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Harnessing E-healthcare Technologies for Equitable Healthcare Delivery in Nigeria: The Way Forward

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Abstract: ***While the traditional model of healthcare, training and medical research in Nigeria had fairly served us well, adaptation is needed in the 21st century to accommodate the ever-increasing demand for health care and the growing population. Though right to affordable healthcare and medical facilities is provided by our local laws, however, it remains a dream as some of those provisions are non-justiciable. Over the last decade the Nigerian society has become increasingly dependent on technological advancement following the growth in the spread of Computing ,Information communications technology, and Mobile devices(CIM). CIM has recorded unprecedented heights permeating and revolutionizing the various areas of human endeavour and social relations leading to what may be called an e-society the result of which is highly delineated social boundaries making distance a matter of personal interpretation. Having regard to the potentials of CIM, this paper discusses the right of the citizenry to healthcare, the place of, merits, and problems of e-healthcare in public healthcare delivery in Nigeria. Our aim is to expose the potentials of CIM, and how it could be made to contribute significantly towards solving the myriad of problems facing effective healthcare in Nigeria. We adopted a descriptive desk approach using standard databases on healthcare, legislations, relevant public documents from public health authorities in Nigeria, and experiential knowledge on CIM to put forward a simple objective solution. Our solution is greatly hinged on the government's political will to implement an e-healthcare infrastructure through the creation of an implementable policy document.***

Keywords: e-healthcare, equity, computing, mobile devices**.**

1. Introduction

The issue of new horizon is about change. While our traditional model of health care, training and medical research had fairly served us well, adaptation is needed in the 21st century. It is common knowledge that over the last three decades that the society has become increasingly dependent on technological advancement in the area of computing, information communications technology, and mobile devices(CIM). These technologies put together had recorded unprecedented heights permeating and revolutionizing the various areas of human endeavour and social relations leading to what may be called an *e-society* the result of which is highly delineated social boundaries transforming the world to a global village and making distance a matter of personal interpretation. In the domain of healthcare, the traditional model is often fragmented which due to its mode of information acquisition and sharing has a very limited time frame. Due to the increasing demand being placed on providers of healthcare services at all levels to deliver effective and equitable healthcare to the citizenry services especially across the public healthcare domain, the need for integration of e-healthcare technologies has thus become a necessity. It is interesting to note that modern healthcare delivery is now a composite of the technology of care and the financial arrangements accompanying the organization and delivery of care. No doubt CIM precisely fits into the technology component.

2. Right of the Citizenry to Medical and Healthcare Facilities

Before clamouring for equitable access to public healthcare in Nigeria, it is important that the average citizen knows whether or not s/he does have a legal right to such provision. Interestingly, international and local laws do provide clues that could enable us reach a reasonable conclusion in that respect.

The Universal Declaration on Human Rights [1], provides "that everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control". The right to health is provided in the International Covenant on Economic, Social and Cultural Rights (ICESCR) as follows: "*The State Parties to the present Covenant recognize the right of everyone to the enjoyment of the highest attainable standard of physical and mental health* [2]". Nigeria is a signatory to this covenant. In a similar vein, the Charter on Human and Peoples Rights [3] provides that: "Every individual shall have the right to enjoy the best attainable state of physical and mental health."

Other international covenants which affirm the right to health include [4];[5]; ILO[6]; the International Convention on the Elimination of all Forms of Racial Discrimination, the European Social Charter[7]; the Charter of Fundamental Rights of the European Union[8]; the American Convention on Human Rights[9];the American Declaration of the Rights and Duties of Man; the Protocol of San Salvador[10], etc.

The concept of human right to health did not develop until after the Second World War when the World Health Organization (WHO), a specialized agency of the United Nations was inaugurated in 1948. Several bodies have adopted numerous resolutions affirming and reaffirming the right to health [11]. Thereafter, several other documents have provisions relating to the right to health, more significantly, in the ICESCR.

Regarding the applicability of these treaties and conventions within domestic framework, it is significant to note that with the exception of the African Charter on Human and People"s rights, which has been incorporated into domestic legal order, no other treaty bearing on the right to health has direct application in Nigeria. Like most common law countries, Nigeria adopts a dualist approach in receiving international law; meaning that notwithstanding ratification, treaties acquire legal force only upon enactment by the National Assembly. That is, domestication of an international treaty is a necessary condition for the application of the treaty in the country. The right to health is contained in some 60 national constitutions [12].

Locally, the right of the citizenry to healthcare in Nigeria is also clearly captured by the Constitution as well as other legislations. The Constitution of the Federal Republic of Nigeria 1999[as amended][13] provides: "that the State shall direct policy towards ensuring that there are adequate medical and health facilities for all persons". Though this chapter of the Constitution being the Fundamental Objectives of government has been rendered non-justiciable by virtue of Section 6(6)(c) of same Constitution and affirmed in the landmark case of Archbishop Anthony Olubunmi Okogie & others v. Attorney General of Lagos State[14] relief is found in Section 13 of same Constitution which clearly provides: "*It shall be the duty and responsibility of all the organs of government, and of all the authorities and persons, exercising legislative, executive, and judicial powers, to conform to, observe and apply the provisions of this chapter of the Constitution*". This provision is to the effect that the Government of the day may be judged in the eyes of its citizenry by simple reference to its achievements regarding the fundamental objectives made in Chapter 2 of the Constitution. Buttressing this assertion is the provision in Section 14(2)(b) which is to the effect that security and welfare shall be the purpose of government. Welfare of the citizenry is paramount and thus forms the essence of government without which the government cannot justify its existence.

Agreeably, welfare is a very broad term and before every rational member of the society it is impossible to assume an average state of public welfare in the society without reference to the health of the population in question.

3. Problems of Public healthcare in Nigeria

The problems of public healthcare in Nigeria are so obvious that a deaf and dumb person on the street can narrate the problems without any effort or need of inquiry from the authorities. The problems have metamorphosed into a gigantic monster that it would take enormous political will and resources to tackle it. The problems range from poor funding, poor maintenance culture, corruption, poor medical facilities, inadequate trained manpower leading to existing workers working under pressure to attend to long queues of patients, inadequate facilities, use of substandard drugs, lack of supervision, etc. A visit to a public health facility in Nigeria often leaves a negative impression to the first-time visitor seeking for healthcare services. The long waiting lines in the primary and secondary tertiary health facilities are often alarming and disheartening. Though the lack of basic drugs and medical supplies are blamed on the poor funding from the Government, it has been shown that lack of logistic management skills also contribute to the frequent stock outs of drugs and consumable supplies. The high demand for medical attention amidst the dwindling manpower and health supplies often result to unrealistic expectations as the available personnel must work under pressure the effect of what generally manifests as high rate of misdiagnosed cases some of which may be grave. Due to the insufficient skilled manpower, there is internal and external supervision crisis that culminates into professional negligence, increased risk of adverse events arising from treatment errors. A treatment error is a preventable adverse effect of care, whether or not it is evident or harmful to the patient. This might include an inaccurate or incomplete diagnosis or treatment of a disease, injury, syndrome, behaviour, infection, or other ailment. A 2016 study of the number of deaths that were a result of medical error in the U.S. placed the yearly death rate in the U.S. alone at 251,454 deaths [15]. An adverse event is an injury caused by medical management rather than the underlying condition of the patient. An adverse event attributable to error is a "preventable adverse event"[16]. Negligent adverse events represent a subset of preventable adverse events that satisfy legal criteria used in determining negligence (i.e., whether the care provided failed to meet the standard of care reasonably expected of an average physician qualified to take care of the patient in question).

3.1 Health Information System in Nigeria

The latest National Health policy is Nigeria is the National health promotion Policy 2016 which has guidelines in creating positive outcomes in the area of empowerment of health activities and increase community involvement. With regard to Information and communications technology (ICT) and its impact on the realization of its healthcare objectives, the Federal Ministry of Health (FMoH) created an ICT department which it saddled with the following responsibilities:

- Managing and operating IT venture for FMoH and provide linkages with the Ministry"s Agencies and parastatals.
- Support the health sector electronically through digitizing and automating the various healthcare processes and providing solid infrastructure;
- Provide technical support for solutions that facilitates efficiency and common processes for staff;
- Liaise with the Federal ministry of Communication Technology, Federal Ministry of Science and Technology, Office of the Head of Service of the Federation, and National Information Technology Development Agency in the formulation of policies.

The Federal Government before the review of the policy in 2016 had established the National Health Management Information System (HMIS). Analysis conducted on the progress of the system shows that:

- There is no significant integration due to emergence of vertical programmes;
- Quality of data cannot be ascertained;

- Poor facility;
- Variation in the value of indicators from data sources;
- No operational research activities.

From the foregoing, it is obvious that the development and beneficial use of CIM in Nigeria is yet to receive any nod from the government.

4. Concept of E-healthcare

Generally, e-Health or e-Healthcare is a complex term that involves the use of information and communications technologies in healthcare delivery. The debate over the scope and meaning of e-health or e-healthcare is still ongoing arising primarily from the expansive domain of healthcare often involving several interrelated areas of specialization which may be driven by a wide range of information and communication technologies. For example, Medical Laboratory Science, Medicine, Surgery, Radiography, Optometry, Nursing, Physiotherapy, Public Health, etc. are all areas of healthcare which may be driven and supported by Computer and Information Communication Technologies including smart mobile devices. Specialized communications software or hardware deployed to aid a surgeon in performing surgical operations may not be useful to a medical laboratory scientist while carrying out laboratory analysis on a test specimen and vice versa. Healthcare covers a large area, and this is a major reason why the contest among digital health industry experts may continue indefinitely, however, prior to dissecting the term e-health, we would consider the definition given by some authorities.

The World Health Organization (WHO) defines E-health "as the transfer of health resources and health care by electronic means" [17]. Figure 1 is a schematic representation of an e-healthcare system. It encompasses three main areas:

- The delivery of health information, for health professionals and health consumers, through the Internet and telecommunications.
- Using the power of IT and e-commerce to improve public health services, e.g. through the education and training of health workers.
- The use of e-commerce and e-business practices in health systems management.

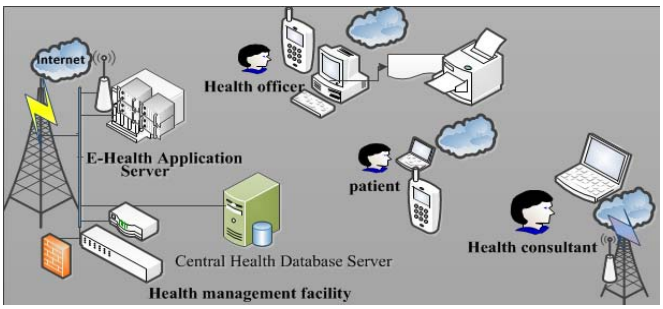

Figure 1: A simple E-healthcare model

The Journal of Medical Internet Research[18] defines eHealth "as an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies". In a similar vein, the European Commission defines eHealth as "an overarching term for the range of tools based on modern information and communication technologies used to assist and enhance the prevention, diagnosis, treatment, monitoring, and management of health and lifestyle".

There is no doubt that E-health could be used in broad and narrow perspectives. In a broad sense, it encompasses both technology and a set of ideologies created to enthrone continuous and effective healthcare beyond boundaries defined by a geographical space. This stems from the widely agreed fact that the world has become a global village hence global thinking and collaboration should form the ultimate direction in approaching traditional issues such as healthcare. In a narrower perspective, eHealth care is any healthcare delivery process driven by the use of one or more electronic information-based technologies such as: computer systems, embedded systems, expert systems, internet technologies, etc. We consider the above definition appropriate particularly when the term "e-healthcare" is dissected into its atomic components *'e'* and *health*. Unarguably, *e* implies *electronic* and can take a cue from other commonly used technologies such as: e-banking, e-commerce, e-marketing, etc. The list is endless.

4.1 Why e-health?

E-healthcare is an evolving area with tremendous prospects. Some of the merits of E-healthcare include: improved quality of care, efficiency, effectiveness, simplicity, evidenced-based care, educative, etc. We shall discuss some of these features.

Efficiency
E-health has the potential of increasing efficiency in health care delivery by decreasing costs through the elimination of duplicative or unnecessary diagnostic or therapeutic interventions, through enhanced communication possibilities between healthcare organization and prospective patient.

Equity
Health inequity is a major problem in Nigeria. Thousands of people in remote local areas do not have access to affordable healthcare as most sophisticated health facilities are located in urban areas hence those living in urban areas are likely to have access to the best medicare available. For instance, majority of the secondary and tertiary health institutions are located in urban(think about the spread off facilities in Abuja, Lagos, Kaduna, PorHarcourt, etc. as against the one useless facility in my remote local government area in Abia State) and semi-urban areas. As millions of persons seeking medical care in Nigeria are constrained by scarce resources, consulting healthcare experts in those urban locations has become the sole preserve of those who have the means. E-healthcare will contribute immensely towards promoting equity in healthcare as the use of computers and smart devices continue to grow among the citizenry.

Extending the scope of care
The traditional healthcare model is based on visits to a health facility where the patient meets with the various healthcare personnel. The process of care follows a

predetermined sequence of actions depending on the condition of the patient. Diagnosis and treatment which form the crux of healthcare, is usually based on physical presence of the presence at the point of care and the application physical skills, procedures and knowledge of the healthcare practitioner(s)". However, e-healthcare extends the horizon of care in both geographical and conceptual sense. E-health enables patients to easily obtain health services from a stream of online providers. These services can range from simple advice to more complex interventions and prescriptions. For instance, in Nigeria, simple digital diagnostic devices are becoming increasingly available and care is no longer restricted to the traditional routine of physical consultations as e-healthcare can provide patients with sufficient information on how to use these simple devices to detect anomalies in the body such as such as increase in blood pressure, blood sugar levels, cholesterols levels, malaria, typhoid, etc. Patients or their associates can feed the results of these tests to online e-health portals to specialists irrespective of location, who would act on these results to effect appropriate prescriptions.

Integration and Effectiveness

E-healthcare does not suffer from the often disheartening problem of fragmentation that dominates the conventional model of healthcare delivery where every professional in the delivery chain is in a state of disconnectedness. A large number of health providers can constitute a healthcare delivery team to render effective service through consistent exchange of information. The use of online integrated intelligent healthcare delivery portals often reduces errors in medical diagnosis and treatment by providing large knowledge base across the various areas of specialization. "Misdiagnosis has often resulted to the deaths of hundreds of thousands of patients"[19]. According to the United States National Centre for Policy Analysis(NCPA), "Misdiagnosis by physicians is a serious and common occurrence in the health industry. The repercussions of a misdiagnosis can damage a patient's health and cost money, or even a life"[19].

The NCPA has noted that "While diagnostic errors are the leading cause of malpractice litigation, the vast majority of errors do not result in **legal action**. Because many go unreported, it is difficult to gather detailed data on how prevalent misdiagnosis is. A recent study on the Veterans Administration hospital system in Texas estimated that there are at least 500,000 missed diagnostic opportunities that occur out of the 500 million primary care visits that occur annually in the United States". A survey [20] found that 96 percent of physicians felt that diagnostic errors are preventable while half said they encountered at least one per month. "Despite these statistics, many doctors are reluctant to report diagnostic errors, even anonymously, despite the likelihood of moderate to severe harm on the patient"[20].

A report by the Health and Medicine Division (formerly called Institute of medicine) estimated preventable deaths as high as 98,000 people and 1,000,000 excess injuries each year from medical errors in U.S hospitals alone. That constitutes more fatalities than from any other source of death. Errors are seldom caused by carelessness or lack of effort. 95% of errors in medical care are "system errors", meaning that they are characteristics of equipment, procedures, job designs, or communication systems used in medical care. Medication errors alone make up a large percentage of common avoidable problems. Errors can be prevented by designing and implementing systems that make error-prone procedures difficult and appropriate clinical methods easier to achieve. This requires the development of effective systems at the level of direct patient care. Clinical software system is one of these "systems" and provides a number of tools, reminders, and system checks that can help professionals reduce errors. Clinical information systems would readily boost such processes like patient monitoring and assistance, routine diagnosis and treatment, surgery, path physiological modeling, electrocardiogram and electroencephalogram analysis, laboratory results management, etc.

Quality enhancement

Increasing efficiency involves not only reducing costs, but at the same time improving quality. E-health may enhance the quality of health care for example by allowing comparisons between different providers, involving consumers as additional power for quality assurance, and directing patient streams to the best quality providers.

Simplicity

E-healthcare simplifies complex processes involved in routine healthcare which are not attractive. The possibility of having many communication devices connected together as single, cohesive system help close the gap in patient care management. Not only does the patient benefit, the health workers also benefit from the arrangement as there could be an easy collaboration among experts at different geographical locations. This often promotes efficiency and productivity. The ease of integration of quality telehealth with existing patient portal applications makes it very attractive. Prospective patients at remote locations can use their communication gadgets, such as smart phones, tablets, computers, and video devices to connect to the health provider"s portal to make enquiries, book appointments, get the results of some vital laboratory tests, etc.

Evidence based

E-health interventions should be evidence-based in a sense that their effectiveness and efficiency should not be assumed but proven by rigorous scientific evaluation. Much work still has to be done in this area.

Increased survival rates

Communication is sine qua non in the business of saving lives. Through e-healthcare, patients under critical conditions who are remotely located or whose conditions may not allow them to be taken to a health facility located at a distance could be attended to by experts who would provide directives regarding what to do to handle the emergency situation pending when expert assistance is gotten.

Empowerment of consumers and patients

By making the knowledge bases of medicine and personal electronic records accessible to consumers over the Internet,

e-health opens new avenues for patient-centered medicine, and enables evidence-based patient choice.

Education
Like other professional areas, continuous education is mandatory among various learned professional and regulatory bodies. The same is true for healthcare professionals such as nurses, physicians, radiographers, etc. consumers also benefit from health education particularly that tailored towards preventive healthcare. Health researchers and students will also find it easier to learn from integrated health portals that contain large documentation and videos of diagnostic and clinical procedures.

Standardized information exchange
For a sound e-health programme, there must be standardized way of exchanging information between health care establishments and professionals.

4.2 Domain of e-healthcare

E-healthcare is a broad domain that encompasses different electronic systems and means through which healthcare may be procured or supported. The scope may be dependent on the perspective of the researcher or author. We have identified the following areas:

- Electronic Health Information Systems (EHIS)
- Big data systems
- CyberMedicine
- Electronic Medical Records (EMR)
- TeleHealth
- Telemedicine
- Health IT systems
- Consumer health IT
- Virtual healthcare
- Mobile Health (m-Health)
- Health analytics

However, an in-depth discussion of each of these areas is beyond the scope of this paper. Each area identified above may overlap with another area. What is important is the purpose and function of the area in question. E-health provides a new method for using health resources - such as information, money, and medicines - and in time should help to improve efficient use of these resources. The Internet also provides a new medium for information dissemination, and for interaction and collaboration among institutions, health professionals, health providers and the public.

4.3 Barriers to implementing effective E-health

Implementation of e-healthcare is often stagnated by a myriad of contending often cumulative factors. We may group these challenges into technological, ethical, economic, sociocultural, legal, and governance.

Technological factors
Access to the required technology is a major issue for implementing e-health, as in all information communication technology-based projects. Most healthcare organizations often use any technology at their disposable to do the implementation. The outcome is a poorly integrated solution which is often not compatible with standard healthcare applications. Some resort to implementing e-health solutions using siloed consumer-grade infrastructure. This is probably a result of poor selection of technologies and/or use of contractors who do not possess sufficient skillset needed to implement such projects. A poorly designed e-health system would definitely add complexity e.g. poor video quality, fractured workflows, questionable security, and too-long wait times (for physician-initiated calls), etc. These outcomes are unsatisfactory experiences that tend to defeat the very mission of e-health.

One of the missions of e-health is to support extended care that goes beyond telehealth/telemedicine, that is, an e-healthcare platform is expected to be a collaboration platform for health practitioners that would transform the clinical care experience by unifying communication infrastructure components, simplify care workflows, and empower high-quality interactive visual communications. But this expectation is often difficult to come by especially where there are no specific technologies that rightly fits into the realm of care as described.

Ethical challenges
E-healthcare is a new system or channel of healthcare with a different ideology. It involves new forms of patient-physician interaction and poses new challenges and threats to ethical issues such as online professional practice, informed consent, privacy and equity issues.

Economic issues
The costs of technology acquisition, maintenance, human capacity training, integration etc. are neither controlled by the healthcare providers nor may the patients hence may be economically out of reach depending on the scope of e-health system that an organization wishes to implement.

Socio-cultural factors
Nigeria is quite a world of its own considering its heterogeneity evidenced by the presence of over 200 ethnic nationalities with diverse beliefs, customs, ideologies, organization, practices and behaviour. These factors cannot be overlooked as they are vital to the implementation of a public regional or national e-health delivery system.

Legal
Implementation of e-health as an integral part of the whole healthcare delivery system requires vibrant and dynamic legal frameworks owing to the rapid changes that are associated with advancements in technology. Dynamism here is stressed because it would be difficult for any health personnel to go extra mile in providing care without the necessary assurance that he/she is protected by the law. The laws in this regard must be dynamic and enforceable to the effect that its provisions must take cognizance of the rapid rate of technology advancement so as to include appropriate clauses that would cover such developments. For instance, compact electronic devices are legally used for diagnosis and treatment because the law provides for such, the question is: “whether or not it would be lawful under the same clinical circumstances for a health facility or personnel to deploy an intelligent robot to extend the function of

diagnosis and treatment and whether or not the health personnel or facility would be held liable if there is a failure leading to death or incapacitation of the patient under the care of such a robot? The legal framework backing the provision of care through the e-technologies needs to make very clear provisions on the boundaries of e-healthcare.

Governance

An e-healthcare system is a deviation from the traditional model of healthcare hence may be associated with the problems of strategic alignment, resistance to change in the assignment of roles and responsibilities, accountability and organizational control.

5. Conclusion

An e-health programme is not a "one sector" affair and adopting such a stand would often lead to programme failure. Like any other programme, implementation of a vibrant e-health programme has its challenges the majority of which we have identified in this paper. A thorough analysis of all these prevailing factors would show that no single factor can frustrate any government‟s political will and commitment to implement an e-healthcare programme. That notwithstanding, there are many actors which must be identified and consulted while planning an implementation of a national e-health programme. Nigeria is blessed with skilled human resources in relevant areas such as Computing, Telecommunications, Health care, social psychology, etc. We believe that the Nigerian problem can always be better handled by Nigerians and on the strength of that belief, we conclude that the implementation of a public e-healthcare programme would work where all key stakeholders are carefully involved. For a successful national e-health programme in Nigeria, we advocate among other things, a special panel or committee on e-healthcare to be chaired by FMoH, and comprising representatives from the following agencies be set up by the Federal Government:

- Nigeria computer society
- National Information Technology Development Agency
- Ministry of Health
- Nigeria communications commission
- Telecommunications companies
- Institute of Software Practitioners of Nigeria
- Federal ministry of health
- Nigeria Law review commission

The mission of this committee would be to produce an e-health policy blueprint that clearly defines what needs to be implemented under e-healthcare and what would constitute acceptable standard for any system implemented to undertake e-healthcare. Where a national e-health system is agreed upon, the modalities must be clearly documented. The modalities should include: funding, governance, how the government and private health sector are to participate, scope of care, etc.

References

[1] The Universal Declaration of Human Rights, 1948
[2] Article 12 (1), International Covenant on Economic, Social and Cultural Rights, United Nations General Assembly, 1966
[3] African Charter on Human and Peoples Rights, 1981
[4] Alma Ata adopted at the International Conference on Primary Health Care,1978
[5] Convention on the Elimination of All Forms of Racial Discrimination, 1965
[6] International Labour Organization No 169
[7] Article 11, European Social Charter, 1961
[8] Article 2 and Article 35 of the Charter of Fundamental Rights of the European Union, 2000
[9] Article 4 of the American Convention on Human Rights, 1969
[10] Article 10 of the Protocol of San Salvador
[11] The World Health Assembly, Human Rights WHA Resolution 23.41, May 1970
[12] O. Schechter, "International Law in Theory and Practice. General Course in Public International Law", 1982
[13] Chapter 2 Section 17 (3) (d) of the Constitution of the Federal Republic of Nigeria 1999[as amended]
[14] Okogie v. Attorney General of Lagos State (1981) 1 NCLR 105
[15] F. Marcia, "Medical Error Is Third Leading Cause of Death in US Marcia Frellick", Medscape, 2016.
[16] A.B. Troyen, L.L. Lucian, L.M. Nan et al., "Incidence of adverse events and negligence in hospitalized patients: Results of the Harvard Medical Practice Study", New England Journal Med, Volume 324,pp 370–376
[17] E-health, Trade, Foreign policy, Diplomacy and Health, http://www.who.int/trade/glossary/story021/en/
[18] E. Gunther, "What is eHealth"[online]. http://www.jmir.org/2001/2/e20/, [Accessed: 20 June 2016]
[19] "Physicians misdiagnosis at an alarming rate" [online], http://www.ncpa.org/sub/dpd/index.php?Article_ID=23148, [Accessed 10 June 2016]
[20] "Doctors' Diagnostic Errors Are Often Not Mentioned But Can Take a Serious Toll," Kaiser Health News[online], May 6, 2013,http://khn.org/news/doctor-errors-misdiagnosis-more-common-than-known-serious-impact/, [Accessed 12 May 2016]

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