Reprinted from

International Journal of Health Research

Peer-reviewed Online Journal

http://www.ijhr.org

Abstracting/Indexing
African Index Medicus, Open-J-Gate, Directory of Open Access Journals (DOAJ), Socolar (China's largest online database), EBSCO, Index Corpenicus

PORACOM
Academic Publishers

e2114p121

International Journal of Health Research

The *International Journal of Health Research* is an online international journal allowing free unlimited access to abstract and full-text of published articles. The journal is devoted to the promotion of health sciences and related disciplines (including medicine, pharmacy, nursing, biotechnology, cell and molecular biology, and related engineering fields). It seeks particularly (but not exclusively) to encourage multidisciplinary research and collaboration among scientists, the industry and the healthcare professionals. It will also provide an international forum for the communication and evaluation of data, methods and findings in health sciences and related disciplines. The journal welcomes original research papers, reviews and case reports on current topics of special interest and relevance. All manuscripts will be subject to rapid peer review. Those of high quality (not previously published and not under consideration for publication) will be published without delay. The maximum length of manuscripts should normally be 10,000 words (20 single-spaced typewritten pages) for review, 6,000 words for research articles, 3,000 for technical notes, case reports, commentaries and short communications.

Submission of Manuscript: The *International Journal of Health Research* uses a journal management software to allow authors track the changes to their submission. All manuscripts must be in MS Word and in English and should be submitted online at http://www.ijhr.org. Authors who do not want to submit online or cannot submit online should send their manuscript by e-mail attachment (in single file) to the editorial office below. Submission of a manuscript is an indication that the content has not been published or under consideration for publication elsewhere. Authors may submit the names of expert reviewers or those they do not want to review their papers.

Enquiries:

The Editorial Office
International Journal of Health Research
Dean's Office, College of Medicine
Madonna University, Elele Campus, Rivers State
E-mail: editor_ijhr@yahoo.com or editor@ijhr.org

PORACOM
Academic Publishers

e2114p122

International Journal of Health Research, March 2009; 2(1): 51-58 (e2114p123-130)

Available at http://www.ijhr.org

Open Access
Online Journal

Original Research Article

Knowledge and Perception of e-Health and Telemedicine among Health Professionals in LAUTECH Teaching Hospital, Osogbo, Nigeria

Received: 19-Dec-08 **Revised:** 02-Feb-09 **Accepted:** 06-Feb-09

Abstract

Purpose: To assess the knowledge and perception of health professionals in LAUTECH Teaching Hospital (LTH), Osogbo on e-health and telemedicine

Methods: In a cross-sectional descriptive survey, 110 different health professionals were selected by proportional multi-stage sampling in LTH, Osogbo using self-administered, semi-structured questionnaire to assess their knowledge and perception of e-health and telemedicine.

Results: Only 34.1% had good knowledge of what e-health and telemedicine entails and only 13% of the respondents have attended any relevant workshop. Respondents' profession and attendance in workshop affected their knowledge. Although as much as 91.6% were in support of introduction of e-health practice in Nigeria, most of them believed that financial implication, illiteracy and poor infrastructure, such as electric power supply and internet services, could limit its full application.

Conclusion: Although the knowledge of the health professionals on e-health and telemedicine was poor, majority of them were in support of the services. There is therefore the need to intensify training workshops for health professionals and improve electricity and Electronic communications.

Keywords**:** E-Health; Health professionals; Knowledge; Perception; Telemedicine; Nigeria.

Olugbemiga L Abodunrin[1*]
Tanimowo M Akande[2]

[1]Community Medicine Department, College of Health Sciences, Ladoke Akintola University of Technology (LAUTECH), Osogbo, Nigeria
[2]Department of Epidemiology and Community Health, College of Health Sciences, University of Ilorin, Ilorin, Nigeria

For Correspondence:

Email: drgbenga_2000@yahoo.com

Introduction

Information and communication technology (ICT) is becoming more popular in almost all disciplines and professions. Banking transactions (e-banking), communication (e-mail and mobile phone), e-commerce and e-trade, e-education, etc have spread in the recent times in both developed and developing countries [1,2]. The health system is not left out; keeping of patients' records electronically for easy accessibility and follow-up has been practiced for long [3,4]. Doctors and other health professionals communicate with one another via the internet or phone in the management of their patients [4]. Also, epidemics and other disasters are expected to be communicated by the fastest means – telephone or e-mail.

The World Health Organization (WHO) defines e-health as the cost effective use of ICT in the support of health and health related fields including healthcare services, health surveillance, education, knowledge and research [4]. E-health may be synchronous/real-time or non-synchronous/ "store and forward" [4]. It is seen as a means of overcoming the growing shortage of health practitioners in developing countries[4,5,6]. It also includes electronic record of patients' registration and consultations (including provisional and definitive diagnosis and treatment) and health information system. The term is often used as an umbrella term that includes tele-health, telemedicine, electronic medical records, and other components of health information technology[7].

Telemedicine is a rapidly developing application of clinical medicine where medical information is transferred via telephone, the internet or other networks for the purpose of consulting, and sometimes remote medical procedures or examinations [7]. It can be viewed as a new technology of offering medical services through communications from a geographically distance locations. Using telemedicine approach, patient charts, X-rays, and other diagnostic materials can be transmitted between doctors' offices. Telemedicine includes machines specially designed to measure and record a patient's vital signs at home then transmit the information directly to a medical professional without the patient ever having to leave home. This is especially useful in follow-up of some chronically ill patients or post-surgical patients. In addition to providing a means for doctors and patients in remote locations to interact, telemedicine also enabled doctors in distant locations to share information [8]. Moreover, doctors in rural areas of the world can observe state-of-the-art medical procedures that they would otherwise have had to travel thousands of miles to witness [8].

Advances in computer and internet technologies started to create new possibilities for doctors and their patients in the early 1990s in the developed nations [8]. Using computers to send live video, sound, and high-resolution images between two distant locations, doctors can easily examine patients in clinics that may be thousands of miles away [8]. Using teledermatology, which is a form of telemedicine, consultations have been successfully practiced by general practitioners in rural areas of South Africa by sending pictures to experts through via the e-mail [9]. It was discovered that the family practitioner's provisional diagnosis, compared to the teledermatologists, was correct in 28 (57%) of 49 cases where a definite diagnosis was made [9].

Being a relatively new concept in Nigeria, the level of awareness and knowledge as well as the perception and acceptance of telemedicine and e-health among the providers of healthcare themselves is important for its successful implementation. Still in its infancy in Nigeria, as in most other in the developing world, telemedicine may one day alleviate some of the regional inequalities inherent in access to modern medicine. Anecdotal evidence indicate that most of the state hospitals in Nigeria are still having problems in referring patients from one hospital to another [3]. This led to the

development of e-referral of patients in which they have been referred from one zone to another in Obafemi Awolowo University Teaching Hospital; the patient's case file and examination data transmitted over the network among the zones successfully which in turns makes patients treatment timely, efficient and cost effective [10].

Telemedicine by its nature may be associated with a lot of ethical issues. Issues of major concern are related to security and confidentially of patient data[11]. Furthermore, decisions are usually taken on patients without personal contact. However, only four countries have been able to developed ethical guidelines for e-health as at 2008 in a study conducted in South Africa [10]. The cost of establishing telemedicine in resource poor countries like Nigeria must be balanced against need for drugs and other medical equipment [11]. Physicians who used telemedicine were aware of these limitations of the technology, but also recognized its potential benefits [12].

There seems to be a strong interest in telemedicine on the part of the physicians surveyed in Europe and knowledge of the existence of telemedicine was high, 93% [13]. The study showed that most people would have liked to have had their clinic's telemedicine system of their own. More than 50% of the physicians believed that their work would be improved by using telemedicine [14]. The findings obtained in another study[14] were that access to therapeutic advice (87%) was a better use of telemedicine than was obtaining a primary diagnosis (24%). The survey also suggested that surgeons more than other medical practitioners are interested in telemedicine and open to its development. Therefore, telemedicine in surgery may be advanced by creating surgical networks for consultation and education [14].

The identified determinants, which would influence the future implementation of telemedicine interventions, can be classified into five major categories: Technology; Acceptance; Financing; Organization and Policy and Legislation [15]. The three most important obstacles identified to the implementation of telemedicine were a lack of knowledge about telemedicine, time constraints, and funding [15]. In Nigeria, the adult literacy is still low and more especially computer literacy[16-18]. Therefore, the acceptability of e-health and telemedicine by the consumers of healthcare may be remote considering the cultural factors. Similarly, the epileptic power supply in Nigeria including network failure or poor coverage may be limiting factors to its successful implementation.

Previous studies revealed that overall willingness to use telemedicine was affected by attitudes to telemedicine itself, attitudes to the patient–physician relationship and by level of technology anxiety [19]. While telemedicine cannot yet be considered to be part of mainstream health care, it has become a more familiar part of health terminology worldwide [20]. This study seeks to access the level of knowledge and perception of health professionals towards e-health and telemedicine as well as the determinants.

Methods

The study was carried out in Ladoke Akintola University of Technology Teaching Hospital, Osogbo in July, 2008. Osogbo is the capital of Osun State in the South West geo-political zone of Nigeria. Being a training institution, it consists of various categories of health care professionals.

This study was conducted between June and July, 2008. It was a cross-sectional descriptive survey with a total of 110 respondents proportionately selected from among the doctors, nurses, pharmacists, physiotherapists in the institution. Data collection was made easy through each professional's association especially the Association of Resident Doctors in the hospital. The data collecting instrument was

semi-structured self-administered questionnaire which was used to seek for information on their socio-demographic data, awareness and knowledge of e-health and telemedicine as well as their opinion on acceptance, workability in the present state of the country and suggestion for successful implementation. The level of knowledge was graded using a ten-set questions; respondents with up to 7 correct answers were assigned good knowledge; those with 4-6 correct answers were assigned fair knowledge while those with less than 4 were assumed to have poor knowledge of e-health and telemedicine.

The data were computerized and analyzed using Epi-Info version 3.4.1 (Centre for Disease Control, USA/WHO, Geneva).

Results

The entire questionnaire were retrieved and analyzed. Respondents' ages ranged between 21 and 50 years with a mean of 34.5±6.6 years. Majority of the respondents (83, 77.6%) were married. Medical practitioners and nurses constituted almost 80% of the respondents. The average length of professional practice of the respondents was 6.9±5.1 years (Table 1).

Ninety-six (89.7%) of the 107 who responded were computer literate but less than half of them had a formal computer training. Only 16 (15.5%) of the 96 have had on-job computer training. Out of the 96 respondents, 89 (92.7%) had access to computer either at home 68 (70.8); office 51 (53.1) or cyber café 62 (64.6%). Fifty-two (54.2%) of them own a computer (Table 2).

Table 1: socio-demographic characteristics of respondents (n=109)

Variable	Number	%
Age		
20 – 29	28	25.7
30 – 39	57	52.3
40 – 49	23	21.1
≥ 50	1	0.9
Sex		
Female	58	53.2
Male	51	46.8
Marital status		
Ever Married	83	77.6
Single	24	22.4
Religion		
Christianity	68	63.0
Islam	39	36.1
Others	1	0.9
Profession		
Medical Practitioner	46	42.2
Nursing	40	36.7
Physiotherapy	9	8.3
Health Information Officer	8	7.3
Pharmacy	6	5.5

Table 2: respondents' literacy and access to computer

Variable (n)	Number	Percentage
Computer Literate (107)	96	89.7
Formal Computer Training (96)	49	47.6
On-job-computer training (96)	16	15.5
Access to Computer (96)	89	92.7
Place of access to computer		
Home (96)	68	70.8
Office (96)	51	53.1
Cyber café (96)	62	64.6
Own a Computer (96)	52	54.2

The level of awareness of e-health and telemedicine by the respondents are provided in Table 3. While about 80 (72.7%) of the respondents have heard about e-health, less than 60% have heard about e-medicine, e-prescription, e-record keeping and telemedicine and only 11 (11.2%) have heard of M-medicine.

The respondents' thinking of what e-health/telemedicine is about is given in Table 4. Out of the 10-point questions on telemedicine, only thirty eight (34.5%) of the respondents had good knowledge of e-health and telemedicine while 57 (51.8%) and 15 (13.6%) had fair and poor knowledge. Most of these respondents had their information by interacting with colleagues 54 (67.5%) while others were from seminars/workshops 10 (12.5%), personal study-internet 14 (17.5%) and personal study-books/journal 19 (23.8%). Also about 80% of the respondents knew that operating the services of e-health and telemedicine will require special structure and training and that it is associated with high ethical issues. Only 13 (13%) out of 100 respondents claimed to have attended seminars or workshops on e-health and telemedicine at one time or the other (Table 5).

Table 3: Awareness of e-health and telemedicine

Variable (n=110)	Number	Percentage
E-Health	80	72.7
E-Medicine	60	57.7
E-Prescription	60	57.7
Telemedicine	62	58.5
Tele-health	38	36.9
M- Medicine	11	11.2
Health Care Informatics	44	42.3
E- Record Keeping	64	59.8

Table 4: What respondents thinking about e-health/telemedicine

What e-health/telemedicine mean	Frequency	%
Patients management with drugs through the internet	55	52.4
Direct full consultation of patients through the internet	52	49.1
Consultation of patients through another professional via the internet	43	41.3
Patients' examination communicated through the internet	47	44.8
Patients' investigations communicated through the internet	53	50.5
Follow-up of patients through the internet	35	33.0
Management of patients including surgical procedure through the internet	31	29.5
Electronic medical record of patients' registration	53	50.0
Electronic medical record of patients consultation with doctor	53	50.0
Health care through the internet	64	61.5

Table 5: Respondents source of information

Source of information	Frequency	%
Interaction with colleagues (80)	54	67.5
Seminars/Workshops (80)	10	12.5
personal study- internet (80)	14	17.5
personal study-books/journal (80)	19	23.8

Table 6: Respondents' perception of e-health

Variable	Strongly agree and agree (%)	Neutral (%)	Disagree or strongly disagree (%)	Total
High cost implication	69 (66.3)	28 (25.7)	12 (11.1)	109
Poor cultural acceptability	53 (50.0)	27 (25.5)	26 (24.5)	106
Can assist diagnosis of patient	76 (71.7)	25 (23.6)	5 (4.7)	106
Can assist in therapeutic management	78 (72.3)	27 (25.0)	3 (2.8)	108
Nigeria ripe for e-health	37 (34.9)	13 (12.3)	56 (52.9)	106
General opinion on e- health	65 (62.5)	32 (30.8)	7 (6.7)	104
Opinion on e-health in Nigeria	42 (40.0)	41 (39.0)	22 (21.0)	105
Patients' management via electronic media	60 (56.6)	37 (34.9)	9 (8.4)	106
Patients' management via mobile phone	48 (45.7)	43 (41.0)	14 (13.3)	105
E-health for routine care of patients	57 (54.2)	39 (37.1)	9 (8.6)	105
Health for specialized care of patients	44 (42.7)	44 (42.7)	15 (14.6)	103

Fifty-three (50.0%) of the respondents either agreed or strongly agreed that e-health will have poor cultural acceptability while 27 (25.5%) were neutral about it and the rest disagreed or strongly disagreed. About 72.3% and 71.7% of the respondents respectively agreed that e-health can assist patients' therapeutic management and diagnosis. Concerning the introduction of telemedicine in Nigeria, 42 (40%) agreed to it while 22 (21%) did not and the rest were undecided. More of the respondents (57, 54.2%) were in support of e-health for routine care of patients than those 44 (42.7%) in support of e-health for specialized care of patients (Table 6).

Whereas all the medical practitioners, pharmacists and physiotherapists were computer literate, 26.3% of the nurses and 14.3% of the health information officers were not ($p = 0.0015$). Unlike the profess-ions of the respondents ($p= 0.0012$), being computer literate was not found to have a statistically significant relationship with the knowledge of e-health and telemedicine ($p = 0.2225$). Having attended a seminar on e-health in the past was found to affect their knowledge ($p = 0.0082$). Age, religion or sex was not found to be statistically significant in relation to acceptability of e-health and telemedicine in Nigeria.

As much as 56 (52.9%) believed that Nigeria was not ripe for e-health implementation in Nigeria reasons proffered were the inconsistent power supply, poor network coverage for mobile communication and internet connectivity including persistent failure of the network, low level of awareness on the subject, high level of illiteracy, ethical issues associated with it, the high cost of the structure and its maintenance.

The respondents suggested that there should be increase in the awareness through seminars and workshops, training in the medical, nursing and other paramedical schools. It was also suggested that the government and hospitals should improve the power supply and internet facilities.

Discussion

The present high computer literacy is a proof of advancing technology among the health professionals. These days, being computer literate is becoming a necessity to sustenance even among the low cadre of workers[16,18]. Computer training has become

part of the curriculum right from the nursery/primary schools. One would hardly be employed in any corporate organization without some level of ability to use the computer. Most transactions, communication etc are being done via the internet[11,17]. However, only about 1.5 out of 10 respondents had on-job computer training. This probably was because most of these professionals do not necessarily use computers for their routine activities except possibly the Health Information Officers and other professions who have administrative functions. More than half of those who were computer literate own a computer. Only among the nurses happened to have less proportion owning than not owning a computer but the difference was not statistically significant. Notwithstanding, almost everyone have access to computer. Access to computer is important to the successful implementation of telemedicine [17].

It was interesting to find out that a good proportion of the respondents were aware of the concept of e-health and telemedicine but not many were clear about what it entailed as only 34.5% had more than average understanding. From this finding among health professionals, it is expected that far less awareness about e-health and telemedicine would be found among the general population who invariably need to be informed in other for its successful implementation. Findings from earlier studies showed high level of knowledge of telemedicine [8,10,13]. The knowledge of the respondents reported in previous studies could not be explained by socio-demographic differences except for some aspect of professionalism which is similar to the findings in this study [5]. Only 13% of the respondents in this study have ever attended a seminar on e–health and this could have contributed to the poor knowledge of the respondents. There have only been few workshops in some parts of the country which can explain why most of the respondents had their information by interacting with other colleagues.

In earlier reports, most people were enthusiastic about the introduction of telemedicine as a solution to bridging the gap between the city and remote areas[5-7,13-15] and this is also supported in this study as most of the respondents supported the use of e-health and telemedicine technology for patients care and would not mind its introduction into Nigeria health system. Definitely, the operation of the services will require that electricity supply, network coverage and other services improve tremendously for its effective implementation [1,21]. In Nigeria, poor services have sometimes delayed banking transactions, including ATM (Automated Teller Machines), mobile phone and e-mail due to network failure.

Conclusion

Our study has revealed that the knowledge of the health professionals on e-health and telemedicine was poor. However, majority of the health professionals support the introduction of e-health and telemedicine. There is therefore the need to intensify training workshops for health professionals and improve electricity and Electronic communications. There is a need for intensified efforts on awareness and sensitization of health professionals on the subject of telemedicine and e-health through seminars and workshops while attending to the factors that can undermine the success.

Acknowledgement

I would like to thank Nurse Adegoke of Community Medicine Department, LAUTECH Teaching Hospital, Osogbo who assisted in administering the questionnaire to the nurses.

References

1. Awolola OJ, Lawson BL. The Creation of a National Telemedicine/E-Health Association in Nigeria and It's Impact on the Federal Ministry of Health. ICT Committee. Society for Telemedicine and E-Health in Nigeria, 2005.

2. Kim Hong-Kyun, SHIN Ilsoon. Effect of IT Job Training on Employment and Wage Premium: Evidence From Korea Panel Data. The Developing Economies.2007; 41(4): 461 – 483 available on http://www.interscience.wiley.com accessed on 20th August, 2008.
3. Ajuwon GA. Use of the Internet for Health Information by Physicians for Patient Care in a Teaching Hospital in Ibadan, Nigeria. Biomedical Digital Libraries 2006; 3(12). Available on http://www.bio-diglib.com accessed on 20th August, 2008.
4. Osbert Egiebor. E-Health and Telemedicine in Nigeria. Available on http://www.jidaw.com. Accessed on 12th August, 2008.
5. Jack C. Telemedicine: A Need for Ethical and Legal Guidelines in South Africa. South African Family Practice. 2008; 50 (2) 2008;60-68
6. Steven R. Normandin Telemedicine: An International Quality Care Solution. Patients, Safety & Quality Healthcare. 2008. available on http://www.psqh.com accessed on 15th August, 2008
7. Della MV. Pererecorded Telemedicine. J Telemed Telecare 2005: 276-284.
8. Sikorski Roberts, Peters Richard. K Telemedicine. Medicine. Microsoft Student 2008 DVD.
9. O'Mahony D, Banach L, Mahapa DH. Teledermatology in a Rural Family Practice. SA Fam Pract 2002; 25(6):4-8
10. Idowu PA, Adagunodo ER, Idowu AO et al. Electronic Referral System for Hospitals in Nigeria. Ife Journal of Science. 2004; 6(2): 161-162.
11. Okoromah CN, Afolabi BB. Telemedicine: Definition, Benefits and Limitation. NQJHM. 2003;13 (3-4): 58-61.
12. Phoebe Lindsey Barton, Angela G. Brega, Patricia A. Devore et al. Specialist Physicians' Knowledge and Beliefs about Telemedicine: A Comparison of Users and Nonusers of the Technology. Telemedicine and e-Health. 2007; 13(5): 487-500.
13. Mairinger T, Gabl C, Derwan P et al. What do physicians think of telemedicine? A survey in different European regions. J Telemed Telecare 1996;2(1):50-56
14. Nicolas Demartines, Oliver Freiermuth, Didier Mutter et al. Knowledge and acceptance of telemedicine in surgery: a survey. J Telemed Telecare 2000;6(3):125-131
15. Tom H F Broens, Rianne M H A, Huis in't Veld et al. Determinants of Successful Telemedicine Implementations: a Literature Study. J Telemed Telecare 2007;13(6):303-309.
16. Jagboro KO. A Study of Internet Usage in Nigerian Universities: A Case Study of Obafemi Awolowo University, Ile-Ife, Nigeria. First Monday. 2003; 8(2). Available on http://www.firstmonday.org.
17. Esharenana E. Adomi, Silvester O. Anie. An Assessment of Computer Literacy Skills of Professionals in Nigerian University Libraries. Library Hi Tech News. 2003; 23(2): 10-14.
18. L M Aires and J P Finley. Telemedicine Activity at a Canadian University Medical School and its Teaching Hospitals. J Telemed Telecare 2000;6(1):31-35
19. Perla Werner and Eddy Karnieli. A Model of the Willingness to Use Telemedicine for Routine and Specialized Care. J Telemed Telecare 2003; 9(5):264-272.
20. Nancy A Brown. Information on Telemedicine. J Telemed Telecare 2005;11(3):117-126
21. Dennis E. Oji, Takeshi Utsumi, Chris Uwaje et al. International Centres of Excellence for e-Health in Africa with Global University System in Nigeria Paper submitted to E-Health International Journal International eHealth Association (IeHA) University of Michigan Health System. 2005.
22. Adewale OS. An Internet-based Telemedicine System in Nigeria. International Journal of Information Management. 2004; 24(3): 221-234.