An Assessment of the Knowledge and Practice of Telemedicine Among Medical Doctors in University of Nigeria Teaching Hospital (UNTH), Ituku-ozalla, Enugu State, Nigeria.

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Research Article

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Abstract

Background: The outbreak of the novel SARS-COV-2 virus, created a paradigm shift in the practice of medicine, a speciality well known for its integration of clinical expertise and manual dexterity in the management of its patients. Telemedicine, a previously less conventional approach in developing countries, has now come to the forefront of patient care. This study assessed the knowledge and practice of telemedicine among doctors in the University of Nigeria Teaching Hospital, Ituku-Ozalla in Enugu state.

Methodology: A questionnaire-based survey was used to obtain relevant information among 149 doctors in the University of Nigeria Teaching Hospital (UNTH), including their knowledge and awareness of telemedicine, its relevance and impact on the clinical outcomes of patients as well as factors limiting its use. Data was analyzed and presented in tables, graphs and pie charts.

Results: There were 149 doctors, who were mostly aged 15 – 30 years (63%). Most 146 (98%) have heard about telemedicine but only 100 (67.3%) have consulted using telemedicine. Doctors were more likely to employ telemedical consultation for follow-up and emergency scenarios but least likely to use telemedicine for first-time visits and the management of chronic diseases.

Conclusion: There is a good knowledge of telemedicine among medical doctors in UNTH but ICT illiteracy, inadequate patient-doctor interaction, patients' preference, lack of internet access, high cost of set-up and maintenance and ethical issues were some of the factors limiting its practice.

Background

Accessing health care services in Nigeria is embattled by a myriad of problems like dilapidated and poorly equipped health care centres, insufficient medical personnel who are poorly remunerated, unviable road networks and poor funding. Therefore, any innovative solution that connects health care professionals to patients in the shortest period, reduces costs and improves clinical outcomes will markedly improve the quality of life of Nigerians. Telemedicine has been shown to close the gap of barriers that limits access to health care services in both developed and developing countries. As the first electrical telecommunication tool in the history of humanity, the telegraph was first used for medical purposes (teleconsultation) in Australia in 1874. ^[1]

Thomas Bird was the first to formally define telemedicine as “the practice of medicine without the usual physician-patient confrontation. ... (via an interactive audio-video communications system.” ^[2] The World Health Organization defines telemedicine as the delivery of health care services, where distance is a critical factor, by all health care professionals using Information and Communication Technologies for the exchange of valid information for the diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care provider, all in the interests of advancing the health of individuals and their communities. ^[3] The essence of telemedicine is to cut down promptly deaths, morbidity or unproductivity resulting from inaccessibility to specialist care, inaccurate or

slow patient information transmission and the use of alternative but harmful healthcare which sometimes involve self-medication, quackery and herbal concoctions.

In 2015, the Federal Ministry of Health and Federal Ministry of Communications Technology jointly developed the National Health Information and Communications Technology (Health ICT) Strategic Framework which articulates the collective vision and necessary actions of stakeholders involved in the health system in Nigeria. It encompasses three phases: phase one (set-up), phase two (deploy, maintain and support) and phase three (consolidate and continuous review) to leverage current and future ICT investments to build an integrated national health information infrastructure and enable universal health coverage by 2020. ^[4]

Its implementation was projected to achieve this through: improved access to health services through the effective use of telemedicine and other information and communication technologies for health worker training and support; improved coverage of health services as well as tracking demand and supply of health services and commodities; increased uptake of health services through the effective use of mobile messaging and cash transfer incentives for demand creation; improved quality of care through the effective use of information and communication technologies for decision support within the continuum of care; increased financial coverage for health care services through the effective use of Information and communication technology for the National Health Insurance Scheme and other health-related financial transactions and increased equity in access to and quality of health services, information and financing through the effective use of information and communication technologies for delivering appropriate health services for those who need them. Currently, there are no updates as to the successful outcome or otherwise of these resolutions.

The emergence of the deadly COVID-19 has further reduced the need for physical contact between health caregivers and patients who encountered difficulties in communicating due to the physical distance, mask, personal protective equipment and often did not understand the instructions given by the doctors.^[5] Therefore, maintaining an optimal telemedical service delivery requires a fast, and uninterrupted internet service since most telemedicine services involve medical data processing, retrieval of up-to-date information and real-time communication between patients and experts. In 2020, UNTH entered a partnership with the Federal Ministry of Health to introduce telemedicine hospital response services which will enable regular patients dial-in to access critical health information and consultations with medical practitioners.^[6] Physician's knowledge, attitude and acceptance are considered some of the main challenges for telemedicine^[7] while poor internet connection, lack of education about telemedicine, instability of basic infrastructure with special emphasis on the electric supply in Africa top the ladder of challenges faced by African countries in the establishment of a good telemedical network.^[8] A study revealed that about 75% of telemedicine projects in developed countries and 90% in developing countries are abandoned or fail outrightly.^[9] In Nigeria, this hesitancy in the full implementation of telemedicine has been linked to the lack of a national telemedicine policy and regulatory bodies as well as low internet

connectivity, the initial huge start-up cost of information and communication technology infrastructure and malpractice-related issues.

Objectives Of The Study

1. General Objective: To assess the knowledge and practice of telemedicine by medical doctors in the University of Nigeria Teaching Hospital (UNTH), Ituku-Ozalla, Enugu.
2. Specific Objectives:
 - a. To determine the level of telemedicine services/systems available at the University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu.
 - b. To ascertain the quality of care delivered using telemedicine in this hospital.
 - c. To evaluate the clinical outcomes associated with the practice of telemedicine in this hospital.
 - d. To identify the factors that limit the complete adoption of telemedicine in this hospital.

Methodology

Study area: This study was carried out at the University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu State. A major referral centre for hospitals within South-East Nigeria. It provides in-patient and out-patient services to its clients and offers both emergency and long-term health care to residents of Enugu and its environs. It is located along Enugu-Port Harcourt expressway, 21 kilometres from Enugu capital city and occupies an area of about 747 acres.^[10] It has been in existence for over 50 years.

Enugu is the largest state by landmass in the South-East geopolitical zone.^[11] It lies between 6°27'10"N 7°30'40"E / 6.45278°N 7.51111°E / 6.45278; 7.51111 and has an estimated population of 4,411,119 in 2016^[12] with an annual growth rate of 2.8% and a density of 1,300 per km².

The study duration was between July and August 2021.

Study population: Medical doctors practising at the University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu who gave informed written consent for the study.

Study design: The study design employed was a cross-sectional epidemiological study of the descriptive type. A simple random sample was done.

Sample size determination: A minimum sample size was determined using the formula: $n = Z^2 pq/d^2$

Where,

n = sample population

Z = standard deviation of 1.96

p = prevalence

q = 1 – p

d = standard error of 0.05

Using the study by Ashfaq et al. ^[13], 80.7% of doctors know about telemedicine.

Hence,

p = 0.807

q = 1 – 0.807

d = 0.05

Therefore,

$$n = 1.96 \times 1.96 \times 0.807 \times 0.193 / 0.05 \times 0.05$$

n = 239

Using $N(\text{final}) = n / (1 + n/N)$ for a study with a sample population < 10,000

Where,

N = estimated total of the population

N = 556 (Number of doctors working in UNTH) ^[14]

$$N(\text{final}) = 239 / 1 + (239/556)$$

N (final) = 167

Minimum sample size will be 167.

A 10% allowance for non-responders = 17

The Sample size for the study will be 184.

Due to scarcity of resources, a convenience sampling was done to include 150 doctors. One doctor declined consent hence, data from 149 doctors was analyzed.

Data collection methods: Data was collected using a self-administered questionnaire. It was adapted using a Likert-type scale with items answered on a five-point scale and telemedicine assessment tools such as Technology Acceptance Model and Telehealth Usability Questionnaire. Brief questionnaires are

preferable to improve response rates as studies using long questionnaires based on Technology Acceptance Model have reported low response rates. ^[15]

The questionnaire had five sections comprising of socio-demographic and socio-economic characteristics of participants, awareness of telemedicine and source of information, perception and practice of telemedicine, factors limiting telemedical practice and recommendations for rectifying identified factors.

Results

After collection, the data was analyzed and presented in tables, graphs and pie charts. Then, conclusions were drawn from it.

1. Socio-demographic characteristics:

Gender: There were more male doctors (65%) than female doctors (35%).

Age: Most of the respondents were between the ages of 15 and 30 (63%).

Age (Years)	Frequency	Percentage
15 – 30	94	63
31 – 45	34	23
46 – 60	21	14
60 and above	0	0
Total	149	100

Department: This is widely distributed with the least percentage of doctors working in the department of Paediatrics (6.3%) and the highest percentage working in the department of Medicine (52.1%).

Department	Frequency	Percentage
Medicine	78	52.1
Surgery	40	27
Obstetrics & Gynaecology	22	14.6
Paediatrics	9	6.3
Total	149	100

2. Awareness of telemedicine and source of information:

Even though most of the respondents (98%) had previous knowledge of telemedicine, only 67.1% have consulted using telemedicine.

Most respondents heard of telemedicine through social media (32%), followed by colleagues (26%) and conferences (19%) while it was least heard of through academic journals (6%).

How did you hear of telemedicine?	Frequency	Percentage
Social media	47	31.5
Conferences	27	18
Journal	9	6
Hospital training	25	17
Colleagues	38	25.5
Total	146	98

OBJECTIVE 1: TELEMEDICINE SERVICES AVAILABLE IN UNTH

3. Perception and practice of telemedicine:

Channels of telemedicine delivery: Most respondents (68%) deliver telemedical services using phone consultations.

Most participants volunteered that telemedicine services available at the hospital were essentially more of interactive sessions (65.1%) than of remote monitoring (25.6%) and storing-and-forwarding (9.3%).

Type of telemedicine available	Frequency	Percentage
Interactive medicine	97	65.1
Store-and-forward	14	9.3
Remote patient monitoring	38	25.6

A majority (83%) reported that they did not know if the use of telemedicine consultation was covered by the National Health Insurance Scheme (NHIS).

OBJECTIVE 2: QUALITY OF CARE AT UNTH USING TELEMEDICINE

Most of the respondents (57%) spend an average length of 15 minutes with one patient.

Average time spent on one patient	Frequency	Percentage
15 minutes	86	58
30 minutes	45	30
1 hour	18	12
More than 1 hour	0	0
Total	149	100

OBJECTIVE 3: CLINICAL OUTCOMES ASSOCIATED WITH THE PRACTICE OF TELEMEDICINE

When asked if they thought COVID-19 has led to an increase in their use of telemedicine, 96 (64.6%) ticked 'yes' while 53 (35.4%) ticked 'no'.

Out of the 100 respondents who consult using telemedicine, the majority reported that they used telemedicine for follow-up (27.3%) and counselling (20.5%) while they never used it to manage chronic medical conditions.

The table below shows the attitude and acceptability of telemedicine by the respondents:

Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Telemedicine improves my patients' access to healthcare services	0	4.4%	15.6%	55.6%	24.4%
Telemedicine is convenient to use compared with the in-person visits	0	28.9%	15.6%	37.8%	17.8%
I am satisfied with this telemedicine system	4.2%	12.8%	36.2%	36.2%	10.6%
I would use telemedicine services again	0	2.1%	17%	53.2%	27.7%
I will recommend the use of telemedicine to my colleagues	0	0	21.3%	53.2%	25.5%
Telemedicine is needed in emergent situations such as COVID-19	0	2.1%	12.5%	50%	35.4%
Telemedicine is needed regardless of emergent situations such as COVID-19	0	2%	18.8%	50%	29.2%
Telemedicine can partially replace in-person visits	6.3%	10.4%	16.7%	52.1%	14.6%
I know the purpose of telemedicine	2.2%	2.1%	19.6%	56.5%	19.6%
I understand the advantages and disadvantages of telemedicine	0	2.2%	13%	58.7%	26.1%
I can check patients' conditions through telemedicine as in-person visits	4.2%	27.1%	37.5%	20.8%	10.4%
I can explain patients' medical conditions well enough as in-person visits	6.5%	13%	19.6%	39.1%	21.7%
I think patients can understand their condition during telemedicine as in-person visits	10.6%	19.1%	23.4%	34%	12.8%
I feel comfortable during each telemedicine consultation	0	8.5%	46.8%	31.9%	12.8%

More than half of the participants (53.3%) gave a good rating for telemedical practice at the centre while the remainder of the distribution goes thus:

100 doctors (67.3%) stated that the use of telemedicine improved the clinical outcome of their patients in the following ways:

Clinical Outcome	Frequency	Percentage
Promotes continuity of care (especially in chronic diseases)	100	67.3
Reduces cost of care	96	64.3
Reduces patient waiting time	85	57.1
Patients are included in the decision-making process	75	50
It allows the healthcare provider to see more patients	53	35.7
Minimizes patients' exposure to infectious diseases like COVID-19	96	64.3

OBJECTIVE 4: FACTORS LIMITING THE COMPLETE ADOPTION OF TELEMEDICINE IN UNTH

All 149 respondents volunteered that there are hindrances to the use of telemedicine at the hospital and attributed some of these hindrances to be:

Hindrances to the use of telemedicine	Frequency	Percentage
ICT illiteracy of medical personnel and patients	124	83
Lack of awareness of the availability of telemedicine services	130	87.2
High cost of set-up and maintenance	108	72.3
Low and expensive internet connectivity	117	78.7
Lack of trust in the telemedicine system	98	66
Privacy and medico-legal concerns	70	46.8

4. Factors limiting the general practice of telemedicine

This table shows respondents' thoughts on the limitations of telemedicine:

Statements	Frequency	Percentages
It doesn't allow for proper examination and interaction	136	91.3
Some patients prefer in-person visitations and respond better to it	139	93.5
Unstable internet access and difficulty using new technology	146	97.8
Ethical issues may arise	110	73.9

5. Recommendations by respondents

According to the respondents, some factors that can improve the use of telemedicine are:

Statements	Frequency	Percentage
Provision of a national telemedicine policy and monitoring agency	135	90.7
Training medical professionals and patients on the use of telemedicine	139	93
Use of electronic health records	135	90.7
Inclusion of telemedicine services in the National Health Insurance Scheme	125	83.7

Conclusion

There is a good knowledge of telemedicine (98%) among doctors practising at the University of Nigeria Teaching Hospital (UNTH), although only about 67.3% have consulted using telemedicine. In keeping with the objectives of this study, the quality of care delivered using telemedicine received a good rating and remarkably improved the clinical outcome of their patients by ensuring that patients are included in decision making, exposure to infectious diseases are minimized, cost of accessing medical care is reduced and continuity of care is promoted. Our results correspond with another study ^[16] that telemedicine cannot replace personal medical care in all cases, especially in severe or unstable conditions or whenever the physician's examination is needed. Most of the doctors admitted that they understood the advantages and disadvantages of telemedicine but a profound demerit of telemedicine from our study is that it does not allow the healthcare provider to see more patients. This could be attributed to technicalities from the machinery, the longer time required to effectively communicate by both parties and the unstable and often, chaotic internet connectivity.

Therefore, to achieve a telemedicine system in Nigeria that meets the high standards of conventional medicine, telecommunication bodies, public and private organizations must collaborate to ensure a seamless telemedicine service. Also, proper legal framework and guidelines must be laid down by appropriate bodies and government agencies because telemedicine encompasses general legal matters like data protection, consent, informed consent, privacy, medical negligence, contracts, medical ethics and more specific medico-legal concerns like e-advising, e-consultation, e-prescribing, e-dispensing and e-consent ^[17] because transmitting patient files via the internet threatens patient privacy.^[18] These should be addressed by formulating a national telemedicine policy or at least, revisiting and updating previous policies, incorporating telemedicine services in the National Health Insurance Scheme and addressing the ethical concerns of healthcare professionals and patients through a vetting process that checks and eliminates substandard health practices.

Declarations

Ethics approval and consent to participate: Ethical clearance was not obtained from the Health Research and Ethics Committee of the University of Nigeria Teaching Hospital before the research was conducted because the researcher felt it was a simple questionnaire survey.

Consent for publication: Participation was voluntary, and the purpose of the research was explained to each respondent. Informed consent was obtained before inclusion into the study. However, anonymity of participants was ensured, and no personal information was collected during the survey.

Availability of data and material: Additional data from the research project could be made available by the author on request.

Competing interests: The author declares that there is no competing interest.

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Authors' contributions: The research was solely conducted by the author.

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Figures

Figure 1

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Figure 2

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Has COVID-19 led to an increase in your use of telemedicine?

Figure 5

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Figure 6

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Rating of Telemedicine at UNTH

Figure 7

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