The use of telemedicine for orthopaedics and traumatology of the musculoskeletal system

Teleradiology is largely and successfully implemented all over the world. Videoconferencing, telediagnosis, teledmedical education, teledconsultations, telediagnoses, telesurgery, and telepresence during surgical procedures are just some of the many telemedical applications in use today.

The TeleOrto Centre of Excellence in Warsaw, Poland, not only applies teleradiographic and telediagnostic and teleducational technologies, but also makes use of telerhabilitation to support orthopaedic treatment. This innovative and inexpensive technology has proven to be an effective telemedical tool.

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Telemedicine and eHealth are both umbrella terms for "medical care at a distance." Recently, however, the term "telemedicine" is becoming narrower because it infers the direct involvement of a registered physician who accepts medical responsibility. By definition, telehealth and eHealth seem to be terms that are less restrictive.

In some of the older hospitals that were built as a complex of separate constructions, it is essential to be able to rely on modern, not only applied teleradiographic and telediagnostic and teleducational technologies (ICT) to achieve faster, better and more efficient healthcare delivery. Many of these older hospitals do not yet benefit from integrated PACS/RIS/HIS systems, but well developed mobile technologies now offer GPRS or even UMTS communication. Telemedicine may actually have a greater impact on these earlier medical facilities than on modern and technologically advanced healthcare institutions.

Tele-education

Distance education and training for orthopaedics and traumatology of the musculoskeletal system is used worldwide. More recently, however, orthopaedic webinars have been introduced. Webinars together with on-line testing procedures lead today's orthopaedic surgeon into a new era of continuous education.

The possibility to log into lectures online and attend real-time surgical procedures not only makes new orthopaedic knowledge more widely available to busy residents from distant hospitals, but also has the added benefit of encouraging access to Continuing Medical Education (CME). Interactive communication tools allow students to direct their questions to the operating surgeon. The webcast utilises Macromedia Flash Player programming, which supports World Wide Web browsers. Flash Player is set on both sides of the videoconferencing system. Moreover, multiplatform availability of Flash Player makes it operable on Windows, MacOS, Linux, PDAs and Symbian operating mobile phones.

Storage of the webinar allows users to log in off-line for detailed analysis. Stored recording, though not open for questions, may contain most frequently asked questions from the online edition.

The knowledge gained during transmission can be evaluated with post Webinar tests. The Multiple Choice Question (MCQ) engine provides an alternative assessment procedure. This special tool was developed to prepare and complete individual tests with rising levels of difficulty for students, residents and specialists. The system has been designed to modify the sequence of study, and the engine is able to improve both the learning and the examination processes. The subject-question-answer approach provides a virtually endless supply of multiple choice items from a limited dataset. Multiple shuffled sets of equivalent question/answer sets can be created. The engine is operable via the Internet browser. Students can be given permission to access the examination material. The engine can generate many MCQ versions, and each student can thus receive a personal test version.

The system includes a variety of functionalities including a statistical data analysis tool, a sophisticated exam composer module, output in PDF file format and multilingual support.

Image analysis enhanced telediagnostics

This orthopaedic therapeutic support tool is the brain-child of researchers from the Department of Orthopaedics and Traumatology of the Locomotor System at the Medical University of Warsaw, Poland. Notwithstanding the great progress made in medical imaging, the classical X-ray image is still the main diagnostic medium used in orthopaedics. The first in a series of successful "TeleOrto" projects carried out at the department of orthopaedics were the development of an Image Evaluation module and a Fracture Healing Monitor module. The former enables doctors to conduct remote analyses of digital/digitised X-ray images to detect skeletal trauma and other pathologies. The second telerhabilitation module is a Decision Support fracture-healing package.

The RDIDA (Relative Optical Density Image Analysis) system allows users to monitor the mineralisation of the fracture gap on a digitised X-ray and objectively measure the healing progress. This system also enables physicians to monitor osteolysis, the wear-and-tear of orthopaedic implants or other bone pathology. It appears to be a very useful tool considering the limited availability of quantitative clinical monitoring methods. The images for evaluation can be remotely uploaded. The database is expanding, and in the near future will become an excellent information source on fracture healing.

Telediagnosis

Imaging telediagnostics is a valuable tool, for example, for hospitals located at some distance away from each other, yet within the same clinical campus. When consulting with patients, radiologists may want to see a wound site or clinical region of interest (ROI). Hence, sending digital images taken during wound dressing or at the time of undraping the patient provides an effective and time-saving solution. From a clinician's point of view, the images are widely used in orthopaedics and orthopaedic trauma.

References


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