

# TIMTEM: A TELEMEDICINE PROJECT ON A GREEK ISLAND. PRELIMINARY RESULTS

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## Summary

Rural areas present severe problems in the treatment of acutely ill patients.

The aim of this project is to improve the care of people living on islands creating a model exportable in other rural areas..

The project is divided in three phase • Phase 1: Clinical and ecographic mapping of the local population

Phase 2: Access to "Dispatch System" . Phase 3: Tele-medicine .

This paper is a preliminary report of the results obtained during the first phase of the project and carried out on Tilos, a little island in the Mediterranean Sea in May 1998.

## Introduction

The treatment of the acutely ill patients represents a severe problem in each country: this fact is particularly true in all those regions that appear geographically isolated, and in which medical aids are reachable only with great difficulties: these sites are called %rural areas%. In most cases, not only the treatment of severe acute diseases represents a problem, but also the treatment of chronic diseases or of minor diseases that require in most instances the transfer of the patient. The most important factors to evaluate are : the knowledge of high risk patients, a good system of dispatching and of transport of patients and a system of telemedicine that allows both the possibility of guiding the treatment of the acute patient and the possibility of helping in the treatment of other, not severe, pathologies.

The aim of this work is to improve the care of people living on islands and islands, creating a model exportable to other rural areas.. The project, applied to the island of Tilos (Greece), is divided in three phases • Phase 1: Clinical and ecographic mapping of the local population; Phase 2: Access to "Dispatch System"; Phase 3: Tele-medicine .

Phase 1: •Characteristics and responsibilities of "Tim-Tem" partners • Procedures for the transmission and recording of data. •Filing of clinical data •Organisational "pre-phase", •Operative phase: Screening of the population (clinical, sonographic, cardiologic). •Training of the medical personnel on the island. Transmission of data via fax, email, Internet, Teleconsultation (preliminary phase). Deadline June 1998  
Phase 2: "Dispatch System" : implementation of a dispatch center and a dispatch system in collaboration with the hospital of the country,, The System is already available and applicable by using multiple files on a computerised programme (modulated answer/question system). Dealing with emergencies, also directs us to the most appropriate medical treatment, (giving us the best timing for it ) • It can be employed by para-medical personnel as well. Training is necessary. •It allows us to avoid high costs and over-use of helicopters . In this phase the implementation of an operative plan for Disaster First Aid is provided.

•Deadline is December 1998

Phase 3: Operative Tele-medicine

Areas of application depending on the needs really observed and on the means available on the island. The most difficult factor is represented by the training of the personnel of the island. Up to now the only Hardwares available on the island have been the computers of our group. In an early phase the definitive organization of a system of teleconsult with transmission of data and fixed image is provided: in a later phase the transmission of images in real time, also from the field in case of trauma , is provided. Dead line December 1999.

This paper is a preliminary report of the results obtained during the first phase of the project and carried out on Tilos island ½ Dodecannese Greek.

## **Material and Methods**

. The island of Tilos (Greece) has been chosen as the operative site of

the "Tim-Tem" project. The local authorities take part in it under the guidance of the only medical doctor available on the island. The University of Pisa  $\frac{1}{2}$  Italy (Dept. of Surgery, Post-graduate School of Emergency Surgery) represents the scientific and organisational site of the project.

Tilos is a rocky Mediterranean island (Dodecaneso) with a surface of 64 Km<sup>2</sup>. It has two main villages, Megalochorio and Livadia (Harbour), which are 7 Km apart from each one another; both villages host military garrisons (with about 50 soldiers). From Livadia Harbour ferry boats sail regularly to Rodos (hospital centre; covering distance in 4h), Nissiros, Cos (hospital centre), Athens (high-quality medical specialities). In summer time the island also offers connections via hydrofoils. The bay of S. Antonio has a little harbour, which offers quick connections to the island of Cos.

Tilos has its own heliport, which is open night and day. Mean flight times are: 20 min. to Rodos; 20 min. to Cos, 90 min. to Athens.

The island has about 250-300 inhabitants, and in tourist seasons the number amounts to 1000 (with peaks of 2000 tourists in the period of July-August). The island physician and a nurse are responsible for the only medical aid on the island - that of Megalochorio and Livadia  $\frac{1}{2}$  and they also provide to drug distribution. Currently, the great majority of emergencies are treated either in Rodos Hospital or in Athens Hospital.

In the period of October-December 1997 and during the first months of 1998 a campaign has been held in Tilos in order to encourage the population to cooperate to the collection of clinical data. This information campaign has been carried out by the authorities of the island, who explained to the inhabitants the possible advantages of their collaboration to the project.

In April  $\frac{1}{2}$  May 1998, during a three weeks period four physicians from the Department of Surgery of Pisa University visited Tilos implementing the Phase 1 of the project.

The screening of the population included : collection of anagraphical data, clinical history, physical examination, blood pressure evaluation, ECG, neck, breast and abdomen sonography, and if necessary, doppler and color doppler sonography.

ECG was performed with Cardiovox Device (Cardiovox P12 Aerotel LTD, Israel.) : this is a portable device that allows a twelve derivations ECG. Recorded ECG were immediately transmitted by

phone to the remote Centre (Centro Diagnostico Italiano ½ Milano - Italy) where a cardiologist furnished an immediate report by phone, sending by Fax the printed ECG.

Sonography was performed using one fixed and one portable sonographic device, Fixed device was an echo color doppler (AU3 partner, Esaote Biomedica, Genua, Italy) with cardiologic software and the availability of three probes (3.5 MHz ½ Convex, 7.5-10 MHz ½ linear, 7.5 MHz transrectal) The portable device (SSD 500 Aloka) was equipped with a 3.5 MHz convex and a 7.5 MHz linear probe.

In case of doubt in the interpretation the images, stored with the software present on the sonographic devices, were send by email, using shareware softwares, to a senior sonographer in Pisa.

All inhabitants data and the most relevant images have been inserted in a computerised database to be employed in case the resident gets involved in a serious emergency case.

We started a basic computer training of medical and paramedical personnel; we started also a basic training of the physician on the use of sonographic devices.

Teleconsult, when needed, was performed with the remote centre (University of Pisa and CDI Milano) using phone, fax, videoconference, internet and email to transmit the images: the remote center is able to perform consult for all specialties (Medicine, Surgery, Radiology, Cardiology, Dermatology, etc•). Dermatological and radiological images were capture and inserted on line using a digital camera.

The main limits to the transmission of data and of the images were represented by the absence on the island of ISDN phone line.

## **Preliminary Results**

268 ( 96 % ) out of the 280 inhabitants living in this period in the island were enrolled in the study: There were 129 men and 139 women with age ranging from 3 to 88 years.

The data collected are actually being evaluated in detail.

Some preliminary results can be reported:

clinical and cardiologic screening showed 4 out of 268 persons with high risk cardiologic pathologies:

sonographic screening detected 2 aneurysms of the abdominal aorta with surgical diameter (more than 5 cm): moreover 2 suspicion cancer

previously undetected, a lot of renal stones and of biliary tree stones were detected.

A complete evaluation of the results will be performed within few months when all patients with pathological results have concluded all the diagnostic program.

In 5 cases a teleconsult with submission of sonographic or dermatologic images was performed: the mean time to obtain the transmission of the images by email was 3 minutes: the remote consultant considered the images of a quality good enough to obtain a diagnosis.

The mean time to transmit ECG and to obtain the response of the specialist was 2 minutes.

## Discussion

The preliminary evaluation of the results obtained in phase 1 of TIM-TEM project allows some considerations. First the participation and the collaboration obtained from the authorities of the island both in the preliminary phase and during the collection of the data must be considered. Particularly important was the collaboration of medical and paramedical personnel of the island, able to speak english, for the collection of the data of the patients. The high rate of participation to the study of the island's inhabitants (more than 95 %) is undoubtedly superior to than expected . All inhabitants are perfectly conscious of their isolation and mindful of previous, tragic experiences in case of acute disease frequently observed on the island. An other element to be considered is the fact that to perform a medical examination (specialist consult, radiological examination, blood sample, etc..) the population needs at least three days for the transfer from Tilos to the main island (Rodi) with relative expenses. From a sanitary point of view , 2 % of population showed pathologies at high risk of acute, severe complications (aortic aneurysm, cardiac diseases) and more than 25 % of population showed minor pathologies (renal stones, biliary tree stones, etc●): patients with severe disease were immediately send to the the regional hospital to obtaine an adequate care.

The main limits observed in this phase excluding the limited technology provided were represented by the very low level of technological equipment present on the island where it is not present ISDN phone line and were there are not available until now hardware

devices. As consequence it is not present on the island people trained in using computer and nobody knows the possibilities of communication using computer (internet, email, teleconsult, etc..). To resolve this problem a collaboration with the Department of Informatics of the Aegean University was began in order to have some computers on the island and to train the population, at least personnel involved in health services, to use them.

Considering the actual structure of the emergency services of the Aegean area at the end of this preliminary experience we decided to change the program of the project postponing the phase 2 (Dispatch system) to the phase 3 (Telemedicine implementation) that seems to be at the moment easier to realise.

## REFERENCES

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- 2 - Lambrecht CJ Telemedicine in trauma care. Telemedicine today 6(1): 25 1998.

## THANKS:

- **Centro Diagnostico Italiano, Milano, Italy**
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