. The physicians' EMR level of difference among different factors with the dependent variable has shown in the figure below. The figure below depicts the dependent variable and three of the factors was the responses of each of the participants for each item. In addition, the figure suggested that the overall computer skill was slightly poor among the study participants. (Figure 2).

Physicians attitude towards EMR acceptance

The respondents' attitude towards electronic medical record acceptance was assessed using 13 Likert scale questions ranging from (strongly disagree = 1, Disagree = 2, neutral = 3, agree = 4, and strongly agree = 5). By summing the value of each question and by considering the mean, 49.19 (SD = ±7.71) value as a cutoff point, two categories were then created as favorable attitude above or equal to the

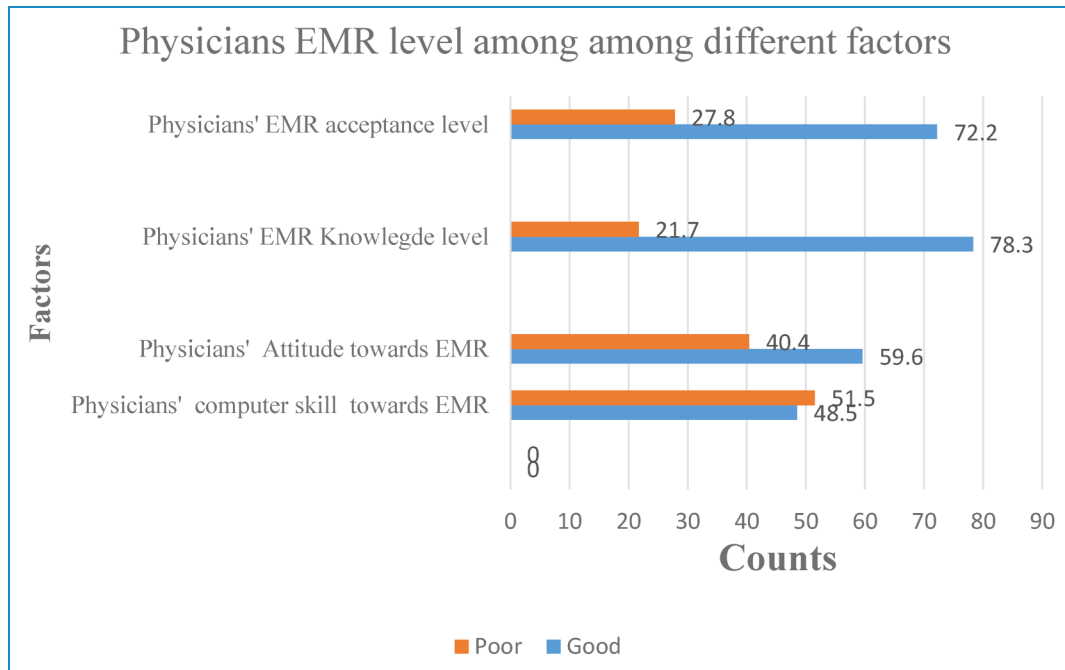


Figure 2. Physicians EMR level among different factors at University of Gondar comprehensive specialized hospital, 2021.

mean value and the remaining as unfavorable if below the mean value. Physicians with favorable attitudes towards electronic medical record acceptance were 59.6% (95% CI; 52.5, 66.7). Among the total participants, about 143 (72.2%) of physicians believed that EMR gives greater control over their work schedule, and 123 (62.1%) agreed that using EMR makes me do my medical work easily. Most 118 (59.6) of the physicians strongly agreed that EMR improves the feeling of professionalism. (Table 2)

Physicians knowledge towards EMR

One hundred fifty-five (78.3%), of the respondents with (95% CI, 71.7, 84.4) had scored above or equal to the mean 8.3 (SD = ± 1.65) value and had adequate knowledge towards Electronic medical records. The majority of 183 (92.4%) of physicians knew how to define electronic medical records. Most 168 (84.8%) of the study participants were aware of about electronic medical records and physicians were asked to mention the application areas of electronic medical records. Most physicians mentioned the following application areas, 189 (95.0%) data management and repository, 172 (86.0%) reduction in workload, and 170 (85.0%) of them mentioned out EMR was applicable for Treatment/drug management.

Additionally, in this study, the respondents were asked to figure out the advantages of electronic medical records, and around 27.83% of the physicians elucidated that electronic medical records are advantageous for the reduction for waiting time and nearly 14.9% of the respondents tried to mention electronic medical records are used for reduction in

health care cost. Moreover, physicians (14.84%), and 14.5% of them at the study area described that electronic medical records are important for improving the confidentiality of care and improving healthcare quality respectively. (Figure 3).

Acceptance of physician towards EMR

To measure the level of electronic medical record acceptance of physicians we used four Likert scale questions and the score was added up and then dichotomized into two categories Good and Poor acceptance. Accordingly, the level of Physicians' acceptance towards electronic medical record was measured by the mean 15.95 (SD = ± 3.2) cutoff points. Those physicians who scored above or equal to the mean score value was categorized as having Good EMR acceptance and those physicians who scored below the mean value were classified as having Poor EMR acceptance. Out of the total 198 study participants, this study showed that 143 (72.2%), with (95% CI; 66.2, 78.8) of the study participants had a good acceptance of using electronic medical records. More than half 118 (59.6%) of the study participants agreed that electronic medical record was easy to use, while nearly 60 (30.3%) of the participants strongly agreed that they had good intention to use electronic medical record. (Table 3)

Factors associated with electronic medical record acceptance

Bivariable and multivariable logistic regression analysis was performed to assess the statistical association between the

Table 2. Physician acceptance for EMR at University of Gondar comprehensive specialized hospital, 2021.

Attitude Item questions (Variables)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	Count (%)	Count (%)	Count (%)	Count (%)	Count (%)
I believe EMR gives me greater control over my work schedule.	0	5(2.5)	30(15.2)	143(72.2)	20(10.1)
I believe EMR will allow me to accomplish tasks more quickly.	5(2.5)	10(5.1)	40(20.2)	123(62.1)	20(10.1)
I think EMR decreases the health professional's workload.	5(2.5)	40(20.2)	25(12.6)	83(41.9)	45(22.7)
I need the EMR to provide effective patient care.	5(2.5)	0	25(12.6)	90(45.5)	78(39.4)
I think EMR will enhance my overall effectiveness in my job.	5(2.5)	0	55(27.8)	98(49.5)	40(20.2)
I think EMR increases patient 's confidence in the physician.	0	10(5.1)	55(27.8)	93(47.0)	40(20.2)
I believe EMR reduces medical errors.	5(2.5)	15(7.6)	25(12.6)	93(47.0)	60(30.3)
I am not satisfied with using paper-based patient records.	0	5(2.5)	25(12.6)	70(35.4)	98(49.5)
I believe EMR increases physician 's credibility with patients.	10(5.1)	5(2.5)	30(15.2)	113(57.1)	40(20.2)
All physicians should learn to use the EMR effectively.	10(5.1)	15(7.6)	20(10.1)	114(57.6)	39(19.7)
I believe EMR improves the feeling of professionalism.	5(2.5)	35(17.7)	20(10.1)	118(59.6)	20(10.1)
Using EMR doesn't require a lot of mental effort	15(7.6)	74(37.4)	59(29.8)	40(20.2)	10(5.1)
Using EMR make me do my medical work easily	15(7.6)	0	25(12.6)	123(62.1)	35(17.7)

Table 3. Physician acceptance for EMR at University of Gondar comprehensive specialized hospital, 2021.

Responses to EMR acceptance	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
	Count (%)	Count (%)	Count (%)	Count (%)	Count (%)
EMR is easy to use	10(5.1)	25(12.6)	15(7.6)	118(59.6)	30(15.2)
EMR is useful	15(7.6)	0	10(5.1)	118(59.6)	55(27.8)
I have good intention to use EMR	15(7.6)	5(2.5)	10(5.1)	108(54.5)	60(30.3)
Do you agree that EMR should be implemented in your hospital	5(2.5)	0	5(2.5)	108(54.5)	80(40.4)

dependent variable (EMR acceptance), and the independent variables. The variables assessed in the bivariable logistic regression analysis were computer skill, attitude, and knowledge, which were statistically significant at P-value <0.2. However, to control the potential confounders multivariable logistic regression was done. Accordingly, age, work experience, Department, computer skill, attitude, and knowledge were significant at a P -value of 0.05.

According to the result found in the multivariable analysis, physicians whose age belongs to greater than or equal to 30 were 87% less likely (AOR=0.13 (0.02, 0.57) to have good acceptance as compared with physicians with age less than 30 years old. The variable associated with physicians' acceptance of electronic medical record was work experience. The odds of having good EMR acceptance was 85% less likely by physicians with a working

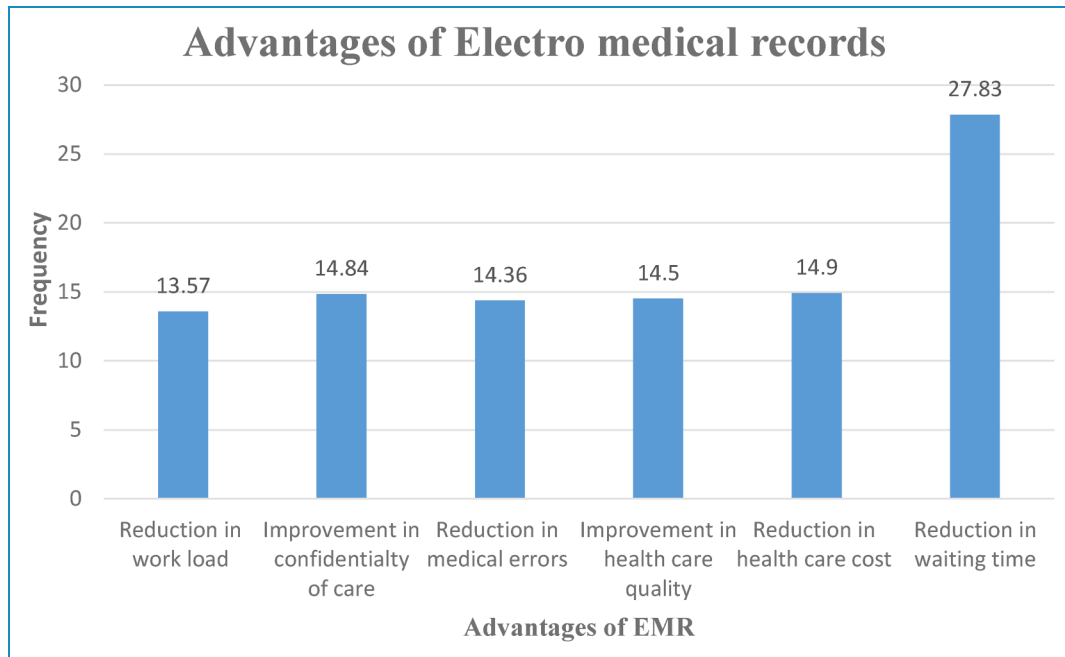


Figure 3. Physicians response regarding the advantages of EMR at University of Gondar comprehensive specialized hospital, 2021.

experience of lower than 5 years than physicians with a working experience of more than 5 years (AOR = 0.15 (0.04, 0.54)). The working department of physicians was also associated with the physicians' acceptance of electronic medical records. Those physicians working at the gynecology department were 91% less likely to have good acceptance of EMR as compared with physicians working in the surgery department AOR = 0.09 (0.01, 0.90). The other variable significantly associated with physicians' acceptance towards electronic medical records was computer skills. Those physicians with good computer skills were 8.42 times more likely to have good acceptance of electronic medical records as compared with physicians with poor computer skills AOR = 8.42 (6.45, 16.02). Good knowledge of electronic medical records was also associated with physician's acceptance of EMR. The odds of having a good acceptance of EMR was 5.21 times more likely among physicians who had adequate knowledge as compared to physicians with inadequate knowledge regarding EMR AOR = 5.21 (1.22, 12.28). Moreover, the attitude of physicians towards EMR was also associated with physicians' acceptance of EMR. Physicians with a favorable attitude were 15.24 times more likely to have good acceptance of EMR as compared to physicians who had an unfavorable attitude towards EMR AOR = 15.24 (12.06, 25.94). (Table 4)

Discussion

This cross-sectional study aimed to assess electronic medical record acceptance and associated factors among physicians at the University of Gondar comprehensive

Specialized Hospital, Ethiopia. In addition to this, the findings provide information regarding the knowledge, attitude, and computer skills of physicians in the University of Gondar Comprehensive Specialized Hospital.

Findings in this study indicated that 72.2% (95% CI: 66.2, 78.8) of physicians had good acceptance to use electronic medical record systems. This finding is in line with a study conducted in Nigeria, which revealed that 78.1% of the study participants had good acceptance of EMR.³⁹ The finding of this study is lower than studies conducted in Bahirdar City Ethiopia 85.9%.³⁶ The possible justification could be due to differences in study design, sample size allocation in the study and socio-demographic characteristics of the participants included in the studies. However, the result of this study is higher as compared with studies conducted in Ghana 59%.⁴⁰ The might be because of variations in study design, sample size, and study populations. The other possible justification for this could be due to the implementation of EMR technology in Ethiopia as a platform including relevant software packages, whereas in Ghana lack of technical personnel to install and operate electronic medical record technology resources indicated a negative relation with electronic medical acceptance.

In this study, the age of study participants was significantly associated with physicians' acceptance of the EMR. Those study participants who had age greater than 30 years were (95%CI :AOR: 0.13 (0.02, 0.57)) 87% less likely to have a good acceptance of electronic medical record system as compared with study participants with age less than 30 years. The possible justification might be

Table 4. Bivariable and multivariable logistic regression analysis of factors associated with EMR acceptance among physicians at the University of Gondar hospital 2021, (n = 198).

Variable	Category	Acceptance		COR(95%CI)	AOR (95%CI)
		Good	Poor		
Age	<=30 Years	25	5	1	1
	>30 Years	138	30	0.92(0.77, 5.85)	0.13(0.02, 0.57)
Sex	Male	74	30	0.89(0.48, 1.67)	2.81(0.82, 9.65)
	Female	69	25	1	1
Profession	Specialist	25	7	2.38(0.75, 7.59)	4.44(0.55, 35.99)
	Resident	74	20	2.47(0.96, 6.32)	0.62(0.09, 4.33)
	General Practitioner	29	18	1.07(0.39, 2.89)	0.65(0.11, 3.77)
	Intern	15	10	1	1
Work experience	≤5 year	80	35	0.73(0.38, 1.38)	0.15(0.04, 0.54)
	>5 year	63	20	1	1
Position	Leader	40	15	1	1
	Other(staff member)	103	40	0.97(0.48, 1.94)	1.01 (0.30, 3.47)
Department	Surgery	25	10	1	1
	Internal Medicine	50	21	0.95 (0.39, 2.34)	1.75(0.34, 9.17)
	Gynaecology	30	10	1.20 (0.43, 3.34)	0.09(0.01, 0.90)
	Other	38	14	1.08 (0.42, 2.82)	1.66(0.28, 9.80)
Computer skill	Good	91	5	7.50(6.5, 16.65)	8.42(6.45, 16.02)
	Poor	52	50	1	1
Knowledge on EMR	Good	127	28	7.65(3.65, 16.06)	5.21(1.22, 12.28)
	Poor	16	27	1	1
Attitude On EMR	Favorable	103	15	6.88(3.42, 13.78)	15.24(12.06, 25.94)
	Unfavorable	40	40	1	1

that physicians with younger age might become more open to adopting new technologies and have better comprehension of information communication technology than physicians with older ages Working experience is the other variable that was significantly associated with physicians' acceptance to use electronic medical record systems. Those physicians with working experience of less than

5 years were 85% less likely to have good acceptance of electronic medical records than those having greater than 5 years of work experience. The possible justification could be that working for long years in the health care system might increase the exposure of physicians towards EMR. Similarly, this exposure will change the knowledge and attitude of physicians to use EMR. This finding is

similar to a study conducted in Kuwaiti, Saudi Arabian, and Malawian, that shows those participants with <6 years of work experience had inverse association with EMR acceptance.^{19,41}

The findings of this study also revealed that; a physician's knowledge of electronic medical records is significantly associated with the acceptance of physicians. Those physicians who have adequate knowledge regarding electronic medical records are 5.21 times more likely to have a good acceptance of EMR as compared to physicians who have inadequate knowledge. This finding is in line with a study conducted in Bahir Dar,³⁶ and China.⁴² The possible justification could be because those physicians with adequate knowledge might have a favorable attitude towards EMR so they might have an interest in using EMR.

The study also revealed that; a physician's computer skill is significantly associated with the acceptance of physicians. Those physicians who have good computer skills are 8.42 (95%CI: AOR 8.42(6.45, 16.02)) times more likely to have a good acceptance of EMR as compared to physicians who have poor computer skills. This finding is in line with a study conducted in Bahir Dar,³⁶ and Ghana.⁴⁰ The possible justification could be because accessing all the soft copies of health-related data and EMR data systems requires basic computer skills.

The study also shows working department and the acceptance of physicians to use EMR are significantly associated. Those physicians working in the Gynecology department are 91% less likely to accept EMR as compared with physicians working in the Surgical department. This might be because those health professionals working in gynecology are busier than physicians working in other departments.

Moreover, Physicians with favorable attitudes towards electronic medical record acceptance were 59.6% (95% CI; 52.5, 66.7). Having a favorable attitude towards EMR was significantly associated with physicians' good acceptance of EMR. Those physicians with favorable attitudes were 15.24 times more likely to have good acceptance of EMR as compared with physicians with an unfavorable attitude towards EMR. This finding is in line with a study conducted in referral hospitals Ethiopia, which was 56.0%.³³ The possible justification might be because having a good attitude towards EMR or habit might force health professionals to use it in healthcare institutions. However, the result of attitude of the respondents in this study is lower than studies done in Malawi⁴³ and Norway,³¹ (71%) and (81%) respectively. This might be due to the implementation of the electronic medical records was successful and users were able to respond to the use of the system. But in Ethiopian context, the attitude was lower due to shortages in technological availability. Not only this but the attitude of health care professionals also vary depending on how the professionals sees the potential advantage while using EMR tools, the benefits such as improved access to

patient information, and streamlined workflows, and their perception regarding the reduction of paperwork.

In this study, participants mentioned the advantages of using electronic medical records in the healthcare arena. Most 27.83% of the study participants stipulated that electronic medical records were used for a reduction in patient waiting time. In addition, they discovered improvement in confidentiality of care, improvement in health care quality and reduction in medical errors were some of the advantages discovered. Knowing the advantages of the electronic medical record will enhance its use in healthcare facilities by healthcare personnel including physicians. Even though the benefits of EMR are beyond providing better care, it has a paramount advantage to financial improvements. Participants had figured out its advantage, as it would reduce the health care cost that the patients pay for the service they got as compared to the manual or paper record.

Limitations of the study

The main limitation of the study qualitative data collection methods were not used. The result of the study might be affected by information bias. Responses might not accurately show the attitude of physicians because the questionnaire has a self-reporting nature. However, we recruited data collectors outside of the study hospitals (who were not members of the study hospitals), and we believed that we minimized the bias to our maximum effort. The study included a small number of physicians which might affect the generalizability of the physicians in the country. Even though the study was conducted with Physicians in a single institution, the findings elaborated on the current experience of electronic medical records that could help decision-makers to intervene and advance the user acceptance of the system in the Ethiopian context.

Conclusion

Generally, in this study, the overall acceptance of physicians toward electronic medical records was good. Age, year of experience, working department, having good computer skills, having adequate knowledge, and having a favorable attitude were significantly associated with physicians' acceptance towards the electronic medical record. Improving computer skills, enhancing positive attitudes, and increasing the knowledge of the health care professionals are vital interventions to enhance and improve the acceptance of EMR system in the study area. Additionally, younger professionals should be aware of the EMR system by conducting in service training regarding how to use computers for health care, so that they can improve their skills to use the system as they grow up. We also recommend that upcoming researchers to study the EMR acceptance of Physicians using qualitative methods to identify the barriers to its acceptance.

Abbreviations

AOR	Adjusted odds ratio
CI	Confidence interval
EMR	Electronic medical record
SD	Standard deviation
SPSS	Statistical package for social science
WHO	World health organization

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Authors contributions: Mulugeta Desalegn Kasaye : has contribution for the design and conception of the study, collection and analysis of the data, and interpretation of the findings and write the manuscript.

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Ethics approval and consent to participate: This study was approved by the Research Ethics Committee of the University Of Gondar Institute Of Public Health (Ref.number HI/0912). The purpose and importance of the study was explained to each study participant and written and signed informed consents were received from each study participant prior to the study commencement. They were informed about the purpose of the study, their participation in the study was voluntary, and notified that the possibility and their right to withdraw from the study at any time, they want. During data collection, personal data were anonymized and no unique information was provided in the presentation of the results. All methods were performed in accordance with the relevant guidelines and regulations.

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