

# Telemedical Technologies in Education: Experience of Introduction and Prospect of Development at Medical University of Gomel (Belarus)

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The introduction of telemedical technologies in educational process makes preparation of medical specialists more expanded, visual and substantial. For the organization and the use of information technologies they are necessary high-speed connection channels, the computer and digital medical equipment, the trained personnel. Development of technologies is especially needed for communication with remote areas where are suffered most by Chernobyl accident.

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## Introduction

Introduction of modern technologies in medical branch has created new area of information space. Telemedicine allows to consult, train and diagnose in remote areas without direct "live" communication between the doctor and the patient.<sup>1</sup> Process of interaction is carried out with the help of communication lines and the special equipment.

Utilization of telecommunication technologies, which connect all medical participants (doctors, consultants, laboratory workers and patients), allows to proceed on qualitatively new level in rendering medical aid to the population to raise qualification of the personnel. There is accessible an operative consultation, a choice of a technique of treatment and discussion of clinical images of patients with medical specialists of all around the world. The establishment of such systems is extremely important for patients and doctors in remote area. Remote contact also allows to analyze clinical database, including clinical images such as X-ray, ultrasound and electrocardiogram, for researches and doctors. Through such utilization of telemedicine, doctor can obtain up-dated medical knowledge and skills, as well as information on the modern techniques of diagnosis and treatments. Furthermore, development of medical educational materials using modern technologies definitely contributes to the education of medical doctors and students in remote areas.

In these points of view, we developed tele-education system within a framework of "Medical Relief for Children Affected by the Chernobyl Accident through the Development and Implementation of Health Telematics", which is a joint project of World Health Organization (WHO), Sasakawa Memorial Foundation (SMHF) and the Ministry of Health of the Republic of Belarus.<sup>2,3</sup> In this communication, we review our current activity on the establishment of tele-education system in Gomel region, Belarus.

## Establishment of tele-education system in Gomel

The term of "telemedicine" had appeared on the medical literature since 1970s.<sup>4</sup> However, in the area of practical public health services, this technology has introduced and rapidly developed during recent years,<sup>5</sup> since the transfer of clinical images needs high-speed liaison channels with the high-speed terminal equipment (routers, modems, computers), the multimedia technique, the special analog-digital diagnostic medical equipment. So, only highly developed states have developed telemedicine as branches of public health services.

In Belarus, since 1998, we developed the healthtelematics project within a framework of "Medical Relief for Children Affected by the Chernobyl Accident through the Development and Implementation

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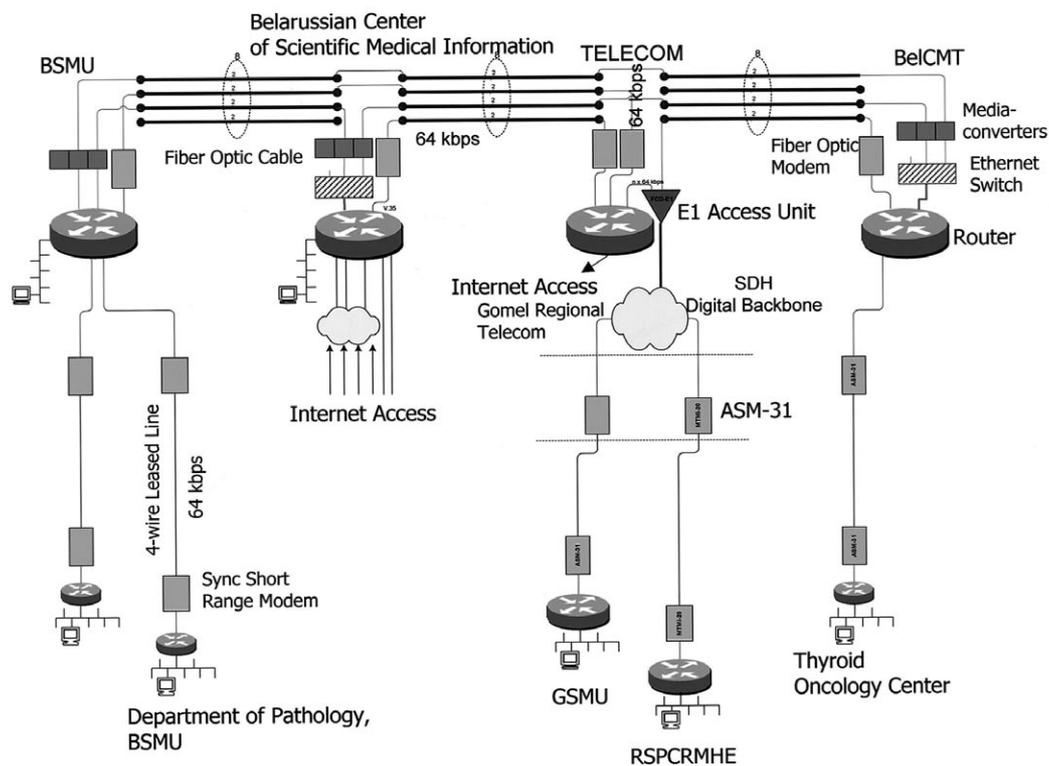


Figure 1. Telecommunication infrastructure for the establishment of telepathology and tele-education system in Belarus.

of Health Telematics". Gomel State Medical University participated in this project, especially in a field of tele-education. Besides our university, Republican scientific-practical center of radiating medicine and ecology of the person in Gomel, Belarusian Center of Medical Technologies (BelCMT) and Belarus State Medical University participated in this project.

In accordance with the Plan of Operation of this project, computer, network, medical equipment has been introduced in each participant. Medical experts were trained for the software operation for remote diagnostics and consultation of patients by thyroid cancer. Nowadays, participants of the Project are united into closed network to exchange information (Figure 1), to participate in the seminars and videoconferences, and to introduce the software by tele-education and telepathology.

### Establishment of Tele-education system in Gomel State Medical University

The participation of Gomel State Medical University in the project has opened essentially new opportunities in the organization of educational process in high school, improvements of professional skill of the personnel in medical establishments of the Gomel region. At university, the local computer network has been organized under the control of the Telemedicine Center, and the multimedia equipment has been purchased. Our Telemedicine Center is in charge of the maintenance with computer technologies and resources of educational

process, scientific, medical activity, interuniversity and international activity in the field of information technologies. On the server of the Center, more than 150 programs of the medical lecture have been established. The electronic catalogue has been created, and it is actively used by students, teachers, post-graduate students, trainees of university and medical doctors (Figure 2). All 32 departments of university developed multimedia lectures on all basic disciplines. Employees of the Center render the advisory and practical help in use of multimedia technologies at the organization and carrying out of training seminars, conferences in hospitals and clinics of the regional center. More than 200 employees of university have been trained to operate computer and multimedia equipment.

In the Center, electronic manuals have been prepared, in cooperation with clinical departments. For this purpose, we used the digital

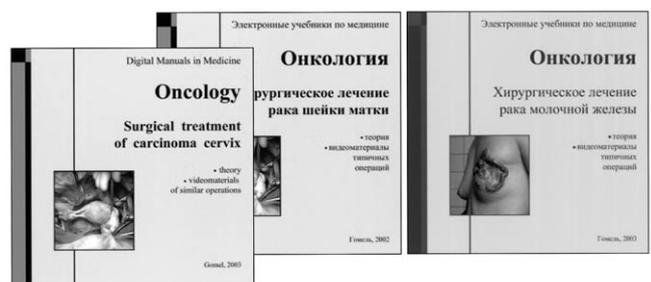
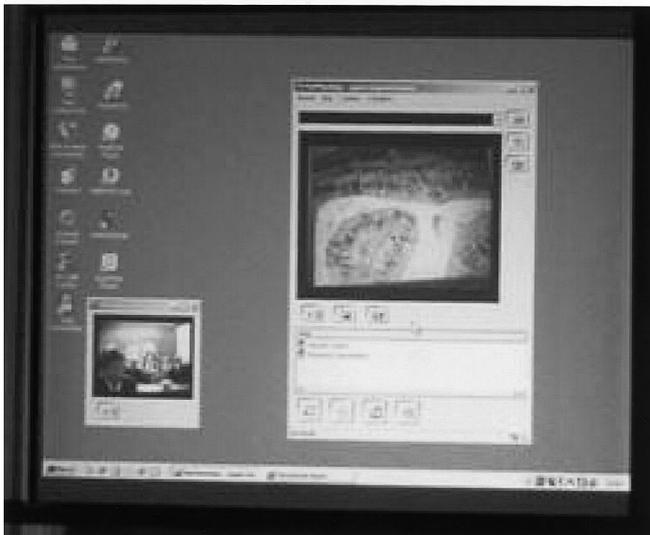


Figure 2. Tele-educational software developed by Gomel State Medical University.

and analog-digital equipment, allowing writing down, reproducing and processing with the help of a computer the text, image, video and sound. With these electronic tutorials, each person is able to participate in "live conference" of the surgical operations, special medical techniques and studying of "rare diseases" with detail comments of leading experts. Such approach, from our point of view, allows us to study surgical operations much more effectively, than by demonstration of operations in "on-line"-mode with use of telecommunications when doctors should concentrate to the operation, instead of on performance it to associates.

Opportunity to access from each computer of the Center to resources of electronic medical library in Minsk essentially enriches process of our training. Since 2004, we have established the network for video-lectures at "on-line"-mode between Gomel State Medical University and Belarussian State Medical University (Figure 3).



**Figure 3.** "On-line" lecture between Gomel State Medical University and Belarussian State Medical University.

## Problems and prospects

The network system which we use within a framework of this project is digital 64 kb/s link between Gomel and Minsk. It is insufficient for high-quality transfer video- and sound, and for simultaneous work in internet of a large number of computers. Therefore, we established a common network with remote departments on the basis of system "a point-many points" with access to already available network system. Information exchange of department computers with the server of the Telemedicine Center, an opportunity of use of the extensive constantly replenishing electronic catalogue on all directions of medical knowledge will allow training of students at modern level. Through this network, doctors can communicate, exchange graphic and video information. Also doctors can consult other doctors, participate in joint forums and videoconferences. Since most of graduates of our university work in the Gomel region, further development of the network should include hospitals situated in remote areas affected by the Chernobyl accident for diagnostic and treatment support.

## Conclusion

The introduction of telemedical technologies in educational fields definitely contributed to carry out our education for medical experts more all-round, evident and thorough. These methods are also introduced in post-graduation education and improvements of professional skill of doctors. The network offered by us, will allow connecting not only departments of university, but also all major medical institutions of Gomel region. It will develop the future telecommunication technologies at all levels of public health services from polyclinics to scientific laboratories. Furthermore, the residents, as well as workers of public health services in "30-km zone" will be included in the health monitoring system behind a state of health.

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