

DESIGN AND DEVELOPMENT OF A REMOTE MEDICAL CONSULTATION SYSTEM

A. Delrobaee¹, M. H. Mirdamadi¹, M. T. Yasamy¹, Y. Kheirandish^{2*}, B. Mohabbati³, H. Delrobaie⁴ and
H. R. Jamaati⁵

1) Department of Psychiatry, School of Medicine, Shaheed Beheshti University of Medical Sciences, Tehran, Iran

2) Department of Oral and Maxillofacial Radiology, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

3) Department of Computer Science, Amirkabir University of Technology, Tehran, Iran

4) Department of Biomedical Engineering, Khajeh Nasir Toosi University of Technology, Tehran, Iran

5) Department of Internal Medicine, School of Medicine, Shaheed Beheshti University of Medical Sciences, Tehran, Iran

Abstract- Telemedicine is an indispensable tool in the hands of doctors to accelerate and facilitate the process of data interchange. To publicize and distribute the culture of utilizing this technology and providing the necessary equipment for this purpose and also to commence some useful activities in this field of science in Iran, the researchers group have designed and performed a telemedicine internet site with the goal of medical consultation. Software was designed and prepared, which is accessible to three groups of users with definite level of access for each one: normal users, doctors and site administrators. There are four main forums on this website with the following titles: medical consultation (Q&A), doctors' special forum, scientific and research centers and also special disease groups, and the forum of graduates and medical students. Ultimately, we could achieve a new horizon to expand telemedicine activities in the field of medical consultation. A free web-based system was developed through the address of www.teleteb.com with the aim of remote medical consultation, developing the public health services and creating a powerful scientific and research link in the society of medicine.

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INTRODUCTION

Medical informatics is the rational study of the way we think about patients, and the way that treatments are defined, selected and evolved.

Although the name 'medical informatics' only came into use around 1973, it is a study that is as old

as medicine itself. It was born the day a doctor first wrote down some impressions about a patient's illness and used these to learn how to treat his next patient (1). Nowadays, there are a very large number of patients that need specific health support at home. The deployment of broadband communication networks is making feasible the provision of home care services with a proper quality of service (2). However, medical information services on the internet are very often provided by people lacking medical expertise such as patients or their relatives and therefore the information found may be false or biased (3, 4).

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*** Corresponding Author:**

Y. Kheirandish, Department of Oral and Maxillofacial Radiology, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

Tel: +98 21 88951877, Fax: +98 21 88962510

E-mail: kheirandish@sina.tums.ac.ir

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Electronic communication and data-processing are by no means a new phenomenon in general practice. The next logical step might be to include telemedicine, *i.e.* images, sound, video and other kinds of medical information in the communication process. We assume that an increase in the use of electronic communication and telemedicine will strengthen the central role of general practice (5-7).

Even in the age of information technology, trust is very important in the relationship between doctors and patients. Telemedicine in the sense of consultation can be considered in special cases and in emergencies. In no cases, telemedicine should be introduced alone because of obligations and the purpose of an apparent progress in all fields of the health care system (8, 9).

Telemedicine is the application of telecommunication technology for the purpose of diagnostics, planning and guiding of therapy and education. With the possibility to gain fast access to specialty knowledge, telemedicine makes it possible to deliver health care to patients at distant sites. Telemedicine is utilized by almost all medical specialties but to varying degrees (10, 11, 6).

Medical professionals should be active in creating the regulatory framework for medical services in the information society. This paper describes an innovation to the overall method and to set a framework for developing an intellectual model of the medical diagnosis procedure. This paper further describes how this system was applied in response to the interested patients in our community.

MATERIALS AND METHODS

Similar samples in different medical consultation centers all over the world were studied to consider their weaknesses and strengths in designing the main model of the project. These websites were reviewed and among them, 6 sites with superior function and quality were chosen by researchers and were carefully analyzed and investigated.

Chosen websites included *consultdrs*, *advicefromdoctors*, *doctorinternet*, *myphysicians*, *webmed* and *thedoctorslounge*. In all studied websites, the users comprised two groups, that is,

medical (providers of health and treatment services) and public (receivers of treatment and health services), who benefited from the following facilities in these sites: 1) health and hygiene information and news for public use; 2) specialized information for medical community knowledge; 3) medical consultation services which are offered in two ways: private (via email) and public (via message), and 4) business and propagation issues in the field of health and treatment

The *consultdrs*, *advicefromdoctors* and *doctorinternet* websites offer health and treatment consultation and responses to questions completely private via email and in return of receiving costs from questioners. *Webmed* and *thedoctorslounge* have message boards and bulletins, in which questions are presented publicly and the physicians of the site give specialized responses to them free of charge. *Myphysicians* site uses both private and public methods for consultation, which are accessible via email and message board.

RESULTS

The group of researchers employed available IT tools, software resources and hardware equipments to design an internet website to be utilized as a center for establishing communications and exchanging data with the golden objective of distance medical consultation. After carrying out preliminary analysis of required facilities in this system, available facilities and similar samples of this work, required resources were collected from open source software shared on internet. The phpBB software was employed as the basic backbone and some other softwares were linked to it to increase its potentials.

MySQL database was used as a support of the databank and as one of the several available tools. This software is capable of being installed on Windows XP and UNIX base servers and is accessible to users in any internet browsers environment with the minimum bandwidth. Therefore, establishing communication between receivers of medical services and suppliers of health and treatment services and also intra-group

communications of health community becomes possible.

Finally, a free web-based system was developed through the address of www.teleteb.com. Establishing communications is possible via email and specialized forums. On the other hand, it is possible to define classified access levels for users in administration section, in which the data management or user's management and security issue have been attended. Classification of subjects at the website has been done according to the common and frequent problems of the clients and at specialized section which is only accessible to registered specialists, certified by managers of the website, subjects are classified according to priorities of treatment and health centers and specialized groups. The physicians that are trusted by the management of the website are identified by certain signs and are responsible for responding to clients.

DISCUSSION

Information systems are starting to become indistinguishable from communication ones. Some of the many different ways that will change healthcare are presented here, from the way communication occurs through to the change it will have upon the doctor-patient relationship (1).

For optimum performance of telemedicine, three aspects of the management of the medical records for teleconsultations are particularly important: multimedia collection, standardization of patient record identification and classification, and information management (12).

Therefore, our research was based on two topics: intensive review of literature related to medical consultation done by means of telemedicine, and evaluation of websites that are active in the field of medical consultation at present.

In all of the reviewed literature, emphasis of researchers was merely focused on consultation. A group of researchers performed the consultation by providing some equipment for remote medical consultation and by means of email, video conference, etc. in some studies and established the results of their researches on these consultations.

Therefore, by benefiting from some well-known websites that are active on the internet, we have designated a system with the aim of performing consultation between medical society and people. By activation of Teleteb website, performing consultations between various medical and health society groups such as medical doctors, patients and researches will be accessible.

To compare Teleteb website with the other websites that have been designated and being used in the similar situation, we respectively draw your attention to the following points:

A) The exclusive options that are available on Teleteb website and other websites do not contain them:

- Inter-medical society consultation.
- Creation of group for specialist and over specialist and private speaking.
- Direct communication between the group of health service providers and health service receivers.

B) The common options available on both TeleTeb website and the other websites:

- Communication between patients (receivers of health care) and doctors (providers of health care).
- Classification of subjects so that the questions and medical subjects are considered in the way patients thinks.

On the other websites, some useful information for users in the field of health information and scientific subjects can be found. Considering the fact that the first aim of researchers of Teleteb website was to create a suitable base for remote medical consultation, there was no requirement for providing similar information on our website at this stage of project. However, we will add the mentioned information to the website in next stages.

In the field of directly sending the image information including radiographic images, sonography, magnetic resonance imaging (MRI), computed tomography (CT) scan, pathologic images and the other images related to medical information, and on account of the importance of 'online information security', we require to do some more research and to utilize some equipment for image transfer. One of the other facilities that we can add to this system is the monitoring system. It can be used between specialist groups in a hospital for

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consultation among the department of hospital and their results have been evaluated in another research project. Also by the use of link between Hospital Information Systems (HIS), we can access to patients' backgrounds for making a quicker consultation.

To sum up this argument, we can be optimistic to promote public health condition and the comfort of doctors and patients by providing the required equipment for executing the telemedicine and a suitable base to utilize it to accelerate the process of prognosis, diagnosis and treatment. To have an optimistic outlook on the future of such systems, it is recommended to pay more attention to the economical stability and independency of these systems in order to be able to preserve the systems and their equipment against economical disorders.

Conflicts of Interests

We have no conflicts of interest.

REFERENCES

1. Coiera E. Guide to medical informatics, the internet and telemedicine. 1st ed. London: Arnold, 1997.
2. Guillen S, Arredondo MT, Traver V, Garcia JM, Fernandez C. Multimedia telehomecare system using standard TV set. *IEEE Trans Biomed Eng.* 2002 Dec; 49(12):1431-1437.
3. Forsstrom J. Why certification of medical software would be useful? *Int J Med Inform.* 1997 Dec; 47(3):143-152.
4. Ottenstein RJ. Supporting remote and complicated critical incidents through E-mail support teams. *Int J Emerg Ment Health.* 2002 Summer; 4(3):213-215.
5. Santamaria N, Clayton L. Cleaning up. The development of the Alfred/Medseed Wound Imaging System. *Collegian.* 2000 Oct; 7(4):14-15, 17-18.
6. Kjaer NK, Karlsen K. [Telemedicine and general practice--future or present. Telemedicine, a way to strengthen the gatekeeper role?] *Ugeskr Laeger.* 2002 Nov 4; 164(45):5262-5266. Danish.
7. Swinfen R, Swinfen P. Low-cost telemedicine in the developing world. *J Telemed Telecare.* 2002; 8 Suppl 3: S3:63-65.
8. Schlungbaum W. [Physician-patient relations in the age of information technology] *Z Arztl Fortbild Qualitatssich.* 2001 Oct; 95(9):667-669. German.
9. Ellis DG, Mayrose J. The success of emergency telemedicine at the State University of New York at Buffalo. *Telemed J E Health.* 2003 Spring; 9(1):73-79.
10. Duker I, Elsner P. [Dermatology in telemedicine. Possibilities and limits] *Hautarzt.* 2002 Jan; 53(1):11-17. German.
11. Cook J, Edwards J, Mullings C, Stephens C. Dentists' opinions of an online orthodontic advice service. *J Telemed Telecare.* 2001; 7(6): 334-337.
12. Lian P, Chong K, Zhai X, Ning Y. The quality of medical records in teleconsultation. *J Telemed Telecare.* 2003; 9(1): 35-41.