

Telesurgery - Telementoring at the Faculty of Medicine and University Clinic Center of Banja Luka

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Telemedicine project on the Faculty of medicine in Banja Luka is telemonitoring service focused on the aspect of education.

As highly upgradeable and open for further extensions, this project provide basic conditions for multidisciplinary education (videoconferencing, distance learning, telemonitoring, teleconsulting), providing wireless connection in the real time between amphitheater of Medical faculty and two operating rooms at the University clinic center in Banja Luka on two different and distant location.

Using this system, students can follow surgical procedures in real time with plenty of details, to listen lessons given "on-line" from the remote sites, to create a database and CD ROM/VIDEO library.

The secondary benefit to the research centers at the clinic is an access to the university computer center via router at the Medical faculty providing Internet access on the LAN, but also possibilities for videoconferencing with scientists from abroad.

This project is an important step to use of advanced technologies in educational process, which offers many benefits to students and physicians and also is the first telemedical service used in the regular lecture in the universities of ex-Yugoslavia.

KEY WORDS: *Telemedicine; Teleeducation, Video-conferencing*

INTRODUCTION

Progress in area of technology and telecommunications in a few last years have played role of catalyst in health care development. In close future, medical institutions will practice wide usage of computer networks, great capacity memories for storing enormous quantities of data, as well as use of highly sophisticated work stations, with great level of interaction between human and machine, supported by powerful tools for signal processing, all with a goal of integration of multimode, multimedia diagnostic and human knowledge in medicine.

Telemedicine is practice of medicine and/or teaching of the medical art, without direct physical physician-patient or physician-student interaction, via an interactive audio-video communication system employing tele-electronic devices.

Also, the second definition of the Telemedicine should be the use of medical information exchanged from one site to another via electronic communications for the health of the patient and education of the students or health care provider and for the purpose of improving patient care.

Telemedicine has potential to improve delivery of health care in Republic of Srpska, as well as in entire Bosnia and Herzegovina by bringing a wider range of services such as radiology, surgery, mental health services and pathology to underserved communities and individuals in both urban and rural areas. In addition, telemedicine can help attract and retain health professionals in rural areas by providing ongoing training and collaboration with other health professional. Specificity of this geographical area is that app. 2/3 of population is rural, while 2/3 of health care providers are located in urban areas.

TELEMENTORING IN TELESURGERY IN BANJA LUKA - IN GENERAL

The main goal of the project is to create an upgradeable backbone of telemedicine infrastructure at the Faculty of Medicine (hereafter MF or central site), including operation rooms (hereafter OR or remote sites) that belong to the University Clinic Center. This infrastructure should provide various possibilities:

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- videoconferencing between physician at the OR and professor/moderator at the amphitheater
- distance learning
- capturing "grand rounds", surgical procedures, photos of tissues, etc. on video tapes or CD ROMS
- creating "off line" library on CD ROMS for students to use it in appropriate time in so-called "off line" mode

Telemedicine classes at the amphitheater, watching "on line" surgical procedures

Videoconferencing between local physicians and scientists distant from the MF

- Secondary benefit for research departments at the Clinical center is an access to the Internet via wireless LAN, as the main I/O unit will be connected to the BiHARNET (BiH Academic Computer Network) through the router at the MF

- Teaching (e.g. didactic lectures, demonstration of surgical or other medical procedures, and demonstration of uses of equipment), consultation, diagnosis, or deliberations.

Successful presentation of the project named Telemedicine at the Faculty of Medicine in Banja Luka was held on December 26th, 2000 when the first telemedical service was launched in BiH, in scope of surgical telemedical services, as well as Telemedicine in general in educational purposes.

PHASES OF THE TELESURGERY - TELEMENTORING PROJECT

The project has been built in two phases:

Phase I

In short, implementation of the phase one has provided building of necessary infrastructure for transmission of picture and sound from side of Clinical departments in the city centre and site on Paprikovac hill to the amphitheatre of the Faculty of Medicine. Two ways communication allows moderator of session together with students within the amphitheatre possibility to watch surgical procedure, to listen comments of the surgeon, but also to put questions either to surgeon or other expert who might be within the operating room.

Secondary great benefit of the project is provided access to the University LAN. This service provides students with access to medical databases at the Clinic, which are subject of regular classes.

Technical specification:

The phase has been realised using wireless communication via WLAN equipment, manufactured by BreezeCom (Israel), which provides wireless transmission of data using bandwidth of 1 - 3 Mbs, depending of weather conditions and other influences. Using H 323 protocol for video-audio communication through

LAN, this allows transfer of video and audio signals in sufficient quality to be presented to great audience in educational purposes. We use VCON (Israel) equipment for capturing picture and sound. Being enabled to adjust wanted ratio between quality of video (CIFF) and audio data, cards embodied in PCs provide compressed signal that will be transmitted via WLAN. Connection of two cameras and one microphone (or other audio device) enables switching from small room camera to the camera above operating table. Picture 1 shows connections among sites.

- SA -10D - station adapter (connected to the uni-directional antenna on Paprikovac hospital)
- AP - 10D - access point - multipoint device connected to omnidirectional antenna on the roof of the Faculty of Medicine
- WB - wireless bridge - allows all computers of LAN at the Surgery clinic to be visible to the access point, providing their direct connection to the Internet, as well.

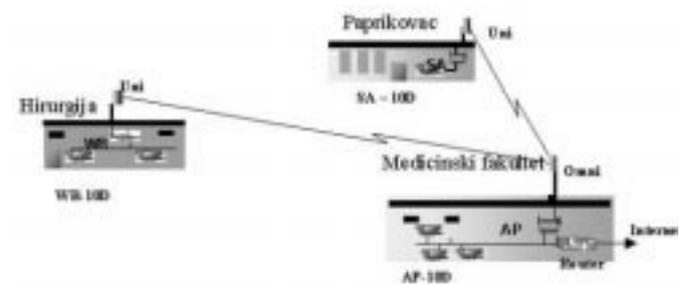


Figure 1. Connections among sites

Phase II

(Extension of services to other surgery departments)

The second phase of the Telemedicine project includes upgrade of the existing project by equipment which primary provides mobility of telemedical services, what should allow their use at other surgery departments, because of great interest of leaders at those crucial disciplines (urology, orthopaedic department, plastic surgery,...).



Figure 2. Line of visibility between two sites, antenna on Paprikovac hospital and operating room equipment for capturing video and sound

This phase should provide some additional benefits, such as:

- every day use of telemedicine in education, affordable by easier handling with devices and by mobility of the equipment
- better introduction of students with present and future possibilities of telemedicine
- decreasing of maintaining costs and easier use of the same ones

- decreasing of costs for education of employees at the Faculty and Clinic

Technical specification:

- 1 x MediaConnect 6000 VCON, mobile device that incorporates a modern PC and videoconferencing equipment (self-navigating camera, microphone and speakers), movable and simple for use in any classroom, at any position within the Faculty or Clinic. The same device will use the faculty's access to already existing WLAN
- 1 x LCD projector, for displaying picture of great size and resolution, essential for transmission of details that appear in surgical procedures, in particular at ORL department
- 2 x Access Point BreezeCom - devices for enlargement of WLAN, 300m range in inner space, which should provide access from any OR or cabinet for clinical subjects
- 1 x Wireless network card for laptop, which provides communication between mobile and above mentioned Access Points
- VIGO Professional VCON, minimised professional device for videoconferencing, connected to the laptop, it provides simple handling even for purely educated user, two cameras inputs plus microphone

FURTHER ACTIVITIES

Particular opportunity that Telemedicine offers for the Faculty of Medicine in Banja Luka is distance learning through video-conferences between the Faculty and other respective institutions from the region and the world. That is our next target that our institution will be focused on, through a few ongoing projects within BiH surrounding.



Figure 3. Preparation of equipment for telemedical session and scheme of possible upgrade