English

Telemedicine in Extremadura. The model of Extremadura

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Abstract

The main goal of this article is to report the experience of a region in the Spanish southwest that in 2002 started working with telemedicine and with its lights and shadows carries on with the experience trying to establish this working tool on the daily practice of health care. A great deal of importance is normally given to technological resources on telemedicine and, although they are really important, they are not responsible for the failures that usually occur. Human resources, on the other hand, are essential. It has to be noticed that almost 90% of teleconsultations happen in real time (online). Some medical specialties such as teledermatology are more popular, although others that seemed more difficult are increasingly being used, such as tele-phsychiatry and tele-trauma. This Telemedicine Model of Extremadura can be applied to geographical regions with mainly rural population, with some difficulties in having access to second level health care units due to social-demographic factors (age, chronic diseases, disabilities) or due to security reasons (prisons).

Key words: *Teleconsultation; Telemedicine; Online; Offline; Productivity.*

Resumen

Telemedicina en Extremadura. El modelo Extremeño

El objetivo principal del presente artículo es dar a conocer la experiencia en el ámbito de la telemedicina, de una región del suroeste español, que comenzó en el 2002 a trabajar en este campo, y que con sus luces y sombras continúa tratando de conseguir asentar en la práctica cotidiana de la sanidad esta herramienta de trabajo. En telemedicina se da generalmente gran importancia a los recursos tecnológicos, que aunque realmente sí son importantes, no son generalmente los responsables de los fracasos que muchas veces tienen lugar. Son fundamentales los recursos humanos. Se debe destacar que casi el 90% de las teleconsultas son en tiempo real (online). Existen especialidades con más presencia como teledermatología. Otras que parecían más difíciles están abriéndose paso (tele-psiquiatría, tele-traumatología). Este Modelo Extremeño de Telemedicina podría aplicarse a aquellos ámbitos geográficos en los que exista población predominantemente rural, con ciertas dificultades de acceso a centros sanitarios de 2º nivel por factores socio-demográficos (edad, enfermos crónicos, dependientes), o por razones de seguridad (centros penitenciarios).

Palabras clave: *Teleconsulta; Telemedicina; Online; Offline; Productividad.*

Resumo

Telemedicina em Extremadura. O modelo da Extremadura

O objetivo principal do presente artigo é mostrar a experiência no âmbito da telemedicina em uma região do sudoeste espanhol que em 2002 começou a trabalhar em este campo e que com as suas luzes e sombras continua tentando conseguir estabelecer essa ferramenta de trabalho na prática cotidiana da saúde. Em termos gerais, na telemedicina os recursos tecnológicos recebem grande importância e embora sejam realmente importantes, geralmente não são eles os responsáveis pelos fracassos que muitas vezes acontecem. Fundamental mesmo são os recursos humanos. Deve-se salientar que quase 90% das teleconsultas acontecem em tempo real (online). Algumas especialidades contam com mais presença como a tele-dermatologia. Outras que pareciam mais difíceis estão ganhando espaço, como a tele-psiquiatria e a tele-traumatologia. Este Modelo de Telemedicina da Extremadura poderia ser aplicado em aqueles ambientes geográfico onde exista população predominantemente rural, com certas dificuldades de acesso a unidades de saúde de segundo nível por fatores sócio-demográficos (idade, doentes crônicos, dependentes) ou por razões de segurança (cadeias).

Palavras-chave: *Teleconsulta; Telemedicina; Online; Offline; Produtividade.*

INTRODUCTION

Extremadura is a Spanish region located in the southwest of Spain near the border with Portugal. It has an extension of 41.634 Km^2 and a population of 1.097.744 inhabitants (with approximately 60% living in the rural area). Demographic density is 26.4 inhabitants /Km^2. This density means that Extremadura is one of the less populated regions in Spain (Figure 1). The Autonomous Community of Extremadura is divided into eight health care areas for organizational purposes. Each area has its district reference hospitals with a total of 13 hospitals and 110 health units.

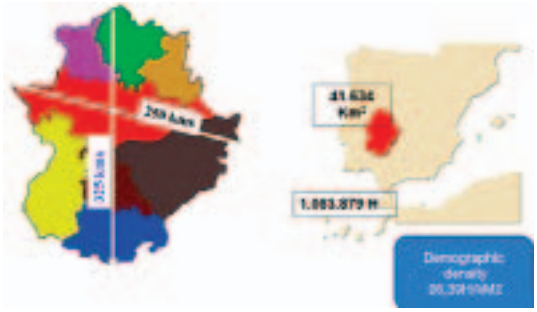

Figure 01 - Extremadura (SPAIN).

This telemedicine project in Extremadura started in 2002 when a pilot project on telemedicine was carried out connecting one hospital with a rural health unit. The purpose was to study the benefits of telemedicine consultations (teleconsultations) on some medical specialties for primary health care during a period of six months. With the positive results of this pilot project, health care officials decided to extend this activity to the rest of the autonomous community, with the idea of having a gradual incorporation (Figure 2). As it happens with every project of this nature, the political will of health officials is a critical factor in its development. Their constant commitment in providing society with the service will determine the success and sustainability of the project.

PROJECT DEVELOPMENT

One of the fears we have to face when dealing with a project of this magnitude is the economic aspect. The acquisition of the necessary technology was partially done with European Union funds and with our own money. The first step was the installation of telemedicine stations with easy to use and solid hardware and software for the connection of the usual peripheral equipments needed for a general medicine consultation, such as: electrocardiographs, pulse oximeters, spyrometers, pressure meters, X rays digitizers, dermatoscopes, general examination cameras, scanners and printers for documents and webcams (Figure 3).

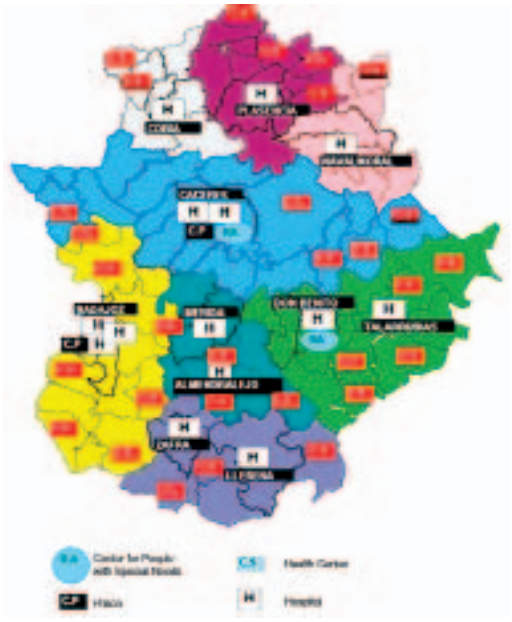

Figure 02 - Map of Telemedicine Stations in Extremadura 2009.

Another essential component is the Communication Network. In our community there is a Health Intranet (MACROLAN) serving all Health Units (Figure 4) and Local Doctor Offices. This network is being improved with the development of Health Care Information Systems (Electronic Medical Records, Digital Radiology, Electronic Prescription), that are about to have full coverage in the autonomous community. This Network gives us enough bandwidth to carry out videoconferencing at the same time we send files (images, radiographies, electrocardiograms).

From the beginning of the project the purpose is to carry out online teleconsultations (Figure 5). Thus, those who are against or skeptical about telemedicine can not use the argument that teleconsultation is something cold and impersonal. We are aware of the fact that physical examinations (palpations) cannot be done on a teleconsultation, but we also understand that nowadays image

and sound technology can replace many of these physical exams. Also in an online consultation, health professionals (physicians or nurses) can carry out a targeted exam.

Figure 03 - Telemedicine station and peripherals in a Health Center.

Figure 04 - Telemedicine station and peripherals in a Hospital.

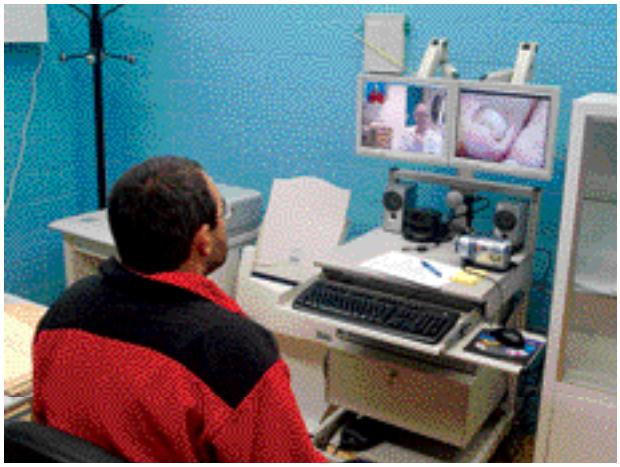

Figure 05 - Online teleconsultation.

Finally, and having a key role in the whole process of telemedicine on its activity of teleconsultations, we have human resources. Health professionals whether physicians or nurses are the ones who will determine if telemedicine will succeed or fail. They have to be deeply involved and at the same time the activity has to be organized. During an online consultation several components have to be there at the same time, the patient, the specialized physician and the doctor or nurse who is with the patient. This can only be achieved with good organization and planning.

In order to make things clear we are going to summarize the most significant features of this **model.** These features are considered key for the development of telemedicine in our community and even with some difficulties the process is still going on and growing little by little:

1. Teleconsultation activities are carried out within the Ordinary Working Day (between eight and fifteen hours). It was not necessary to increase the number of working hours, only changing and adjusting working schedules.
2. No need to hire more staff. The working day of some health professionals has been rearranged, normally with nurses because they are the ones who have to organize and prepare teleconsultations. This model needs the involvement of the whole Primary Health Care Team, sharing the activities among themselves so efforts can be more equitable. Teleconsultations at other times, such as at nigh or during holidays would pose many organizational difficulties with the need for extraordinary resources.
3. Specialists participate in a voluntary way and they do not receive any extra payment for that. The project did not hire any specialist. In order to carry out these activities their usual consultation agenda has been organized with some free time for teleconsultations (bear in mind that the number of patients does not increase, it is the same, the only difference is that they are going to be seen through telemedicine). In most cases the idea is to have the whole relevant service participating or at least most of them in order to avoid the cancellation of the consultation if something unexpected happens.
4. Since 2005, this activity is included in the Management Contracts of each area although in a different way and with some goals to be achieved, that will be reflected on the **variable productivity** of health professionals and participating services (with the payment of the amounts agreed upon).

5. Most teleconsultations are on **real time, online** and although this way demands more dedication and organization, they favor the physician-patient relationship avoiding they lose contact. Thus, those who do not like telemedicine have few arguments against this consultation model.
6. At the health units patients are given the opportunity to choose between the conventional consultation or teleconsultation. Almost all of them prefer teleconsultation. When the specialist has any doubt on the diagnosis or on how to handle the patient, he/she sends the patient to his/her usual consultation but having already a previous assessment or giving the patient a priority if necessary.
7. Depending on the specialty, the resolution capacity of teleconsultations varies between 70% in tele-dermatology, 60% in tele-trauma for first consultations.
8. For chronic, elderly patients or for patients with difficulties to move, teleconsultation is an invaluable help for primary health care physicians, avoiding many hospital visits.
9. Telemedicine stations enable tele-information sessions between primary and specialized health care professionals, avoiding time waist going back and forth.

ACTIVITIES CARRIED OUT: WHAT-HOW-HOW MUCH?

From the beginning of the activities (in 2003), every effort was concentrated on trying to gradually implement this model on health units, starting by those units far away from hospitals or from specialized health units. Today the maximum distance between a health center and a hospital in Extremadura is approximately 90 Km. At centers where telemedicine equipments were installed, it is possible to make X-rays and put them into Digital Imaging Communications in Medicine (DICOM) images with a digitizer. This allows us to attach these images to the patient medical records.

At these units of health there are medical equipments for measuring blood pressure, glucometers, spyrometers, digital cameras and electrocardiographs. These equipments allow us to attach this data into the patient's medical records. Therefore, the specialist has a great deal of information at the time of teleconsultation. Besides, the family doctor or the nurse is present at the teleconsultation to clarify any doubt the specialist may have. All teleconsultations are scheduled and if consultation cannot be solved at that moment, patients are sent for a conventional consultation as usual or in a preferential way when needed.

The number of teleconsultations on medical specialties is gradually increasing (Table 1). During the first years of the project we started with those specialties, that according to papers published, had more experience. Later on other specialties had been incorporated and in some cases we have been surprised by the acceptance received, such as psychiatry, trauma and rheumatology.

Tabla 1 - List of specialties with Teleconsultations (2003-2009)

2002-2003	2005-2009	
Radiology	Endocrinology	Pain unit
Dermatology	Hematology	Smoking
Pneumology	Neurology	Nephrology
Cardiology	Trauma	Occupational health
Out patient major surgery	Psychiatry	Infectious pathology
Internal medicine	Geriatric medicine	Rheumatology

Table 2 - Nº of total teleconsultations per specialty (2003-2009)

Teleconsultations per Specialties	
Radiology	3835
Dermatology	14084
Cardiology	623
Internal Medicine	660
Out Patient Major Surgery	3319
Nephrology	693
Trauma	4254
Pneumology	1737
Endocrinology	1721
Rheumatology	1120
Back Surgery	753
Geriatric Medicine	136
Psychiatry	310

The number of specialties used in each health unit is not the same. Each center has different needs depending on its geographical location, its reference hospital, staff and the degree of participation in the project.

Since the beginning the use of telemedicine (teleconsultations) has been a voluntary activity. This feature used to affect both patients and health professionals in charge. In many cases the pressure by one of the parties had a positive influence on the other party.

In the following figure (Figure 6) we see the evolution of teleconsultations during the six years of the project. These figures should not be analysed as a mere sequence of numbers. We believe that behind every number there are people, situations, attitudes, concerns, patients for whom this new tool is opening new ways. As we all know changes take time. We can really say that teleconsultations mean an effort for professionals and they have to change or modify habits acquired for many years of health care practice.

Figure seven shows that most consultations are on-line, which requires good coordination and organization among professionals and patients. The positive aspect is seen in the good results showed in satisfaction surveys done regularly.

Another doubt we used to have at the beginning was about the resobility of teleconsultations. They could be seen as extra work load that would later need a conventional consultation (face to face). In the periodic analysis carried out (Figura 8), it can be seen that percentages of solutions are high, although there are some specialties that require more face to face consultations because of the need to have a good physical exam. Despite all this, even when patients have to be sent to another consultation, he/she goes with most complementary exams done and with the priority of the visit if that is the case (avoiding waiting for a long time without being seen).

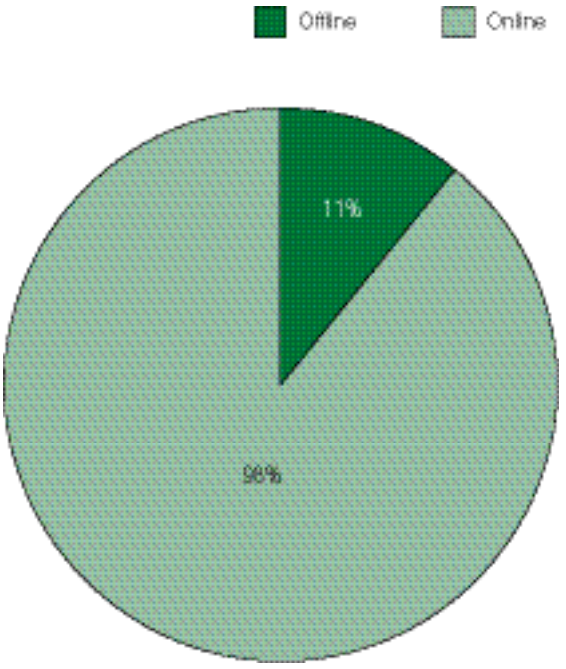

Figure 07 - Percentage value of ONLINE and OFFLINE teleconsultations (2003-2009).

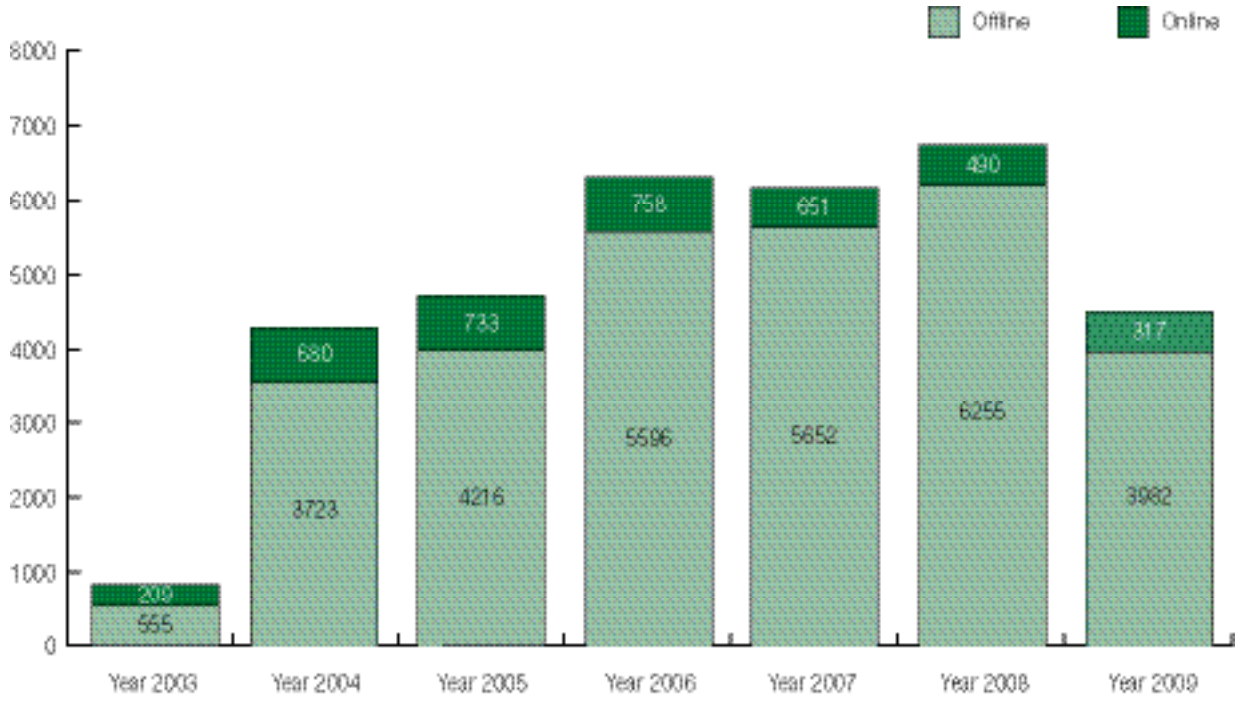

Figure 06 - Evolution of the number of teleconsultations from the beginning (2003) until July 2009.

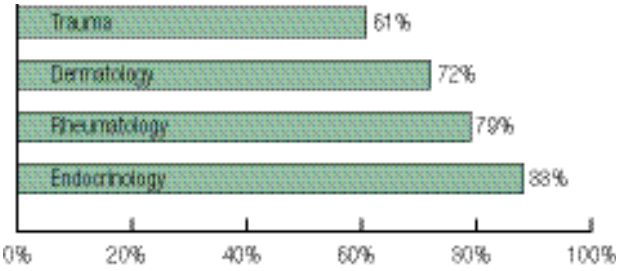

Figure 08 - Percentage of Teleconsultations solved by Telemedicine and that did not need to be sent to another center later on (2003-2009).

CONCLUSIONS

- TELEMEDICINE ADDED VALUES (MODEL OF EXTREMADURA)

Over the period when Telemedicine has been used in Extremadura, new fields had been discovered where this working tool could be useful.

1. At the beginning, as we have already explained, the activity was concentrated on rural health units and also on centers located far away from hospitals.
2. Then it appeared another social group that due to legal reasons lives in Prisons. Although its health care is regulated and guaranteed, some times it is difficult to provide this service due to accessibility problems and in many cases due to the difficulty to use the requested police resources for taking the inmates to the health center. With telemedicine, many of these problems had been solved, releasing the pressure that existed before.
3. At the moment we are working on Residences for People with Special Needs (centers for people with addictions, the elderly, disabled people, etc…). With telemedicine we can provide support to health professionals who take care of this population, avoiding hospital admissions to solve many chronic pathologies that do not need technology or special care.
4. Together with these activities of teleconsultations there are also tele-information activities which are done in two ways:
   a. Continuous Training done **during teleconsultation**, establishing a knowledge flow between health professionals at the health center, hospital specialists and patients.
   b. Planned informative monographic clinical sessions where lecturers and health professionals do not need to move from their working place, saving time and money.

- DIFFICULTIES IN DEVELOPING THIS MODEL

It is clear that this model has difficulties and weak points. The experience we have gained for almost six years had allowed us to identify many of them. Our challenge at the present and the near future is trying to correct them. Below there is a list of those we consider the most important ones:

1. Unequal involvement of professionals. There are still skeptical people to whom it is difficult to change some habits, remaining with a fear of the unknown that is beyond reason.
2. Technology itself is not a problem, although the pressure by the technology industry creates an excessively fast race to purchase new products even when they do not bring many changes when compared to those they are trying to replace.
3. In the health care setting there are professionals who have difficulties getting into the new technologies, although luckily enough the current flow is forcing us to use them instead of being left side.
4. Health professionals in charge find difficulties in allocating resources for these activities. We have to incorporate these tools into the everyday practice naturally, without making a drama out of it. In many cases it will be necessary to change and rearrange some consultation schedules and planning, without having to increase the staff. The unequal application of the variable remuneration based on goals encourages some inequalities in the development depending on the health care area.
   a. The high economic cost of these equipments together with the need for a good maintenance makes impossible to have a wider development. That is why is necessary to have a good planning and selection of the targeted population.
   b. There are many problems to carry out cost-effectiveness, effectiveness and efficiency studies. On health care, sometimes we deal with parameters that are very difficult to quantify and measure. We try to optimize the resources available bearing in mind that these expenses cannot affect other needs that are more important.

IMPORTANT OBSERVATION

Data showed in this paper comes from **TELEMEDICINE ANNUAL REPORT OF EXTREMADURA HEALTH SERVICE**, of our own production.