# Development of Teleconsultation System

Yuichi Ishibashi[*1], Atsuko Hara[*2], Muhammad A. Sadiq Sadiq[*1], Hiroshi Juzoji[*1], Isao Nakajima[*1]
**1 Tokai University School of Medicine, *2 Kitasato University School of Medicine*
*y-ishi@statlab.jp*

## Abstract

*Tokai University has developed a standard telecardiology system and confirmed practical applicability in Bhutan. With this system information on patients, from ECG (Electrocardiogram), echo-cardiography and so on, is sent and medical consultation can be provided between distant places. In this case the data are transmitted through the internet and other information may be exchanged through E-mail, Fax and by telephone.*

*We are now introducing a new teleconsultation system in which almost all of the information transfer, whether for findings of ECG, laboratory examination and physical examination, or for diagnosis and other opinions, is by internet. This facilitates ease of communication and storage of all the information in databases for reference.*

## 1. Introduction

The standard telecardiology system in Bhutan is as follows. Patient's ECGs, echocardiograms and phonocardiograms are taken in primary care centers using multi-purpose ECG equipment made in Japan. To benefit from experience not available locally they are transferred with data from physical examinations through a simple phone, fax, internet connection and satellite between the primary care center and a secondary health care center. The 33.6 kbps connection speed by dial up in Bhutan imposes limitations of file size for image data, but carefully recorded still images of ECG and echocardiography can be transmitted for expert consultation.

This study has performed for the following purposes,

- To access the feasibility of transmitting ECGs and echocardiograms with an internet protocol.
- To enhance the diagnostic accuracy through telecardiology consultations diagnosing heart disease, and provide specialist care and consultation to places where no such facilities existed.
- To develop a standard telecardiology system for countries like Bhutan plagued with the shortage of human resources.

The following problems were encountered:

- The consultant receives many kinds of information through different media, such as internet, telephone, fax, E-mail, and then the received information needs to be sorted and filed.
- To record different kinds of information is not easy without a computer base.
- There is no standardization regarding formats for information, with different levels and contents exchanged between clients and consultants.

We therefore developed a new consultation system to solve these problems.

## 2. Purpose and features of the system

The system was developed for medical teleconsultation through the internet, with the following functions. A medical worker as a client registers patient information and symptoms, and data from laboratory examination, ECG, echocardiography, X-ray, CT and histopathology into the system and then requests a consultation. A consultant indicates the necessary tests and provides a diagnosis and treatment recommendations. The client may ask different opinions from more than one consultant. The information, test data an image data are recorded in database, and then these are referenced as a case study.

## 3.The flow of consultation using teleconsultation system

The flow for consultation inside a hospital is as follows:

(1) The patient exhibits some symptoms.
(2) Doctor A in charge of the patient (client) immediately consults doctor B of the relevant department (consultant) with documents and oral reports after first aid is given.
(3) The consultant examines and treats the patient directly, and indicates the necessity for additional checkups..
(4) The consultant continues medical treatment where necessary
(5) Consultation is finished at the time of recovery or improvement of the patient condition.

## 4. References

[1]Sadiq, M., Nakajima, I., Juzoji, H., Nawaz, M., Tanabe, T., Standard Telecardiology System for Developing Countries, 2005, 3rd APT Telemedicine 2005, Kuala Lumpur, Malaysia.

[2]Ahmad, S., Gilani, S., Malik, A. Z., Telemedicine software for a developing country, 2006, 4th APT Telemedicine, Rawalpindi, Pakistan.