

**Knowledge and Utilization of Mobile Health Technology Among Medical Doctors in
Federal Medical Centre, Bida, Niger State, Nigeria**

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Abstract

The research was a study on knowledge and utilization of mobile health technology by medical doctors in Federal Medical Centre Bida Niger State. The aim was to find out the level of knowledge and utilization of the technology among physicians and the challenges associated with its usage. Survey method was adopted while interview was the instrument used. The population of the study was 126 doctors. Nwanna (1981) sample size determination was used to arrive at a sample size of 50. Data was analyzed in line with Yin (1984) explanation building model. Findings revealed that awareness is quite low while some are totally against the use of

the technology. Further findings revealed that MHT is only utilized at the HIV clinic, tuberculosis laboratory and health records respectively. Findings also show that although the center has launched a concept called complete care in May 2018 to create awareness about the technology but the actual use with patients is not a practice in the centre at the moment. Further findings also revealed that the use of MHT leads to an increase in workload for doctors in terms of patients care and creates physical distance between the doctor and the patient. The study therefore recommends increased sensitization about the technology, more steady power supply and availability of internet services. In addition, a functional and periodically upgraded computer, spyware, malware and antiviruses should constantly be in place to avoid loss of medical records and to avoid putting patients care in jeopardy amongst others.

Keywords:e.health, mobile health technology, health care delivery,electronic medical records, physician.

Introduction/Background of study

The health sector is one of the beneficiaries of advancement in technology. Apart from medical equipment and facilities which is direct product of scientific innovations, mobile health technology (MHT) is more or less an application designed to facilitate effective health care delivery anywhere in the world.

Just as it is one thing to have good health facilities, trained and qualified doctors, who possess medical expertise, it is another thing to provide effective and efficient service to the consumers who are referred to as patients in this study. MHT is a technology specially designed to aid medical services. This statement is affirmed by Ukandu J (2018) when he admitted that MHT has to do with the use of digital devices to support the practice of medicine

Furthermore, MHT is most times used as a communication channel between physicians and their patients and vice versa. It has made medical practice easy for doctors so to speak. Infact it will be very difficult to practice medicine in this era without the knowledge and application of this technology. With MHT for instance, patients who are being managed can carry out their tests or investigations in distant places and send their results through a digital platform to their doctors to review and in response, the doctor will makes assessment, give the patient update on the health condition or probably prescribe medications for them. Olaniran M.(2018) attested to this when he said; physicians can share a radiological investigation of a patient to consultants and get

feedback of what his/her opinion is as to how to manage the patient. All these will ease the stress of and hustle of moving from one place to the other.

Health information currently is widely available on digital platforms that most physicians have and update their knowledge through their mobile gadgets which they can easily access than carrying books or literatures around the place. Which most times are voluminous due to the nature of the study and practice of medicine

Furthermore, in terms of interdepartmental communication at hospitals, between doctor's office and the health records office, just a touch of a button, doctors can access patient's records and also access results of investigations of medical test from the laboratory. Doctors can also send prescriptions to the pharmacy for the patient to simply go and access. All these are made possible through MHT.

In addition, MHT in healthcare services, help saves time and energy, reduces unnecessary protocols at the hospital, cuts out so many unnecessary cost in health practice and ultimately save lives in terms of quick response to emergencies, such that first aid treatment or prescriptions can be administered before detailed investigation of the patient. It also aids communication and feedback between physicians and patients as the case may be. Also, MHT makes patient monitoring easier and faster as posited by Ukandu J(2018).

If these be the case, then there is more to gain from the technology and the need to utilize it for efficiency in health care services. It is on this premise that this study sought to find out if physicians are actually aware of the potency this technology, its benefits and to find out if they are actually adopting it in practice especially at FMC Bida amongst others.

Statement of the problem

A lot has been said by people, so many literatures by authors and findings from researches abound on the benefits of mobile health technology to mankind. For instance, majority of Nigerians have access to mobile phones which is one of the cheapest ICT gadgets in the world today. As a matter of fact, it is the key tool needed as far as MHT is concerned. So many deaths of loved ones could have been averted if only this technology is being optimally utilized by doctors and their patients in the right way. With the use of the technology for instance, certain

medical instructions from the physician could have helped saved a life before the one on one contact with the doctor.

Similarly, a lot of surgical errors and wrong prescriptions could have been avoided if the utilization of the technology were the practice among medical doctors and consultants. This could afford the opportunity to share observation and opinion about certain medical conditions and to learn more from well experienced and knowledgeable colleagues rather than trial and error with human lives. Today, with ICTs, knowledge and information is just a click away

It is a surprise so to speak that despite these huge benefits that the technology has to offer as briefly highlighted in the introduction of this study, Most times, avoidable mistakes and deaths still abound. What possibly could be the challenge confronting the use or adoption MHT when it has so much to offer? It is against this backdrop that this study seeks to find out medical doctors in Federal Medical Centre Bida knowledge and utilization of this technology and to unravel if there are any challenges associated with the use and application of the technology at the health centre.

Objectives of the study

The objective of this study is to:

1. Determine the level of knowledge about mobile health technology among medical doctors in Federal Medical Centre, Bida..
2. Determine their level of utilization of the technology.
3. Examine the challenges associated with the use and application of the technology at FMC Bida.

Literature review

A brief overview of Mobile Health Technology

Mobile Health is the utilization of mobile devices like cell phones and tablets for the delivery of health care. It is an up and coming intervention to benefit and improve health services. Recent mobile health studies tend to focus on M-Health for data collection and surveillance rather than on actual patient care. The current use and development of Mobile Health (M-Health) applications is on the rise in the developing world. According to Chester, M, & Kefiloe A M (2017) M-Health applications are being used in the developing world to improve health

education and awareness, diagnostic treatment and support services, data collection and remote monitoring services, surveillance, emergency medical services and other healthcare services. The basic tool needed for this service is a mobile phone provided that electric supply and good network service is in place.

Benefits of mobile health technology

Apart from prescribing, follow up on patient and disease surveillance. Wey G. (2018) pointed out that MHT can also be used to help patients. He emphasized that there may be no need to queue, unnecessary delays and waste of time will be eradicated. He further noted that there are mobile apps online to this effect. All the patient needs to do according to Wey is to register online, a token will be deducted as charges which is a fee to the doctor or hospital online, the doctor can attend to such patient especially if it is a cases where the doctor don't have to see the patient live, to touch, palpate or conduct a one on one examination on patient

Furthermore, he stated that even though there is always a place for one on one interaction with patient, which cannot be overemphasized, MHT can help to assist in patient management, but should not replace the traditional way of investigation.. He noted that with MHT, patients can take a snap shot or screenshot of medical investigations from laboratory with the use of camcorders, videos and send to their doctor through mobile app which the doctor can see and reads and or prescribe or counsel as the case may be.

Review of empirical studies

Chester. M and Kefiloe A. M (2017) conducted a study on utilization of mobile health technology by medical doctors in a health facility at Zimbabwean. The study examined the opportunities and challenges associated with the use of the technology. Survey method through the administration of questionnaires to selected respondents was adopted. The results showed that Fifty percent (50%) of the respondents indicated, lack of knowledge and unawareness in using M-Health to support chronically ill patients. Majority of the respondents (83.3%) actually believed that M-Health presented opportunities to improve health care delivery if adopted.

The study concluded that knowledge about M-Health is generally lacking among medical doctors at the health facility and therefore, recommended that successful use of the technology will require the institution to educate doctors and other health team members on the benefits of the

technology as well as advocating for the innovative use of same in health care practices they further recommended that M-Health program should be officially launched to ensure uniform usage of M-Health devices.

The phenomenon under study is similar in both works but differs in environment, health centers and theoretical framework respectively. Both works also share similarity in research method adopted but the research instrument differ. Furthermore this study accessed not only utilization of the technology but also the level of knowledge about the technology and the challenges associated with the use of the technology at the health facility.

Similarly, Olufunmilayo. V. A, Idowu. O. A, Raji. O, Gabriel. O. E & Onigbogii. O (2017), conducted a study on MHT. The study was aimed at assessing the knowledge, attitude and willingness to use M-Health technology among doctors at a semi urban hospital in Nigeria. One of the objectives was to examine medical management and patient follow-up by doctors at the Federal Teaching Hospital, Ado-Ekiti. The study was conducted using the survey method with questionnaires as instrument. The result showed that although knowledge was high and attitude of respondents 'were positive, but the willingness to expand M-Health use was low. Hence, there is need to expand M-Health coverage in Nigeria.

Further findings showed that doctors with poor knowledge and negative attitude were the younger doctors who were still in training. The study recommends among others that there should be an inclusion of M-Health in medical education curriculum as .this will expose doctors early enough to the benefits and cost-effectiveness of mobile health technology.

Both studies are similar only in assessment of knowledge of the technology among doctors but differ a bit in objectives and research instrument adopted. Furthermore, while this study was hinged on a framework, the reviewed study was not hanged on any.

Also, Farahnaz.S, Morteza H, Ali. V, Ali. M & Hesamedin. A. M (2017), made an assessment study on health information technology: knowledge, attitude, and practice among health care professionals and students in a teaching hospitals in Iran. The study was aimed at encouraging students and professionals to use health information technology (HIT), find out their level of awareness and their perceptions of various aspects of the use of the technology. The study was essentially a survey with questionnaire as instrument, and administered to participants in the hospital.

Findings showed that a high percentage of responders had a good level of knowledge about HIT and positive attitude towards the technology. Both studies share similarity in the phenomenon under study but viewed it in different perspective and context. In addition, both studies are similar in the adoption of Technology Acceptance Model, (TAM) as framework for the study. This study also adopted the diffusion of innovation theory to provide further backing to the study.

Furthermore, Dafni. B. A&Lior. H (2016) conducted a study on physicians' attitudes toward the use of IoT (internet of things) Medical Device as part of their practice. It focuses on the attitudes of physicians toward adoption of IoT medical devices (IoT-MDs) and the impacts these devices have on medical practice during patient visits. The study made use of questionnaire, and personal semi-structured interviews. The interviews were conducted face-to-face and were simultaneously transcribed. The results showed that concerning the reliability of IoT-MDs, majority of the respondents find such devices reliable, some view them as unreliable, while others are not sure. One of those interviewed explained that an approval of a broad variety of products would change doctors' willingness to count on varied devices used by patients, while adding that processes in the medical field are very prolonged and can take many years. 67.4% of respondents believe that IoT-MDs can substitute for existing medical products, but of these, only 68.8% would recommend that their patients obtain such devices.

The study recommended that, apart from awareness and attitudes of physicians about IoT-MDs, further research should be extended to research into IoT-MD challenges, security, privacy, regulatory barriers worldwide, handling of massive data, etc., may also contribute to a better understanding of the results.,

The last empirical review for this study was conducted by Reem. K, Alik P, Muhammad I, Zahra H, Pedro B & Jennifer B (2017), the study was concerned with the awareness and use of M-Health apps by pharmacists, It examined public's perceptions of M-Health apps in general, and the awareness and use of health apps by diabetic patients in particular. The objective of the study was to explore the scale of awareness of M-Health apps and their recommended use by pharmacists for the public. The features desired for such apps by those patients, and how they perceived the role of the pharmacists and their care.

The study was conducted using the survey method with questionnaires administered to selected respondents. The result showed that 56% of the respondents were aware of health apps, 60% of

which recommended them to patients. Over 76% of the individuals owned a smart phone. The types of applications that saw the most use from the general public were health and lifestyle apps (24%), social apps (19%), followed by news (18%).

Further findings from the study revealed that although eight out of nine diabetic patients owned a smart phone, only three used diabetes apps. Diabetic patients also suggested an interest in using diabetes apps to aid in optimizing care via the utilization of visual aids, reminders, recording patient data, social coaching, and remote collaboration with healthcare professionals (HCPs), but time was seen as the biggest obstacle to using a diabetes M-Health application. The study is different from the current study because it was more of a discursive paper.

Theoretical framework

The study was hinged on Technology Adoption Model (TAM) and diffusion of innovation theory. Technology Adoption Model (TAM) was propounded by Davis, F.D. in 1989. The theory was used to explain user adoption of technology and how it is used in various environments. TAM is a model that shows how users accept and use technology. According to Karahanna, E.D., & Straub, W., (1999); Koufaris, M., (2003); Wixom, B., & Todd, P.A., (2005), the basis of the theory was built on the premises that when users are presented with a new technology, (in this case MHT) three major factors are considered as determinants of key predictors that influences users' decision on how to and when they use it. These are namely: perceived usefulness (PU), perceived ease of use (PEOU) and Attitude towards user (ATU).

- **Perceived Usefulness (PU)** is the degree to which a user believes that using a particular system would enhance his/her work or job performance Davis, F.D., (1989, p.320.) considered what the users perceive and how easy their work will be improved when a new technology is used. It is the subjective probability that there will be improvement in the way users carry out their work when using a particular technology.
- **Perceived Ease of Use (PEOU)** “is the degree to which a user believes that using a particular technology or system would be free of efforts”. It considers how a user perceives a system to be better than its substitute. Davis, (1989, p.320)
- **Attitude Towards use (ATU):** Fishbein, M., & Ajzen, I., (1975, p.216) described ATU as “an individual's positive or negative feeling about performing the target behavior (e.g., using a system)”.

This theory agrees with the fact that when users are presented with a new technology, they do not just automatically accept and get carried away using it. A number of factors influence their decision on whether to accept it, how and when they will use it. The model aims not only to explain key factors of user acceptance of ICTs but also to predict the relative importance of such factors Davis et al., (1989). States that Technology Acceptance Model explores the factors that affect behavioral intention to use a particular technology and that, the information or computer systems have a causal linkage with how easy they find the usability of that system.

Matching this side by side, this theory is relevant to this research because it agrees with the fact that medical doctors will develop a positive intention of using MHT if they find it easy to use and if the technology will enhance their job. This implies that, similarly users' (in this case, doctors) positive attitude toward a specific technology leads them to developing an intention to use the technology.

The study was also hinged on the diffusion of innovation theory as propounded by Ryan and Gross in (1943), later developed by Everett Rogers in (1962) and revised in (2003). The crux of the theory has to do with the introduction and adoption of new innovation such that with time people are quick in adjusting to the new technology and adopting it as a new and acceptable system. The theory is relevant to this study in that, MHT is a relatively new technology which application in medical services is gradually delving into developing countries and with time people will get used to it and adapt to it

Methodology

The research was essentially a survey. Qualitative data were obtained using in-depth interview as method of data collection. The population of study was 126 which consist of medical doctors at FMC Bidaas at October 2018..A sample size of 50 was arrived at using what (Okoro, 2001:69) citing Nwanna (1981), posit that, if a study is a few hundreds, a 40% sample or more will do, if it is several of hundreds, a 20% sample will do and if it is few thousands, a 10% or more will do, if several thousands, a 5% sample or less will do. It is against this background that the study arrived at a given sample for the study

But frankly speaking, interviewing 50 medical doctors at the same health center and considering their tight schedules and limited time frame for the study, may be too cumbersome. Therefore to

make for proper management of data and time, the study purposively selected each of the head of departments at FMCBida as respondents for the interview session. However, where it was difficult reaching the head, other medical doctor within the department were interviewed. Therefore a total of 19 respondents were interviewed to generate data for the study. Only three departments were excluded because they were not manned by medical doctor(s) nor have direct usage of the technology

Table 1. The various departments at Federal Medical Centre Bida

S/N	DEPARTMENTS AT FMC BIDA, NIGER STATE	TOTAL NO OF RESPONDENTS
1	Radiology	1
2	Obstetrics & Gynecology	1
3	Ear, Nose and Throats (ENT)	1
4	Ophthalmic	1
5	Physiotherapy	1
6	Accidents and Emergency	1
7	Internal Medicine	1
8	Family Medicine	1
9	Community Medicine	1
10	Pediatrics	1
11	Surgery	1
12	Dental Surgery	1
13	Pharmacy	1
14	Chemical Pathology Lab.	1
15	Microbiology Lab.	1
16	Hematology Lab.	1
17	Nursing Services	1
18	Morbid Anatomy Lab.	1
19	Health Records	1
20	Works and Estates	NIL
21	Finance	NIL

22	Administrative	NIL
		19

Source: Federal Medical Centre Bida, Niger State 2018

Presentation of data/Discussion of findings

The interview guide contained basic questions derived from the objectives of the study, while thematic explanation of the interview was adopted using the Yin explanation building to analyze data from the interview.

Level of knowledge about MHT among medical doctors in Federal Medical Centre Bida

Response from the first contact with respondents for interview on the subject matter show that majority of medical doctors at Federal Medical Centre Bida, were not adequately knowledgeable on MHT. Some confessed they are not conversant with the technology but can only mention a few things about it theoretically, which implies that the actual utilization of MHT may not be applicable at the hospital. Furthermore, most of the respondents refused to grant the interview on the grounds that they have to search/google about it before they can comfortably speak on the subject at a rescheduled date because they wouldn't like to talk about what they don't know about. Therefore majority of respondents demanded for more time to check what MHT is all about before they can grant the interview.

On the rescheduled visit, it was obvious from responses from the interviews that not a large number of doctors in FMC Bida were knowledgeable about MHT as it relates to healthcare and patient management. Although awareness level is high for a few doctors (probably as a result of their research on it before the interview). Further response revealed that MHT is not the major practice in the management of patients at FMC Bida. Specifically Dr Olaniran was optimistic that with progress, good management and political will, a lot can be done in terms of awareness.

Further response from one of the head of department revealed that in terms of creating awareness by management of FMC Bida on MHT, there is a concept called Complete Care Initiative (CCI) which was inaugurated in May 2018 on Family Physicians Day. He noted that the concept is still at the early stage and hope to be fully blown in 2019 thereby creating more awareness about the technology.

Level of utilization of mobile health technology

Responses from interviews revealed that in FMC Bida, the efforts of management in implementing the use of MHT is specifically in three departments namely: health records, HIV clinic and Tuberculosis laboratory respectively out of the twenty two departments at the health centre. Further investigations revealed that some Staff of FMC Bida were actually sent on training sometime in 2018 for the purpose of exposure to MHT after which they were expected to educate others but for now the utilization of the technology at the centre is not fully implemented. According to a source, during one of the interview sessions, he mentioned that “there is awareness, but as a hospital we have not been able to come together to put down policies that would really benefit patients” and doctors who are major users of the technology. This implies that utilization of MHT in FMC Bida is yet to be fully implemented. Speaking on the level of utilization, one of the respondents rated FMC Bida two, on a scale of one to ten. His reason for the rating was that, in terms of health care delivery, management investigations and exchange of patient’s information among professionals, not all these levels are being utilized optimally in Federal Medical Centre Bida.

Challenges associated with the use and application of MHT in FMC Bida

Response from one of the interviewee revealed that the use of MHT leads to an increase in workload for doctors in terms of patients care; he stressed that adoption of the technology increases physical distance between the doctor and the patient which is against the ideal practice of one on one patient’s examination. Further response from interview revealed that implementation of MHT at the centre will requires huge logistics, huge technical knowhow and huge funding. But on a minimal scale, health professionals at the centre exchange ideas concerning patient’s information management and patients investigations. Another challenge mentioned is the problem of low level of literacy among majority of patients in FMC Bida. According to respondents, age is a major predictor of the adoption of the technology with older people less likely to adopt new technology

This fact is supported by Czaja, (2006), Charness and Boot, (2010) when they posit that perceptions of technology also vary by age. This is as a result of their cognitive abilities, low awareness of the technology’s benefits, perceived competence and anxiety related to its use. They further opined that, specific training for older or minority populations on the benefits of

technology use and counseling on self-efficacy and anxiety for such groups can reduce these barriers and disparities. Further responses revealed that service networks in Bida are critically poor, unavailability of internet services and epileptic power supplies are a stumbling block. Other challenges include socioeconomic status, local perception and attitudes toward technology.

With respect to a few of the challenges mentioned by respondents above, Czaja., (2006) and (Tamrat&Kachnowski, (2012).. Suggested that a first step to resolving these socio-cultural barriers is adapting M-Health programs to the local context, including language translation, and addressing cultural perception and nuances

Summary, conclusion and recommendation

The concept of MHT in health care services is a laudable technology with its undeniable benefits to both patients and doctors. This study showed that majority of doctors at the centre lack adequate knowledge about the technology but a few are quite knowledgeable about MHT. Further investigations revealed that some staff of the centre had undergone some form of trainings in May 2018 in this regard, which was the brain behind the Complete Care Initiative (CCI). The centre was only able to implement the technology in the area of health records, the HIV clinic and Tuberculosis laboratory, but yet to be implemented on other sections of the centre.

Moreover, the management is yet to put down policies that would really benefit patients directly. The major challenges confronting the total application of the technology at the centre is the poor level of literacy of majority of their patients in FMC Bida. For reasons being that, if the centre is to utilize the technology efficiently, the illiterate ones may be deficient in utilizing it optimally. Furthermore, lack of steady power supply, unavailability of internet and service network are a major encumbrance to the adoption of MHT at federal medical centre Bida

The study therefore recommends a more steady power supply and availability of internet service/network. It further recommends that provision of functional and periodically upgraded computer, spyware, malwares and antiviruses should constantly be in place to avoid loss of medical record(s) thereby putting patients care in jeopardy amongst others. The study recommended that if all these are put in place, the utilization of MHT will make medical practice a worthwhile venture, stress-free, efficient and effective.

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