

Original Article:

Ethical aspects of Dhaka University Tele-medicine System

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Abstract: To provide basic health care services in rural areas is one of the major challenges for developing countries like Bangladesh because of lack of infrastructures and unavailability of qualified medical doctors in the villages. Telemedicine viewed as a new way of offering health care services that has the potential to overcome this problem. Author is a member of extended group at Dhaka University (DU) which has been developing telemedicine equipment and data acquisition software to promote telemedicine practice in Bangladesh. PC based ECG equipment, Digital stethoscope, Digital microscope, Digital X-ray view box and some other essential medical equipment was developed for telemedicine services. The data acquisition software establishes an easy and appropriate patients to doctor interaction through a trained operator in a remote center that involve management and arrangement of consultation of a chosen and agreeing doctor by a patient. Upon establishing audio-visual connection between patient and doctor relevant physiological data from different diagnostic instruments will be uploaded securely in a dedicated web server which can be viewed real time using unique patient/doctor ID and password. Recently the Telemedicine group of DU and a local NGO named SAMAMA with support from Service innovation fund (SIF) of Prime Minister Office (PMO) of Bangladesh took the initiative to establish eight rural telemedicine centers and one expert center for the field trial of telemedicine in Bangladesh. The aim of this paper is to examine the ethical challenges of such health care system and our effort to overcome those problem before starting the field trial.

Keywords: Telemedicine, bioethics

Introduction: Almost 70% of total population live in rural areas of Bangladesh. There are only 3.6 doctors for 10,000 people. For this reason many people tend to take religious medication from various religious institutions or consult village doctors who has little or no formal training for curative purpose¹. The WHO has identified the necessity for further medical resources in the developing countries and has suggested telemedicine as a promising solution². Telemedicine can be defined as a practice of medicine over a distance, in which interventions, diagnostic and treatment assessments and recommendations are based on data, documents and other information transmitted through telecommunication systems. Bangladesh Government has recently established internet links with video capability to almost all the rural health complexes (called Upazilla Health

Complex), together with PC and necessary accessories. Recently thousands of rural community clinics have also been provided with laptop and internet connections. Therefore it is an appropriate field for the incorporation of telemedicine. In Bangladesh, several groups are working in Telemedicine. However most of these depend on video conferencing only having no diagnostic equipment at the rural end. Although some of these are using some diagnostic equipment from abroad, but the cost are prohibitively high. Besides, most of foreign equipment are not designed to work in the hot and humid climate under an uninterrupted electricity supply. Keeping these problem in view, the Department of Biomedical Physics and Technology (BMPT) at Dhaka University started developing a telemedicine system based on a PC with some integrated diagnostic equipments using information such as documents, laboratory results, ECGs, heart sound, digital photograph, real-time ultrasonography or video, video recordings and physiological data such as blood pressure, hemoglobin saturation, heart rate and spirometry can be transferred from rural center by secure web based application³⁻⁸. Hardware developed for telemedicine purpose has been tested, compared with existing technology and had been certified by an expert board formed by the Directorate General of Health Services to implement health programs and services for the ministry of health of Bangladesh.

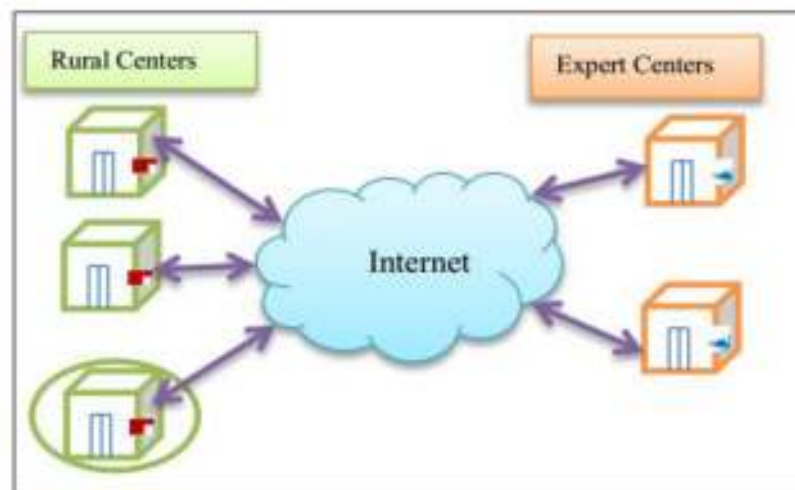


Figure 1: Basic Concept of Telemedicine System

Telemedicine is rapidly becoming popular in many countries in the world. It has several advantages such as being cost effective and ability to provide better access to health care in remote areas in many parts of the world including developed countries. Like Telemedicine, as with anything new, there is often resistance. Gainsayers have been quick to cite possible ethical and regulatory complications associated with telemedicine. One of the major challenges is that of patients' rights and confidentiality in the use of Telemedicine. There are still no standard guidelines and procedures in the practice of telemedicine which make both patient and physician uncertainty about the standard of practice and how to maintain confidentiality. Medical liabilities of such system are also very crucial. In cases where damages occur a clear identification of the medical liabilities involved has to be ensured⁹. There are several guidelines for Telemedicine has

been found to overcome such ethical challenges mostly developed by the USA, UK, India and Australia which focus, to different extents, on clinical, operational or technical aspects of various types of telemedicine and tend to be specific or a sub-specialty with the medical field. Only three countries and one association have published ethical guidelines. After the publication of clinical guideline developed by the General Assembly of the World Medical Association in 1999 and Finland in 1997 and internet eHealth Code of Ethics was drafted in 2000 to ensure that the people can use the internet to manage health with knowledge of the risks and benefits. The World Medical Association (WMA) started four principles of telemedicine practice in ethical guideline¹⁰. The aim of this paper is to examine the ethical challenges of such health care system in Bangladesh and how to uphold the ethical principles.



Figure 2: BMPT DU proposed Telemedicine web application

Procedure of Telemedicine in Bangladesh: DU developed Telemedicine offers a direct consultation between patient and a registered doctor, by creating a ‘virtual consultation’ environment through communication links as provided by existing technology. Since the invention of telephone, telemedicine started through telephonic conversation between a patient and a doctor at a distance. However, one can easily understand its limitations, so telemedicine did not go a long way in the past. In the present age, computers with their astonishing capacity and power with fast internet links can facilitate almost real time video & audio communication and other data transfer from electro-medical diagnostic equipment, creating an environment which is very close to direct consultation by a doctor. In general, doctor-patient relationship has been characterized by the clinician’s duties relating to confidentiality, risk disclosure and patients right to privacy and autonomy. In the present form of our Telemedicine system, a patient comes to a rural center manned by one or more trained technician and equipped with internet connected computers and appropriate diagnostic instruments. This rural center is connected to an expert center situated at

another place, possibly in a city or a district town, through internet. The expert center is manned by qualified doctors. The patient consults the doctor through internet communication and the doctor tries to acquire as much diagnostic information as possible during the session including a direct video conversation. The doctor then gives a prescription to the patient giving advice on medication, diet, physical movement or exercise, and may ask for carrying out some other specialized investigation and to come back with the report at a later session for update. A few doctors taking turns in one expert center can serve many remote rural centers, and distance is of no problem. Generally speaking, the medico-legal position of doctors involved in our telemedicine consultation is similar to that when telephone, fax, email or letter is used instead. All amount to the delivery of advice from remoteness and the standard of care and skill will apply. The patient – physician relationship will be based on a personal encounter and sufficient knowledge of the patient’s personal history. It will be based on mutual trust and respect and will be assisted primarily by expert technician deployed in the rural centers.

Historically, doctor-patient connection has been characterized by the clinical right to confidentiality and sovereignty. With the introduction of electronic mediation and the possibility-for extended facilities, the physician’s duties also increased. In our system, obligations, appropriately, are placed on both the rural and expert center. The service will be provided in a private setting with digital line. The consumer will be educated about the nature and purpose of the system, equipment and any potential breaches of confidentiality inherent in the technologies installed and will be question regarding the level of satisfactory action.

Data confidentiality and security: DU developed Telemedicine web application has the capability to produce digital patient file, digital physician’s consultation, digital prescription and patient registration card. These will facilitate and improve the treating of sensitive medical data as well as the promises for using medical resources in an unusual degree and can thereby considerably contribute to the well-being of the patient. A research conducted by Kenyon reveals that security is not merely a technological challenge, but represents potentially significant human factor barrier^{11, 12}. By improving the quality of health care, our system has no intention to degrade patients’ rights, in particular their self-determination. But as it will be a field trial certain evaluation of patient data is required to ensure better service and to gain better understanding about certain disease and demography. Therefore, the technician will let patient know about the future research possibilities with the data and will give a consent form. Each patient will have the right to share their medical data for research purposes. If any person doesn’t want to share his/her data it will be remain secured and will then only be accessed by the patient and physician involved. Our system follows the legal basic conditions for medical data processing and data security i.e. the discretion, the integrity, the accessibility of the data at any time and the verifiability of the data processing will be guaranteed as well. Web server containing all the medical information will be secured efficiently against any dangers resulting from open networks, particularly the Internet. Electronic patient’s files can only be opened by the treating physician and the medical assistants up to necessary magnitude, safeguarding the likelihood of an emergency access. Any access beyond will

require the approval of the patient. The medical secrecy will be ensured. The digital prescription with a documentation of the patient's medication will require the consent of the patient and will protect the rights of the physicians. In particular, physician's prescribing behavior can only be seen by the physician and won't be available for a third party. Furthermore it will protect the pharmacists' right to hide their revenue from other pharmacies. Patient registration cards will require the consent of the patient. The right of the patient to keep his information secret will be ensured with access options to the information stored on the registration card.

Responsibilities of Doctor and Rural Technician: To understand responsibilities of Doctor and rural technician let us first review how a direct consultation between physician and patient works with the help of rural technician in our Telemedicine system. A patient comes to a doctor, and the doctor gets information in various ways- a) Listening to physical complains from the patient directly through mobile phone either by audio or video call. b) Visual observation of the overall look of the patient. c) Special focused look at certain organs like eye, tongue, or skin, etc. d) Touching and pressing different points of the body of the patient to feel for any abnormality. d) Using different diagnostic devices to probe further into the body that which is not apparent externally. Some of these are used by the doctor on the patient directly (as a stethoscope), and for some s/he asks for data and reports of diagnostic tests carried out by others, to be produced during a later visit by the patient. e) Sometimes an assistant takes some prior information on the patient like height, weight, temperature, blood pressure, etc., and hands over the records to the doctor. Based on all information received, the doctor makes an assessment of the medical problem and may prescribe medicines, diets and give necessary advice.

A physician whose consultation is sought through the use of telemedicine will store a detailed record of the advice s/he conveys as well as the medical data s/he received was conveyed. Both the physician and technician will ensure that the patient or family members caring for the patient are able to use telecommunication system and necessary instruments accordingly. They both will also ensure that the patient has understood the advice and treatment recommendations given and that the continuity of care is assured. There will be an emergency transportation service available and will be used when direct consultation between physician and patient is required.

Implications of telemedicine in Bangladesh: Rural people are often deprived of proper medical treatment in Bangladesh as it is difficult to retain qualified doctors there. Telemedicine offers a solution but most of the current telemedicine systems in use in Bangladesh are based on videoconferencing only which may lead to incorrect diagnosis and wrong treatment. PC based diagnostic equipment, if added, could allow a doctor to assess and diagnose a patient better. Such equipment based telemedicine systems are available from foreign manufacturers, but the cost is very high. Since such PC based diagnostic equipment will be needed at each of the hundreds or thousands of rural health centers eventually, the final bill will be prohibitively high. Furthermore, if something goes wrong in any equipment, it will be very difficult to fix, if not impossible, to get it repaired locally that may interrupt the service to the people.

DU telemedicine project will essentially bring the services of qualified medical experts to the doorsteps of the common people throughout the country, even in the remote rural areas. Although a telemedicine cannot match a face to face consultation, it is much better than no consultation at all. Rural poor, particularly the marginalized people, women and the physically disabled are deprived of the consultation of a qualified doctor for most of their ailments, as it is difficult to go to a hospital or a clinic in the town, physically and financially too. Telemedicine can at least give them an opportunity of consulting a qualified doctor at a reasonably low cost at a center very close to their place of residence. Even in remote areas of industrially developed countries telemedicine has rooms to play. The use of indigenously developed diagnostic equipment and software for telemedicine has opened up the possibility of spreading this service out to a much larger population. Conceptually the whole of Bangladesh can be brought under a network with affordable costs. Since the equipment and the software are locally developed, local maintenance and repair, and that at low cost, is ensured, in turn ensuring sustained service.

Conclusion: DU telemedicine system can lead to a big change with respect to improved healthcare within a few years for people living in rural areas through providing consultation of qualified doctors, and particularly, through providing vital diagnostic information using the diagnostic equipment that go with it. Indeed there are several ethical challenges of such system but is possible to overcome. Once this technology and the model of delivery are successful in Bangladesh, it may be possible to export the concept as well as hardware and software to other countries of the Third World, bringing a big positive change globally.

References:

1. Bhuiya A. 2009. Health for the rural masses:Insight from Chakaria - Monograph No. 8. *ICDDR,B Cahpter 8*.
2. WHO Committee A. 2005. World Health Assembly eHealth Resolution (WHA 58/28). A58. :4-6.
3. Rabbani K S, Amin Abdullah-Al, Bodiuzzaman A K M, Khan Ahamad Imtiaz, Abir Ahmed Raihan & Tarafder Zihad. An indigenously developed affordable and sustainable telemedicine system. *Appropriate Healthcare Technologies for Low Resource Settings - AHT2012, 2014 London, UK*.
4. Rabbani K S, Amin Abdullah-Al, Bodiuzzaman A K M, Khan Ahamad Imtiaz, Abir Ahmed
5. Abir Ahmed Raihan & Rabbani K S. Indigenous development of a Computerised 12 lead diagnostic ECG Equipment. *International Conference on Physics of Today, 2012a BUET, Dhaka. Bangladesh Physical Society*.
6. Abir Ahmed Raihan & Rabbani K S. Low cost computerised Stethoscope for Phonocardiography and real time Telemedicine. *International Conference on Physics of Today, 2012b BUET, Dhaka. Bangladesh Physical Society*.

7. Rabbani K S, Abir Ahmed Raihan & Bodiuzzaman A K M. 2011a. Design and Development of a Low Cost Personal Computer based ECG Monitor. *Bangladesh Journal of Medical Physics*, 4. 149. <http://dx.doi.org/10.3329/bj.mp.v4i1.14701>.
8. Rabbani K S, Al-Amin Abdullah, Abir Ahmed Raihan, Bodiuzzaman A K M, Khan Ahamad Imtiaz & Tarafdar M Zihad. 2011b. A Rural Health Monitor with Telemedicine. *Biomedical Engineering*.
9. Gulick PG. 2002. E-health and the future of medicine: The economic, legal, regulatory, cultural, and organizational obstacles facing telemedicine and cybermedicine programs. . *Albany Law Journal of Science and Technology*, 12. 351-408.
10. WMA. 2007. *WMA Statement on the Ethics of Telemedicine* [Online]. 58th WMA General Assembly, Copenhagen, Denmark.
11. Kenyon JI Sessions GR. Security and confidentiality issues. *Telemedicine Journal and e-Health*, 2003.
12. Tachakra S Mullett ST, Freij R, Sivakumar A. 1996. Confidentiality and ethics in telemedicine. *ournal of Telemedicine & Telecare*, 2 Suppl 1. 68-71.

Conflict of Interest: No

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