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Factors That Affect the Use of Ict in Nursing Profession in Ebonyi State Nigeria

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ABSTRACT:
Information and Communication Technology (ICT) has become a major tool in the delivery of health services just as it has made a great impact on other sectors. In Health, it has given birth to e-health, Health informatics, tele-health, etc. The primary focus of this paper is to outline and discus the factors that affect the use of Information and Communication Technology (ICT) in Nursing profession in Ebonyi State. The paper also analyzed and found out that the problems of ICT application in Nursing profession are paramount in preventing the successful implementation of health informatics in Ebonyi State. It went ahead to suggest the possible solutions to the identified problems. The paper concluded that nurses need to engage fully in ICT so that they contribute to shaping the care system and emerge as leaders of the new care system.
Keywords: ICT, e-Health, health Informatics, Nursing, Internet, computing, telephony.

Introduction

Technology has increased rapidly over the past four decades, and has become an integral part of healthcare. In this paper, we discuss the problems facing the use and implementation of Information and Communication Technologies (ICT) in the health sector in Ebonyi State. The World Bank (2002) defined ICT as 'the set of activities that facilitate the capturing, storage, processing, transmission and display of information by electronic means'. In the words of Frenzel (1996) ICT is 'a tool that is radically altering the balance of power between institutions, governments and people by broadly disseminating important information'. ICT in the health context is unlikely to alter the balance of power between institutions, but it is assuredly a tool that can aid dissemination of information through electronic media. In this paper, we define ICT as a tool or technology for gathering, processing, analyzing, storing, retrieving, and disseminating information electronically. There are many factors that determine the implementation and use of ICT such as expert knowledge, user's attitudes, etc. ICT is a fusion of telecommunication and computing technologies with the aim of processing and disseminating information.

The advent of ICT in the health sector in many developing countries can be linked to international organizations (such as World Health Organization, World Bank, United Nations Development Program, etc), research institutes and educational institutions. For example, in 1993 Mongolia was provided with personal computers funded by the World Health Organization to support health care services in the country (Braa, et al., 1995).

Nigerian Health Informatics: Past and Present

Nurses have participated in the purchase, design, and implementation of information technology in healthcare. The knowledge required for the field of nursing informatics has expanded and it is now a recognized specialty in the profession. Nursing informatics is considered both a science and a system. The term "nursing informatics" was initially seen in literature in the 1980s, including a definition of combining nursing, information, and computer sciences for managing and processing data into knowledge for using in nursing practice (Murphy, 2010). In 1994, The American Nurses Association (ANA) began developing a statement to describe and define the scope of nursing informatics (Baker, 2012). The meaning of nursing informatics has evolved and has been refined, with the American Nurses Association (2008:p. 65) definition stated as "a specialty that integrates nursing science, computer science, and information science to manage and communicate data, information, knowledge, and wisdom in nursing practice".

Another definition of nursing informatics comes from the American Medical Informatics Association (AMIA) (2009, p:1), which states that "Nursing Informatics science and practice integrates nursing, its information and knowledge and their management, with information and communication technologies to promote the health of people, families and communities worldwide".

Nurses' Involvement in the New Technology

The environments in healthcare have encompassed more than just a physical location. There is an increase in the use of ICT such as mobile computers, wireless solutions, and automated exchanges between health providers and patients. Adapting to these new environments requires a paradigm shift for how care is communicated and delivered, which requires knowledge of the evolution of new technologies. Nurses are at the center of this advancement as the professionals with the greatest amount of direct patient care. Healthcare environments now incorporate virtual office visits, online appointment scheduling and payment, mobile laboratories, and electronic medication prescription. Nurses are also essential in helping patients set up their own personal health records (PHRs), or explaining to patients how to use a patient portal. The use of tele-health exchanges is increasing, particularly with underserved rural populations. New technologies offer access and opportunities to provide quality care to patients in remote settings. The challenge for these technologies with healthcare is ensuring that the automated solutions completely interact with one another, as well as with the healthcare professionals using Health Information Management System (HIMS,).

History of Nursing Informatics

Historically, nurses who worked in nursing informatics were considered “pioneers” who frequently got into the informatics practice because they were good practitioners. They were involved in IT projects as project team members or educators, or were just curious and technically competent. The role, responsibilities, and titles of these nurses were varied, and they often got into nursing informatics unintentionally (Murphy, 2010).

The Nursing Informatics Specialty

In 1992, the American Nurses Association (ANA) recognized nursing informatics as a specialty, which includes demonstrating a distinguished practice based on identifying educational programs, and support from nationally recognized organizations. With this increased recognition for educational programs focused on nursing informatics, the American Nurses Credentialing Center (ANCC) created a certification in nursing informatics in 1995 (Murphy, 2010).

ICT enables people to interact and communicates as though they are living together no matter the distance, also it makes it easier for us to obtain goods and services in convenient ways. The world in which we live in today has been changed by ICT. ICT has the potential to transform radically the delivery of health care and to assist in defining strategies to address future health problems. ICT has assisted in driving down healthcare costs (Remlex, 2007); and improved the delivery and effectiveness of healthcare services through help in disease management, improved patient safety and decision support for practitioners (O’Carroll, et al, 2003). Various systems have been developed to aid health care delivery such as local area network based patient information systems (Modai et al, 2002), and online health information for patients and medical personnel (DG INFSO, 2006). Despite Nigeria’s claims to have reorganized its health care delivery system since Bamako’s 1987 initiative, which focused on how to increase access to good health care systems, the government is yet to implement any ICT policy in the health sector.

Components of Nursing Informatics

It was identified by the Institute of Medicine (IOM) report in 2001 that a transformation in healthcare is needed. Included in the report was a call for the use of information technology (IT) in health to enhance the quality, safety, and efficiency of healthcare delivery. This transformation includes improving communication between providers and patients, automating clinical information, reducing errors, and promoting evidence-based practice. It is important to note that:

- Nursing informatics (NI) supports the decision-making of patients, nurses, and other providers in all roles and settings. This assistance is achieved through the use of information structures, processes, and ICT.
- Informatics nurses are those who have extensive clinical practice, are considered experts in using the nursing process, and have additional experience and education with ICT (Healthcare Information and Management Systems Society [HIMSS], 2012).

Meaningful Use of health information technology

The Patient Protection and Affordable Care Act and the American Recovery and Reinvestment Act of 2009 (ARRA), includes incentive payments from the Centers Medicare and Medicaid Services (CMS) to eligible

hospitals and providers for the meaningful use of certified health information technology products. Meaningful use is mandated for providers and hospitals to improve quality, safety, communication, and coordination in healthcare. There are three components of meaningful use: use of an electronic health record (EHR) in a meaningful manner, use of EHR technology for electronic exchange of information, and use of EHR technology to submit clinical quality measures (CMS, 2010). Stage one of meaningful use of health information technology for hospitals includes reporting of 14 core objectives and 15 clinical quality measures, and stage two includes 16 core objectives and 6 hospital main objectives (CMS, 2010 and 2012).

Components of meaningful use through the EHR include computerized physician order entry, patient demographics, vital signs, medication reconciliation, drug interactions, allergies, smoking status, clinical decision support, interdisciplinary communications, advance directives, confidentiality, transitions of care, patient education, and ability of patients to obtain a copy of their EHR (CMS, 2010 and 2012). As the criteria for meaningful use evolve, it is essential that nurses be involved as key stakeholders in the planning, design, implementation, evaluation, and optimization of health Information systems (HIMSS, 2011).

Health informatics

Nigeria has one of the highest mortality rates in sub-Saharan Africa; (WOCON, 2004) with a population of 140,003,542 (Nigeria Census, 2006) which is the highest in Africa but with inadequate health care delivery system. According to Hyman & Silver (2004), inadequate health care delivery might give rise to health risk which means that Nigerian may be liable to health risk. The problems of inadequate health care delivery are arguably minimized in countries like United Kingdom (UK) whose health services make more extensive use of ICT. The Nigerian health sector which Ebonyi state is a part, though one of the youngest state,would have been improved, if government had exploited the potential of ICT like other developed nations of the world (NHS, 1998). Health informatics which was formerly known as medical informatics was defined by Warner et al (1997) as the science that deals with the use of computers and communication technology to acquire, store, analyze, communicate, and display medical/health information and knowledge to facilitate understanding and improve the accuracy, timeliness, and reliability of decision making. According to O'Carroll, et al, (2003), health informatics was defined as a demonstration of how organizations can use IT to bring their strategic goals from theory into practice.

The term medical informatics was changed to health informatics or healthcare informatics when some Nursing officers felt that the term medical informatics had to do with physicians alone (Shortliffe & Blois, 2001) although today some people still use the two terms interchangeably. In this paper we will define health informatics as the application of information systems that allow collection, updating, storing, analysis and management of health related data in order to assist health care delivery.

Health informatics has a number of branches and sub domains, Shortliffe & Blois (2001) grouped health informatics into seven domain namely, clinical Informatics, Nursing Informatics, Veterinary Informatics, Dental Informatics, Bioinformatics, Imaging Informatics and public health informatics. Public health informatics is "the systematic application of ICT to public health practice, research and learning" (ASTHO, 2004 & O'Carroll, et al, 2003). It uses ICT to analyze risk factors to prevent and record health problems, and to promote health.

The History of Health Informatics in Nigeria

The history of health informatics in Nigeria started in the late 80s when a collaborative research project between the Computing Centre of the University of Kuopio, Finland and Obafemi Awolowo University, and Obafemi Awolowo University teaching Hospital (OAUTHC), Nigeria (Idowu, et al, 2003a) was initiated and this initiative was part of INDEHELA (a long term research project on Informatics Development for Health in Africa) details of which can be found at http://www.uku.fi/indehela/. The joint project produced a very rudimentary hospital information system based on the Veterans Administration's (VA) Admission Discharge Transfer, running on a stand-alone PC, which was in use at OAUTHC in 1991(Daini et al, 1992). According to Daini et al (1992), the group then organised the first International Working conference on Health Informatics in Africa which was held April 19-23, 1993 at Ile-Ife, Nigeria (HELINA, 1993).

In the late 1990s, the Nigerian research team (Finnish) decided to expand their rudimentary hospital information system with the aim of developing a comprehensive system suitable for use in all Nigerian teaching hospitals and medical centers. The plan then was that by 2001 all the teaching hospitals in Nigeria would have Health

Informatics units which could make use of standardized software. In reality, though some hospitals and Nursing Institutions in Ebonyi State though have computer or IT units, but they serve primarily to support word processing for typing pools and offices. Development of the commercial software 'Made in Nigeria Primary Healthcare and Hospital Information System' (MINPHIS) ran alongside the doctoral programme of one of the staff of the Department of Computer Science & Engineering, Obafemi Awolowo University, and was completed in 2004. Unfortunately, the system was not tested at OAUTHC and only five teaching hospitals and medical centres used the system as at 2007. The primary reason for this limited use is the cost of purchasing the commercial software. As Finnish/Nigerian research team were working on primary healthcare and hospital information system, a Norwegian and South African team focused on a district-level information management system (Anja, 2002).

There are other software packages developed for hospitals in Nigeria, though they are non-commercial. In 2003, the State Hospital Network known as SHONET was developed for sharing of hospital resources over the computer network in Nigeria. The philosophy behind the development of SHONET was to minimize the cost of running state hospitals. Hospital resources such as personnel, laboratory and equipment will be distributed to various zones in the state. The allocation of the resources depended on the diseases that was peculiar to the zone and whenever there was need for any of those resources in another zone within the system, the hospital resource can then be allocated over the network (Idowu, et al, 2003b).

In 2004, another system was developed at the Department of Computer Science & Engineering, Obafemi Awolowo University, Nigeria. The system was developed for referral of patients from one hospital to another such that patient's case file, referral note and medical examination results that were transferred manually from one hospital to another could be transferred over a computer network (Idowu, et al, 2004).

Presently most Nigerian teaching hospitals have to generate money by billing patients for the services rendered to them, so as to augment the money received from the government to run the hospital and pay staff salaries. Meanwhile, it is believed that if the use of ICT is adopted fully, the cost of running the hospital on the long run will be reduced and the health care delivery system may be as efficient and effective as it is in the developed world (NHS, 1998). The hospitals in Nigeria which includes hospitals and Nursing institutions in Ebonyi state are battling with opposing forces which serve as barriers to the adoption and infusion of ICT in health sector. The details of these barriers are discussed in the later part of this paper with possible solutions.

Benefit of ICT in Health Sector

ICT has benefited the health sector both in developed and developing nations. The benefits affect the hospital's stakeholders which include management of the hospital, Nurses, patients and other health personels.

- The use of ICT in health sector reduces the cost of running hospitals (Remlex, 2007). For example, The NHS in UK has its own network known as NHSnet which has benefited all parts of NHS. Apart from data networking and Internet, the NHS spends millions of pounds each year on telephone services across England to aid patient transport services and emergency ambulance. This is because the two areas help the NHS to deliver good health care services (NHS, 1998). ICT introduces potentials of sharing patient's files easier without any threat to patients' privacy. It is used for hospital management such as admission, health informatics and appointment management.
- ICT improves the efficiency of medical personnel by reducing waiting times and minimize paperwork. ICT makes information available for the use by the hospital personnel in an easily readable form. The result of patients' test can be added to the patients' case file as soon as they are ready.
- To the patients, ICT assists them to locate the heath facility and personnel, gives 24-hour access to health information and through encryption and password protection can help to keep patients data confidential.

Factors that affect the use of ICT in the health sector in Ebonyi state

In Ebonyi State just as it is in many other parts of the country-Nigeria, these seven (7) under listed factor affect the use of ICT and the successful implementation of health informatics. These factors range from people, government and scarcity of ICT infrastructure to resistance to change. These factors were discovered as a result of personal experience as an IT expert and interview conducted on Nursing Officers in Health institutions within Ebonyi state. The details are discussed as follows.

1. Electric Power Supply

Any society that finds it difficult to provide uninterrupted Power Supply (UPS) to its citizens will definitely have problems with the deployment of good ICT services. Nigeria which Ebonyi state is a part of is synonymous with this problem. People brought up in developed nations of the world will find it difficult to adapt to the 'epileptic' electricity supply in Nigeria. This has caused a lot of damage to research institutes computer and telecommunication equipments. The usually sudden interruption of electric power causes damage to computer components such as hard disks and motherboards. ICT equipments were made to function with other infrastructure such as electricity under "controlled conditions" that is when electricity supply is stable and constant. ICT/internet facilities in Ebonyi state suffer frequent downtime due to power interruptions and equipment damage.

A few years ago, Ghana celebrated one year without power failure, in contrast to Nigeria electricity situation. Ebonyi state has her share of this Nigeria problem as a state in the country. Despite her claims to be 'the giant of Africa', Nigeria rarely has stable and reliable electricity for ten consecutive hours. In developed nations, many companies supply and guarantee electricity and there is no problem of electric power supply. Ebonyi state should as a matter of urgency liaise with the federal government and urgently address this critical power problem in the state.

2. Government's Attitude

Ebonyi state government is yet to appreciate the use of ICT in health care delivery. This would have exposed the Nursing officers to ICT usage and application to their practice. Government has not seen ICT as a vehicle that can drive health and provide good health care facilities for the citizenry. Presently, apart from University College Hospital Ibadan, Abuja National Hospital in the Federal Capital Territory, only few health institutions have websites. Ebonyi state government could perhaps support the use of ICT in health care delivery systems by establishing an agency that will see to the deployment of ICT in the state hospitals. The state should as well make a budgetary allocation for its full implementation. This should be aimed at exposing Nurses and other health officers to ICT and equally ease delivery of health care services.

3. Cost of ICT Equipments

The price of computer hardware and software in Nigeria is very high compared with the income of an average Nigerian. This makes it prohibitive for most people, and even government establishments to buy the equipment. Government should encourage indigenous computer companies to produce major components in-house by giving interest free loans to them. Research institutes can be used in production of the components because in developed nations like UK, research institutes are the ones spearheading technological innovations and development. Ebonyi state government should encourage research institutes to become actively involved in software development. This should be done in line with identified best practices as they exist in the states of developed countries. Particularly, they should encourage open source applications.

4. Telecommunication Facilities

The ICT development problem in Nigeria is due to inadequate telecommunication facilities. Though the International Telecommunication Union (ITU) has rated Nigerian's telecommunication sector as the fastest growing in Africa (Anja, 2002), this applies chiefly to mobile technology, and the majority of Nigerians have no access to landlines. This growth is basically experience in the urban/metropolitan cities. Rural state like Ebonyi state is yet to experience such rapid growth. Ebonyi state in conjunction with the federal government should find means of restoring an effective and efficient telephone system that is landline, which is more economical to maintain. Also there is a need for Intranet within the hospitals which will aid communication and efficient ICT usage.

5. Internet connectivity

The Internet helps in controlling cost and more importantly it transforms the flow of information in all sectors including the health sector. Healthcare organizations use Internet for business processes due to cost reduction which O'Carroll, et al, (2003) estimated at 10:1 to 100:1 in routine transactions. Communication satellite is not common in Nigeria due to the cost of equipment. As at 2003, Nigerian Communication commission (NCC) the body responsible for telecommunication had not provided any satellite equipment for the country (Esselaar, et al, 2004). Private or government-run hospitals cannot host websites because of high subscription and maintenance costs (Oak, 2007). In May 14, 2007, China built a communication satellite called NIGCOMSAT-1 for Nigeria,

which was later announced as lost in space. A part from this other attempts has been made, but the effect of the attempts has not been felt by Ebonyi state health sector.

6. Resistance to New Technology

The introduction of new technology is affected by the response of the user of the technology which may be positive or negative. Many Nurses in Ebonyi state, like every other citizens, resists the introduction of new technological developments because they feel it will have negative impact on their job or profession. The idea is for new technology to be associated with new knowledge and skills, through training on how to use the technology. Workers expectations are that the introduction of new technology should come with new skills and a corresponding increase in their income. On the other hand, the organization introducing the new technology expects reduction in staff strength and cost of operation. In Nigeria, downsizing is the issue to be raised before the introduction of new technology and 09erfthis always leads to resistance by the workers. This is due to the fear of losing their jobs. In order to use ICT in Nursing profession in Ebonyi state, the State government should training Nurses on how to use ICT and not lay them off.

7. Lack of Maintenance Culture

Lack of maintenance culture is another problem; even government agencies find it difficult to maintain ICT equipment in Nigeria. Both preventive and corrective maintenance is very important for any ICT equipment. The financial plans for purchases of any equipment should encompass the maintenance of such equipment, and allowances for depreciation in value which is not the case in many organizations in Nigeria. This could be enforced by an ICT policy banning any organization from importing, supplying and installing any ICT equipment for another organization or herself without maintenance agreement.

CONCLUSION:

The state of ICT in Nigeria cannot be compared with what is obtainable in developed nations like the UK. Out of all the three ICT Indicators, mobile phone has the highest number of users in UK and Nigeria. The number of computer users equals to that of mobile phones in UK and with time the number of Internet and computer users in Nigeria may equal to that of UK. In Nigeria, mobile phones have the highest number of users, followed by Internet and computers. In this paper, we have discussed the problems facing the use and implementation of ICT in Nursing services in Ebonyi state which also have direct effect on health services as a whole in the state. Since "health is wealth", there is a need for Ebonyi State government to expose her Nursing officers in the use of ICT to improve the delivery of healthcare so as to get out of poverty. In order to coordinate this initiative and tackle some of the problems highlighted above, Ebonyi State government should establish an agency, separately from the ministry of health and empower the agency financially to administer and fund ICT equipment and personnel in government hospitals. The agency will also oversee the deployment of ICT at various levels of the state health institutions. from state hospitals to rural clinics. Finally, the state government should adhere to the solutions suggested above as a good strategy to redress this ugly incidence in the Nursing profession in the state.

REFERENCES

Adomi, E.(2005). Mobile Telephoning in Nigeria, *Library Hi Tech News*, emerald Group Publishing Limited, Volume 22(4) pp.2-3

Ajuwon G. A. (2003). Computer and Internet use by First year Clinical & Nursing Students in a Nigerian Teaching Hospital, *Journal of Medical informatics & Decision Making*, Volume 3(1) pp.10-15

Anja M.(2002). Information System Development in Developing Countries, *Risk management and Sustainability Analysis in Nigeria Software Companies*. In Seppo Puuronen(eds.), Department of Computer Science and Information Systems, University of Jyvaskyla, Marja-Leena Tynkkynen and pekka Olsbo pp.27-54.

Braa, J. B & Nermunkh C. (2000). *Health Information System in Mongolia; a difficult process of change* Inc C. Avgeuru & G. Walsham (Eds.) Information Technology in Context, perspective from developing countries, UK, Ashgate.

Borzekowski, R. (2002): Measuring the Cost Impact of Hospital Information Systems, The Federal Reserve Board, Finance and Economics Discussion series, September, NW Washington, DC 20551

Clark J. (2006). *The Impact of ICT on Health, Healthcare and Nursing in the next 20 years* [online]. Available from http://etdevents.connectingforhealth.nhs.uk/eventmanager/uploads [Accessed 15 Aug 2007]

Nwachuku, M.A.(1994). Development of Information Technology in Nigeria. In Drew, E.P & Foster, F. G. (eds) Information Technology in Selected Countries.

Oak, M. R. (2007). A Review on Barriers to Implementing Health Informatics in Developing Countries, *Journal of Health Informatics in Developing Countries*, Volume 1(1), 2007.

O'Carroll, P. W.; Yasnoff, W. A., Ward M. E.; Ripp, L. H.; Martin, E. L.(eds.). *Public Health Informatics and Information Systems*, Springer.

Peter Idowua Dan Cornfordb and Lucy Bastinc (Vol.2 • No.1 • Jan 08)Health informatics deployment in Nigeria

Remlex D. (2007). Information and Communication Technology in Chronic Disease care. *Medical Care Research and Review*. 64(2). P.123-147