

E-Health in Biomedical for Sustainable Development-Its Role and Challenges in Bayelsa State, Nigeria

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Abstract This report is taken a broader look at electronic health (E- health) in biomedical, its importance and challenges of adopting this system in biomedical profession in Bayelsa State. Great strides are being made to improve healthcare services through the use of ICT (Information and Communication Technology). One of the most promising ICT development project is the e- health which involves the store and forward system; the tele-medicine system video conferencing and the real time tele-medicine system (Rodrigue 2011). ICT has transformed the ways modern healthcare system acquire, store, access and communicate medical information. These developments offer significant benefits to patients and healthcare providers, though it gives rise to ethical and legal challenges in the protection of patient privacy and confidentiality (Chin 2003) ICT tools can lead to higher quality of healthcare delivery, increased patient safety and better risk management in health services and health care in Bayelsa State. The traditional and humanistic concept of doctor-patient relationship is under threat as this system is used to bypass the need for personal consultations, for patients may not have the opportunity to explain to the doctors or the healthcare providers (Rodrigue 2011). An effective approach in the use of (electronic health) ICT for advancement in biomedical world is the proper training of medical specialists to set up and manage the system, also setting public standards for accessibility and expression of patient autonomy. This ensures its effectiveness and safety for sustainable development.

Keywords: Biomedical, Patient safety, ICT, health care providers.

Introduction

Electronic health is based on Information and Communication Technology. These two terms e –health and ICT (Information and Communication Technology) are synonyms. ICT is a tool of expression, the competence of healthcare workers such as medical doctors, nurses medical Laboratory scientist, radiologist in modern healthcare. ICT has become well assimilated into healthcare delivery system that few doctors can imagine a day without using the computer or the network: prevention of disease and injury, promotion and maintenance of health, relief of pain and suffering, care and cure of those with malady, avoidance of premature death, and pursuit of a peaceful death (Hasting Center Report 1996).

Another benefit of ICT in medicine is in aspect of intra-organizational communication as mostly interpersonal. Synchronous interruptive communication is recognized as a primary source of inefficiency and error in healthcare, but there is much potential for information. Another important benefit of ICT in biomedical profession is that information about patient can be easily read by healthcare providers through the computer, the information is always available, cannot be lost or left sitting on a desk. The information is available to users in different locations, such as doctor in clinic, nurse in ward or radiologist in x-ray department. For record keeping, this can be explained in terms of patient laboratory or any clinical test results in the hospital can be added to patient's record as soon as the test result is complete and ready, and this will be available immediately to the doctor, or any healthcare provider.

Another vital benefit is ICT can be used to perform life saving operation via robots (Jack 2011); For example if someone had a bad heart condition and needed a vital operation and the health professional was

unable to perform it then a robot could perform the operation by the commands of another surgeon elsewhere. ICT enables hospitals to experiment with smart cards which the patient keeps with them and contains all of their medical records, these cards will have to be taken every time they visit a doctor, dentist, pharmacists or hospital. The smart card can store a complete medical history and can be updated at the end of each visit.

Information and communication technology (ICT) in biomedical profession is a system that provides timely information that can save lives, improve the quality and efficiency of the health delivery system and contain the cost. ICT systems help in the acquisition and storage of electronic medical records, and the accessibility and rapid transmission of healthcare information over the internet. ICT system in biomedical helps diagnosis and treatment of patient faster, for example e-health system such as the store and forward system works like this if a patient is diagnosed and necessary tests are conducted on him or her in one hospital, the results of these tests can be sent via this store and forwarded system to the referral doctor in another hospital and this doctor can then examine the test results and propose the treatment via the same route (Rodrigue 2011). Through ICT the issue of the Journal showcases two essays by authors is made possible (Beredjikian 2001).

E-health in biomedical field can involve the use of real-time system that monitor patients in hospital (outside intensive care in order to provide early warning of health deterioration and the use of mobile phone based telehealth can be used to improve the management long-term conditions of patient of diabetes, asthma, and hypertension. Another benefit of e-health in biomedical signal processing is that it helps vital signs of patient to be monitored using multi-parameter patient monitor system. Within the hospital acutely ill patients routinely have their vital signs continuously recorded by multi-parameter patient monitor. Statistical techniques are used to learn a description of normality in multi-parameter space and abnormalities are subsequently identified by testing for novelty against this description. This can then trigger the intervention of a medical emergency or critical outreach team when the patient begins to deteriorate.

The real-time system of analysis of patient data is enabling personalized healthcare for people with long term conditions such as asthma and diabetes and will change the way acute patients are managed in hospital. Mobile technology and new methods of communicating information are playing an important role in self-management of long-term conditions. E-health in biomedical field helps bring together the views of leading researchers and biomedical professionals, practitioners from around the globe from a series of high level discussions and workshops.

Role of E-Health in Promoting Biomedical Profession

E-health system in biomedical are very vital in this profession in promoting effective healthcare delivery for example the store and forward system can be used to diagnosis a patient, necessary tests are conducted and the results can be sent via the system to the referral doctor in another hospital within or outside of that country for treatment. It improves biomedical research and proper treatment in the world of medicine, these include providing access to scientific resources, improving quality of healthcare services with respect to current information in microbial infection, antibiotics and chemotherapy, academic improvement of potential scientist in biomedical field, including hospital workers. ICT also helps medical healthcare providers have broad knowledge in biomedical research, and the ability to change from an old traditional methods of treatment to an automated and interesting one which eventually leads to effective treatment of any microbial infection or medical complication. ICT is capable of transmitting large amounts of data in very short time intervals, and of by-passing the conventional physical barriers and safeguards, certainly heightens public anxiety (JCAHO 2000). The use of ICT in biomedical field brings about rapid communication and efficient data analysis.

Limitation or Challenges of E - Health in Biomedical Field

Majority of medical healthcare providers are wallowing in their traditional method of diagnosis and treatment including research on how to know the new emergence disease globally, they are not ICT compliant, and this becomes a herculean task to access this information. Medical or biomedical professionals such as pharmacist, science courses lecturers, medical doctor, nurse, medical laboratory scientist: if these categories fail to acquire the skill, it will be difficult to be current and access information for the betterment of the patient, also difficult to inculcate the knowledge into potential scientists (students). If staff of medical healthcare are not trained, including the part time staff. Even some staff may be resistant or fearful of using ICT in hospitals, hence cannot access vital information.

Another challenge is most of the electronic health devices are computer based, there is a big danger that patients over rely on computer control equipment. This happened in America when radiation therapy machines accidentally gave patients overdoses of radiation, leading to 3 patients death (Denise 2011). If the computer network goes down , information is unavailable. This could be inconvenient or may even be life threatening. Unavailability or inadequate of ICTs infrastructure present another onerous challenge to the effective utilization of ICT in biomedical field , these include installing , maintaining and repairing including internet; this should be effective to ensure equality with the developed countries. This was stressed by Gyang (2008) that "Information and Communication Technology facilities particularly the internet is important in the access of valuable information. However, inequality of access of these facilities to Nigerians is a serious problem as computers telephone lines; satellite dishes etc necessary for internet connectivity are still not available in most parts of Nigeria districts.

Another limitation could be linked to lack of provision of computer in most tertiary institutions and installation of internet for browsing to have current understanding in biomedical field. Many healthcare workers do not have computers individually, even projectors and other digital electronics, and most of these electronic health machines such as CAT, MRI, are expensive to set up, even most hospitals cannot afford to install them in Nigeria. The hospital, laboratory scan centre especially teaching hospital are underfunded including the manpower, which affect procurement of automated scientific machines to carry out research, diagnosis, and treatment of patients respectively.

Another vital limitation to this system is through communication synchronously. This was stated by Marchetti et al., (2001) and Lavie et al., (2004) that synchronous communication in healthcare especially face to face interactions; interruption is unavoidable, this can have a negative impact on the working memory and performance of healthcare providers, interruption can lead to distraction and forgetfulness and leads to overload and errors. A maternity ward staff in an interruption - driven environment failed to enter patient data into an electronic medical record at appropriate times (Cooper et al., 2005). The failure to register patient data has a detrimental effect on the work of others who rely on documented date in their work process (Bates et al.,2003). Therefore , decreasing synchronous interactions and increasing asynchronous ones contribute a more efficient performance that can help improve organizational memory on the part of healthcare professionals thereby provides effective quality of healthcare.

On the internet you can find a wide variety of medical information which includes symptom diagnosis: this is for people who wish to identify their problem without consulting General Practitioners, Information about available treatments, support groups for people suffering from particular ailments, access to medical research and journals, information about side effects and expert systems to aid diagnosis. The challenge with these diagnostic web-sites at times is that they are not trustworthy, and this can lead to incorrect diagnosis and cause false complacency or anxiety (Timmermans et al., 2003).

High cost of using the electronic health in biomedical field on the side of the patients, transferring parts of the research and development cost back to patients may not be so unethical, but the cost can be distributed fairly among providers and users (patients): this is justifiable in terms of benefits to patients. If the usage of e -health in healthcare is not guided by medical goals and ethnics, for the public to be informed and be allowed

a say in its design, and cost to patients become prohibitively high; these eventually cause patients to decline in medical care.

Another major ethical conundrum in using e-health in biomedical is the inevitable increasing in the vulnerability of patients' privacy and confidentiality (Chin 2003). These have been deliberated upon by many researchers Yeo (2003) and Ng (2003) and in various other papers and position statements. All have expressed concerns at unprotected accessibility and potential abuse of confidential medical information via IT (JCAHO 2000); The Brudnick Centre (2003). In her paper, Yeo (2003) rightly pointed out that IT medicine, specifically telemedicine and cybermedicine, can result in ambiguous doctor-patient relationships. Healthcare professionals, especially doctors and nurses, are not trained nor tested in delivery healthcare, both diagnostics and therapeutics, over an electronic domain, medical judgement encompasses a complex interaction of facts, therefore it is difficult to expect even the most sophisticated of computing system to discharge these duties and provide a safe and reliable answer. Another vital challenge is the communication between physician and patients via e-mails lacks human touch, legally ambiguous and equally costly in terms of time and resources, and is fragile in terms of privacy and confidentiality (Beredjikian et al., 2001). Even system with audio-visual and real time capabilities such as teleconferencing also precludes sensory modalities such as sense of smell and touch, which can be vital in the assessment of patients. Most importantly, it erodes the humanistic nature of the doctor-patient interaction and deprives patients of the physician's healing touch, which can only be delivered through a person-to-person encounter. Also an unlimited access to one's own medical records (patients) without the proper professional guidance can be harmful to the patients themselves.

Conclusion

In this work, we critically analyzed the benefits and limitations of adopting electronic health in biomedical profession, getting literature from different scientific disciplines related to improving healthcare delivery through the Information and Communication Technology ICT(e-health), empirical studies show that the approach of fully adopting e-health in biomedical profession should be patient-centered as "service buyers" and be conscious of fundamental precepts of medical ethics in order to overcome the challenges posed by new inventions in order to preserve the ideals and aspirations of the profession and society.

At the end of the analysis, the study reached the conclusion that for effectiveness in electronic health in biomedical profession, healthcare providers should assert and impose their ethical standards and philosophy on the research and development (R & D) as well as design of IT system to be used in practice, so that the end product is consistent and relevant to the goals and philosophy of the medical profession. For example, the medical profession must insist and persuade medical IT companies to focus their R & D efforts beyond mere capacity, power and speed, but also on systems that are safe and more controllable from patient's perspectives. Recommendation should be adopted and applied improving.

Following from this model of e-health in biomedical field, Nigeria will experience medical sustainability and integration, thereby brings about peaceful co-existence and co-habitation among healthcare providers and receivers (patients) in Nigeria and the world in general. This automatically leads to the maintenance of good health as a tool for physical, mental, social, cultural and spiritual growth of individuals and their communities.

Recommendation

The government should ensure they provide ICT infrastructure and train all medical staff in the use of the software, this should include the part time staff in order to access vital information.

The government should invest massively in ICT infrastructure in hospitals, healthcare centers tertiary institutions (Universities, Polytechnics, and Colleges of Education for effective skill).

Medical healthcare providers, scientists, including science students should show more interest, remove

Another effective approach is to manage the utilization of ICT in medicine through the use of legislative and regulatory measures looking into legal reforms to enhance the privacy of health information. For example, empowering patients with rights to consent to disclosure, laws to limit disclosure when consent is absent, incorporating industry wide security protections and establishing a national data protection authority (Hodges et al., 1999).

References

- Beredjikian, P. K., D. J. Bozentka and J. Bernstein. 2001. "E-mail in clinical orthopaedic practice." Published In: *J Bone and Joint surgery* vol. 83 pp 615 -618 .
- Cooper R., S. Viller and J. Burmeister. 2005. Observations in a maternity ward : usability considerations for EHRS in an interrupt driven environment. [h#p://www.infenvi.itee.uq.edu.au/es/2004/publication/034_cooper.pdf](http://www.infenvi.itee.uq.edu.au/es/2004/publication/034_cooper.pdf)
- Jack. C. 2011. Benefits and Drawbacks of ICT in Medicine page 1-2.
- Joint Commission on Accreditation of Healthcare Organizations (JCAHO). 2000. Protection personal health information - overview of the challenges [online]. Available at: [h#p://www.Jcaho.org/pphi/6overview.htm](http://www.Jcaho.org/pphi/6overview.htm).
- Lavie N., A. Hirst, J.W. de Fockert and E. Viding. 2004."Load theory of selective attention and cognitive control." Published In: *J Exp Psycho Gen* vol. 133(3) pp 339 -354.
- Marchhetti D., G. Lanzola and M. Stefanelli. 2001. An AI-Based Approach to Support Communication in Health Care Organizatios. In: Qualini S, Barach P. and Andreassen editors. The 8th Conference on AI in Medicine in Europe; Cascaia, Portugal. Pp 384-394.
- Ng, E.S.T, 2003. Ethical dilemmans of healthcare delivery in the information technology age . Published In: *Singapore Med J* Vol.44 pp 145-148.
- Parker J. and E. Coiera. 2000. "Improving Clinical Communication: a view from psychology." Published In: *J Am Med In form Assoc* Vol.7 (5) pp 453-461.
- Rodrigue, R. 2011. Rwanda: Better Health Care By Using ICT in medicine. In : [h#p://allafrica.com/stories/printable/2009082804497.html](http://allafrica.com/stories/printable/2009082804497.html) pages 1-2.
- The Brudnick Centre . 2003. Information policy in the electronic information age: ethical, policy, and legal implications for the human services [online]. Available at: [h#p://www.violence.neu/info2.html](http://www.violence.neu/info2.html).
- The goal of medicine :Setting new priorities. 1996. Hasting Center Report, Special supplement. Nov -Dec.
- University of Oxford. 2011. Home - Biomedical Signal Processing and e - health, available in [h#p://www.ibme.ox.ac.uk/bsp](http://www.ibme.ox.ac.uk/bsp) page 1.
- Yeo, C.J.J. 2003. Ethical dilemmas of the practice of medicine in the information technology age. Published In: *Singapore Med J* Vol.4 pp 141-144.

