



International Telecommunication Union

East Bhutan Tele-ECG Project

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Workshop on Standardization in E-health
Geneva, 23-25 May 2003

Introduction

The Kingdom of Bhutan is an ancient kingdom with unique customs and people, lies in the Central Himalayas, between Tibet to the north, the Indian territories of Assam and West Bengal, to the south and east, and Sikkim to the west.



The Kingdom has a total area of about 47,000 square kilometers, about the size of Switzerland. Located in the heart of the high Himalayan mountain range, Bhutan is a land-locked country surrounded by mountains.





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Demographic Data

Area:	47,000 km ² ; <i>rugged mountains, swiftly-flowing rivers and extreme climate</i>
Population:	620,000 (1997 estimate); <i>Predominantly rural</i>
Population growth rate:	2.5% per year
Population under the age of 15:	> 39.1%
Life expectancy at birth:	66.0 years (in 1994)
Infant mortality rates:	60.5 per 1,000 (<i>47.4 years in 1984</i>)
Maternal mortality rates:	2.55 per 1,000



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Healthcare Facilities

Medical facilities - a four-tiered health care network: 1.National Referral Hospital: 2.Regional referral hospitals: 3.District hospitals: 4.Basic Health Units (BHUs): Out-Reach Clinics:	 1 (Thimphu) 2 (Mongar and Yebilabcha) 26 (centers of each district) 160 447
Total hospital beds:	1023 (in 1999)
Population per bed:	622 (in 1999)
Total medical doctors:	109 (<i>including 20 specialists</i>)
complicated cases transferred abroad for specialized treatment per year	140-150



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Condition of Major Routes in Bhutan Creates difficulty in Transport Patients to Referral Hospitals



Telecom Infrastructure

- Telephone density: 1.04
- Digital microwave link between Thimphu and Tashigang with spurs connecting the main population centers
- The first and only ISP, DrukNet, launched in 1999 (<http://www.druknet.net.bt>; 1600 subscribers until Dec. 2001)
- > 50 BHUs connected to the national telecom network by single channel, point-to-point VHF systems (primarily for voice communication, but also handle fax)



DrukNet



Several Previous Pilot Projects

1. ITU Pilot Project - MCT

- o A Multipurpose Community Telecenter (MCT) was established in Jakar town by the ITU/BDT in 1999.
- o The objective of the MCT was as follow:
 - (1)public telephone, fax, email and photocopying
 - (2)data communication services (file transfer and email) through modem for simple applications: telemedicine, education and research, trade information services, government and community information

2. ITU Pilot Project- Telemedicine

- o A teleradiology link was established between Thimphu and Jakar in 2000.
- o X-ray images and medical data were transmitted as email attachment through a dedicated line at MCT.
- o System Configuration: Fine laser scanner, 2 laptop computers, software for image capture, compression, encryption and transmission.
- o Result: The only doctor at Jakar Hospital found it extremely helpful.

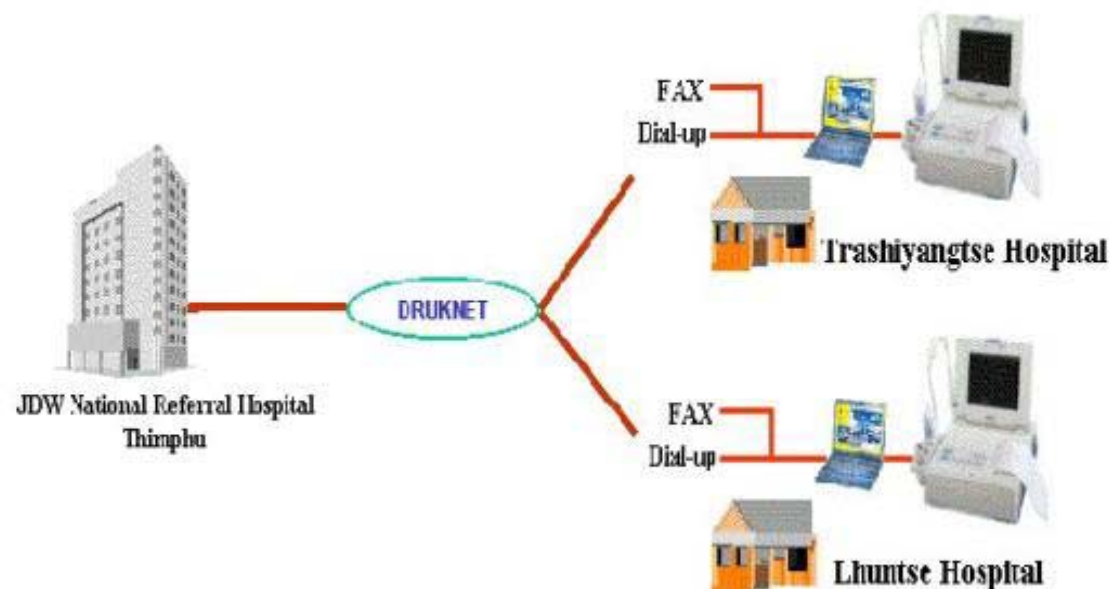
3. WHO - Health Telematics Project

- o On 20 Oct. 2000, Telemedicine Task Force was jointly formed by WHO and the Dept. of Health. A Health Telematics Masterplan has been drafted
- o JDW National Referral Hospital in Thimphu was connected to Mongar Regional Referral Hospital via a 64 kbps leased line in Sep. 2001
- o Telemedicine, including teleradiology, teledermatology and remote medical consultation, has been carried out since then. Training and tutorial courses have been delivered by the Short-Term Consultants (STC). Links to districts hospitals via dial-up connection are under studies

Tokai University - East Bhutan Tele-ECG Project

- o Objective: To install tele-ECG equipments at district hospitals in remote East Bhutan
- o Project description:
 - Two hospitals, Trashiyangtse Hospital & Lhuntse Hospital, were linked with Thimphu via dial-up connection
 - 12-lead ECG analyzer with a laptop computer were installed at each hospital
 - Training and tutorial course have been given
- o Benefits:
 - Improved medical care for cardiac and emergency patients
 - Early detection of pediatric abnormality
 - Cost-saving on referral cases
 - Reduced isolation and provision of CME for health-care workers through the Internet

Configuration of e-health Tele-ECG in Bhutan



Tele-ECG with Echo-graphy in Bhutan via dial-up Analog line(PSTN): for Consultation and second opinion





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Equipment used for this Tele-ECG Project

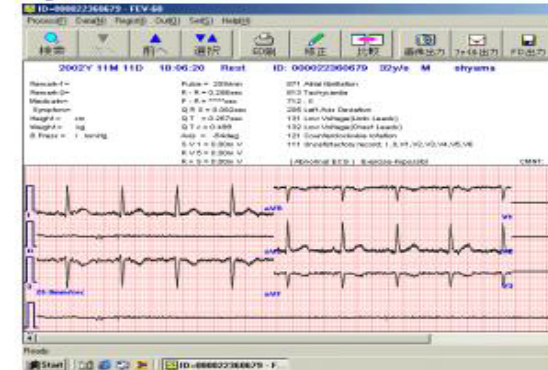


12 ECG and
Echocardiography



Flash memory card

ECG display on Computer system



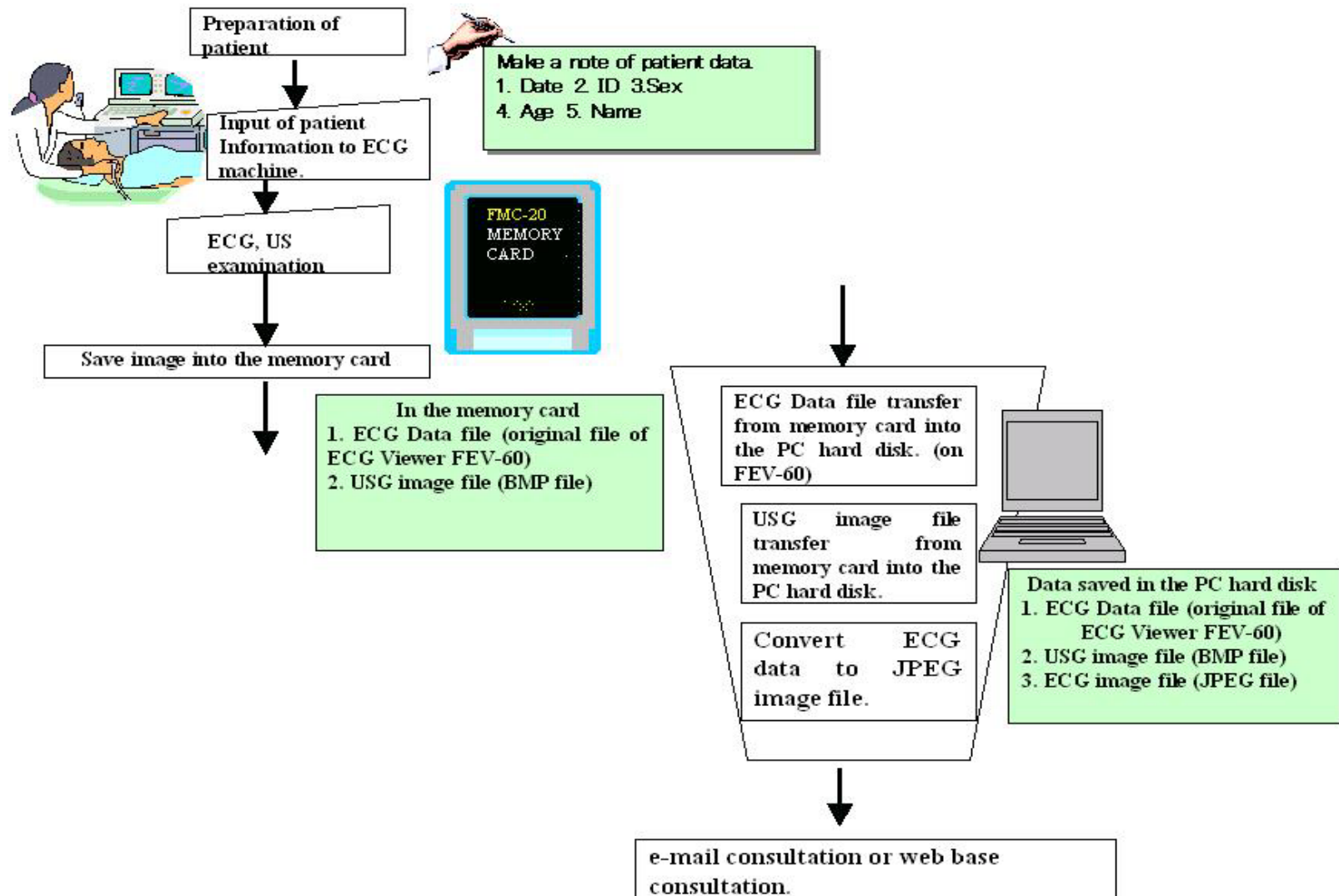
Portable computer (OS: windows me)



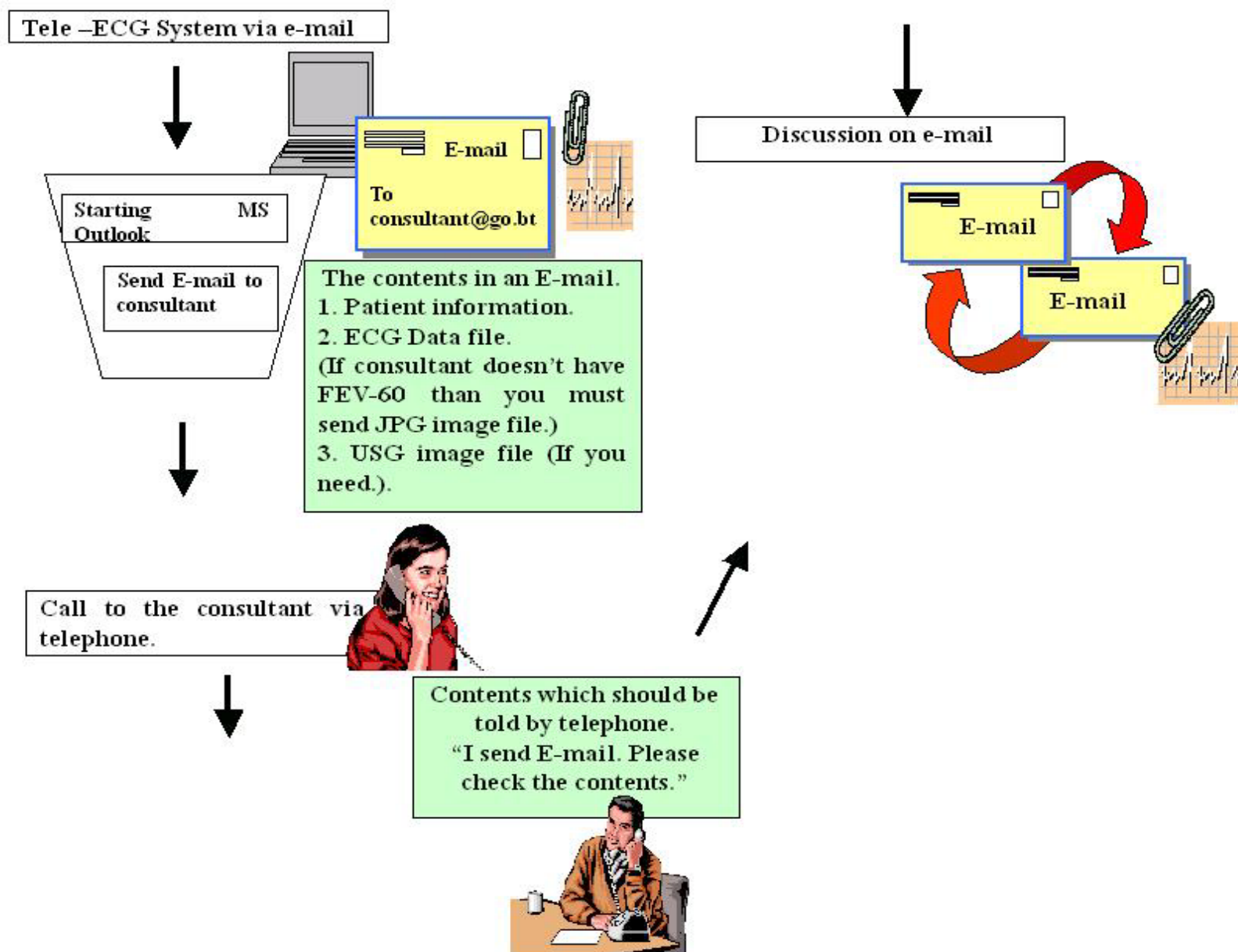
Use as workstation to Internet
connection and display ECG and
USG image.

Operation procedure of Tele-ECG system.

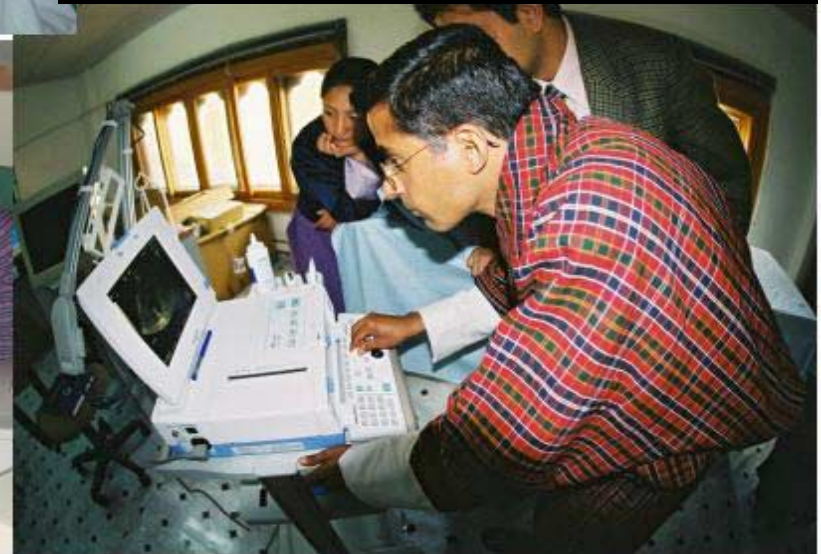
1. Examine Patient and save image data into the memory card



2. Teleconsultation and Second opinions based on sent patients data



Training to doctors and nurses in Bhutan how to use ECG, cardiac ultrasonography, phonocardiogram, and telemedicine system via Internet.



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Several Findings from Tele-ECG Project

- ECG machine is a new equipment for those 2 hospitals. Although we gave training, the time is not long enough to make them familiar with the equipment as well as operational procedure such as attach file to email.
- Healthcare professionals are excited with our project, they want to get further project for other hospitals as well as training program.
- Utilization of the equipment is still under studying.

Future Plan of e-health in Bhutan

- Tele-ECG will be installed to more hospital, training program should be conducted properly and will be arranged further.
- Tele-consultation will be conducted. Since last March 2003, tele-consultation in cardiology have been conducted between Bhutan`s hospitals and Tokai University of Japan.

APT Second Opinion Center at Tokai University

- On the completion of this tele-ECG Projects, connection has been established between Rural Trashi Yantse, Luntshe hospital and National Referral Hospital in Timphu as well as with Tokai University Japan. Second opinion center is held at Tokai University, to help local doctors in Bhutan dealing with cardiology. This second opinion center is supported by Asia Pacific Telecommunity (APT).
- Since then, about 12 patients` data have been sent. Second opinion for treatment and medication have been given by specialists at Tokai University. All discussion and patient data are sent by email, which shows that this system operation is very low cost and effective
- At the same time, training in ECG are also given to local medical staffs, in other the achieve better technique, especially in Using ECG machine as well as internet.
- Interim results seem promising for continuation of this system, and broadening the projects to more hospitals to achieve better service to patients.



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Example of Teleconsultation for Patient with serious case in Bhutan

1. Email and Data of Patient

Email from Medical Doktor from Bhutan send to Tokai University:

On Wed, 30 Apr 2003 16:47:54 +0600, username dhsoty <dhxxxx@druknet.bt> wrote...

dear sir,

This is a case of Ms Dxxx 19 yr old student who is having persistant hemoptysis and giddiness for the last two years. She has no other complaints. OE she is avg built. General examination is WNL. She has a weak pulse in the left side and a good volume pulse on the right. BP is 140/90 in the right and only 100/70 in the left. There is no radiofemoral delay.

She has a very prominent suprasternal pulsatile swelling which on palpation is likely to be arterial*the suprasternal hollow is full with the swelling* Chest exam is normal clinically and so is the heart execept the slightly loud second sound. No clinical evidence of heart failure.

Blood esr-75, ASO negative, Chest xray shows promonent aorta. I am sending her 2 D echo, PSL view ins syst and dias and also the suprasternal view. ecg also sent along.

please advise.

Dr. P. Bhxxxxxi, DMO
Trashiyangtse Hospital

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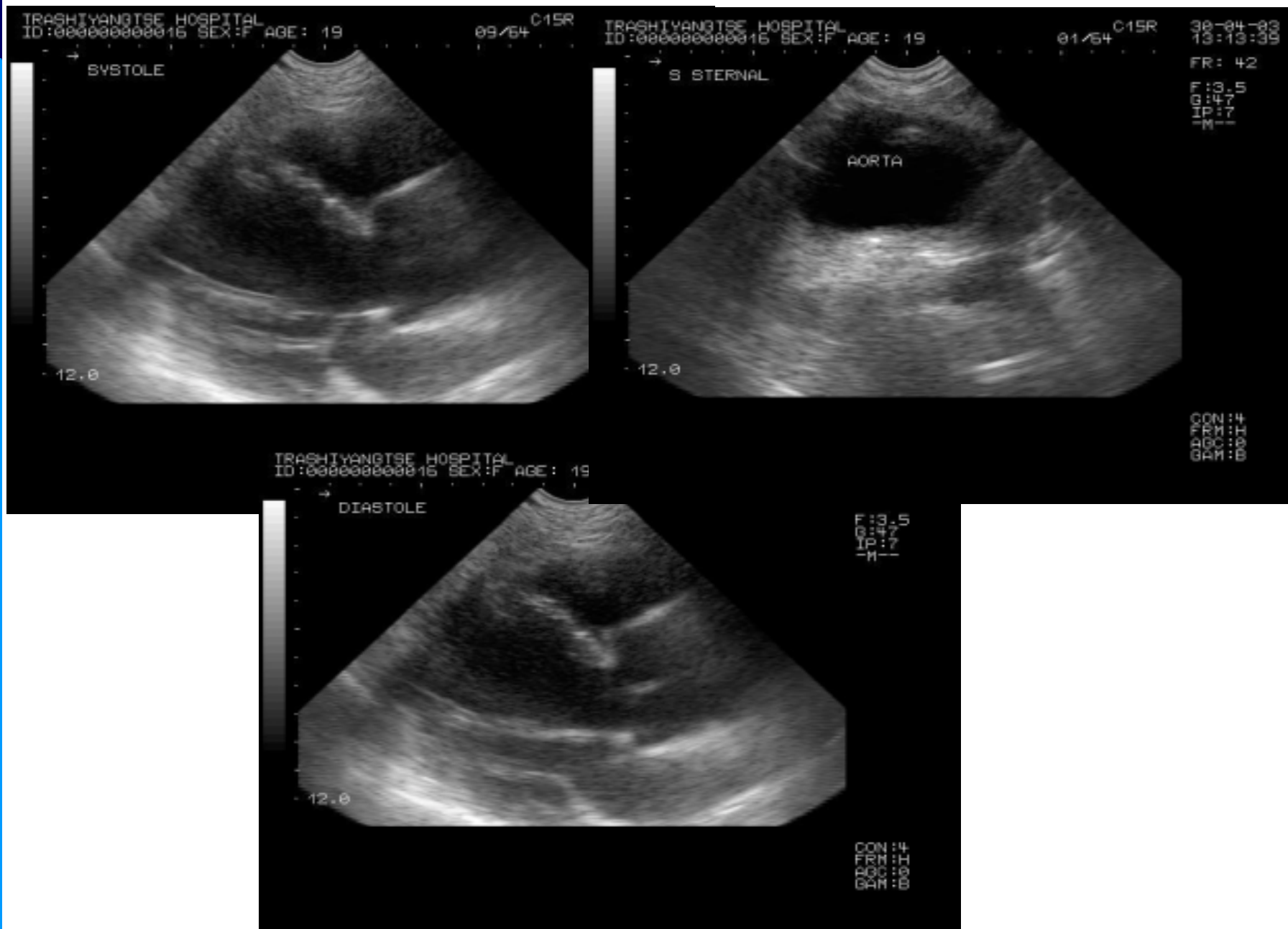
Get a free DrukNet e-mail account and stay in touch

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Data of Patient





2. Advise

From: <sxxxx@is.icc.u-tokai.ac.jp>
To: "username dxxxx" <dxxxx@druknet.bt>
Cc: "Futoshi Ohyama(Isehara)" <fxxx@is.icc.u-tokai.ac.jp>
Sent: Thursday, May 01, 2003 6:22 PM
Subject: RE
Dear DR Bxxx!

This looks to be a case of chronic aortic dissection or aneurysmal dissection. Please look for the signs of Marfan syndrome in this patient. I think it is better if you refer her to some cardiovascular center in india without much delay. In the meantime control her systolic blood pressure at 130mm Hg or below.
Dr.M.Athar. S (Tokai Univ.)

From: "Futxxx Ohyama(shonan)" <fxxxx@umin.ac.jp>
To: "dxx" <dxxxx@druknet.bt>
Cc: "sxxxx" <sxxxx@is.icc.u-tokai.ac.jp>
Sent: Tuesday, May 27, 2003 3:42 PM
Subject: 19-year-old female patient

Dear Dr.Bxxxxxx, Sr.Kxxxxx

Hello,

I am worried about the 19-year-old female patient introduced by you on the other day. (ID:16 aortic dissection patient) Has she already moved to Thimphu?

I have also cared many aneurysm patients in the past. Such a patient must control blood pressure enough.

And check the blood pressure of both hands, check the Dorsalis artery and Popliteal artery pulse.

The nursing care which softens uneasiness and pain control is also important to such a patient.

Please let me know about her progress.

F.Ohyama R.N.

Tokai/Japan

“Based on Teleconsulation, finally this patient was sent to referral hospital”

Workshop on Standardization in E-health



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Concluding Remarks

- o Telemedicine in Bhutan
 - very useful
 - step-by-step approach
 - sustainability
- o Evaluation from our current project will become feedback to gain better result for the future projects
- o Government of Bhutan and Health Professionals have high enthusiasms and welcome to this project which shows high potential sustainable of this project.

Acknowledgement

- This East-Bhutan Tele-ECG Project is sponsored by Ministry of Foreign Affairs Japan under Scheme of Grant Assistance for Grassroots Projects.
- We are very grateful to Ministry of Foreign Affairs Government of Japan and Ministry of Health of Bhutan for the cooperation.

Thank You

