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When information technology meets healthcare in West Africa: a literature review

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Introduction: This paper presents the study and analysis of some articles that were selected according to their potential contributions to the introduction of information technology (IT) in the Healthcare industry in West Africa. A total of nineteen papers published in various journals were analysed after their titles and abstracts were reviewed.

Objective: The aim of this paper is to find out on how the introduction of information technology can transform the healthcare delivery in West Africa.

Methods: Keywords were used to select online articles that focus on the ways in which the use of information technology has improved or is yet to improve the provision of better healthcare in West Africa.

Results and Conclusions: Information technology has a very bright future for healthcare managers, practitioners and the industry as a whole in West Africa when all the known challenges either politically-based or economy-based are removed.

Keywords: Health Information Systems (HIS), Healthcare, Information Technology (IT), West Africa.

1 Introduction

Healthcare in Africa is faced many challenges that prevent its efficiency and effectiveness. Most of these problems are brought about by the fact that the African continent is still advancing in terms of modernity and informatics tools. These are specifically designed to assist those clinicians and healthcare professionals who provide the majority of patient care in non-academic medical settings. Such advancements could have a tremendous impact on improving healthcare quality as well Ogunyemi et al, (2010) [15]. One of the main impediments to proper healthcare in West Africa is lack of exposure to readily available healthcare information systems. This goes along with the fact that most of the population up to date is not educated and thus there is a lack of health care information about how they can improve their own health by receiving the proper healthcare delivery services.

Developing countries in Africa suffer from shortage of well-trained healthcare providers and brain drain of health professionals. According to Fraser and McGrath (2000) [9], there are approximately ten doctors per 100,000 people which may vary from country to country. In some countries in Sub-Saharan Africa (SSA) the healthcare workers serving the population are distant away from them. Others do not either have well-trained radiologist or out-dated X-ray, computer axial tomography (CAT), and magnetic

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resonance imaging (MRI) machines. SSA is simultaneously faced with a shortage of doctors and other professionals. Mbarika et al (2005) [13] after five years confirm that the continent has even fewer than 10 doctors per 100,000 people, and fourteen of its countries do not have a single radiologist, which is sad compared to the developed countries. People also lack access to up-to-date healthcare information due to poor roads and expensive Internet facilities in rural areas as well as scarce of library facilities in those areas.

This paper reviews current papers on Medical Informatics and IT in health care in order to:

- give an overview on some important solutions and current research projects in West Africa and
- describe a collection of most important specific requirements on IT-support for health care in West-Africa.

2 Materials Used

Articles that were selected were those that focused on the ways in which the use of modern technology has improved or is yet to improve the provision of better healthcare in West Africa. The articles were mostly restricted to OpenAccess Papers and have been written by scholars and have been peer reviewed because they are more likely to carry equally accurate information. Search engines such as Google scholar, Microsoft Academic and Yahoo searches were used to achieve a broad overview on related articles even if they are not referenced in PubMed. We wanted also to experiment literature review outside PubMed, which would have been a better source, because access to well-known international journals is limited especially in West African. Sites such as jstor.com that contain scholarly articles were also used with one article from MEDINFO.

Once the articles showed up on the search engines using keywords like health information systems, healthcare, information technology, electronic prescription, digital radiology, e-health and West Africa, their contents were carefully scrutinized to ensure that those with the most accurate information were selected. Priority was given mostly to those that were written within the past seven years. This is because topics that involve technology are quite sensitive given that technology changes rapidly in the current world.

3 Results

3.1 Communication Technology

The Internet has quickly found a way to navigate and penetrate Africa in the past few years. Currently, it is easily available in most, if not all parts of the continent, Benson (2011) [3]. This has enabled the people to access free information for example by online journals, books and articles that contain the information they are searching. These Internet services are also easier to use because they are much cheaper and readily available than the traditional ways of acquiring information. As long as one has good access to the Internet, everything else becomes almost if not absolutely free. SatelLife is one of the organizations that have taken advantage of the Internet availability in Africa to assist in alleviating their healthcare problems, Idowu, (2008) [11]

It is again noticed that the problem that is eating away proper healthcare in Africa is the lack of consistent and reliable channels of communication between patients, healthcare providers and any other healthcare stakeholders, Zurovac et al (2012) [21]. Therefore, the emergence and quick spread of mobile handsets may provide a long-term solution. Text messaging is one of the e-services that are likely to be used most on these gadgets. This is because they are easy to use, cheap and are available on all types of mobile phones and other mobile devices like the electronic tablets used in surveillance and in assisting the patients to be more consistent with treatment and seeking further treatment when required.

Additionally, how reproductive health workers are using information technology to perform their jobs is also analysed, Olatokun & Adeboyejo (2009) [16]. They have recently adopted video conferencing as a method of communication amongst themselves. E-mails are the most used electronic mode of communication among these practitioners because they find it cheap, quick, free and quite easy to use. Although through this means of communication, the parties involved are not able to interact on face to face or in real time, it has proven fundamental in the provision of information, especially when it is urgent, within a short time. Users normally praised ICT for having aided them in easy access to medical information. However, this sector still faces several challenges that can be blamed on economic and leadership problems, despite the people's willingness to embrace technology.

3.2 Digital Radiology

At large the African continent in general again suffers from inability to access to radiological assistance. A technology that plays a critical role in the management of many acute and chronic diseases and eliminates the need for film development and processing, being simpler to use, and enabling instant reporting via teleradiology. This, however, would be overcome through various projects like the Institute for Maternal and Child Health IRCCS Burlo Garofolo supporting the Hospital Divina Providencia (HDP) in Angola since 2001 serving a population of about 1 million, in the suburbs of Luanda, Zennaro, et al, (2013) [20]. Interventions like these will oversee the use of digital images, which may still be availed to less people because of its high costs involved. Laser film scanners, which are a little too costly, can be replaced by consumer image scanners, which may be more affordable, but may provide less than perfect images. Medical practitioners are therefore thinking about the option of taking x-rays and transmitting them by taking digital images of them for sending, Zurovac (2012) [21]. This may still prove a challenge when quality is being short, but can be effective when the medics that are handling these images are well trained and able to see through the imperfect pictures.

3.3 Electronic Prescription

With the introduction of technology in the healthcare services in West Africa products and service like the electronic prescription (e-prescription) could boost health delivery services. Such services enable improving the quality of the scripting process and reduce prescription errors and preventable adverse drug events. Above all, e-prescriptions are also easy to read and can thus be processed quickly by pharmacists, Cohen et al, (2013) [6]. The e-prescription would be instrumental in reducing the situation where patients become responsible for guarding the privacy of their prescription information while such information is in transit to the prescriber from the dispensing office. In addition, the inception of e-prescription would reduce the cost of drugs prescribed.

3.4 E-Health and Mobile Technology

Information systems, such as electronic health records (EHRs) and mobile phones and hand-held computers (also called m-health), can be of enormous value in providing health care in multiple settings. They can support a health worker performing clinician duties where there are no doctors and can help keep track of patients, Blaya et al, (2010) [4]. This initiative is geared towards the provision of medical tools and information to parts of countries where they are rather scarce. This could be done in collaboration with other health stakeholders in such countries such as the government, NGOs, and other private health agencies and is meant to improve access to better healthcare with technology, Korpela, (1994) [12].

The penetration of technology such as mobile phones has proven to be a good thing to the continent as it has been found fundamental in the delivery of quality this e-health care. These electronic devices have made it easier for medical practitioners to avail medical information and resources even in areas that are hit by serious shortage of qualified medical practitioners.

Pakenham-Walsh and Bukachi (2009) [18] recognize the impediments to proper healthcare that are brought about by illiteracy and lack of information regarding access and use of proper healthcare information. This problem is existent in the public and sadly, among health practitioners as well. These health practitioners are unable to correctly diagnose and provide correct treatment for many diseases. This means that the healthcare they are able to provide becomes insufficient and ineffective, thus the masses continue to perish under circumstances that may have otherwise been avoided. They therefore suggest that there is need for close attention to be given to provision of better education and training to this group of people to ensure that they are well equipped to provide the necessary healthcare.

3.5 General Information System

A study that analyses the changes that information systems have brought to the continent in relation to provision of better healthcare in West Africa has been undertaken. The study cites a study that revealed the significance of technology in the management of renal diseases, Clifford et al (2008) [5]. However, they state that it is important for more improvements to be made to these services to realize even better outcomes.

On the other hand Rotich et al (2003) [19] recognize the need to implement electronic patient records system in African hospitals, precisely those in the sub-Saharan section. This would go a long way to improve patient safety by ensuring that patient records are up to date, kept in safe modes, and much easier to access, thus improving the general quality of healthcare delivery in these countries.

Similarly, Odusote, K. et al, (2012) [14] echoed that the West African Health Organization (WAHO) is aimed at improving the population's access to quality health care by implementing a regional approach to strengthening human resources information system (HRIS). By this, WAHO works to improve health in the region by harmonizing policies and pooling resources of Economic Community of West African States (ECOWAS) member countries. Upon this, WAHO has coordinated a regional training on national health information systems given jointly by CapacityPlus's iHRIS team and two "sister" open source software projects, DHIS 2 and OpenMRS. DHIS 2 is the recognized global standard for open source disease surveillance and service statistics; while OpenMRS is the most widely-adopted open source medical records system in developing countries for better health care delivery.

This interoperability system allows for ease of communication among several branches of healthcare services delivery such as patient management, human resource management and laboratory test results et cetera. Eleven countries in West Africa are already rolling out this program, having already received the necessary training and attended workshops that aimed at improving the availability and efficiency of these systems.

Additionally, Pakenham-Walsh and Bukachi (2009) [18] analysed the needs of developing countries regarding health care delivery. The study opens that many health care workers have little or no access to basic, practical information in developing countries with attempts of information needs of primary and district health care providers. The study attributed this to several factors, including unequal distribution of Internet connectivity, and also a failure of international "information for development" policies and initiatives. However access to information is one of the main factors that should be looked into if these countries intend to have access to better healthcare delivery. Information technology has the potential to improving of healthcare delivery through better provision of information.

Acheampong (2012) [1] also recognizes the milestones that Ghana has undergone in the use of information technology in healthcare delivery and upholding the quality of life. This has been largely aided by the availability of cheap resources that facilitate projects geared towards improving efficiency of healthcare providers and exploitation of opportunities for improving healthcare. He however recognizes one of the major challenges to effective use of ICT in the health sector. This, he says is the scarcity of computers and Internet to those who are not wealthy.

4 Limitation

The biggest impediment that was met during this selection of publications was finding articles that exclusively talked about healthcare and technology in West Africa. Most of them were about the same topic but in the large sub Saharan Africa. Those that handled West Africa put too much emphasis on one country like Nigeria. This is a little misleading because they do not give us the true picture of the whole region as is required.

5 Conclusion

Health managers and practitioners in West Africa seem very willing to embrace ICT in service delivery. Unfortunately, the challenges that they are still facing are not solvable by them since they are political or economy based. Another problem that seems still far from a solution is illiteracy. It would be difficult for IT to be embraced and used effectively due to illiteracy. Poverty is the third major problem that may have to be dealt with before the region can truly enjoy the benefits of incorporating ICT into the healthcare system. This is because it makes it extremely difficult for the common people to have easy access to such technology that may aid them in acquisition of better health.

The most important lesson originates from the developments in adoption of national health information systems in most of these West African countries due to political instabilities and changes in government resulting from the practice of democracy.

Notwithstanding all these challenges, developed countries have seen rapid headway in health information technology despite the differences in architecture, infrastructure and facilities. It is and would therefore be useful for West African countries to unearth some valuable lessons especially those that are trying to gain full benefits of health information technology for the delivery of healthcare services.

In meeting the need to integrate trusted IT solutions with healthcare in West Africa for long-term patient quality and safety we propose the following requirements to include:

- the need for political and economic stability in these countries;
- the need for improved level of literacy;
- the need for workforce and its training needed to most effectively implement HIT systems;
- adherence to standards and interoperability, and concerns about privacy and confidentiality;
- to close the gap between of return on investment between those who pay and those who benefit from such services, Hersh and Wright, (2008) [10].

These requirements would likely lead to the provision of improved quality of care and reduction of associated risks of care like medication errors and delay in service provision with some amount of proof of associated savings of time or money.

In spite of the above requirements there have been a number of important IT health solutions in the African continent. Some of them worth knowing are:

- the Institute for Maternal and Child Health IRCCS Burlo Garofolo supporting the Hospital Divina Providencia (HDP) in Angola, Zennaro, (2013) [20],
- the 1998 teleradiology project connecting two secondary KwaZulu-Natal hospitals' radiography departments to a central Durban teaching hospital, Corr (1998) [7],
- the CellPhones4HIV in South Africa, Benjamin, (2010) [2] and
- The mPedigree Network, based in Ghana, lets people determine with a text message whether their medicine is legitimate. Talbot, (2013) [17]

6 Discussion

Emphasize the new and important aspects of the study and the conclusions that follow from them in the context of the totality of the best available evidence. Do not repeat in detail data or other information given in the Introduction or the Results section. For experimental studies, it is useful to begin the discussion by briefly summarizing the main findings, then explore possible mechanisms or explanations for these findings, compare and contrast the results with other relevant studies, state the limitations of the study, and explore the implications of the findings for future research and for clinical practice.

Link the conclusions with the goals of the study but avoid unqualified statements and conclusions not adequately supported by the data. In particular, avoid making statements on economic benefits and costs unless the manuscript includes the appropriate economic data and analyses. Avoid claiming priority or alluding to work that has not been completed. State new hypotheses when warranted, but label them clearly as such.

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