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# Telemedicine in the Context of Different Medical Specialities. The Polish Perspective

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**Two types of telemedicine are considered in the paper: pre-recorded and real-time. The advantages and disadvantages of each type are described.The choice of telemedicine type depends on medical speciality. The separate branch of telemedicine - teleprevention of civilization diseases is discussed and examples of relevant WWW services in Poland are given. The own work examples of the Dept. of Medical Informatics, MUW, namely Onco-service of 200 protocols used in hematology and oncology and Cardio.net - a distributed teleinformation system for cardiology, are presented. In conclusion: the barriers of the development of telemedicine in Poland are caused by the organization of health service - Patients Funds using different software, no messaging standards and different reimbursement systems.**

## Introduction

Telemedicine is any system of medical care in which doctor and the patient are at the different locations. The often claimed effects of telemedicine are: better access to health care services, better efficiency, decentralization - the services of higher level are taken over by a lower level. Usually, the technical, economical and medico-legal aspects of telemedicine are considered. With regard to technical aspects (Table 1 [3]), the low popularity of Integrated Services Digital Network (ISDN) in Poland due to its relatively high cost, is characteristic in comparison to Western Europe. The standards of data transmission (HL7) [5] are not implemented in the medical software. The economical aspects are difficult to consider as telemedicine services are not included in plans of health providers. In medico-legal aspects [10] the main areas of concern are security and confidentiality. The other areas such as professional responsibility, technical and clinical standards, intellectual property rights, licensure and reimbursement are often neglected. In Poland the doctor's license is valid in the whole country which is opposite to such countries as Canada where doctor's license may be valid in just one hospital. In Canada such license is also valid for telemedical consultations performed from that hospital. The confidentiality of patient data in Poland is protected by the Personal Data Protection Act approved by the Parliament in 1997.

## Types of Telemedicine vs. Different Medical Specialities

Telemedicine includes different medical specialities. The most frequent applications are teleradiology, telepathology, telecardiology, emergency medicine, telesurgery, teleoncology, telehomecare. Also teleprevention of civilization diseases can be mentioned. Each speciality poses specific requirements.

Two types of telemedicine can be distinguished: pre-recorded [2] and real-time [11].

The advantages of pre-recorded are that there is no need for organization of a simultaneous meeting of a doctor and a patient, and that it operates on a low bandwith. It is often used in teleradiology and telepathology.

The advantages of a real-time are: immediate result and possibility of obtaining additional information if required. It also meets patient expectations. The examples of applications can be telepsychiatry [1] and telecardiology [4].

The requirements related to reaction time are very different for different diseases. The most demanding ones are for ischemic diseases such as acute coronary syndromes and stroke [6]. The real time telemedicine, shortening the time from the onset of symptoms to the diagnostic and therapeutic intervention, is most appropriate here.

## Teleprevention of Civilization Diseases

The separate branch of telemedicine is teleprevention of civilization diseases and health promotion**.** Several diseases can be included in that group of namely: neoplastic diseases, circulation diseases, diabetes, stroke and mental disorders. The prevention of civilization diseases can be achieved via internet services addressed to patients and doctors. The services should comply with the standards of eg. Geneva Health on Net Foundation.

**TABLE 1**
Telecommunication systems used in telemedicine (according to Falconer [3])

| System | Data transfer rate | Coverage | Investment costs | Running costs | Applications |
|---|---|---|---|---|---|
| PSTN | 28.8 kbit/s | Common in industr. countries | Low | Low | Data (eg. text) |
| ISDN | 128 kbit/s | As above | Low | Low | Text, static images |
| ISDN | <2 Mbit/s | As above | High | High | Dynamic images |
| Leased lines | 64 kbit/s - 2 Mbit/s | Available in many countries | Medium | Low/Medium | As above |
| Microwaves | <30 Mbit/s | As above | High | Very low | As above |
| Satellite | <2 Mbit/s | Global | High | High | As above |
| ATM | 155 Mbit/s and more | Restricted | High | Medium/High | As above |

Many WWW services were created in Poland. They are of 2 types:

a) information, passive ones:
hypertension - www.nadcisnienie.pl,
ptkardio (heart) - www.ptkardio.pl,
diabetes - www.cukrzyca.pl,
onkonet (oncology) - www.onkonet.rco.pl;

b) active - diagnostic ones for vision, hearing and speech www.telewelfare.pl.

Service www.nadciśnienie.pl was built by the Polish Arterial Hypertension Association. It offers, among other information, a test determining the risk of coronary disease, myocardial infarction or stroke. The method of blood pressure measurement is described in a user friendly manner.

The active diagnostic services for vision, hearing and speech were designed and built by the Gdańsk Institute of Technology in cooperation with the Institute of Physiology and Pathology of Hearing (hearing diagnostics) or the Clinic of Ophthalmology of the Medical University of Warsaw (vision diagnostics).

These internet services represent a completely new approach in screening methods.

## The Own Work of the Department of Medical Informatics, MUW

Our own work includes www.amwaw.edu.pl/onco - oncological and hematological service for doctors and nurses and Cardio.net - a distributed teleinformation system for cardiology [9].

Onco is a database accessible via Internet of 200 protocols used in hematological and oncological diseases. The doses of drugs can be calculated correspondingly to the Body Surface Area (BSA) or weight of the patient and displayed in the form of orders for nurse. The important information regarding the way of dissolving the drug, maximum doses and necessity of hydrating the patient is presented.

Cardio.net is a distributed teleinformation system for cardiology integrating teleinformation and network solutions, and simultaneosly introducing new standards of cardiological care with particular reference to intervention cardiology. Cardio .net is planned as a tool to reduce the time from the onset of symptoms to the cardiological intervention, which in turn can reduce the mortality rate.

Main goal is the design and implemention of the prototype system in Mazovia and Pomerania Districts. Then dissemination of the system to other districts in Poland will follow.

It is expected that the system will increase the efficacy of highly qualified cardiological care *via*:

- creating the network of cooperating cardiological centers on the basis of existing centers and introduced digital telecommunication system,
- teleconsultations enabling the access to knowledge and experience of specialists in cardiology/cardiosurgery on the basis of data acquired within electronic patient record (EPR),
- rationalization of the specialized clinical resources and access to unified, distributed digital archives of cardiological data,
- local or remote use of modern visualization modeling techniques (3D reconstruction of cardiac muscle and coronary vessels, educational portal Healthy Heart).

The structure of the system consists of 3 layers: reference centers, regional hospitals, individual (mobile) monitoring. The last layer performs the task of intelligent ECG monitoring and alerting the regional hospital in case of a sudden cardiovascular incident. The regional hospital can obtain the teleconsultation regarding the need for cardiological/cardiosurgical intervention from the reference center. If such intervention is decided upon the patient is transported to the reference center.

The tasks to be done with the development of the system include the design of telecommunication infrastructure, incorporating data transmission standards such

as HL7 [5], DICOM [8] work on security and safety of the system. The backbone informatics structure of cardio.net will be of a computational grid type with the distributed digital archive (data grid) performing closely to real-time. The separate task is creating EPR for cardiology and archive of EPR's.

The last task is the Decision Support System incorporating knowledge base of "Acute Coronary Syndromes" and visualization modeling tools for 3D reconstruction of cardiac muscle and coronary vessels.

Several modules of the system such as EPR, decision support system "Acute Coronary Syndromes" have been completed. The archive design is close to completion and its fulfillment will be started soon. The system will be verified in its prototype implementations.

## Conclusions

- The shift from telemedicine to teleprevention of civilization diseases and health promotion can be observed;
- there is a transformation of internet services from passive to active-diagnostic ones;
- telemedicine type (pre-recorded or real-time) depends on medical speciality;
- the barriers of the development of telemedicine in Poland are caused by the organization of health service: Patients' Funds using different software, no messaging standards and different reimbursement systems.

## References


1. *Baer L, Greist JH:* An interactive computer administered self-assessment and self-help program for behavior therapy. J Clin Psych 1997, 58(suppl 12), 23-28.
2. *Della Mea V:* Pre-recorded Telemedicine. In: Introduction to Telemedicine. Wootton R, Craig JE, eds. The Royal Society of Medicine Press Ltd. 1999, 39.
3. *Falconer J:* Telemedicine Systems and Communications. In: Introduction to Telemedicine. Wootton R, Craig JE, eds. The Royal Society of Medicine Press Ltd. 1999, 17.
4. *Fogliardi R, Frumento E, Rincon D, Vinas MA, Fregonara M:* Telecardiology: Results and perspectives of an operative experience. J Telemed Telecare 2000, 6(suppl 1), 162-164.
5. *Heitmann KU, Blobel B, Dudeck J:* HL7 Communication standard in medicine. Verlag Alexander Moench, Cologne 1999.
6. *Levin SR, Gorman M:* "Telestroke": the application of telemedicine for stroke. Stroke 1999, 30(2), 464-469.
7. *Michalik J, Okoń A, Rudowski R, Tomaszewska M, Charliński G, Dwilewicz-Trojaczek J, Jędrzejczak WW:* Serwis Onkologiczny i Hematologiczny zawierający Bazę Protokołów Chemioterapii. In: Telemedycyna II, WSI Łódź 2001, 117-120.
8. *Oosterwijk H:* DICOM Basics. 2000 Otech Inc., Cap Gemini Ernst&Young.
9. *Sable C:* Telecardiology: potential impact on acute care. Crit C Med 2000, 29(suppl 8), N159-N165.
10. *Stanberry B:* Medico-legal aspects of telemedicine. In: Introduction to Telemedicine. Wootton R, Craig JE, eds. The Royal Society of Medicine Press Ltd. 1999, 159.
11. *Wootton R:* Real-time telemedicine. In: Introduction to Telemedicine. Wootton R, Craig JE, eds. The Royal Society of Medicine Press Ltd. 1999, 53.



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