

# Knowledge, Attitude and Perception of Healthcare Workers on use of Electronic Medical Records in Ahmadu Bello University Teaching Hospital, Zaria, Kaduna State Northwest Nigeria

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## ABSTRACT

**Background:** Electronic Medical Records (EMR) has shown a lot of advantages over the conventional paper based medical records. Its use has grown rapidly in the developed world and yet most African nations are still lagging behind. In Nigeria, the penetration of EMR is low with less than 10.0% of hospitals embracing it. Factors responsible for this low penetration or use of EMR in Nigeria include interoperability issues, epileptic power supply, cost of installation, resistance to change, health providers' and patients' poor orientation. This study aimed to assess level of knowledge, attitude and perception of health care workers on the use of EMR in Ahmadu Bello University Teaching Hospital, Zaria.

**Methodology:** Cross sectional study was conducted in May 2019 among 128 healthcare workers that were randomly selected using stratified sampling technique. Pre-tested structured self-administered questionnaire was used for data collection. Data was cleaned and analyzed using IBM SPSS version 21.0. Univariate analysis to generate summary statistics, proportions and frequency tables was conducted. While Bivariate analysis was conducted to identify variables that were significantly associated with respondents knowledge, attitude and perception at a P-value of <0.05.

**Results:** Majority (46.1%) of the respondents had fair knowledge of EMR and 35.1% had good knowledge. All the respondents had positive attitude towards EMR while 96.9% of them had positive perceptions on EMR. Doctors were 85.0% less likely to be knowledgeable about EMR than other healthcare workers (aOR 0.150; 95% CI 0.030 - 0.748). Respondents that were computer literate were 30.0% more likely to be knowledgeable than those who were not (aOR 1.297; 95% CI 3.885 – 4.330) and those that had computer training were 13.0% more likely to be knowledgeable than those who were not (aOR 1.126; 95% CI 0.032 – 0.501).


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**Conclusion:** Majority of respondents have at least fair knowledge and good perception regarding EMR despite all of them having good attitude towards it. Respondents' cadre, being computer literate and having computer training have a statistically significant association with respondents' knowledge on EMR.

**Recommendation:** EMR should be introduced in ABUTH Zaria by the hospital management as there are positive signs from the healthcare workers pointing towards its favourable and seamless implementation.

**Keywords:** Electronic health records, Healthcare workers knowledge, Personal health records, Electronic medical records

## INTRODUCTION

The documentation of health information has always been a key component of quality healthcare delivery.<sup>[1]</sup> Paper medical records (PMRs) and electronic medical records (EMRs) constitute the means of documentation of health information, and they are generally used in parallel to support different tasks.<sup>[2]</sup> Electronic medical record (EMR) can be defined as a systematic collection of electronically-stored health information about individual patient and population in a digital format and they have enormous benefits<sup>[3],[4]</sup>

Though the use of EMRs has grown rapidly in developed countries<sup>[5,6]</sup> however, African nations are still lagging behind developed countries in the availability and use of EMRs.<sup>[7]</sup> This problem is particularly more in sub-Saharan African countries, despite EMRs already proven to be a vital tool to improving access to patient information with consequent improvement in quality of care.

In Nigeria today, the penetration of electronic medical records is low with less than 10% of Nigerian hospitals having embraced computer-based health services.<sup>[8]</sup> Majority of hospitals in Nigeria still engage in manual record-keeping which is time consuming and keeps the patients waiting, and is very frustrating, especially in emergent conditions.<sup>[8]</sup> The factors responsible for this low penetration or use of electronic medical records in most hospitals in

Nigeria include interoperability issues, epileptic Power supply, health providers' and patients' poor orientation, patients' concern on the security of their records, high cost of installation and maintenance of equipment, poor government funding of healthcare and lack of internet connectivity.<sup>[8]</sup>

The advantages of EMRs include easy access to patient records, reduced waiting time, legibility of handwriting, reducing errors in orders, better management of the appointment system, more space in the hospital, which means a more conducive environment when visiting.<sup>[8]</sup> Others include improved efficiency of the healthcare delivery process, saves cost, provides important health data for monitoring and evaluation of current hospital policies, helps governments plan policies based on accurate data, boosts the confidence of healthcare consumers and improves the overall quality of the health system.<sup>[1]</sup>

A study on Health information technology in Tehran showed good knowledge among doctors, students and staff to be 15.6%, 35.0% and 32.3% respectively.<sup>[9]</sup> Similar study in Benghazi showed majority of the doctors had good knowledge about the advantages of EMRs.<sup>[10]</sup> Another study reported that 40% of the healthcare workers ever used computers and 29% had computer training.<sup>[11]</sup> Abodunrin and Akande in 2011 in a study conducted

in Oshogbo to assess the knowledge and perception of health care professionals to e-health and telemedicine revealed that out of the 110 respondents, as much as 91.6% were in support of introduction of e-health practice in Nigeria.<sup>[12]</sup> Also, the study carried out in 2004 by Ibrahim et al in Ile-Ife on knowledge and utilization of Information Technology among healthcare professionals and students, it was observed that out of the 148 respondents, 39.9% of them demonstrated a good attitude and good utilization habits, while in 33.8% of them, attitude and utilization habits were average and in 26.4% they were poor.<sup>[13]</sup> About 54% of doctors and 27.7% of the health records officers showed good utilization habits and attitudes.<sup>[13]</sup>

There are very few studies in Nigeria that have been carried out to assess knowledge attitude and perception of health workers toward EMRs especially in the North where none has been carried out based on our search results.

This study therefore assessed the level of knowledge, attitude and perception on the use of EMRs among health care workers in Ahmadu Bello University Teaching Hospital (ABUTH) Zaria.

## MATERIALS AND METHODS

The study was a hospital based cross-sectional survey carried out in May 2019 among healthcare workers of Ahmadu Bello University Teaching Hospital (ABUTH), Zaria on permanent employment who are involved in patient care for at least six (6) months prior to the study. Healthcare workers that are on outside posting and those due for retirement were excluded from the study.

The minimum sample size was determined using Cochran formula as shown below:

$$n = z^2pq / d^2 \text{ (15)}$$

**The proportionate allocation is as shown in the table below**

Category of staff	Calculation	Proportionate Number sampled
Doctors	524 /1649 X 130	41
Nurses	956/1649 X 130	75
Laboratory Scientists	96/1649 X 130	8
Pharmacists	40/1649 X 130	4
Health Assistants	33/1649 X 130	2

n = minimum sample size

Z= standard normal deviate = 1.96, corresponding to 95% confidence interval

d = desired precision or margin of error tolerable; at 5%

p = proportion of the study population with a positive attitude to electronic medical record in a previous study i.e. 91.6% = 0.916<sup>12</sup>

q = complementary probability = 1- p = 1 – 0.916 = 0.084.

$$n = \frac{(1.96)^2 \times 0.916 \times 0.084}{0.05^2} = 118 + 10\%$$

non-response rate- 130 health workers

Stratified sampling technique was used to select the study population. The various cadres of healthcare workers in the hospital were stratified and each cadre was taken as a stratum. Thereafter, proportionate allocation was employed and respondents from each stratum were chosen using simple random sampling by balloting until the required sample size of 130 was obtained.

Structured self-administered questionnaire was used to collect the data. It contained four sections as follows; A- socio-demographic information, B- knowledge on electronic medical records, C- attitude towards use of EMR and D- perception on use of EMRs. The questionnaire was pre-tested in a comprehensive health centre in Sabon Gari among 35 healthcare workers to check for clarity of questions and to eliminate repetitive and ambiguous questions. Cronbach's alpha statistic was also employed to measure the reliability of the study instrument.

The data was collected over a period of 4 weeks, then cleaned, validated and analysed using statistical product and service solutions (IBM SPSS) software version 21. Frequency distribution tables were generated for all categorical variables. The mean and standard deviation were computed for quantitative variables. Bivariate analysis was conducted to test the associations between independent and outcome variables at a 95% confidence interval and statistical significance was set at  $p < 0.05$ .

Ethical clearance for the study was sought and obtained from ethics and research committee of Ahmadu Bello University Teaching Hospital, Zaria and the ethical approval number is ABUTH/HREC/D-U-N-S Number 954524802. Written informed consent was obtained from the respondents after explaining the objectives and method of the study to them.

## RESULTS

A total of 135 questionnaires were administered and 128 were finally retrieved and analysed, giving a response rate of 94.8%. The median age of respondents was 28 years. The age range with the highest number of respondents was 20-29 years (57.0%). Majority of the respondents were single (53.9%), males (71.9%), Muslims (76.6%), and 56.3% were Hausas by ethnicity. All the respondents (100.0%) had attained tertiary level of education, 84.4% were computer literate and 48.4% were nurses by cadre (Table 1).

Approximately 86.0% agreed that EMR will make patients' management and follow up easier and 78.1% mentioned that EMR should be introduced into the Nigerian healthcare system. However, 65.7% were of the opinion that health workers should resist the introduction of EMRs and 93.0% claimed that EMRs will be detrimental to healthcare in the long run (Table 3).

Majority (78.9%) of the respondents perceived that EMR would lead to better patient care and safety and 82.8% perceived it should be used in the routine care of patients in their hospitals. Those that feel that electronic medical records affect doctor-patient relationship negatively constitute 64.1% while 76.6% feel electronic medical record does not protect patient privacy (Table 4).

Overall, 35.1% of the respondents had good knowledge, 100% had positive attitude and 96.9% had good perception on EMRs (Table 5).

There was statistically significant relationship between respondent's knowledge, cadre ( $p=0.002$ ), computer literary ( $p=0.002$ ) and training ( $p=0.031$ ). There is no statistically significant relationship between perception of EMRs and the socio-demographic characteristics of the respondents.

Other healthcare workers are likely to be

knowledgeable on EMR compared to the medical doctors. Those respondents that are computer literate are 30% more likely to be knowledgeable on electronic medical records than the non-computer

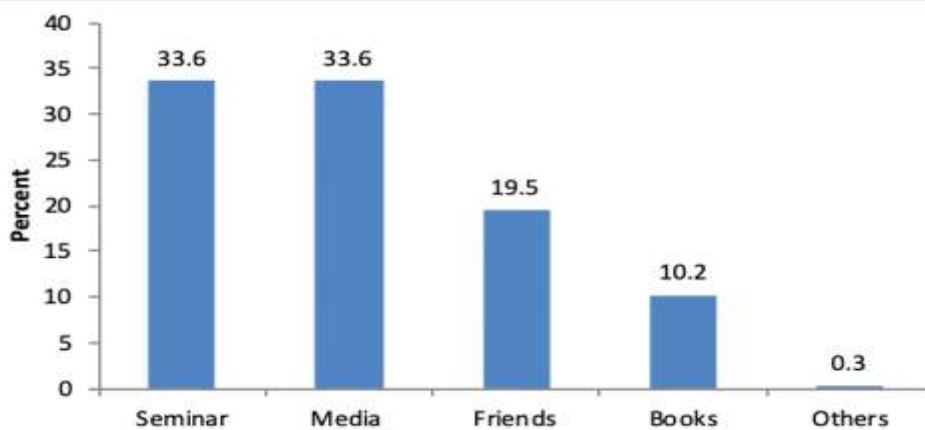
literate. While those respondents who had computer training, are almost 13.0% more likely to be knowledgeable on electronic medical records than those without computer training.

**Table 1: Socio-demographic characteristics of respondents (n=128)**

<b>Socio-demographic characteristics</b>	<b>Frequency</b>	<b>Percent</b>
<b>Age range (in years)</b>		
<20	1	0.8
20-29	73	57.0
30-39	50	39.1
40-49	3	2.3
50	1	0.8
<b>Marital status</b>		
Single	69	53.9
Married	59	46.1
<b>Sex</b>		
Male	92	71.9
Female	36	28.1
<b>Ethnic group</b>		
Hausa	72	56.3
Igbo	4	3.1
Yoruba	23	18.0
Others	29	22.7
<b>Religion</b>		
Islam	98	76.6
Christianity	30	23.4
<b>Highest level of education</b>		
Tertiary	128	100.0
<b>Cadre</b>		
Doctor	45	35.2
Nurse	62	48.4
Pharmacist	4	3.1
Medical Laboratory Scientist	17	13.3
<b>Years of experience</b>		
<5	74	57.8
5-10	48	37.5
>10	6	4.7
<b>Computer capabilities</b>		
Computer trained	96	75.0
Computer literate	108	84.4

**Table 2: Knowledge of respondents on electronic medical records (n=128)**

Knowledge Areas	Frequency	Percent
<b>Definition of electronic medical records (EMRs)</b>		
A digital record of patient’s clinical data, management plan and treatment	107	83.6
<b>EMR is synonymous with EHR</b>	99	77.3
<b>Forms of EMRs</b>		
Appointment scheduling software	90	70.3
Charting software	57	44.5
Compliance tracking	58	45.3
Electronic prescribing	75	58.6
Telemedicine	58	45.3
<b>Components of EMRs</b>		
Patient management	106	82.8
Clinical	96	75.0
Laboratory	100	78.1
Radiology	93	72.7
Billing	63	49.2
<b>Advantages of EMRs</b>		
Improved quality of care	82	64.1
It is more efficient and convenient	75	58.6
Quick access to patient record	100	78.1
It reduces medical errors	66	51.6
It saves time	90	70.3
<b>Disadvantages of EMRs</b>		
It could be hacked	80	62.5
It requires time for training	74	57.8
Financial implication is huge	67	52.3
The system can crash	92	71.9
<b>Examples of EMRs</b>		
EClinicalworks	103	80.5
PrimeSuite	20	15.6
EpicCare	42	32.8
IPatientCare	97	75.8



**Figure 1: Source of information of the respondents on EMRs (n=128)**

**Table 3: Attitude towards electronic medical records among respondents (n=128)**

Attitude statements	Frequency	Percent
Electronic medical records will make patient management and follow up easier	110	85.9
EMR when introduced aids faster patient care	74	57.8
Healthcare workers prefer EMR than the paper based type	112	87.5
Electronic medical records should be introduced into the healthcare system in Nigeria	100	78.1
Training healthcare workers on EMR should be mandatory	80	62.5
Healthcare workers should not be bothered about using EMR	105	82.1
Healthcare workers should resist the introduction of EMR	84	65.6
EMR is detrimental to healthcare in the long run	119	92.9

**Table 4: Perception of electronic medical records among respondents (n=128)**

Perception statements	Frequency	Percent
I believe that electronic medical record would make patient care faster than paper based records	115	89.9
I feel electronic charting would lead to better patient care and safety	101	78.9
I feel electronic medical records require too much time for training of hospital staff on its use	42	32.8
I believe electronic medical record increases cost of care for the patient	45	35.2
I feel electronic medical record affects doctor-patient relationship negatively	82	64.1
I feel electronic medical record does not protect patient privacy	98	76.6
When in use, I believe EMR will have a poor cultural acceptability	68	53.1
I believe that EMR should be used in the routine care of patient in our hospitals	106	82.8
I think EMR should only be used for specialized care of patients	72	56.3

**Table 5: Overall grading of the respondents' knowledge, attitude and perception (n=128)**

Variable	Frequency	Percent
<b>Knowledge</b>		
Poor (0-15)	24	18.8
Fair (16-23)	59	46.1
Good (24-32)	45	35.1
<b>Attitude</b>		
Positive ( 20-40)	128	100.0
<b>Perception</b>		
Good (( 20-40)	124	96.9
Poor (<20)	4	36.1

**Table 6: Binary Logistic Regression of Respondents' Socio-demographics and Knowledge of Electronic Medical Records (n=128)**

Variable	Adjusted		
	aOR	95% CI	P – value
<b>Age groups</b>			
<30	1.423	0.334 – 6.060	0.633
30	1.000		
<b>Sex</b>			
Male	0.750	0.220 – 2.552	0.645
Female	1.000		
<b>Cadre</b>			
Medical Doctor	0.150	0.030 – 0.748	0.021*
Other Health Workers	1.000		
<b>Years of experience</b>			
<5	2.406	0.610 – 9.497	9.497
5	1.000		
<b>Computer literacy</b>			
Literate	1.297	3.885 – 4.330	<0.001*
Non-literate	1.000		
<b>Computer training</b>			
Yes	1.126	0.032 – 0.501	0.003*
No	1.000		

\*Statistically significant

**Table 7: Binary Logistic Regression of Respondents' Socio-demographics and Perception of Electronic Medical Records (n=128)**

Variable	Adjusted		
	aOR	95% CI	P – value
<b>Age group</b>			
<30	0.050	0.406 – 2.320	0.331
30	1.000		
<b>Sex</b>			
Male	0.574	0.053 – 6.180	0.647
Female	1.000		
<b>Cadre</b>			
Medical Doctor	0.410	0.051 – 3.318	0.403
Other Health Workers	1.000		
<b>Years of experience</b>			
<5	0.432	0.610 – 9.497	0.997
5	1.000		
<b>Computer literacy</b>			
Literate	0.006	0.071 – 6.330	0.998
Non-literate	1.000		
<b>Computer training</b>			
Yes	0.006	0.231 – 0.810	0.998
No	1.000		



## DISCUSSION

This study revealed that at least nine out of ten respondents were within the age group 20-39 years; this is higher than that reported by Abodunrin *et al* (73.0%) in Oshogbo.<sup>[12]</sup> This could be because the respondents are more of the working and productive age group as in any society. This age group is also more likely to take advantage of digital technology compared to the older age group irrespective of their gender and marital status. This was reflected in this study, as most of the respondents had tertiary education and were computer literates. This was consistent with the findings of Abodunrin *et al* and Sukums *et al* which showed that 89.7% and 80.0% of respondents were computer literate respectively.<sup>[11],[12]</sup>

More than two-third of the respondents were males and singles, different from the findings in Oshogbo with the figures of 77.6% and 53.2% for married and females, respectively.<sup>[12]</sup> The male dominance may be a reflection of differential school enrolment between males and females in the northern part of Nigeria where males enrolment is generally higher compare to females. The need for both genders to be computer literate has become very important and critical to organisational success especially in the 21 century. Singles are more likely to have more time acquiring computer literacy and also applied the skills in the area of EMRs. Most respondents were aware of EMRs with seminar as the commonest source of information. This was different from the findings of a 2008 study carried out by Abodunrin *et al* in Oshogbo which showed interacting with colleagues as the commonest source (67.5%) followed by seminar/workshop (12.5%).<sup>[12]</sup>

Only about one-third of the respondents had good knowledge of EMRs, similar to what was obtained in a study by Ebrahim *et al* in Ethiopia which showed that 33.7% of respondents had good knowledge of

EMRs.<sup>[16]</sup> The public health implication of this is that this knowledge gap has to be bridged for effective performance when implementing EMRs in hospitals. Another study carried out in Benghazi showed that most of the doctors (consultants and specialized doctors) have good knowledge about the advantages of EMRs. In this study in ABUTH, Zaria, the difference in knowledge could be due to high level of use of computers among the younger age groups (< 30 years) and their increased awareness of electronic medical records. This is due to the fact that the younger respondents were exposed to the computer and internet while the older respondents were not adequately exposed to because of inadequacy in the availability of computer and internet during their period of learning in school.

All the respondents had positive attitude towards electronic medical records. This finding contrast what was obtained in 2016 by Farahnaz *et al* in Tehran which showed that 40.4% had good attitude and practice habits, whereas 25.4% exhibited poor attitude.<sup>9</sup> However, a study in Benghazi in 2005 reported similar findings as only 4% of the respondents had negative attitude and 96% had positive attitude towards the implementation of an EMR system in the hospitals.<sup>[10]</sup> Abodunrin *et al* also obtained a similar finding which showed that 91.6% were in support of introduction of e-health practice in Nigeria.<sup>[12]</sup> This finding obtained could be due to the increased awareness of health workers to EMRs and their knowledge of its advantages. The overall positive attitude also corroborates the fact that EMRs would be easily accepted and practiced by the health workers if introduced into the healthcare system of ABUTH Zaria.

Majority of the respondents had positive perceptions of electronic medical records. This was far more than

what was obtained in 2008 by Abodunrin *et al* in Oshogbo where 40% had positive perception to introduction of electronic medical records in Nigeria.<sup>12</sup> In this study, over two-third of the respondents believed that electronic charting would lead to better patient care and safety. This was similar to what Moody *et al* observed, where 76% of respondents believed electronic charting would lead to improved safety and patient care.<sup>17</sup>

One-third of the respondents felt that electronic medical records require too much time for training of hospital staff on its use. This was consistent with the findings in a study by Rodriguez *et al* which showed that 30.2% of the respondents thought that entering a patient into the electronic prescribing system takes too much time and 4% of them perceived the application as difficult to use.<sup>18</sup> At least half of the respondents in this study believed that electronic medical record will have a poor cultural acceptability. This was slightly higher to the 2008 finding of Abodunrin *et al* in Oshogbo which showed that 48.2% of the respondents believed that e-health will have poor cultural acceptability.<sup>12</sup>

About two-third of the respondents felt that electronic medical record affects doctor-patient relationship negatively and 35.2% felt that it would increase cost to the patients. The study in Benghazi gave different findings which showed that approximately 12% of respondents believed that electronic medical record affects negatively on doctors-patients' relationship, increases the costs, and does not protect patient privacy.<sup>10</sup> This is a wrong perception by the health care workers of ABUTH which in the long run might hamper the introduction, acceptance and practice of electronic medical records in this hospital.

In this study, it was noted that cadre of respondents, computer literacy and computer training were significantly associated with knowledge of

electronic medical records. Sex, age and years of experience had no statistically significant relationship with knowledge and perception of electronic medical records. This was similar to the finding by Cinaroglu *et al* in Turkey in 2015 which revealed that nurses' attitudes and perceptions toward electronic health records varies according to their specialties.<sup>19</sup> The 2011 study by Sukums *et al* in Africa showed contrasting findings where educational level, age, and years of work experience were significantly associated with computer knowledge and influenced the knowledge of use of computer in healthcare.<sup>11</sup> Adedeji *et al* in Nigeria also showed different findings where there was significant association between use of the electronic health records and age, years of working experience, availability of computer system and training of users.<sup>20</sup>

This study showed other healthcare workers are more likely to be knowledgeable on EMR than medical doctors. This is probably due to the fact that in this environment, doctors are more inundated with other more demanding hospital activities than engaging themselves with EMRs. Also, there is no much awareness of EMRs in the medical curricula in this environment that may warrant teaching it in medical schools.

## CONCLUSION

This study showed that majority of the respondents had fair knowledge and good perception of EMRs, and all the respondents exhibited good attitude towards EMRs. Respondents' cadre, computer literacy and training had a statistically significant relationship with knowledge on EMRs.

## RECOMMENDATION

The management of ABUTH should organize

seminars and workshops so as to correct those wrong perceptions of the healthcare workers regarding electronic medical record. Also, based on the positive attitude exhibited by respondents, electronic medical record system should be introduced in ABUTH by the hospital authority for effective and efficient management of patients.

#### Limitation of the Study

The survey uses self-administered questionnaire and relied on what was reported by the respondents that could not be independently verified and validated.

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