

## TELEMEDICINE IN NIGERIA: A MEDIUM TO THE UNDERSERVED COMMUNITIES.

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### Abstract

**Background:** Telemedicine which means the use of Information Technology to provide healthcare from a distance, is among the new innovations in the science and art of Information and Communication Technology. Its concept requires simplification for greater understanding in the 21<sup>st</sup> century.

**Objective:** To state the relevance of telemedicine in achieving greater healthcare coverage and efficiency to the underserved communities and highlight its progress at the Federal Medical Centre Yenagoa.

**Materials and Methods:** Relevant literature on Telemedicine, Information and Telecommunication Technology (ICT) were reviewed and these were gathered from various sources. Search engines like google.com, bing.com and msn.com were used to search for online materials.

**Results/Conclusion:** It was found that telemedicine is at its embryonic stage in Nigeria and attempts made at higher administrative levels to institute telemedicine practice have yielded too little results. However, the Federal Medical Centre Yenagoa has recorded successes through collaboration with International and local partners to the effect that the future of telemedicine use in Nigeria seems bright.

**Key Words:** Telecommunication, information technologies, computers, telemedicine, e-health.

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### INTRODUCTION:

Access to healthcare is a core component of health care provisioning which includes physical accessibility<sup>1</sup>. This is why scholars, decision-makers, healthcare practitioners and management experts have always given it a pride of place in healthcare discourses. The greater the access, the greater the number of lives that can be saved.

It is posited that Telemedicine offers promising additions to breaking down barriers to health care

access<sup>2</sup>. This article therefore focuses on the concept of telemedicine as it is being practiced in our clime, its prospects and benefits in improving access and adding value to the quality of care from healthcare practitioners to the patients.

### GENERAL BACKGROUND

It is no news that the world is rapidly evolving into a global village through electronic medium, a term, long ago, conceived by Marshall McLuhan<sup>3</sup>. Some

scholars have even argued that globalization has already crystallized with the aid of technology. This argument is however over-stated because there are tens of thousands or millions of people who are still being bypassed with the benefits of modern technology.

Our world is certainly not where it used to be many decades back. This is made possible due to the speed which information and imageries can now travel from one part of the globe to another. Our world is aided by the advent of Information and Communication Technology (ICT) with massive positive effects by facilitating contacts over greater distances with ease<sup>4</sup>

Specifically, scholars and students of history believe that the use of technology is as old as man himself, but its monumental modernization and application did not come about until the twentieth century. The transformation was the direct result of the invention of computers. It is thus stated that it was only in the last two decades of the twentieth century that computers were beginning to be seen as great inventions<sup>5</sup>.

The introduction of the communication element into Information Technology gave impetus to the extent that information could easily be produced, stored and retrieved at will as well as transmitted through electronic pulses from one end to another on a real time basis<sup>4</sup>. Consequently, the birth of Information and Communication Technology devices started to bring the world nearer to itself, hence the now common currency of the term “global village”<sup>3</sup>

Today, the use of ICT has become widespread and cut across all strata of the society including healthcare<sup>6</sup>. It has revolutionized the way we think and do things. It has brought knowledge and exposure to places that were hitherto in obscurity. Politics, engineering, law, religion, education, pure and applied sciences and such disciplines as zoology, forensics, geography, medicine just to mention a few, have become major beneficiaries of the use of ICT for the benefit of mankind, although not without some attendant disadvantages.

Not minding the widespread use of ICT today, the prime purpose of this article centres on and is narrowed down to Telemedicine which is defined as the use of Information Technology to provide healthcare from a distance<sup>7</sup>. Properly conceived, the engine room of telemedicine is the application of ICT devices. These devices have been recognized as vista of “new possibilities” to health care and medical practice<sup>8</sup>. As a relatively young area for exploits, it is our belief that an article of this kind will attempt a robust clarification of the concept of Telemedicine, as well as the inroads that it has made in Nigeria with some recorded benefits.

### TELEMEDICINE IN NIGERIA

Nigeria remains the most populous black nation in the world. There is a dire need of improvement in the healthcare system. The socio-economic indices of the country are far from optimal with about “87 million people in extreme poverty”, taking over India's position as the world's poverty capital<sup>9</sup>. The vast majority of the population is poor and find it difficult to afford adequate healthcare services through their out of pocket spending.

The poverty rate is at all time high and coupled with costs of orthodox medicine compounded by difficulty posed to rural dwellers trying to access modern healthcare facilities through physical contact, this makes a vast majority of the citizenry resorting to alternative healthcare services<sup>10</sup>. In some cases, healthcare seekers travel many miles or several kilometres before they can access care. People living in the hinterland and the riverine areas are often challenged by the economic being at a low ebb and other sundry stressors to embark on long journeys through the inland waterways to access healthcare facilities in the metropolis due to unavailability of such medical facilities in their localities<sup>10</sup>.

The challenges posed by distance, poor economic status and other inconveniences are ameliorable through telemedical approach to healthcare provision because it facilitates medical information sharing from one distant point to another between practitioners so as to treat and

improve a patient's health<sup>11</sup>. With the growing use of ICT devices such as mobile phones, television sets, computers and other telecommunication devices, coupled with the growing ease of acquiring these devices, the stage is already set for telemedicine to thrive. The challenges facing many people in accessing healthcare can therefore be reduced through telemedicine.

The benefits of telecommunication devices in healthcare has been noted and governments of developing economies are searching for alternative ways of bringing healthcare services to the people through cheaper means. The growing popularity and penetration of ICT devices stand a better chance to help achieve this at lower costs with the probability of reaching out to more people especially those living in remote areas<sup>12</sup>.

In Nigeria, the image of telemedicine may conjure a mega project where lots of installations are required. While such mega projects may indeed be necessary in big healthcare facilities like teaching hospitals, tertiary medical centres and specialized clinics to facilitate interface, collaboration and interaction among medical personnel within their localities and across the globe, it is worthwhile to simplify the telemedicine concept to include the use of small e-devices to make healthcare available and accessible to the under-served communities or people living in remote locations. This measure has been proven to aid community health extension workers (CHEWs) and healthcare teams at the rural areas<sup>13</sup>.

There is now the need as a people to begin to understand the true concept of telemedicine. If we fail to do this, the shared-perspective of the Nigeria Medical Association that “despite the wide range of ICT application in Nigeria...studies show that this technology has very little impact in the health sector” will linger with us for a long time to come<sup>12</sup>.

The infantile stage of telemedicine concept<sup>14</sup> in Nigeria calls for enlightenment or deliberate education both for medical and health practitioners and healthcare users as well<sup>14</sup>. This is because no

matter how noble the idea may appear and no matter how well it is working in other climes, same cannot be achieved here if the population is ignorant of the concept. Therefore, any telemedicine project that does not incorporate an educational component to drive the knowledge down to the people will meet with brick walls.

In 2009, the Federal Ministry of Science and Technology in conjunction with the Federal Ministry of Health hatched a noble idea to “establish a national coordinating mechanism for e-Health activities in the country in accordance with World Health Organization (WHO) resolution passed in 2005”. It has been observed pertinently that since the project was commissioned with the launching of a mobile satellite clinic, the project has refused to fly. This underscores a salient fact that the country may, for now, be facing teething challenges in practicing telemedicine at a wide scale which may be due to difficulty associated with high level expertise required to drive the process<sup>15</sup>.

Nevertheless, telemedicine is possible and it is being practiced, albeit, not in such magnitude as could have been expected. The root of the concept is taking its course at the Federal Medical Centre Yenagoa. With an ongoing collaboration, the Hospital has installed facilities where the ideals of telemedicine continue to thrive. The collaboration and partnership of the Hospital and the Global Offsite Care has been duly noted and the initiative applauded with the hope of being “a catalyst of more of such around the country”<sup>16</sup>. Telemedicine in Nigeria thus requires effort, patience and determination to bring everyone on board to become active stakeholders and participants.

### **BLAZING THE TRAIL OF TELEMEDICINE IN NIGERIA**

The Hospital is no doubt blazing the trails of Telemedicine in Nigeria<sup>16</sup>. The personnel of the Hospital, have over the years, gained access to and interfaced with leading telemedicine practitioners beyond the shores of Nigeria and had the opportunity of attending training sessions through

collaborative efforts of partners within and outside the country. This is coupled with policy encouragement from the parent Ministry, the Federal Ministry of Health. A brief background of how the practice of telemedicine first commenced in the Hospital, the strides so far recorded, the prospects and the potentials yet untapped are given below.

### **THE HISTORY OF TELEMEDICINE PROJECT AT THE HOSPITAL**

The Telemedicine experience of the Hospital dates back to 2007 when a set of teleconferencing, associated medical examination equipment and a VSAT Internet facility were delivered to the Hospital as part of a pilot scheme of the Federal Ministry of Science and Technology, an initiative supported by the then Medical Director of the Hospital. The Pilot Scheme which brought together some federal tertiary hospitals was concluded in 2009, but the Hospital was unable to key in fully due to the absence of training for its personnel, lack of a conducive space for teleconference and telemedicine consulting room, irregular power supply and inconsistent internet access at the required bandwidth.

As the leading tertiary referral hospital in Bayelsa State, with a vision to become an excellent and foremost reference tertiary health care service provider in the Niger Delta region and beyond and recording over 10,000 outpatient visits within a given month, the Hospital worked assiduously on the initiative to embrace Telemedicine. This initiative was further fuelled by the rate of population growth in the country which has greatly affected doctor-to-patient ratio, and the rise in infectious and non-infectious diseases such as stroke, and the poor health care indices of the region. This gave the impetus that one of the best ways, in the 21st century to have a wider scope and coverage especially for the people of the Niger Delta Area of Nigeria who live in difficult terrains, is Telemedicine. In one of the telemedicine sessions in 2016, the Head of the Hospital's Telemedicine Unit, Dr. Kemelagha, while addressing the participants, emphasized the imperatives of doing a lot to bring

the full benefits of telemedicine to those in need of quality affordable healthcare and said that there has to be a resolve not to relent until the goal is attained and sustained<sup>17</sup>.

### **ESTABLISHMENT OF TELEMEDICINE PROJECT PARTNERSHIP**

To overcome the inherent challenges of driving a project of this nature, the Hospital resolved to go into partnerships with relevant organs to seek humanitarian donations for the project. The Telemedicine Project Partnership was then established to drive the process to explore a Model that will fast-track achievements in the expected direction.

#### **The Hospital had to:**

Raise a core team of the Hospital's personnel to form a Telemedicine Unit.

Train the team abroad on how to set up a telemedicine practice.

Study existing scenarios and adopt a model of telemedicine for the Hospital.

Identify the areas of assistance in terms of logistics and equipment for telemedicine practice.

Provide certified international standard continuous medical education through teleconferencing.

Provide continuous support to the Hospital's telemedicine programme.

Provide a pool of medical specialty experts who will provide teleconsult in both directions.

Extend the practice of telemedicine beyond the Hospital promoting it and expanding its reach using the hub and spoke model.

### **TELEMEDICINE YESTERDAY, TODAY AND THE FUTURE**

In 2013, the Hospital signed a memorandum of understanding (MoU) with the Rotary Club of Sebastopol Sunrise (USA), the Rotary Club of Yenagoa (Nigeria), and the Heberden

Telemedicine Foundation (USA) which signalled the practical commencement of the Project in the Hospital that year<sup>18]</sup>. This gave rise to the eventual partnership with the Global Offsite Care (GOSC, USA). Through the instrument of the MoU and GOSC, the Hospital received supports from several Rotary Clubs in USA, telemedicine equipment Manufacturers, Software and other Technology Companies. These gestures combined is driving the practice of telemedicine in the Hospital from where it was yesterday, giving it a firm root in the present with the promise of a well-rooted and robust tomorrow in the provision of healthcare services not only in the Hospital but in other sister institutions in Nigeria, Africa and indeed, the global community.

### TELEMEDICINE TEAM TRAINING

Early in the life of the project, training was identified as a critical need, thus the partnership decided to interview and identify a team of professionals from various disciplines that would be trained to form the core Telemedicine Team for the Hospital.

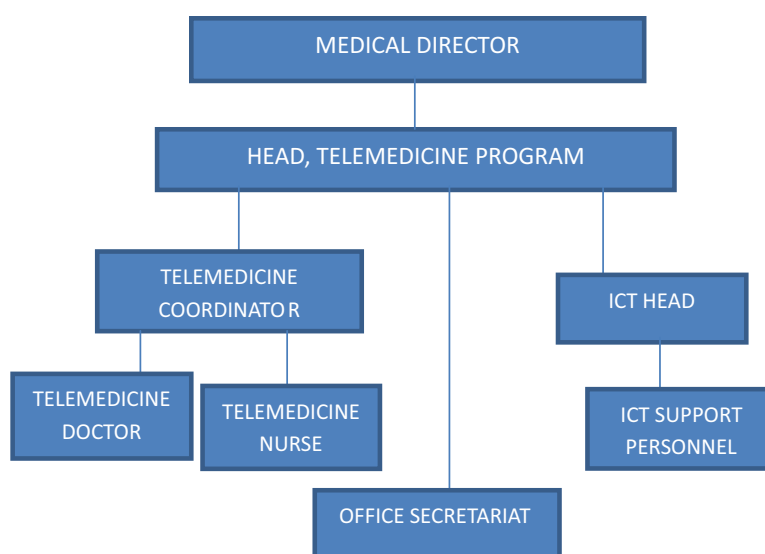
In August 2015, the team of selected personnel was trained in Sebastopol, California USA, on how to implement telemedicine to provide access to specialist care for the underserved. The rigorous

training had class room and field tour segments on a daily basis. The team received practical hands-on experience on the use of telemedicine tools and developed a plan for how to expand the use of telemedicine on return to the Centre. As a prelude to the training, Gude<sup>19</sup> remarked that the essence of the training was to afford participants the benefit of sharing medical information for difficult medical conditions”.

The training programme was organized by GOSC and funded through a global grant from the Rotary Foundation. Four doctors and an ICT personnel from the Hospital took part in the training. This included the Medical Director and the Head of the Telemedicine Team.

### THE TELEMEDICINE UNIT AS IT IS TODAY IN FMC, YENAGOA

Sequel to the training, the Medical Director formally inaugurated a Telemedicine Unit (Fig.1). The Unit was set up with a team of Consultant Doctors, ICT personnel and a Nurse. The Telemedicine Unit is headed by a Physician who from the beginning initiated the connections that yielded the partnership. The Unit Head reports to the Medical Director who is an integral promoter of the programme.



**Figure 1: FMC YENAGOA TELEMEDICINE UNIT ORGANOGRAM**



## **FMC YENAGOA INVOLVEMENT IN THE NIGERIAN TELEMEDICINE MODEL**

The Hospital as an active participant in the Nigerian Telemedicine Model, is involved in a four-pronged approach comprising Continuous Medical Education (CME), Teleconsult, Hub and Spoke, and lastly, Electronic Medical Record (EMR).

**The CME Telemedicine Programme:** This began providing continuing medical education sessions called "grand rounds" to FMC Yenagoa in 2014. This is a weekly teleconference anchored by Dr. James Gude with a pool of expert physicians. Dr. Gude is a Clinical Professor of Medicine at University of California San Francisco and Medical Director for Global Offsite Care in the USA. Attendees gather in a room fitted with teleconference equipment so they can all see and participate in the session. The programmes follow a schedule usually based on a patient that has been seen recently.

Several Sites from up to ten countries participate simultaneously on the screen such as the United States, Nigeria, D.R. Congo, Haiti, Bahamas, Uganda, Rwanda, Zambia, India, Zimbabwe, and Ghana. Apart from Dr. Gude, selected local doctors present clinical cases from the USA occasionally. Doctors at FMC Yenagoa and participating hospitals from three other countries also take turns to present and discuss cases with the International Audience. Thus, the CME teleconferences have become a veritable mentorship platform for participants and a ready source of second opinion on medical cases.

### **Achievements of the CMEs**

Sustained online Continuous Medical Education for our staff since 2014.

The CMEs have provided a backdrop for comparing and contrasting medical practice across borders thus creating a template for best practices that take into cognizance the unique environment and circumstances that have shaped the approach to healthcare delivery regionally.

The Hospital requires its resident doctors to

participate in the grand rounds sessions as part of their training. As a result, the rate of their success in the West African College of Surgeons and Physicians has been on the increase.

The doctors, nurses and pharmacists who attend in Nigeria get to keep up with medical best practices. They build their skills and get to share their experience and knowledge in the back and forth style session.

Award of International CME credits to attendees also boost the importance of this programme in our contemporary Nigeria.

### **Teleconsult**

To enhance the benefits of the project, there is a Teleconsult Section. The Teleconsult Room fitted with necessary equipment gives Nigerian doctors access to a specialist in the USA, Israel, and other Hubs the benefit to address challenging clinical cases.

### **Benefits in Teleconsult**

Teleconsult has its benefits for both the patients and the healthcare providers alike. In 2016, a 75-year-old cardiac patient, through teleconsult mechanism, was accessed by a team of doctors in the United States of America and was given confirmatory diagnosis where he was lying critically ill in a remote village in Nigeria. It was found that the patient was in need of a potentially lifesaving pacemaker.

### **Hub and Spoke**

Drawing from the training received in the USA in 2015, the Hospital adopted the Hub and Spoke Model of telemedicine for its rural outreach centres.

The Hospital is expected to train sister health care facilities in the region and serve them through telemedicine. By setting up the Hospital as a Hub, the expertise of its local doctors with all the peculiarities of healthcare delivery in its operating environment can be brought to bear on the clinical and non-clinical practices of the spoke hospitals who depend on the Hub for specialist services,

peer review and education. The Hospital operates an outreach hospital at Otuoke town in Ogbia LGA selected as the first spoke hospital of the project.

### **Achievements of the Hub and Spoke Telemedicine Model Expansion**

Designation of the Hospital as a Regional Telemedicine Hub in Nigeria and Africa by Global Offsite Care.

Establishment of the first expansion Site at the Otuoke annex hospital in October 2016 when the International Partners from the USA visited the Project. The new Site has continued to participate in the weekly conference calls.

Establishment of a Telemedicine Hub and Spoke linked up with the annex hospital in Otuoke town, enables the rural community and its surrounding towns receive expert medical care without having to leave their towns for Yenagoa.

Addition of the Shyira District Hospital, a hospital in the East African country of Rwanda to the Telemedicine Network of the Global Offsite Care through the telemedicine promotion activities of FMC Yenagoa. This saw the sponsoring of two members of the Hospital's Telemedicine Team to Rwanda in July 2017 by the International Partners to help inspect, setup, and inaugurate the telemedicine programme of the Rwandan hospital.

**EMR:** The Hospital recently received donation of an International Standard Electronic Medical Record which is expected not only to enhance telemedicine consults but also eventually become the Hospital's de facto EMR. Currently in the customization phase, the EMR implementation is billed to begin at the Medicine, Laboratory and Imaging departments.

Use of an EMR reduces patient waiting time, curtails loss of patient records or duplication, makes retrieval of records extremely fast at the touch of a button, entrenches professional accountability and improves the overall completeness of reporting. In addition, it improves revenue collection and reconciliation of bills. In the event of a telemedicine

call, this EMR will enable a remote specialist doctor review case notes, view investigation results and make necessary inputs to improve the patient's outcome.

### **DONATIONS FROM PROJECT PARTNERS**

The following items have been received from partners since the inception of the Telemedicine project:

Tablets.

A Laptop.

Teleconference equipment for the main FMC Yenagoa hospital.

Teleconference equipment for the Otuoke annex hospital.

An Internet Voice call device.

Telepresence Robots.

Medication for a teleconsult patient.

EMR.

### **BENEFITS DERIVABLE FROM THE TELEMEDICINE PROJECTS**

An estimated 10,000 patients who visit the Hospital monthly in Yenagoa, Nigeria could benefit from diagnoses by senior specialists via tele-consults.

Saving more lives at the ICU & Emergency Rooms.

Fast response time in the treatment of stroke, thereby preventing irreversible brain damage and disabilities

Enhance the skills of specialists and medical staff who participate in telemedicine sessions which will afford them the opportunity of seeing more patients to fully engage their skills.

Provide future training to help doctors, nurses and other Hospital staff implement and use telemedicine and thus, add to their range of medical services

Increase in the effectiveness of hospital personnel occasioned by access to mentorship by highly experienced doctors and other professionals

Enhancement of health infrastructure of local communities

Reduction in the time involved in accessing health care by patients which is a critical factor in saving lives.

Reduction in the overall cost associated with obtaining healthcare

Through the Hub-Spoke Model, the Hospital can engage medical professionals that usually refer their patients in their primary level of care to secondary and tertiary health facilities located in the metropolis; this will be to assist them to provide the needed care for the patients at that level of care without the patients having to travel far distance to access such care.

### **PRACTICAL LESSONS FROM TELEMEDICINE SESSIONS**

There is need to explore and adopt new developments in technology and practice of telemedicine and eHealth. Cumbersome and complex technologies should be replaced with new light weight and easy to use technologies.

There is need to engage in regular appraisals and trainings.

Telemedicine will extend and deepen healthcare delivery faster as the hub trains smaller health care facilities and serves them through the hub and spoke model.

Hospitals participating in regional telemedicine networks are more likely to benefit from each other's experience because they tend to share similar characteristics and face common challenges or

circumstances in their practice.

Electricity shortage is a reality of most developing countries for whom the adoption and use of telemedicine is crucial. This has been known to hamper or interrupt our participation in some CME Teleconferences. Power problems affect the stable operation of most ICT equipment leading to premature failures and breakdowns.

Solar Power alternatives have been adjudged cost effective in the long run to mitigate prolonged electricity supply shortages.

Telemedicine depends on connections and thrives on deepening connections. To sustain and extend the programme to the point that it actually yields a radical improvement in the doctor to patient ratio of the region, there is the need to be more committed to regular promotional tours and exhibitions where demonstrations are carried out. These have been found to be an efficient means of bringing in new sites/hubs/spokes.

Partnership is the key to advancing the adoption of telemedicine as the veritable means of delivering quality healthcare to the underserved.

The practical lessons enumerated can help maximize the gains of telemedicine if they are underscored by a research finding which states that telemedicine and telehealth can only improve healthcare access and delivery if the potential of the technologies involved can be maximized through the commitment of the human resources whose effort is needed to achieve effective integration among participant institutions<sup>20</sup>.

### **CONCLUSION**

From this article, it can be appreciated that telemedicine presents a ray of hope that can expand the scope of medical reach to people who before now are unreachable in their locations. Aided by telecommunication devices, medical knowledge can now be shared by experts, thus leading to the right diagnosis over a long distance without physical contact - all for the patient's benefit.



Bearing the benefits of telemedicine in mind, the way forward for the concept in Nigeria is hinged on political and administrative will of government and other relevant agencies to ensure provision of basic telecommunication facilities and enabling environment. There is also the need for continuous education on the subject for both medical and health personnel as well as health seekers themselves.

Therefore, the vision of the Hospital is to occupy the front burner of driving the process of telemedicine in Nigeria. Poised at continuous upgrade of telemedicine facilities it has on ground, the synergy built with telemedicine partners at home and abroad is to be sustained while opening new frontiers. As a Hub Hospital (HH), all established Spokes will be nourished and new ones initiated and established. This will lead to increased participation that will enable more members of the under-served communities to benefit especially in Nigeria, the West African Sub-Region and indeed, the globe at large.

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