

THE INTERRELATIONSHIPS IN TELEMEDICINE-TELEHEALTH NETWORK: AN EUROPEAN FRAMEWORK

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The main purpose of this research is the study of the interrelationships in telemedicine-telehealth network generated by the introduction of new technologies in health system. The most important objectives of this research can be synthesized as:

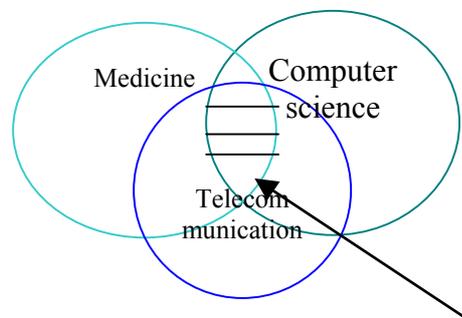
- to investigate the impact of new technologies in health network, analyzing the creation of telemedicine - telehealth network,
- to study the evolution of relationships between doctor and patient, among health organizations and between an health organization and its personnel,
- to analyse the interrelationships in telemedicine-telehealth network and their impact on creation and delivery of e-health services

The impact of new technologies on health network: the breaking out of telemedicine - telehealth network

The introduction in health sector of new technologies has produced significant developments in this area. The traditional health network is made up by general practioners, physician (specialist doctors), nurses, actors of social services,...patients and his/her caregiver. We can also consider the different social health organizations (private/public; international, national, local...) and public institutions....

The convergence of medicine, computer science, and telecommunications (figure 1), as said by Nora and Minc (Buccoliero, Mele, Calciolari 2001), has created health telematics. This one has generated telemedicine- telehealth network.

Figure 1

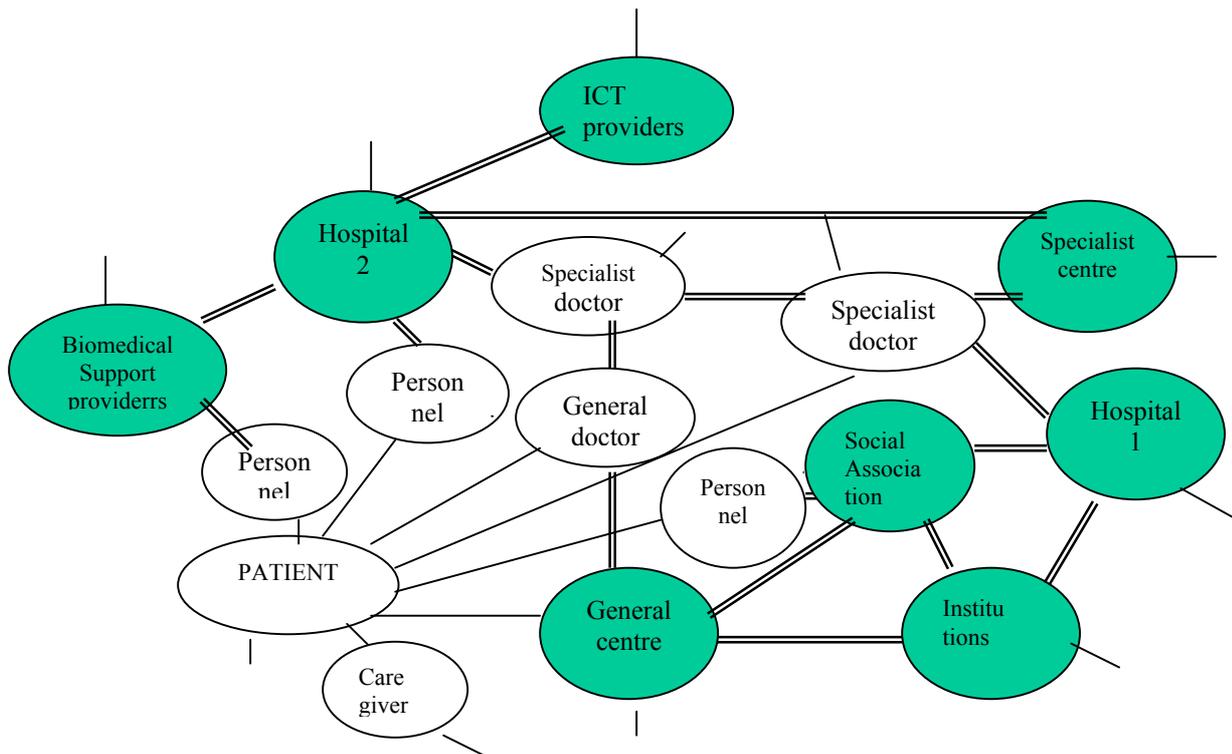


*The convergence:
Health Telematics*

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Considering the three areas of health telematics, the main actors (figure 2) involved in new network are: health organizations, Information and Communication Technologies (ICT) providers, providers of biomedical supports, public institutions, non profit organizations, social services organizations, health specialized centre, general centre, patient and his/her caregiver. We also consider doctors and internal personal of health organization.

Figure 2



In this figure it is possible to see the differences between telemedicine and telehealth. The **telemedicine** network regards relationships between doctor and patient, or his/her caregiver, mediated by new technologies. It also concerns the relationship between organization and patient in order to satisfy, through ICT, his health needs. A doctor can realize a remote control of patient through the transmission, by the Net, of biological data (realizing telepressure, telecardiology, teledialysis...). A patient can interact with general doctor, specialist doctor, personnel of health organization. All of these are micro relationships (among white knots in figure 2). Moreover patients will interact with providers of biomedical tools and social association that support the satisfaction of health's need using new technologies.

Telehealth, otherwise, concerns relationships among organizations in order to improve the process of these ones. It regards macro relationships (among coloured knots in figure 2). An hospital, through e-procurement, can optimize the relationship with ICT providers or biomedical support providers. A general centre can create a digital health portal with social associations in order to increase the offer of health services. New technologies can also support the relationship between an

health organization and its personnel; courses of eLearning can increase professional training. Moreover ICT improve organizational process regarding internal communication, administrative, logistics...

Telemedicine - telehealth network: the strengthening of relationships

In the telemedicine-telehealth network we analyse three main dyadic relationships:

- between doctor and patient,
- among the organizations,
- between an health organization and its personnel.

How new technologies has changed these three types of relationships?

The changes in demography and epidemiology and - on the other end - in culture and technology, define the necessity of a new **relationship between patient and doctor**. This one becomes an **“advisor”** and leaves his role of “paternalist doctor”. The patients claims a greater care for humanization of dyadic relation. Today a major attention is dedicated to health need. Which are the implications of this development for patients, doctors, and health system?

Due to **telehealth there has been an improvement of relationships among organizations**. ICT can facilitate the reengineering process of organization to provide new services that satisfy customer’s needs. Which changes have occurred in the organizational process and which improvement have been caused by technologies?

To analyse the **relationship between an organization and its personnel**, we must consider that knowledge becomes an important asset for profit and non profit organizations. Can courses of e-Learning completely satisfy the demand for professional training of health personnel? Can digital portal support the constitution of a community which members are involved in health sector?

The interrelationships regarding actors of telemedicine and telehealth network: how the the quality of services is growing up to satisfy patient

Considering figure 2, we can notice the interrelationships between the actors of telemedicine-telehealth network. We can see how the fulcrum of this one is identified in the patient (and his/her caregiver). How interrelationships increase the value of network and allow to this one to pursue its main objective, to grant satisfaction of patient and citizens health need?

The objective of the telemedicine network is to optimise the relationship with patient in order to grant the best performance for his health. The objective of telehealth network is to optimise the process of health organizations in order to satisfy patient’s needs.

Which are the reciprocal influences between telemedicine and telehealth? Which of these have been created before? In the USA telemedicine have been developed before telehealth. In Italy, instead, new technologies have been used in a first time in organizational process. What is the situation in the other European Countries?

The telemedicine-telehealth network can pursue the objective of satisfy the patient needs through the delivery of e-services. Which are the potentialities of these new services? Which benefits can be generated by new technologies and which obstacles patient can find in their use? But also, which benefits are generated by new services for doctors and health organizations and which obstacles can they find in their use?

THE STAGES OF RESEARCH

Preface

We have started our study analysing the health area of Italian Transplant. The main organization that has generated the network of Italian transplant is the Nord Italia Transplant (NITp). It has been recognized as the first Interregional Referred Centre. This one, situated in Ospedale Maggiore of Milan, has a focal position in the network that has allowed to introduce managerial and scientific innovations in Italian context, and is considered as a benchmark for foreign transplant organizations. In recent years NITp has launched some projects in telehealth context (Innovative Information System, Digital portal with e-Learning services, Work Group Management). The attention on transplant area, in 2003, is recognized by Italian Health Ministry. Last month a communicational campaign on donation-transplant has been launched. Transplant association collaborating with Ministry has created a digital portal that provides information and e-services. These ones regard services of telemedicine, as they give the chance of teleconsulting, and offer services of telehealth, as they facilitate the professional training of doctors and support the activity of health organizations. Through National Transplant System Information, people can also access to transplant data online. Realizing this research we will give a particular attention to projects of telemedicine-telehealth referred to transplant and health areas connected, like cardiology and nephrology.

The context of research

This research will focus on Italian telemedicine-telehealth projects and also on project that has been made in UK and Nordic Countries. In 2002, as outlined by European Commission, Internet connection by general medical practitioners reached an EU average penetration of 78% with 100 % connection of general medical practitioners in UK and 98% in the Nordic Countries. Three

successive Eurobarometer Survey (2000-2002) demonstrated a steady rise in the rate in Internet Connection by general medical practitioners.

The field of research is based on actors which belong to Countries before cited and which are involved in the health projects that have presented an application to eHealth Conference 2003. This has taken place in Brussels last May. In this European Conference the best eHealth solutions across Europe have been presented. The field is made up by actors of telemedicine and telehealth network involved in 64 projects; these ones are divided in:

- 18 Italy's projects
- 31 Nordic Countries' projects
- 15 United Kingdom's projects

The research is based on four stages.

First stage

In the first stage, with a **preliminary inquiry**, through a desk analysis, we will **recognize the actors** involved in the selected eHealth European projects. We want to investigate the **telemedicine and telehealth network** in which these actors take action.

In order to achieve this, we will make a web survey to single out the **health organizations** that show in their web site telemedicine-telehealth services. With this purpose we will also investigate the national, regional-local health plans.

We will analyse the telemedicine or telehealth **services, differentiated in categories** (like teleconsultation, teleoncology, telecardiology, teledialysis), which are offered to patient or used by health organization. We also consider e-Learning services, administrative services, e-procurement services.....

We will investigate whether these services are part of the "core offer" or part of the "integrated services", as explained by Gronroos' model of Augmented Service Offering (Gronroos 2001).

The objective in this first stage is also to start to investigate the interrelationship in telemedicine-telehealth network.

The second stage

The second stage is based on a **qualitative research**. We will make clinical interview and focus groups.

A) The first field of this analysis is based on doctors, nurses, information system manager, other personnel of health organization.

B) The second field is based on patients

The main objective is to investigate the **creation or strengthening by technologies of relationships** between actors involved in the network outlined in the previous stage. With the first field we want to analyse how ICT can satisfy the need of organization and its internal personnel. We wish to investigate how ICT can improve process of an health organizations and can improve the process through which services are offered to patients in order to satisfy their needs.

With the second field we want to investigate the change in relationships between doctor or organizations.

We want to **study the interrelationships** which concern telemedicine-telehealth network and which allow the offer of **e-services**.

The objective is also to investigate, for both fields, the **benefits and the obstacles of** telemedicine and telehealth services. In order to achieve this, we want to understand what kind of approach have been used for innovative solutions, demand pull approach or technology push approach.

In this stage we will define the critical variables that we will use to investigate in the next stage, through the questionnaire, the expectations and the perceptions of patient.

The third stage

The third stage is based on **quantitative research** which is supported by off line and on line tools.

We want to administer questionnaires to precedent field A) e B) in order to:

- investigate their expectations and perceptions
- investigate the quality of e-health services and “customer satisfaction”
- analyse the main services used
- study the intensity of relationships and investigate the interrelationships between actors
- check the pursuing of the mission and of the objectives of telemedicine- telehealth network

The fourth stage

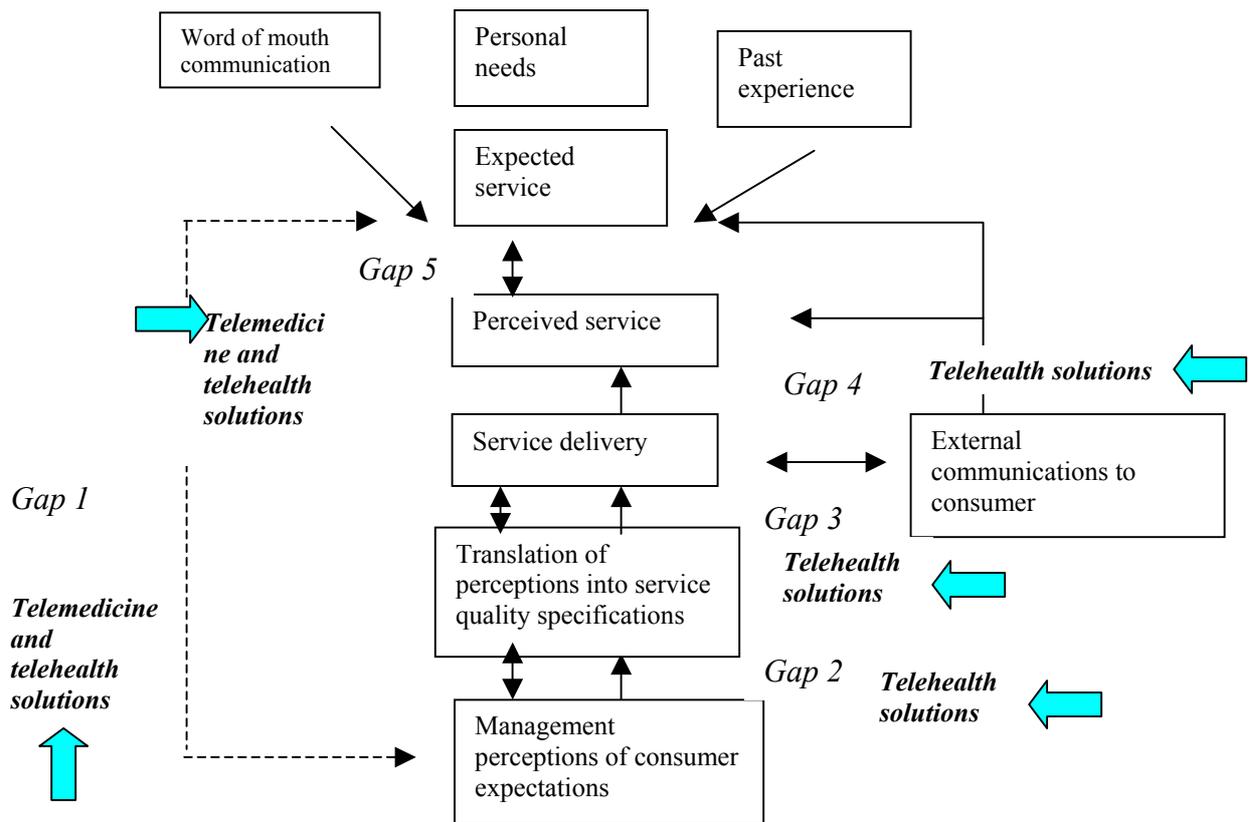
The fourth stage will be based on analysis and elaboration of data.

The model used in the second and third stages

In order to investigate the interrelationship involved in the delivery of e-services we will consider the Gap Analysis Model developed by Berry-Parasuraman- Zeithaml (figure 3).

We want to check if new technologies can reduce the gaps in the process of health services creation and delivery, increasing the quality of services. We also check how the new network, through interrelationships, can increase the value offered to patient.

Figure 3



Source: Reelaboration of Berry-Parasuraman- Zeithaml model

We can consider:

- First Gap between expected services and management perceptions of patient-customer expectations. It can be due to inaccurate information or to inaccurately interpreted information about expectations. The two way communication of ICT, can support a continuous transmission of data and information. We will investigate how new technologies can realize the update of data regarding patient’s requirements, that are in continuous evolution, and patient expectations based on the variables of previous steps. We consider telemedicine service, but in this case the cooperation among health organization of network can permit the up to date information sharing about patient.
- Second Gap between management perceptions of customer expectations and translation of perceptions into service quality specifications. It is due to insufficient planning procedures or bad management of planning. We will check if new technologies can reduce this gap supporting the effectiveness of internal communication process and process of motivation. The growth in commitment can increase the sharing of objectives and strategies of organization. In this case we investigate how a telehealth service can increase the value of telemedicine service.

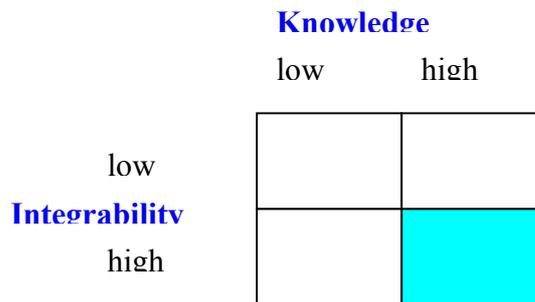
- Third Gap between translation of perceptions into service quality specifications and service delivery. It is due to specifications too rigid or to employees who not agree with the specifications. We will investigate how ICT can support the process of professional training in order to delivering a correct service. Also in this case we consider a telehealth service.
- Fourth Gap between service delivery and external communications to customer. This one can influence the expected services so the organization must provide information to create the right expectations. We want to understand how health digital portal, through services of telemedicine and telehealth, can grant information up to date to patients concerned the activities of the organization.
- Fifth Gap between service delivery and perceived service. It is due to bad quality, bad word of mouth, a negative impact on corporate image. New technologies can reduce this gap, reducing the previous gap (through telemedicine and telehealth interrelationship). The continuous assistance, the two-way communication between doctor and patient, also through interactive or fidelity web site, are very important to urge the exchange of information, and to reach a good level of patient satisfaction. Internet becomes a new channel of delivery services that must be integrated with other channel. The “screen to face” interface with patient will delivery a good service only if the previous step of process will have been oriented to patient’s needs. We will investigate whether it has been used demand pull approach or technology push approach achieving telemedicine and telehealth solutions.

Referred to the “Zone of Tolerance” model proposed by Berry, we will consider that “customer can tolerate a variation in the real experiences and still consider them acceptable according to their expectations” (Gronroos 2001). It is possible to define a desired level (how service should be) and an adequate level (what customer believe it could be). The two level form the borders of customers’ zone of tolerance. If the real experience will be between the two level there will be good quality. The zone of tolerance can vary from customer to customer. It is very important to find the area for action to improve quality and satisfaction. In order to make a better evaluation of service quality and patient satisfaction, we want to investigate how new technologies can influence zone of tolerance.

The satisfaction of customer is the base to create a win win relationship for a long period. This result can be reached only through the ability of new technologies to improve **loyalty, the premise of relationship**. Unlike traditional mass media, Internet promotes a two-way communication. This type of communication is very important to realize a reciprocal knowledge between doctor and patient, but also among members of health organization.

With Hakanson’s Model (figure 4) it’s possible to analyse how the increase of reciprocal knowledge can provide an aid to take awareness of possible integration, supporting the intensification of the relationship.

Figure 4



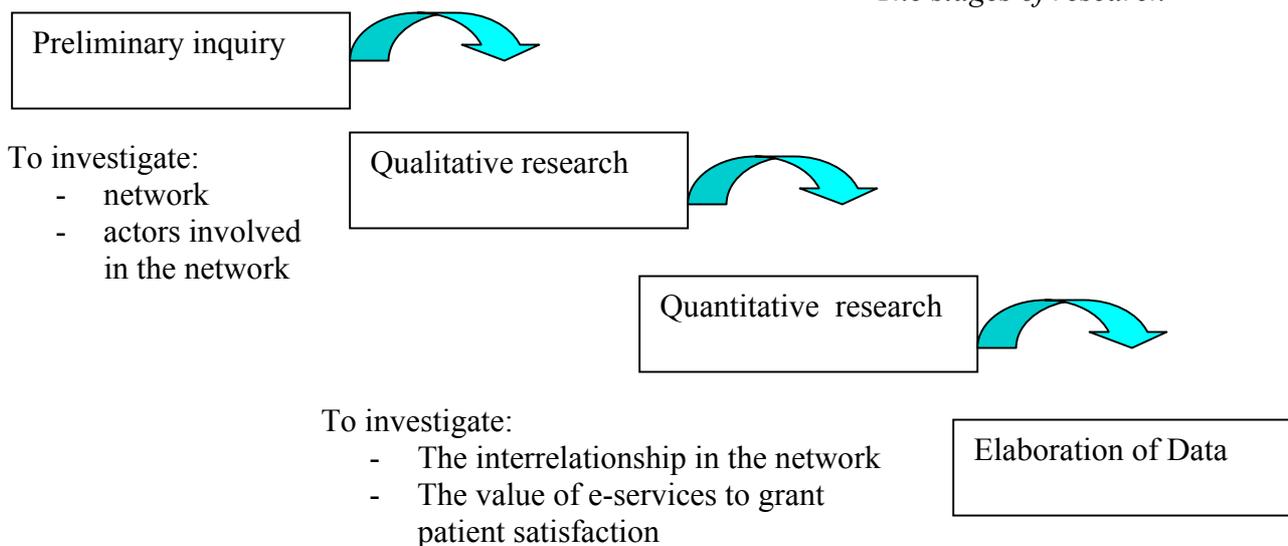
Source: Ferrero 1992

We want to analyse the application of this model to telemedicine telehealth network in order to investigate the intensification of relationships and interrelationships.

The stages of research can be synthetised as reported in figure 5.

Figure 5

The stages of research



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