

# Strategic Procedures and Revisions for implementing Telemedicine and Telecare in Greece

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## Keywords

Telemedicine, telecare, healthcare management, strategic procedures

## Summary

The development of telemedicine and telecare has been changed all over the world the recent decades as practitioners and health care managers reached better understanding of the use of information and communication technologies to offer urgent and qualified medical services at a distance. Governments and health care providers have shown a large initial interest in the benefits of telemedicine services to reduce costs mostly for patient's transfer to tertiary hospitals or for educational purposes but have been slow to provide strategic plans and procedures in order to proceed the projects into practice.

The paper identifies the involvement of governments, healthcare management, healthcare professionals and IT suppliers in telemedicine policy development and reviews the experience of Greece in the specific field which seems that despite the enormous scientific interest for both medicine and health informatics, the practice until now has not gained the expected results. Furthermore, the analysis concerns the critical success factors that have to be revised simultaneously with the main managerial principles for the design and implementation of quality telemedicine and telecare services.

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## 1. Introduction

The term “telemedicine” is expressing the ability to transmit health care information with images, data and voice from distance via telecommunication technology for the delivery of clinical and educational services wherever patients and healthcare professionals can be.

Telemedicine seems to be a valuable tool for governments and stakeholders in the macro environment of medical services for covering the increase of health care demands and the augmented cost of them. Despite the ambitious scientific interest the practice until now in Greece has not shown the expected results. The opportunities and the barriers of Telemedicine’s applications can give the framework for successful strategic procedures. The roles of Governments, IT suppliers and health care professionals are crucial for building common principles to encourage innovation and investment.

The long term effort to establish Telemedicine services in Greece requires the revision of some strategic procedures and critical success factors in a way that can be useful to the patient and apply knowledge into practice.

## 2. Short history of Telemedicine

The history of Telemedicine began with the telephony and telegraphy in the end of the 19<sup>th</sup> century. Until the end of the first quarter of the 20<sup>th</sup> century, sea voyages were the main means of long-distance and international travel. The 1920s and 1930s saw the introduction of several radio-medical services that continue to develop [1, 2]. In the next years we have to mention the development of television and the various space programmes especially by National Aeronautics and Space Administration (NASA) of the United States while telemetry had significant advances in the effects of gravity on blood pressure and the other vital signs. In the 1970s telemedicine had better opportunities with the satellite communications especially for emergency situations [3]. Projects in that period focused on the capabilities of equipment and their clinical applicability.

The next decades brought fast development to Telemedicine services because of the augmented role of Personal Computers (PCs) and information technologies that covered more public needs with more speed and quality. From the 1990s we have the explosion of the Internet all over the world not just for tele-education but as the way of providing health care services in a cost effective manner [4].

Since then a large amount of scientific Telemedicine projects were funded in Europe and all over the world [5, 6]. These projects were the basis for the creation of the recent scientific platform of Telemedicine and a new e-health environment for the 21<sup>st</sup> century with achievement of common technical protocols and further investigation of clinical and managerial standards.

## 3. Opportunities and barriers of Telemedicine

The review of Telemedicine applications identifies the needs and opportunities that lead the framework of successful future trials for the European Union (EU) countries [7–10]:

**THE NEED OF ACCESS TO MEDICAL CARE:** Health care providers have recognised the benefits to provide healthcare services to those who have limited access to specialized medical care or those who live in rural areas that often are cut off from public transport due to bad weather or other conditions.

**THE WIDE RANGE OF MEDICAL SPECIALISTS:** The development of Medical Science in all fields brought new demands of further specialization and continuing medical education but at the same time medical care had to deal with the needs of more equitable access in knowledge and fundamental issues such as new standards of care and intellectual property rights.

**THE INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT) DEVELOPMENT:** The advances in networking and communications infrastructures after 1990’s became available to more people with lower prices, which facilitated the extensive use of computers and the transition from analogue to digital data for medical equipment. The interest of IT suppliers for telemedicine research and development increased in order to promote interactive health care services.

**THE MARKET DEVELOPMENT:** The augmented demands for better quality in medical services has encouraged some healthcare providers to expand their expertise mostly for commercial reasons to people that cannot have the ability for transportation to tertiary hospitals.

**HEALTH CARE FOR TRAVELLERS:** In the EU countries a lot of projects were funded because of the need to develop telemedicine services e.g. for navy transportation, and the need of better access of first level medical services for travellers.

**HOME TELECARE NEEDS:** The ageing population problem in all developed nations as well as the increasing amount of chronic, long term diseases gave the opportunity to health care providers in several countries for telemedicine delivered at home in order to reduce the cost of hospitalization and ameliorate the quality of health care services.

**COST-BENEFIT SOLUTIONS IN HEALTHCARE:** As the problem of reducing the cost in medical services became crucial to many governments the issue of cost-effectiveness of Telemedicine applications arises and the experience of several countries in this field serves as prototype for further development.

The most common barriers for implementation and further development of Telemedicine and e-health services in various degrees within the EU are the following [11]:

- Many Telemedicine and e-health projects are lacking coordination and resources in order to be implemented in practice.
- Procurement procedures are too long (up to 4 years!). That causes delays because of unexpected internal or external changes (governmental, organizational, etc.).
- The criteria of projects' selection are too restrictive and too technical and not always functional in different environments.
- Release of pre-financing is too long (9 to 18 months in some cases) having as a result the projects delay or even their cancelation.
- Support for the successful implementation of projects is not always provided. Projects are not well advertised and widely known to the main participants in order to be accepted.
- Telecommunication infrastructure and standards often have to be updated such as the bandwidth of the shared links. Another technical problem is the incompatibility of operating standards or protocols especially between different countries in order to recognize transmitted data.
- Many countries in Telemedicine and e-health projects are lacking best practice repository and guidance.
- The implementation procedures of projects sometimes have not been totally identified in each country at the same level, so the projects evaluation has not always given acceptable results. Furthermore, the transparency is not totally ensured.
- There are issues in Telemedicine practice that are not accepted in the same level from the physicians and healthcare professionals in various countries despite the guidance protocols of several projects. The most important of them are physician's license and accreditation, reimbursement and intellectual property rights. Recently, the European (56%) and American (50%) regions reported to the world Health Organization (WHO) the absence of legal guidelines on privacy and confidentiality as the two most important barriers for the implementation of mobile and wireless technologies in health (mHealth) [12].

The multi variability of Telemedicine factors in the several countries is enhancing the evaluation of technical and clinical feasibility of projects but make rather difficult the cost benefit analysis. It is interesting to mention that the unknown cost-effectiveness of mHealth initiatives was reported as one of the top four barriers by almost all WHO regions in 2011, particularly the Western Pacific, European, Eastern Mediterranean, and the Americas Regions [12].

## 4. Experiences in Greece

Greece is a country with many remote areas (isolated islands and mountainous regions), where residents do not have always easy access in hospitals and other medical units. In addition, there is insufficiency of suitable infrastructures and lack of specialised medical personnel and for these reasons the telemedicine can offer crucial services in these regions.

In Greece, telemedicine application was initially introduced in 1989 through the collaboration of Sismanoglio General Hospital of Athens and the Medical School of University of Athens [13]. They have initially installed a system of telemedicine for twelve Centres of Health in all country extended to forty for the time being. The equipment that has been used consisted of a telephonic centre connected to computer terminals with modems, image digitizers and acquisition devices. When the connection of the Primary Care Units was completed during the initial phase of the Greek Telemedicine Network until April 1992, 3000 cases had been served (pneumonological: 27%, cardiology: 17%, orthopaedics: 21%, Ourology: 5%, Surgery: 2%, Supporting and Diet: 12%) [14, 15].

The design of Telecardiology Services entitled “TALOS” was based on the results of the European Programme FEST (Framework for European Services in Telemedicine) funded by the European Commission in 1992–1994. Each one of the 7 participating primary care units (in the Islands: Mykonos, Skiathos, Santorini, Naxos, Milos, Lesvos, Amorgos) had a digital cardiographer and a computer for electrocardiography (ECG) transmission to the Onassis Cardiac Centre in Athens through the regular telephone network. Transmission was also feasible through Global System for Mobile Communications (GSM). The system has been used for more than four years with success especially for emergency situations [16]. The project HERMES (Telematic Healthcare Remoteness and Mobility Factors In Common European Scenarios) was one of the 4th Framework Programme Projects of the Commission of the EU [17]. During this project a platform was designed for the development of quality assured Telemedicine Services at the point of need. The HERMES Greek partners have also implemented Maternity Telemedicine Services between the Primary Healthcare Centres of the Islands of Naxos and Mykonos and the “Arêteion” University Hospital of Athens.

Another telemedicine program was the “V-SAT Project” (financed by the Ministry of Health, NATO and University of Athens) which used satellite technology for the confrontation of cardiovascular incidents in the islands of Naxos, Milos and Karpathos [17].

In 1999, the Ministry of Justice decided to use telemedicine in order to improve medical care for the detainees in the prisons of Coridalos in Athens. Despite the functionality of the program, problems related to the reactions of hospital’s personnel drove the rejection of the program.

The Greek Ministry of Health, in 1998, funded a study on the development of Telemedicine Information Systems and in 1999, moved towards the design and implementation of an integrated National Telemedicine Action Plan. Unfortunately, this plan was not implemented during that period.

Moreover, the General Hospital Patision and the University of Ioannina visited, from 1999 to 2001, five remote regions of Greece and examined about 1200 patients using telemedicine with the support of mobile units for eyes’ examinations [18]. A pilot program was introduced in Tilos so as to constitute the starting point of the expansion of the program in small islands of the Mediterranean aiming at the improvement of the health services of the islands. However, the lack of technological infrastructures and the essential knowledge of handling and use of technologies drove to the abortion of the program [19].

Since 1998, the University of Crete and the Institute of Technology Sciences-ITE have started an ambitious program (Hygeia-Net) with the collaboration of the University Hospital to cover the needs of healthcare centres in Crete. In the year 2005, a test application (twelve month period) was introduced in two remote islands of Greece, Limnos and Skyros, while, Sotiria hospital offered support to patients in their houses with the help of telemedicine [20, 21]. At the same time, there existed various telephone support lines in Greece, as urgent psychiatric support and support for patients with AIDS [22]. We should mention that several telemedicine programs have been developed between institutions in Greece and other countries either for educational purposes or for a second medical opinion (projects Mermaid, Emergency 112, etc) [23–25]. Additionally, there is new cooperation between private hospitals and companies in order to establish telemedicine services to remote areas in Greece (e.g. Iatriko Centre, Athens).

From the above, we distinguish the initial enthusiasm of health care professionals with many medical specialties to participate in several projects using the chances and the opportunities of them even with the absence of technical and managerial infrastructures, taking the risk to implement pilot studies with continuing educational roles, giving quality services in difficult geographically regions of Greece.

Nowadays, the telemedicine services in Greece related to the National Health System include 40 peripheral Telemedicine units connected to the Sismanoglio General Hospital of Athens [26]. Furthermore, the Ministry of Health and Social Solidarity is proceeding in the creation of the National Telemedicine Network to provide Telemedicine Services in primary care using the Syzeyxis Network (National Network of Public Administration) [27].

## 5. The roles of Government, IT suppliers and health care professionals

Government and policymakers, IT suppliers and health care professionals are the main participants for designing and implementing innovation and investment in Telemedicine. What is the role of each participant in the specific field?

### 5.1 Governments' role

There are welfare systems where government is the main purchaser and provider of healthcare services (public hospitals, primary units, etc.). From the other part in a healthcare system that is mainly private funded, the role of government is to enable market to operate in functional frameworks. In both systems governments are responsible for priorities settings and the regulations of healthcare as they determine the legal and ethical aspects that all healthcare providers are using [28]. For example, if a priority concerns the quality of life of patients with chronic diseases then it will facilitate the telemedicine and telecare solutions to resolve many parts of the problem. It is easier then to introduce specific policies and relative funding.

Governments in all EU countries have realised the importance of ICT for national competitiveness. They can encourage research and development (R & D) of ICT technologies by tax breaks and other incentives, donations of institutions beneficial to the public that are deemed as highly important, followed by the co-financing with companies in the industry of IT and pharmaceutical ones.

Telemedicine and telecare open new markets for health care services that have not been until now in high priority of governmental policies and strategic direction in Greece. The results from a recent research about identification of Telemedicine's benefits in practice in Greek private hospitals, suggest that the reduction of the required time for the customer service, the improvement of social fame and the customers' increase are the most important benefits that a private hospital can have from the application of a telemedicine program [29]. The researchers suggest that the most suitable form of telemedicine that is considered to be applicable, based on the existing conditions, is the electronic database followed by telemedicine for distance in-house follow-up, telemedicine centre and finally complicated medical cases. Moreover, the most profitable form of telemedicine appears to be that of electronic database of medical content with subscription. The telemedicine centre and telemedicine from distance for in-house follow-up were considered marginally capable of producing profits. The complicated medical cases were considered from the sample as not likely to be profitable.

Furthermore, it was concluded that the level of cost of telemedicine in which the shareholders begin to differentiate their attitude from positive to negative was a specific amount (400.000 € in 2008). This practically means that when a private health institution wishes to develop a telemedicine program it will be difficult to exceed the particular level of cost and potentially alternative ways of financing the program need to be found for levels of cost higher than this amount [29]. That also means that in Greece, despite the various barriers that we have mentioned, the National Telemedicine program has to deal with all non profitable cases.

Finally, both law and private accrediting standards require hospitals and adequately credential providers to ensure that medical staff members can be competent in their practice areas. In the absence of specific regulation, however, individual institutions still have a number of questions to answer [30].

- Is it necessary to have separate standards for "virtual" practice?
- Must remote physicians be admitted to the host's medical staff in order to admit patients?
- If this happens, will be necessary to monitor remote physicians' competence and skill to the same degree as with other medical staff members?

- Will be useful for Telemedicine providers to give more attention on law changes to reflect telemedicine procedures?

Common accepted answers for these questions have not been given yet in EU.

## 5.2 IT Supplier's role

An important role of an IT supplier is to produce equipment and offer services that the purchaser wants and is reasonably priced. For telemedicine services this refers to telecommunication products, suitable videoconferencing equipment, PC's, user friendly software for the transmission of data and technical support. Furthermore, products have to fulfil user's requirements and specific standards of accreditation in order to facilitate the users on their healthcare issues and not to technical problems. Companies need also to support health care customers with flexible solutions that can follow scientific developments [31].

Nowadays, business becomes more global and some researchers are mentioning that multinational companies start to set rules acting like quasi-governmental organisations. Despite this tendency, governmental and managerial policies that facilitate IT suppliers and companies collaborating with health care professionals are the best combination to develop telemedicine and telecare services acceptable to all sides for the benefit of the patient.

## 5.3 Healthcare professionals' role

Physicians and other health care professionals must be qualified to provide their advice to the other Telemedicine participants to establish clinical standards and protocols for procedures, policies and best practices. Among the most important negative issues for the health care professionals' involvement in Telemedicine applications are licensure and reimbursement. Furthermore, the Physicians' opinion, that telemedicine and remote technologies undermine the taught traditions in Medicine and the direct contact with the patients, still remains.

In this point, we must see the benefits of continuing education to improve skills and capabilities that is an obligation for medical providers [32]. The practice has shown that health care professionals can enhance more than any other the Telemedicine technology with enthusiasm as they play the major role for the success of such projects sometimes even without the assistance of the other providers [33]. We should mention as a paradigm, a Physician in the island Amorgos in 1994 who had made Electronic patients records of all people in the island in order to have better access to telemedicine services when they needed to.

## 6. The Main Problem

The investigation of the published work on telemedicine in Greece shows that most pilot studies that have been grant-funded are unable to demonstrate the cost effectiveness of quality gains forecast in their grant submissions [34, 35]. This phenomenon doesn't concern only Greece and that is the reason why the EU Commission supports the development by 2011 of guidelines for consistent assessments of the impact of telemedicine services including effectiveness and cost-effectiveness [5, 36]. Developers still have to risk when they deal with health care innovations concerning public standards and equity of access demand as administrators are reluctant to support ventures with political cost. As we have seen in practice, policymakers have been slow to respond and coordinate telemedicine applications. Which is the best way between government and policymakers, IT suppliers and health care professionals in order to cooperate? The answer to this question is concerning many parameters (economic, social, political, technological, and others) of a complicated scientific area such as Telemedicine. The existing knowledge and the strategic application procedures in Telemedicine are rather difficult to get into practice with various degrees of success, even between different regions of the same country.

## 7. New Strategic Procedures and Success factors for Telemedicine applications in Greece

We believe that strategic procedures and critical success factors have to be revised with the main health care managerial principals for the design and implementation of quality telemedicine and telecare services in order to achieve better application results.

1. The key to the reduction and removal almost all of the barriers in Telemedicine's applications in Greece as we have seen in section 3 (barriers on coordination, support, resources and technical issues), is a new alliance between governments, healthcare professionals and industry to follow a common acceptable strategic framework of basic principles that can encourage innovation and investment in Telemedicine. This can be developed in parallel with the e-Health National Strategic framework. A stable national Telemedicine policy even with limited sources where the roles of each stakeholder should be clear for long distance period (government, health private and public insurances) to evaluate performances and the development of topical frameworks for the peripheral units and hospitals, will permit any modifications or any further improvement. The absence of this cooperation is the main problem for a long term progress.
2. It is not easy to establish Telemedicine procedures in a country with very limited health care services in primary level. Especially in Greece, it is necessary to develop high level primary care services at least in two levels: In the first level, it is necessary to manipulate urgent situations (accidents, myocardial infarctions etc), where Telemedicine can ensure quality medical aids and use of specific protocols by occasion until the transportation of the patient to tertiary units when it is needed. In the second level, the primary focus has to be given on more integrated approaches to delivery of care (inpatient, out-patient, pharmacy services, continuum of care) in order to meet the needs of the patients in all situations, (e.g. e-health, Telemedicine procedures and disease management). Furthermore, it is necessary to address the shortage of the health workforce serving the elderly, through trainings, skills mapping and planning of telemedicine services (e.g. in geriatrics, gerontology, palliative care, home care etc) [37, 38]. The expected results for these interventions with legal guidelines on privacy and confidentiality should be more accredit and acceptable telemedicine services for more population.
3. We have to close the gap between several scientific projects and the degree of their performance in the real world and promote in health market all useful results collected for long term period and speed up the process of turning ideas into services in order to reduce delays and failure of projects.
4. More efficient use of infrastructure funds for health care in Greece is going to reduce the final cost of services giving new priorities:
  - Even in a tight fiscal environment, under crisis, it is necessary to continue to invest in Telemedicine and e-Health projects. That means responding to the increasing demand of health care services in remote areas, the problems of monitoring chronic diseases and ageing and the benefits of remote consultation by healthcare professionals and communicating with managerial personnel.
  - There is need for more efficient application processes for those institutions eligible to receive funds for telemedicine projects to be more successful.
  - It is particularly necessary to provide more accurate specifications in health tenders and quality criteria by type of tender (e.g. infrastructure, Electronic Healthcare Record-EHR, e-Prescribing).
  - The projects need to fit the medical needs and not the needs of the suppliers.
  - It will be useful to limit the time of the planning stage to a reasonable length.

Finally, Telemedicine success factors in Greece must not be far away from general e-Health success factors as they have been proposed by the main EU stakeholders in order to resolve most of the main problem that we have mentioned in the previous section:

1. Commitment and Involvement of all stakeholders
2. Strong health management and clinical leadership that guide a flexible and regularly reviewed Telemedicine strategy

3. Regular estimation of cost, incentives and benefits for all stakeholders in various stages of the projects
4. Organisational changes in clinical and working practices (spreading more the ownership to the other participants of the project)
5. Multi-disciplinary teams with a well-grounded experience in ICT and Telemedicine
6. Long term perspective, endurance and patience.

The methods to achieve these factors should be examined furthermore. Finally, we need appropriate benchmarking of citizen's awareness, inform them and find out how they want to use Telemedicine in Greece, effectively and efficiently for future measures.

**Conflict of Interest Statement.**

The author declares that she has no conflicts of interest.

**Human Subject Research Approval Statement**

The author declares that no human and/or animal subjects were included in this study.



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