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Assessment of Present Health Status in Bangladesh and the Applicability of E-health in Healthcare Services: A Survey of Patients' Expectation toward E-health

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Abstract Health is the most important aspect for economic sustainability of a country. Bangladesh is facing a lot of challenges in quality healthcare management. The recent advances in information and communication technologies (ICT) could play vital role in improving healthcare services and reaching them to the doorstep of the marginalized people. This research aims to evaluate the present health status of the country and explores the applicability of e-Health as well as the challenges and issues of electronic healthcare development. This study has conducted a survey on patient's views and expectations toward e-Health for quality healthcare management. The survey was conducted in some selected rural and urban hospitals/clinics in the light of effective adoption of ICT in eHealth services. This research would be useful to improve the access, effectiveness and quality of health services utilized by healthcare organizations, doctors, patients, and consumers in an effort to pick up the health status of patients and to face the emergency situations in some cases. Finally, a set of guidelines has been provided to aid the implementation of a successful electronic healthcare system.

Keywords e-Health, ICT, Electronic Health Records

1. Introduction

Electronic Health or e-Health is an emerging field of health informatics, which refers to the delivery of health services and information by using the Internet and other related technologies in the healthcare industry. The European Commission (EC) has defined e-Health as the use of modern information and communication technology (ICT) to improve the access, efficiency, effectiveness, and quality of clinical and business processes utilized by healthcare organizations, practitioners, patients, and consumers in an effort to improve the health status of patients [1].

There are seemingly an endless number of possible applications of e-Health to healthcare management. The area of e-Health is very broad, covers topics such as telemedicine, e-consultation, electronic health records, healthcare score cards, e-prescribing, patients information systems and so on. Detmer [2] defines three areas of health informatics: Consumer informatics, Medical & clinical informatics, and Bioinformatics.

The consumer (patients) informatics is commonly referred to as 'e-Health' and focuses communications to patients and the public about health topics. Consumer-to-consumer (C2C) applications are potentially strong means of empowering individuals and the public. Already C2C applications have contributed to the creation of "virtual" and sometimes powerful communities [3]. At present there are about 25,000 health-oriented websites and they are among the most visited.

Medical informatics relates directly to health care structure, processes and outcomes. A main application is computer-based medical records, a sub-category of which is computer-based personal records that will facilitate access to low cost therapies, for example, with certain areas of mental health, such as depression. Another sub-category is computer-based patient records that will facilitate clinical decision-making. These later records may be linked to knowledge-oriented systems that may contribute to quality control of clinical processes.

Telemedicine, meaning healthcare delivered by electronic means like telegraph and telephone, has been on the road for over a century. However, towards the end of the last century, this emerged as a delivery system with huge potential due to the information technology revolution, which made two-way, audio-visual transmission possible at reasonable cost [4]. However, telemedicine is facing many shortcomings. It has a long way to go before it can be effectively integrated into a healthcare delivery system. One crucial difficulty is that many telemedicine applications have yet to be developed, evaluated and implemented in the hospital environment, before application of the system over longer distances.

Bangladesh as well as other least developed countries

needs to drive the development of e-Health to improve healthcare delivery services. The industrialized countries like the United States and Europe have many years of experience in the use of ICT in healthcare delivery [5]. Due to the advancement of ICT, Bangladesh has the opportunity to employ ICT in a more integrated way in the healthcare sector to improve the quality, safety and efficiency in delivering healthcare services to the people.

2. Present Health Status in Bangladesh and Necessity of e-Health Applications

Bangladesh is one of the most densely populated developing countries where most of the people are living in rural villages. There is a huge disparity in health care distributions between rural and urban areas. People are also suffering due to lack of medical expertise and health care facilities. Bangladesh cannot provide minimal health service to the people due to insufficient number of doctors, health care professionals and medical services. Although there are many clinics and hospitals are found in the rural and suburban areas but they are often ill-equipped. The inadequate infrastructure makes it more difficult to provide health care in rural and remote areas at the right time. In this scenario utilizing the limited resources, e-Health may be an easier and cheaper way to disseminate healthcare facilities to the rural people. Table 1 shows the present heath status of Bangladesh.

Table 1. The present heath status of Bangladesh

Category	Quantity
Infant mortality rate (per 10,000)	520
Maternal mortality (per 10,000)	570
Years of life lost due to communicable disease (%)	60
Births attended by skilled health personnel (%)	20
Hospital beds (per 10,000 population)	3
Total Health Workers (per 10,000 population)	5

In Bangladesh, providing medical care is the constitutional obligation of the government. The national health policy emphasizes on "To develop a system to ensure easy and sustained availability of health services for the people, especially communities and urban areas" [6]. In order to meet the requirements of the overall objectives of the health sector, e-Health might be an economically viable solution to serve the healthcare needs through its high reach and low cost mechanism by making healthcare services more accessible, affordable and effective.

For many years, the mobile phone was not considered powerful tool to reduce the digital divide in health. However, the dramatic penetration rate of mobile phones in Bangladesh over the last decade has increased the potential of electronic health services [7-9]. Several private and public telecommunication operators have established their network all over the country. Currently there are 6 mobile operators in Bangladesh and more than 100 million people are under the mobile telecommunication networks [10]. The leading mobile phone operator (Grameen Phone) in collaboration with a telemedicine firm (TRCL) provides medical information services to the patients. It receives 10,000 calls everyday to provide primary healthcare to the people. The current and emerging wireless technologies could improve the overall quality of service for users in both cities and rural areas, reduce the stress and strain on healthcare providers while enhancing their productivity, retention, and quality of life, and reduce the overall cost of healthcare services in the long-term [11].

Since, the main purpose of e-Health is to reach health care services to the patients who are isolated from specialized care, development of a successful e-Health system could help in delivering adequate and efficient healthcare in remote areas at an affordable cost. E-Health can provide services for 24 hours a day and seven days a week. In Bangladesh where access to medical services is restricted by distance and poor transportation and health care services are inadequate, e-Health offers a great opportunity and possibilities to distribute medical services by utilizing ICTs.

3. Methodology

The research was conducted by incorporating different phases: (i) Literature study on e-Health applications and existing healthcare systems (ii) A survey of patients expectation (iii) Expert opinion (iv) Data collection, and (v) Employment of the study results to compile an e-health framework.

The aim of the study was to explore the views and expectations of a large sample of patients about e-Health applications in healthcare management. Data were collected from patients of different age group using a random selection. We considered the following age ranges: 16–25, 26–35, 36–45, 46–55, 56–65, and 66–75 or above. Patients under the age 16 were not considered since they are not matured enough. We have conducted our survey in some selected hospitals/clinics at rural and urban areas of Bangladesh. A questionnaire was designed, and covered the following points: knowledge of ICT, access computers and the Internet, involvement in patient health record studies; rights to see records; views on holding/seeing records; potential effect on consultations; accuracy and completeness; access to children's or dependant's records; security and confidentiality; access to electronic health information.

4. Key Findings

We sent 300 questionnaires to the patients of different age groups while 75% responded. 50 questionnaires were sent to each age group. We noticed highest contribution from the age group of 36-45. Table 2 shows the response rates to the questionnaires for different age group.

Table 2. Response rate per age group

Age Group	No of questionnaires	No of patients responded	Response rate (%)
16–25	50	18	36
26–35	50	23	46
36–45	50	31	62
46–55	50	26	52
56–65	50	29	58
66–75 or above	50	12	24

Table 3. Response rates (in %) to questionnaires from total patients

Questions	Yes	No	N/A
Do you think that e-Health would be a viable solution to improve healthcare facilities?	73.6	26.4	-
Do you have previous experience of using e-Health?	2.1	97.9	-
Do you think that it would be useful to store health data on a server?	54.2	44.1	1.6
Do you think that it would be useful to store health data on a SMART Card?	44.3	55.1	1.5
Do you think that you should have the right to see the health record?	92.5	7.6	-
Do you think that you should have access to your health record?	65.4	24.5	-
Do you think that you should have right to update the health record?	51.2	46.4	3.3
Do you think that the advantages of e-Health outweigh the disadvantages?	78.2	21.7	-
Do you have computer in home/office?	62.5	37.4	-
Do you have Internet connectivity in home/office?	45.6	54.3	-
Do you use computer regularly?	58.9	41.2	-
Do you use Internet regularly?	42.3	57.4	-
Do you have mobile phone with Internet facility?	54.4	45.8	-
Are you worried about getting the benefits of e-Health?	56.5	43.7	-
Are you worried about the security of your health records?	51.1	43.5	5.6
Do you think that government should give priority and encourage the private sectors to come up for e-Health implementation?	87.6	12.3	-

Response rates to the questionnaires are listed in Table 3. The majority of patients opine that e-Health systems should be developed in the public/private hospitals of Bangladesh and it would be an economically viable solution to ensure the healthcare facilities to the doorstep of the patients. Moreover, the majority believe that they should have access to their health records. Most patients expect that they should have the right to access their records. Our study has found that a number of patients have concerns about security and confidentiality of their health data. They need reassurance that access to their health records will be controlled. Another group of patients have concerns about the accuracy and completeness of their health records. Many patients feel that parents and guardians should have access to dependants' health records.

5. Implementation Challenges

As a least developed country Bangladesh is facing various obstacles to the promotion and implementation of e-Health. This study has identified some major threats and challenges for developing e-Health in our country which include:

a) High-cost, lower liability of Internet access
b) Lack of appropriate IT policy
c) Poor ICT infrastructure
d) Non-acceptability of IT systems
e) Lack of coordination
f) Lack of awareness of government and citizens
g) Hassle in getting required services.

6. Recommendations

The use of ICT in health services can reduce the primary gap in health related needs that exist in daily life. In this context, functional quality of health information, affordable cost, availability of services, communication infrastructure, and easy to use information can play a predominant role in developing user perceived health care system. Technical awareness, network dynamism, service effectiveness and data delivery mechanism should be emphasized for raising user satisfaction. This study intends to recommend that the following policy initiatives are important conditions and facilitators for successful implementation of e-Health in Bangladesh:

- Facilities should be built to e-Health services both in urban and rural areas.
- Modern and effective ICT networks need to be built to support e-Health services.
- The bandwidth capacity and availability needs to be ensured all over the countries at a reasonable cost to encourage the growth of the internet.
- Everyone should have access to ICT learning and training.
- .An integrated flexible and reliable nation-wide transmission system capable of voice, audio, video, data and graphics transmission should be ensured.

7. Conclusions

Bangladesh is facing the challenges of quality healthcare. This research evaluates the present health status of the country and explores the applicability of e-Health as well as the challenges and issues of electronic healthcare development. This study has conducted a survey on patient's views and expectations toward e-Health for quality healthcare management. This study has found that if traveling cost of a patient to visit a medical specialist is higher than the cost of providing e-consultation, then e-Health might be an economically viable solution.

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