SUMMARY. Health networks and Telemedicine systems within and between European countries (as those of Adriatic and Balkan area) can promote e-health applications in the European Regions by ICT applications. That permits the exchange of medical information and knowledge in order to support teleconsulting and telemonitoring activities and the linking of hospitals and health structures. The medical data exchanged can improve care and treatment of patients. This cooperation and inclusion by means health networks between institutions of EU and not EU countries is also the main objectives of FP7 program in e-Health (application of health networks, of telemedicine systems, of smart cards in the frame of health information systems, etc.). Nowadays in Europe there are radical changes in health care: ICT can support better administrative processes and patients care activities in ambulatory and in to the hospitals, in diseases prevention and health promotion, in rehabilitation and even in telehomecare. Computer based patient records, health networks and telemedicine systems will be the most visible development in the years ahead. The creation of networks among the groups working in the area of telemedicine and medical informatics permits several advantages as: a) possibility to exploit the specific competencies of each one of the e-Cooperation and e-Inclusion partners; b) access to up-to-date information on the state of the art of the research and the application. Cooperation between groups studying and developing this field of health care system. These health/medical networks will undoubtedly add value to the European area and in particular for the academic, research and health institutions in countries in pre-adhesion phase to E.U. Several cooperation projects in this field now exist between Italy and some European countries. In particular here it will be presented the Inter-Hospital Project between Italy and Romania.

Keywords. Health networks, Telemedicine, Electronic Patient record, Smart Card

1. INTRODUCTION

The Health Service, at National and European level, must face two challenges: the expenses control and the improvement of the quality of assistance and care. The application of ICT in health care can better support the organization of the Health Services and improve the consultations of the clinical cases by both Doctors and General Practitioners.

The development of medical informatics and telematics in health care makes it available the creation and the link of data base oriented to clinical treatment, biomedical research, epidemiological surveillance and preventive medicine (1,2,3,4,5,6).

The contribution of ICT applications in healthcare to EC policy is related to the diffusion of telemedicine systems, of health networks (internet and web based) and even of particular electronical devices as smart cards for accessing in secure way to the networks and systems. So it is possible to reach a well interoperability between the health structures of all European countries (7,8,9,10).

There is no doubt that the development of active and thriving application and research into telemedicine and health informatics systems is vital to the long-term future of the European health community (e-health). This necessity has been recognized by many national research groups in Europe. In European Countries the development of medical network could establish interoperability between systems in the health market. The standardization of some care proceedings could serve to provide relevant information for clinical and administrative decision making.

The benefit and added value associated with the introduction of health networks and medical web sites can be briefly summarized as follows:

• spread of knowledge and continuous medical training;
• availability of regular (or on-demand) medical care in distant areas in order to avoid population shifts;
• improvement of the health indicators used by the WHO and national governmental organizations.

In particular, networks health services can provide access to the expertise of prominent medical institutions, with consultations and second opinions being returned much more
quickly than in the past. Physicians anywhere in the world who need a primary diagnosis or second opinion can consult a leading hub specialist.

Telemedicine and network health care based on Internet technology can remove some of the constraints imposed by geography (if not important cultural and linguistic barriers), thus allowing telemedicine services to be provided in one country for another.

Both public and private specialist centers in many countries could provide a wide range of services, especially to hospitals and clinicians who now refer patients for diagnosis and treatment.

The strong positive impact of information systems and of Internet has been demonstrated in various sub-specialties of the medical field too. These systems deliver a number of benefits to doctors as well as patients. The most straightforward benefits related directly to the improved flow of information to clinicians, including more reliable access and completeness of medical record. The benefits of such systems include facilitating patient treatment and professional collaboration, quicker turn-around, lower operating costs. Additionally, clinicians receive benefits from improved productivity and convenience and ultimately patients receive better care.

In the field of medical specialties, as neurology, oncology, cardiology, ophthalmology, traumatology, etc., it is possible to have: direct transfer of diagnostic results or diagnostic findings with integration in the relevant patient information systems using established communication standards; quality assurance based on clinical practice guidelines and through the integration of different health care facilities; tele-consultation, as a tool of joint diagnostics by remote experts.

In the field of health administration: electronic transfer of accounting data by several service providers, soon after the provision of the service; disease management, for example, through resource management; case management, for example, through online cost payment decisions.

In the field of health care information: public information for patients; anonymous case databases and online information services for medical topics.

2. E-COOPERATION AND E-INCLUSION ASPECTS

The ICT in health care applications can permit developments and applications of telediagnosis and biomedical informatics systems among some hospitals, health districts, academic and research Institutions and technological structures presents in the European Countries. These networks can also permit exchange of experiences and medical knowledge between researchers, doctors, health operators and researchers for clinical treatment, for biomedicine research and for epidemiological studies (11,12,13,14).

Specific goals of the health networks and telemedicine usually can applications of web based systems in order to offer, by means of telecommunications and information technologies (ICT), a quick and spread access to medical knowledge for the diagnosis and treatment purposes independently from the localization of the care centers. (It is necessary to use common, standard and accessible technologies).

Doctors can use the network to retrieve and find information by Internet connected computer regardless of regional or national boundaries and constraints.

Another aspect realized by means ICT networks is the exchange of experience in health information systems (HIS) organization using for sample particular tools for secure accessing as smart card at regional level in the countries. (That will be useful for European health policy and for enlargement of e-Europe program and e-Health Action)

An important topic of the health care networks can be the improvement of e-learning and teleducation in medicine based on Internet services. The end user could be General Practitioners, health operators clinicians of remote hospitals, students and researchers of Universities and research centers.

More specifically, the objectives of these e-Cooperation and e-Inclusion could be:

realization of health care network based on linkage of existing medical web sites between hospitals, clinical centers, universities and research institutes of EU and not-EU Countries as (those of Balkan and Adriatic area). These cooperative/inclusive networks can allow accessing to medical information useful for treatment and educational purpose (consultation of clinical databases, diagnostic/therapeutic protocols, medical guidelines, teleconsulting/telediagnosis).

Use of teleconsulting/telediagnosis services, in order to support the building of partnership based on trust and closer understanding between clinicians and health professionals.

Introduction of particular tools such as electronic cards (smart cards) for patient and the physician both to follow the patient health status and the physician activities, to make easier the access to administrative services, health insurance, social security. In this way it will be possible to endow the users (the citizens and in particular subjects affected by socially relevant chronic diseases) with a portable electronic record on which it is possible to store a number of useful data for health emergency and to make available a larger quantity of correct information for clinical and epidemiological purposes.

To favorite interactive environment for education, of technical and medical professionals, by means of wider and closer co-operations. Besides medical cooperation the network will stimulate and extend, by e-learning, the training and education in specialist area of researchers, physicians and IT operators.

The health networks can foster joint work and the exchange of results and knowledge among the involved clinical centers and research groups and it will specifically exploit the special competencies of each one of the medical institutions. Furthermore, the health networks teledicine systems can accelerate the cooperation an inclusion, both among the members of the networks and outside.
3. INTERHOSPITAL: BILATERAL COOPERATION PROJECT BETWEEN ITALY AND ROMANIA

Several are the cooperation projects related ICT applications in health care financed and supported by the Italian government and regions (Ministry of Foreign Affairs, Regional Governments). Most of these projects involve Hospitals, Universities, ICT Companies in Italy and different European Countries as Croatia, Slovenia, Albania, Greece, Hungary, Romania, etc. Following we describe the InterHospital project between Italy and Romania (Hospital and University of Timisoara, Hospitals of Florence and Brescia, University of Milano Bicocca, @ ITIM/IITM – International Institute of Tele-Medicine). This project has been founded by Italian Ministry of Foreign Affairs and Regional Governments of Tuscany and Lombardy (6,10,15,16).

The communication between hospitals is based on an ICTI infrastructure that implements a Virtual Private Network connecting the hospitals, the universities and a server farm, located in Italy, like in Figure 1.

The technological support is based on Internet and Web Technology. The clinical departments involved are: cardiology, radiology, pathology and infectious diseases. A particular software ensure specific functionalities to the clinical and administrative process: management of the electronic patient record, image processing, connection to the VPN, secure communication and authentication due to hardware keys with electronic signatures, teleconsultation sessions with videoconference facilities and electronic patient records transfer (including all associated data as images from the radiology or pathology departments or video sequences from the cardiology departments). The program and its components are developed in Visual Basic

![Figure 1. The structure of the telemedicine system health networks and Telemedicine](image)

the call partner, can actually be transferred and stored on the partner’s computer. Moreover it has been developed a software package, based on Microsoft.NET technology, in order to insure a simplified set of functionalities for the teleconsultation partners. This package contains only a simplified electronic patient record, authentication based only on user and password and a teleconsultation system without videoconference, but with associated information sending and a chat-style conversation. Other applications like Yahoo Messenger will be used for

![Figure 2. Interfaces of the teleconsultation software](image)
The Italian-Romanian InterHospital project proves to be a useful tool in providing medical services at distant regional levels, offering the opportunities of high-level teleconsultation and videoconferences with several Italian clinics in Lombardy and Tuscany hospitals. The support offered by the activities in the project is useful for both Italians and Romanians that are performing activities in Romania, respectively in Italy, having access to their home country doctors. InterHospital project can be used even for e-learning activities. The current results of the performed activities are of technical, educational, managerial, medical services and also social nature:

- The technical staff used modern technologies and solutions for the equipments and for the software (wireless, communication standards, and .NET technology). This experience can be used in future engineers’ education.
- The physicians from the Hospital can directly demonstrate medical acts to the students.
- A good, solid team consisting of physicians, academics and technical staff was formed, that can develop further projects and can state and demonstrate by facts that the medical and technical world can cooperate for the benefits of the society (at national and European level). Not only once health information projects collapsed due to communication interdisciplinary issues.
- For the future, we intend to extend the network with neighborhood countries.
- The project has also benefits in reducing the costs of the medical activities and the social costs, due to the improvement of the access to high qualified medical advisors, in the improvement of the scientific quality of the communication between different specialists, in direct benefits for the patients – at the cost level and in insuring mobility and availability of the medical act at different locations, in best practices in medical activities by removing barriers and approaching European standards.

4. SOCIAL IMPACT OF E-COOPERATION AND E-INCLUSION IN HEALTH CARE

The social aspects and objectives can be referred to health promotion concerning interoperable medical information services definition and distribution, using ICT Technology as Internet, Smart Cards, etc.

The e-Cooperation and e-Inclusion applications in health care can provide integration among services already available either to the local community extended to a larger geographical area or interconnecting existing information and services for medical activities.

In social terms the health networks and telemedicine systems/services can permit to enlarge the number of people that can obtain a high quality medical services, in order to satisfy the increasing demand of cure (give health services at low costs and high quality), due to:

- circulation of knowledge, information and health data in order to reach objectives of productivity, management control of activities and resources, quality standards, etc.;
- need for continuous and better quality care for an ageing population (with neurological, oncological, cardiovascular diseases, etc.) that also takes into account the mobility and/or the need for home care.

Systems based on the health care networks and telemedicine, can deliver health services at long distance that compensates for the unequal distribution of high quality medical resources by bringing low-cost, high quality medical care to everyone and can lead the way in revitalizing the variously isolated communities.

The linkage between hospitals and community care (at European level) will improve the quality of care by providing earlier access to comprehensive information.

The networks between some health structure involved in e-Cooperation could provide people in remote workplaces or in communities with limited health care provision with access to highly trained medical specialists, reliable medical diagnosis and care. (The systems can establish an increased use of treatment protocols and standard methods of care).

The e-Cooperation in medicine can contribute even to standardization and harmonization of the methods, in particular in telemedicine and
health informatics. (An important aspect of standardizations in medical informatics is due to the computerization of medical record and unifying of the electronic health record by means electronic health cards). Using smart cards in health care, it is possible that medical information travel together with the patient.

The aim is also to make easier both the mobility and the improvement of the health services by granting a cost reduction because the patient already carries the main information (from emergency to the outpatient visits, from the hospitalization to the booked visits, from the general practitioner to the chemist’s, to the social services, etc.).

Moreover the telematics integration in hospital, between hospitals and in general between health centers allows to exchange data coming from different medical records and to create the so-called record-linkage in order to get an information completeness both on a single patient and on groups of risk patients or of patients with special pathologies to be followed on an epidemiological basis, and to set up preventive actions and a correct health scheduling. Some social advantages can be stressed:

- endowing the subjects with a tool for the immediate consultation of clinical data in case of hospitalization
- automating the relationship between health and social structures and patients, in order to improve the services level and to quicken the administration, social security, booking procedures, etc.
- supply the patients with a memory support more handy for the recording of more significant data of his/her social and health history.

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