



*Teleeducation, Telemedicine, e-learning,
videoconferencing, Flash Macromedia Player*

Wojciech GLINKOWSKI^{*, **, ***}, Konrad MAKOSA^{***, ****}, Szymon PAWLICA^{***, ****},
Krzysztof Marasek^{****}, Andrzej GÓRECKI^{*},

MEDICAL INTERACTIVE TELEEDUCATION VIA INTERNET BASED VIDEOCONFERENCING

The use of videoconferencing systems through the Internet teletransmission connects physicians around the world without the limits of distance. The aim of the study was to evaluate our own experience based on Webinars and Congresses (national with international participation and fully international) presented over the Internet on topics related to various branches of medicine including orthopedics and orthopedic trauma and telemedicine. Application based on (Macromedia) Adobe Flash Player program was set on videoconferencing system. The chat was organized and followed along with Webinar transmission allowing interactive communication and asking questions during the conference "on line". The quality of the image transmitted during the Webinar was mostly screen size and resolution dependent. Lectures, Images and live movies send via Flash Enhanced videoconference were seen in real time. Teleeducation team delivered worldwide interactive videoconferences accessible through the Internet. Between Nov 2005 and June 2006 approximately 200 attendees accessed our conferences transmitted online. Good quality Web camera was used for broadcast over the Internet. The internet as an international communication network between international centers of excellence allows multidisciplinary exchange of medical information among specialists from different countries and cultures. Improvements in videoconferencing systems, accepted by lecturers and participants, permit interactive distant communication and decrease their costs. Teleeducation videoconferencing seems to enable providing and receiving CME without traveling long distances. Flash enhanced Web seminars may not replace in person conferences or lectures but teleeducation broadcasts may supplement other CE activities.

1. MEDICAL INTERACTIVE TELEEDUCATION VIA INTERNET BASED VIDEOCONFERENCING

1.1. INTRODUCTION

The information age is revolutionizing the practice and education of medicine and surgery. The use of videoconferencing systems through the Internet teletransmission connects physicians around the world without the limits of distance. All medical specialties require Continuous Medical Education to progress and update practicing physicians. Most of doctors need to organize practice and look for replacement when attending to updating conferences outside their home city or rural area. New techniques presented during conferences and updating courses require seeing first how the

* Chair and Department of Orthopedics and Traumatology of the Locomotor System, Center of Excellence "TeleOrto", Medical University of Warsaw, 02-005 Lindleya 4, Poland

** Department of Anatomy, Center of Biostructure, Medical University of Warsaw

*** Polish Telemedicine Society

**** Multimedia Department, Polish-Japanese Institute of Information Technology, Warsaw, Poland

skilled surgeon is doing it. Live transmission is often mentioned as a useful tool for this purpose. The Academic Research and Clinical Centers usually present live practical skills techniques or surgeries during stationary courses and conferences. It is relatively rare to have an opportunity to attend the net conference offering live practical observation via internet. The aim of the study was to evaluate our own experience based on Webinars and Congresses (national with international participation and fully international) presented over the Internet on topics related to various branches of medicine including orthopedics and orthopedic trauma and telemedicine.

Material and method

New software developed by one of co-authors has been implemented for Internet accessible videoconferencing. Application based on (Macromedia) Adobe Flash Player program was set on videoconferencing system. The *Real Time Messaging Protocol* was implemented for multimedia communication. Pocket PC devices were also enabled to receive Webinar. On line chat was organized and followed along with Webinar transmission allowing interactive communication and asking questions during the conference "on line". Our material covers four Webinars organized in cooperation by Chair and Department of Orthopedics and Traumatology of the Locomotor System, Center of Excellence "TeleOrto" and Polish Telemedicine Society. Various mobile devices were tested for the purpose of attending the Webinars, for example: Qtek 2020 devices running on Windows Mobile operating system. Displays used in a study varied from radiology dedicated screen, 240 x 320 pixels TFT (MDA) and 176x220, 1.8 inch TFD, 262k colors (mobile phone). Transferred via WiFi Webinar was acceptable. The quality of the image transmitted during the Webinar was mostly screen size and resolution dependent. The best resolution was achieved on PC screen. Images and live movies send via Flash Enhanced videoconference were seen in real time. Internet based Flash Enhanced Videoconference was found as a useful and attractive media on orthopedic lectures of knowledge update based on teleeducation. Teleeducation team delivered worldwide interactive videoconferences accessible through the Internet. Between Nov 2005 and June 2006 approximately 200 attendees accessed our conferences transmitted online. Part of the group lives in rural and suburban areas. Most of participants work in hospitals. Over 80% of participants were physicians. Topics included orthopedics and telemedicine. There was no charge for participant's certificate of attendance. Considering clinically oriented material including live surgery unique identifiers were required for participation. Good quality Web camera was used for broadcast over the Internet. Online and offline Internet based videostreaming was utilized for distance –education system. Center of Excellence "TeleOrto" widely uses telemedicine approach in order to allow easier, quicker, and more effective access to orthopedic and medical knowledge. Over the past 2 years, Center of Excellence has established a reputation as a unique educational and training center in Orthopedics and Traumatology.

Discussion:

Telemedicine becomes the new necessary way for teaching and practicing medicine and surgery [20]. Telemedicine practice including teleeducation, teleteaching, teletraining, telementoring have been introduced into daily services. Health-care professionals employ many methods to lifelong stay updated to medical sciences progress. They attend various forms of Continuous Medical Education including reading books and journals, attending rounds, workshops, lectures, and conferences. The goal of Continuous Medical Education (CME) is to maintain a high level of competence, through continuing education courses and clinical privileging confirming the ability to practice specific techniques. Tele-education has been used for many years to deliver continuing education programs to rural health-care professionals. It describes application of information and communication technologies (ICTs) in the delivery of distance learning. Videoconferencing allows successful development of the concepts of medical and surgical teleeducation [16]. Videoconferencing is typically delivered using digital connections (e.g. ISDN lines), satellite, or fibre-optic cable. Internet-based technologies (e.g. email and the World Wide Web) and videoconferencing are the most common tele-education technologies being used [6]. Internet transmission using currently available hardware and Internet capabilities allows achieving real-time or simultaneous surgical teleconsultation and education to students in distant locations video-teleconferencing.

Video image captures and image transmission are required to provide successful medical teleeducation. High-resolution video imaging cameras can transmit accurate visualization of the surgical field and share the surgical procedure with trainees and, or consultants in a distant location. Rafiq et al. presented the feasibility for mentoring and consultation to a remote audience with visual transmission of the surgical field, which is otherwise very difficult to share surgery [18]. Obtaining an acceptable quality of image display is necessary to provide videoconferences delivering a transmission of medical images through the Internet. Multimedia computer-aided learning in medicine will introduce important changes in surgical education [10, 3]. New methods from the "information age" progressively replace surgical teaching methods previously based on apprenticeship only. It is highly expected that surgeons will soon be able to acquire practical skills, theoretical knowledge as well validate and test their new competences from any location, using computer technology [7, 14].

Physicians can have access to expert's lectures and discussion through internet Flash enhanced videoconference and chat used in our study. The interventional specialists can make own remarks during ongoing procedure but he can telementored by the expert specialist during the procedure through videoconferencing [4, 8, 9, 11, 13, 15, 17, 18, 21, 22,].

Allen et al. [1] utilized videoconferencing to provide distance education for medical students, physicians and other health-care professionals, such as nurses, physiotherapists and pharmacists. They found that videoconferencing has been well accepted by faculty staff and by learners, as it enables them to provide and receive CME without traveling long distances.

Videoconferencing plays very important role in international medical scientific linking. Anogianakis et al. [2] have set clinical and educational telemedicine link between the Medical University of Varna in Bulgaria and the Faculty of Medicine of Aristotle University of Thessaloniki in Greece utilizing various modalities including videoconferencing via ISDN. They found that telemedicine experience greatly improved the quality of care available to travelers and migrant workers in cases where the patient cannot communicate with the attending physician because of a language barrier. Ricci et al. [19] pointed out that physicians in rural communities have limited access to continuing medical education (CME) opportunities.

The significance of teleeducation videoconferencing was assessed due to its effectiveness and CME credits gain. It was hypothesized that CME could be delivered via a telemedicine network as effectively as in-person [19]. Compared to having the presenter in the room, attendance through telemedicine approach was judged to be "more effective" in 19% (n = 334), equally effective in 60%, (n = 1074), and "less effective" in 21% (n = 367). The study conducted by Krupinski et al. [12] analyzed factors that influence the decision to attend or not attend tele-education broadcasts via a telemedicine network for continuing education (CE) credits. The topic and perceived utility of the information for respondents were most influencing factors the decision to attend a broadcast. Respondents gained less than 25% of CE credits through teleeducation broadcast attendance. They concluded that tele-education broadcasts may supplement other CE activities but may not replace them.

Videoconferencing technology commonly used for university educational applications has the potential for bridging urban-rural divide for the benefit of new and continuing health professions education [5]. Evaluation data have shown overall satisfaction rating averaged 80% mainly due to VGA only transmitted lecture screen. Participants confirmed that

the teleeducational methods help them to understand new technologies in their field. They estimated the likelihood of the information changing their practice at 85%.

Conclusions:

The internet as an international communication network between international centers of excellence allows multidisciplinary exchange of medical information among specialists from different countries and cultures. Improvements in videoconferencing systems permit interactive distant communication and decrease their costs. Utilizing telemedicine videoconferences distance education can be provided for medical students, physicians and other health-care professionals, such as nurses, physiotherapists and pharmacists. Videoconferencing seems to be accepted by faculty staff and by participants. Teleeducation enables to provide and receive CME without traveling long distances. Flash enhanced Web seminars may not replace in person conferences or lectures but teleeducation broadcasts may supplement other CE activities.

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