

Conference on "Personal Health Systems" 2007

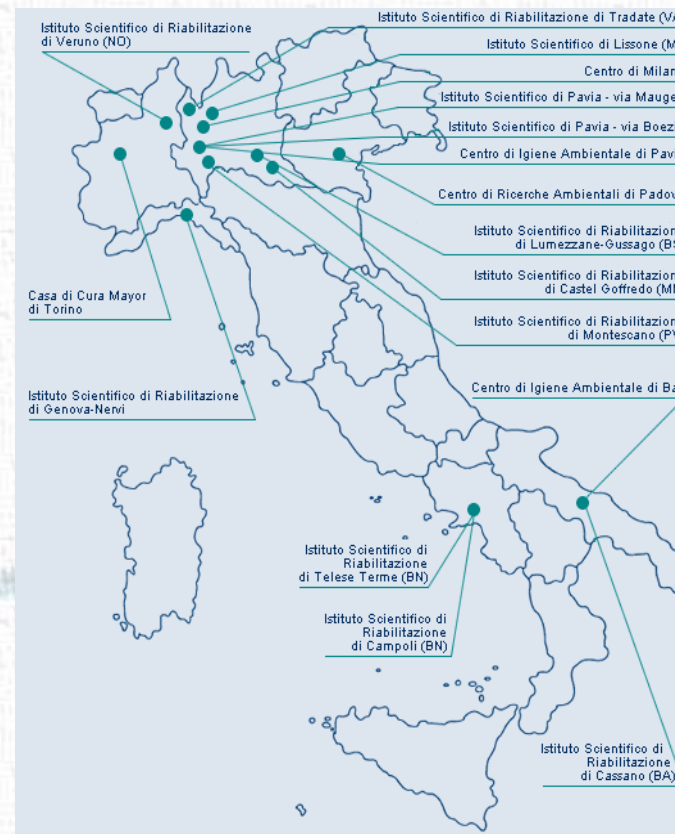
The benefits of remote telecare solutions for the management of cardiac diseases.

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Health Telematic Network S.p.A.

Brescia Italy



HEALTH TELEMATIC NETWORK



Clinical Review: Telemedicine

- Home Telenursing
- Electronic referrals to specialists and hospitals
- Teleconsulting between GPs and specialists
- Call centers and online health services

British Medical Journal, 2001; 323: 557-60

Telecardiology in Italy: Benefits from a telemedicine network connecting chronic patients, General Practitioners and Health Provider Organisations.



High Level Conference and Exhibition
Malaga, Spain, 10-12 May 2006



**Association of Chartered Certified Accountants
Health Telematic Network S.p.A.
IRCCS Salvatore Maugeri Foundation
European Commission Information Society and Media Directorate General**

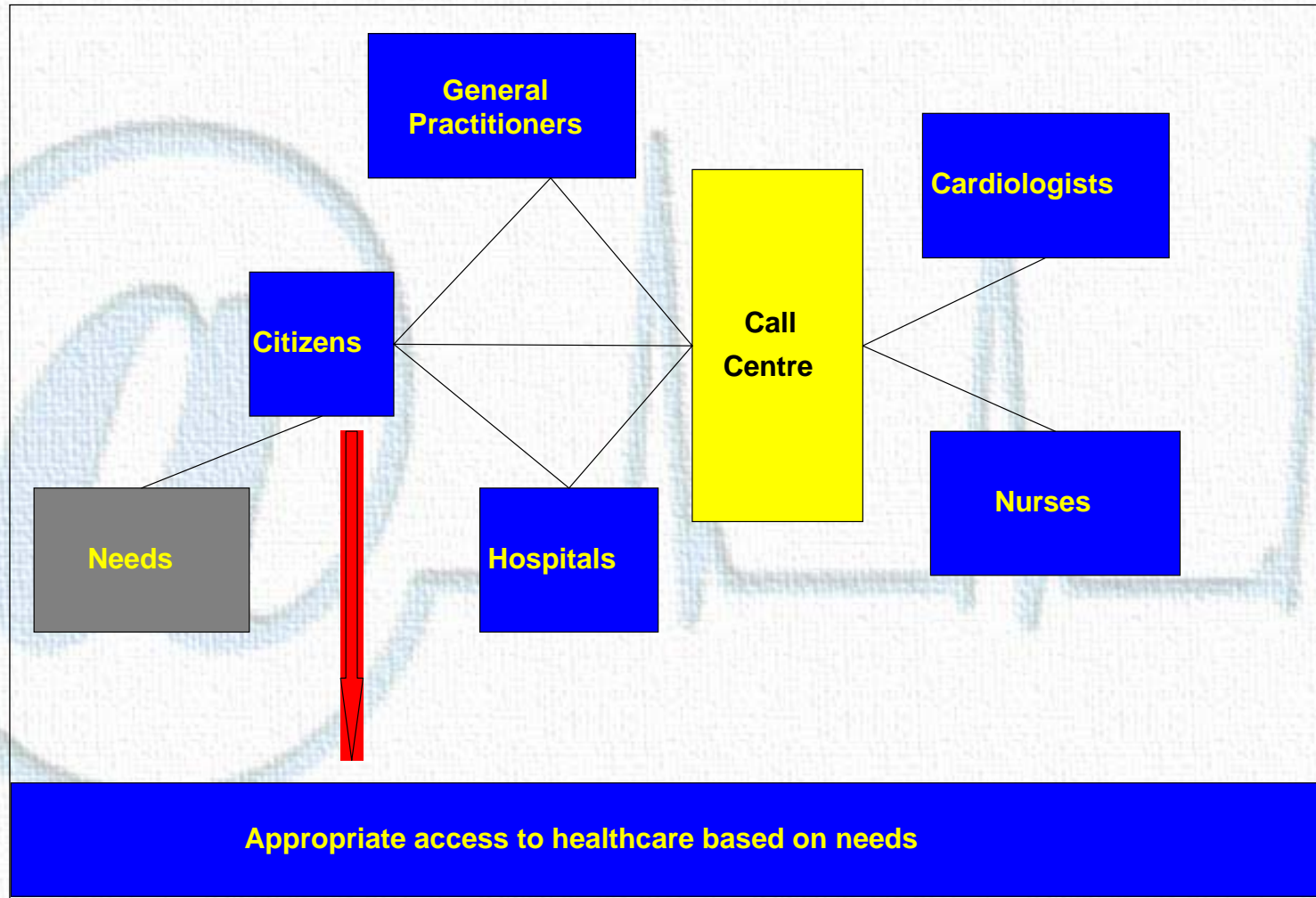


FONDAZIONE SALVATORE MAUGERI
CLINICA DEL LAVORO E DELLA RIABILITAZIONE
I.R.C.C.S.



www.ehealthconference2006.org

Telecardiology in Italy: Benefits from a telemedicine network connecting chronic patients, General Practitioners and Health Provider Organisations.



Telecardiology in Italy: Benefits from a telemedicine network connecting chronic patients, General Practitioners and Health Provider Organisations.

The telecardiology philosophy of the Fondazione Salvatore Maugeri and the Health Telematic Network, is to convert evidence from clinical trials and research into practice.

The evaluation of telecardiology in Italy is the ACCA third eHealth project with the European Commission's Information Society and Media Directorate General.

The Scientific Institute of Research and Care at Fondazione Salvatore Maugeri and the telemedicine service provided by Health Telematic Network, has been researching the clinical impact of telecardiology on patients and health services in Italy since 1998 and providing direct telecardiology services. They have assembled the clinical and technological evidence-based platform for the telecardiology services now available throughout Lombardy, and potentially Italy.

(www.ehealthconference2006.org)

Telecardiology in Italy: Benefits from a telemedicine network connecting chronic patients, General Practitioners and Health Provider Organisations.

Telecardiology in Italy.

Up to 1998, patients in Italy with signs and symptoms of a heart problem, or with known cardiovascular diseases, relied on conventional health services from general practitioners and hospitals. Access to cardiology services and the high number of inappropriate hospital or emergency department admissions, most with high costs, have been identified from the Boario Home Care Project reports. It includes patients with extremely complex cardiology conditions, such as those with chronic heart disease, those waiting for heart transplants or for other types of cardiac surgery, and those who need multidisciplinary care management in their homes. This service is essential to reduce hospital readmissions and to improve their quality of life.

(www.ehealthconference2006.org)

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Boario Homecare Project

➤ **Honorable mention**

“Europe Awards in e-Health”

European Commission 2003 Brussels “The contribution of ICT to eHealth”
Telemedicine and Homecare eHealth Applications

www.e-europeawards.org

➤ **Runner-up in Health Care Provider category**

The 2003 ATSP telehealth awards

The Seventh Annual ATSP International Conference September 16-18, 2003

www.atsp.org/about/telehealth_awards.asp



Boario Home Care Project

Boario Home Care project was born nine years ago, in February 1998, in order to realize a telematic network for the General Practitioners in a mountain territory (Vallecamonica) and to give them the possibility, 24 hours a day, of monitoring the cardiovascular diseases of their patients using a mobile electrocardiographer. Thanks to the successful results, the project has been expanded in northern Italian regions and then all over the territory.

During this research stage, Fondazione Salvatore Maugeri, and later, Health Telematic Network, participated in several projects with the Health Institution, Health Ministry and Health Department of Lombardy.



Boario Home Care Project

Today it is a Service Centre for health offering:

- Teleconsulting and ECG referrals and multispecialty second opinion for General Practitioners and Cardiologists
- Home telenursing for chronic diseases
- Telediagnosis for arrhythmia
- Call Centre for Hospitals



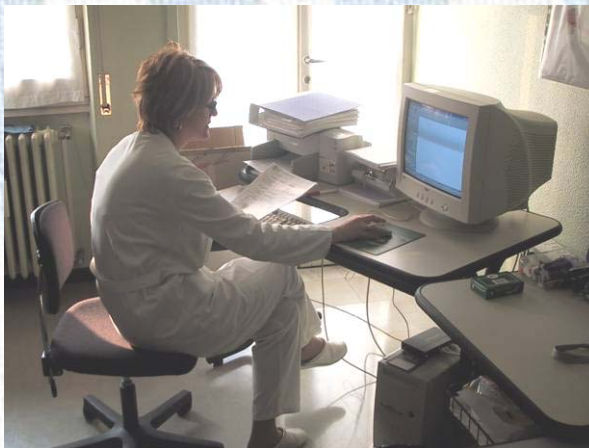
Benefits in access to health care



Hospitals

GPs

Patients



Nurses

Call Center
Teleworking

Specialists

Three different types of services are now available

- One is a service to provide a rapid second opinion for general practitioners.

Telecardiology provides electro-cardiogram information earlier than waiting for conventional appointments with doctors, and usually for patients waiting for a second appointment, to be given their electrocardiogram results, then starting the appropriate treatment.

Earlier diagnosis and treatment refines the healthcare response needed by each patient. It links general practitioners to cardiologists to provide rapid access to specialist advice, as it is needed.

This enables faster and more appropriate access to treatment and therapy when it is needed.

General Practitioners



GP



Service Center

Second opinion:

- ***cardiology***
- ***pneumology***
- ***reumatology***
- ***diabetes***
- ***dermatology***



Specialist

Three different types of services are now available

- The second type of services is home telenursing for chronic patients. Telecardiology is used by patients in their homes to collect data about the performance of the heart. Data is then transmitted to medical and nursing staff for review and response.

Chronic patients



Patients



Service Center



Cardiologist



Telework



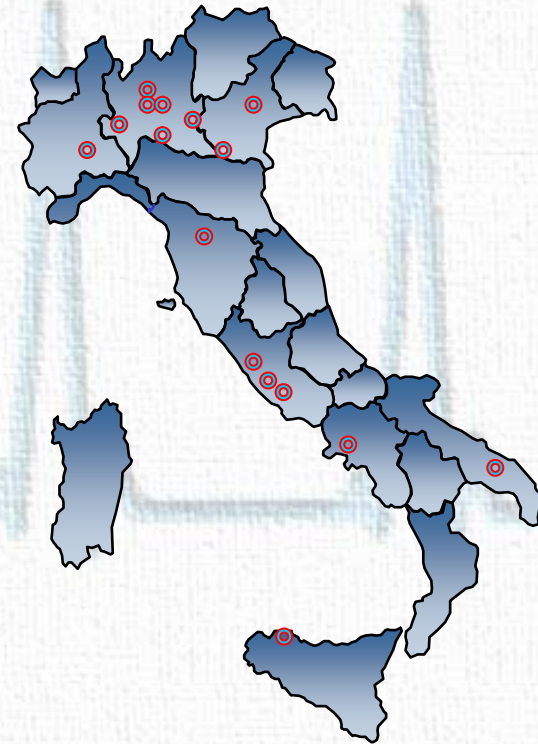
Nurse

Three different types of services are now available

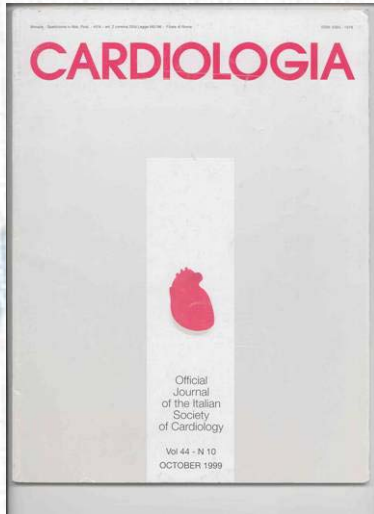
- The third service is the call centre services for hospitals. Terminals have been set up in university and public hospitals, functionally linked with the service centre, and configured to share the application program interface of the central station with on-site and on-line licences. The service centre provides technological and organisational support, while healthcare activity is managed by the hospital's cardiologists and nurses.

Services for Health Provider Organisations

- the outsourcing concerns only the private net, the technological platform and the call centre technical staff while the professional consulting by physicians and nurses is executed by the hospital personnel.



Benefits in access to health care (1)



Telecardiology community: a new approach to take care of cardiac patients

2254 subjects were entered in the study; at the time of ECG recordings, 42% of patients were asymptomatic. GPs' problems were solved by Cardiologists in 2004 patients (89%) while 92 pts (16%) were sent to the ED and further diagnostic tests were requested in 158 pts (27%).

Cardiologia 1999; Vol 44, n 10: 921-24



Benefits in the quality of Health Care



Service Centre

The Service Centre, as an ASP (Application Service Provider, call/contact center), is :

- An advanced technological platform (hardware + software) which can be easily upgraded;
- A computerized call centre active 24/24 hours all year round;
- A dedicated "human resources" team;
- An innovative teleworking model;
- A network of physicians and patients able to offer effective and efficient telemedicine services.



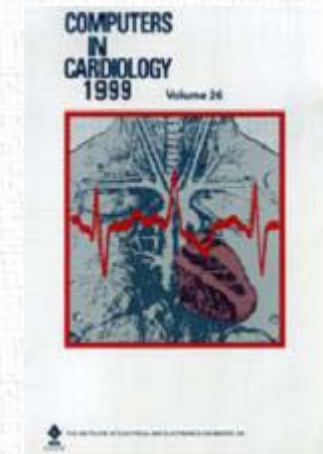
Data-base (December 2006)

- 103.050 second opinion for 1224 GPs with their 1.836.000 patients
- Home telenursing for chronic diseases (660 patients)
- Telediagnosis for arrhythmia (920 patients)
- Services for Health Provider Organisations (23 hospitals): the outsourcing concerns only the private net, the technological platform and the call centre technical staff while the professional consulting by physicians and nurses is executed by the hospital personnel.



Action taken on 27934 patients

- No action: 18668 patients
- Therapy adjustment: 3791 patients
- Problems' solution during telephone call: 22459 patients (80.4%)
- Referral to the Emergency Department: 1695 patients (6.0%)
- Further investigations: 3799 patients (13.6%)



15 Publications on International indexing journals
7 Publications on Italian indexing journals
35 Abstracts on international meeting
71 Abstracts on Italian meeting
6 chapters on books

Benefits in the quality of Health Care: (1)



Appropriatezza dell'invio in pronto Soccorso mediante un servizio di telecardiologia sul territorio.

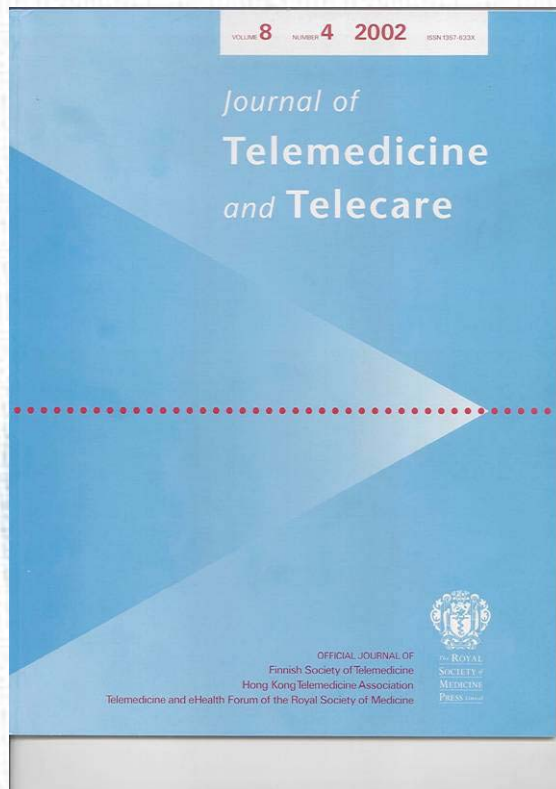
3456 patients were enrolled; ECG and teleconsultation solved all the problems in 2452 pts (71%); 142 (4%) were sent to the Emergency Department; further diagnostic tests were requested in 862 (25%); 5 pts were sent to the ED in the 48 hours after the teleconsultation.

Sensibility: 95%; Specificity: 97.5%; Diagnostic Accuracy:94%.

Italian Heart Journal Suppl 2000; 1 (7): 905-909



Benefits in the quality of Health Care: (2)



CHEST PAIN PREHOSPITAL ASSESSMENT WITH A TELECARDIOLOGY SERVICE

952 patients were enrolled; ECG and teleconsultation solved all the problems in 700 pts (74%); 83 (9%) were sent to the Emergency Department; further diagnostic tests were requested in 162 (25%); 7pts were sent to the ED in the 48 hours after the teleconsultation. Sensibility: 97.4%; Specificity: 89.5%; Diagnostic Accuracy: 86.9%.

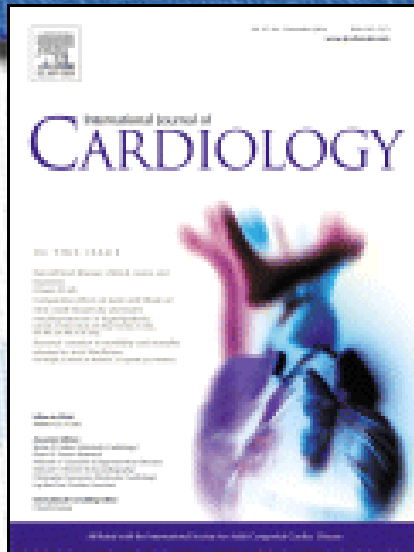
Journal of Telemedicine and Telecare 2002; 8: 231-236





Diagnostica del cardiopalmo accessionale: Event recorder transtelefonico versus elettrocardiogramma dinamico sec. Holter

Palpitation is a common symptom than sometimes results from a substantial cardiac arrhythmia. A 24- hour Holter monitoring is usually used, but not in patients whose symptoms occur infrequently. 310 pts with palpitation were randomly assigned to receive a transtelephonic event recorder (TER) or 24-hour Holter monitoring. Patients with the presence of palpitations during the examination were 119 (76.8%) in the group of TER and 74 (47.8%) in the Holter group ($p < 0.01$) with an efficacy increase equal to 29% for TER. The cost per test was 61.97 Euro with Holter, while 38.83 Euro with TER.



Incidence of Atrial Fibrillation in an Italian population followed by their GPs through a telecardiology service

AF was detected in 719 patients (9.%) (77 ± 12 years). In 448 patients it was a known chronic disease condition, while in 271 patients it was a new diagnosis.

After teleconsultation, a solution of the GP's problems during the telephone call was reached in 348 pts (77.6%) (194 patients (43.5%) needed therapy adjustments and in 154 cases (34.5%) no further action was necessary) while 47 patients (10.5%) were hospitalized and 51 patients need further diagnostic tests. In 259 cases, GPs requested a teleconsultation in presence of symptoms and a first episode of atrial fibrillation was recorded; in this case, 121 patients (46.9%) were sent to an Emergency Department, 101 patients (39.1%) needed therapy adjustments, and for 19 patients (7.5%) further diagnostic tests were prescribed.

Economic benefits



Economic benefits (1)

Potenziale riduzione dei costi per il Servizio Sanitario Nazionale mediante un servizio di telecardiologia dedicato ai medici di medicina generale.

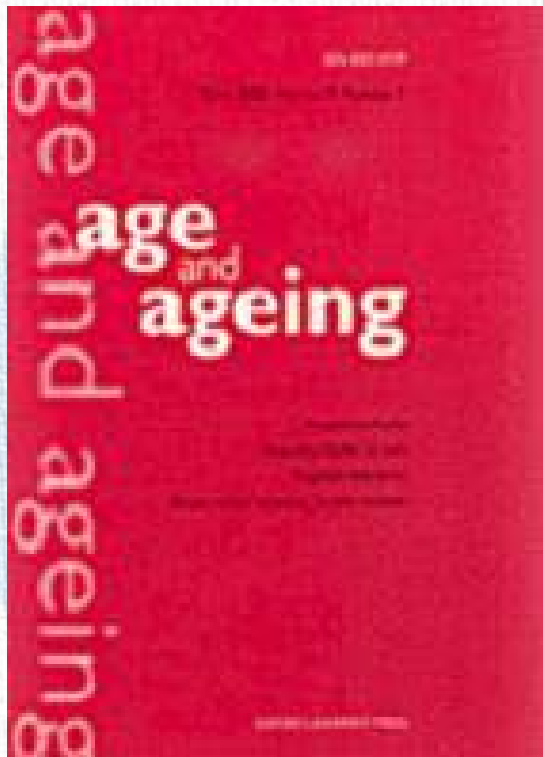
891 pts were enrolled and followed with a telecardiology service; a 47% reduction of ED admission and 95 % of cardiac consulences were obtained with the telecardiology service in comparison with the usual care followed by the GPs.



Italian Heart Journal 2001; 2 (10): 1091-1097



Economic benefits (2)



Telecardiology: a new support for GP in the management of elderly patients.

311 elderly pts were enrolled and followed with a telecardiology service; a 37% reduction of ED admission and 94 % of cardiac consulences were obtained with the telecardiology service in comparison with the usual care followed by the GPs.

Age and Ageing: 2002; vol.31, N2:153



Economic benefits (3)

Links to these locations enable cardiac second opinions and electro-cardiogram data to be collected as close to the patients' homes as possible. It also achieves these earlier than relying on a conventional general practitioner visit for a cardiac condition. This information can be used to avoid some hospital visits, enable earlier intervention in some potential cardiac crises and enable therapies to be modified rapidly. Decisions about these can be taken by general practitioners connecting with cardiologists to review clinical data and electro-cardiograms.

Chronic patients



Patients



Service Center



Cardiologist



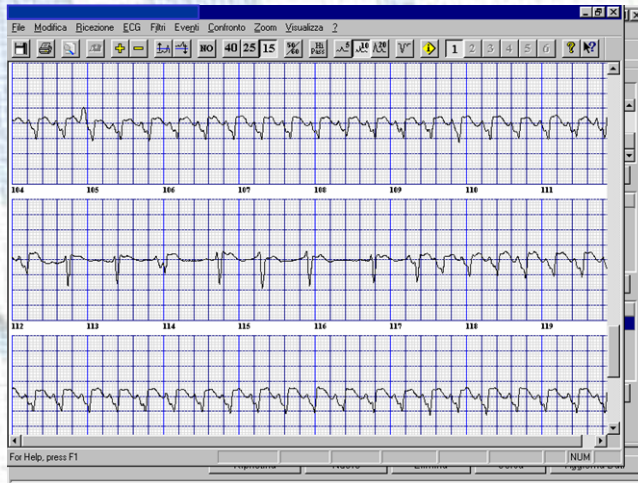
Telework



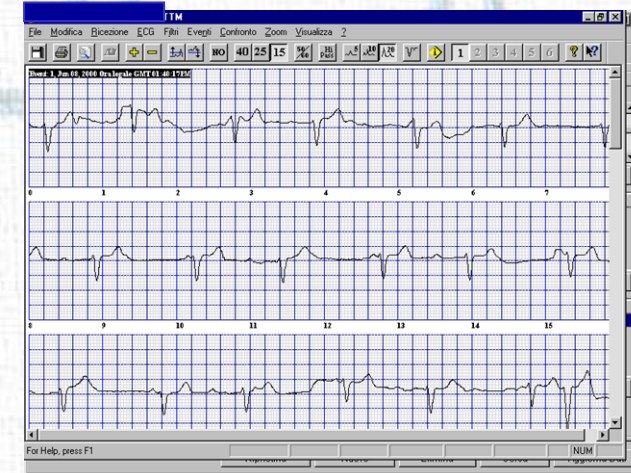
Nurse

METHODS

- Telemonitoring (scheduled appointment) (clinical data, blood examinations, therapy, ECG)
- Teleassistance (occasional appointment) (symptoms, ECG)
- Teleconsultation (scheduled or occasional between cardiologist and GP)



The image shows a screenshot of a medical software window titled 'Wincare - Gestione Eventi'. The window is divided into several sections. On the left, there is a 'Gestione Eventi' menu with options like 'Precedente', 'Strumenti', 'E-Mail', 'Mappa eventi', and 'Stampa eventi'. Below this is a list of 'Eventi disponibili' with a tree view showing categories like 'Anamnesi', 'Esami_obiettivo', 'Esami_ecg', 'Esami_ecocardiogramma', 'Esami_torace', 'Esami_torace', 'Esami_test_sforzo', 'Terapia', and 'Contatti_telefonico'. The main area is a form for 'Contatto telefonico' with fields for 'Data' (19/10/2001), 'Ora apertura' (12:17), and 'Ora chiusura' (12:17). The form includes sections for 'Eziologia' (Dilatativa valvolare (Stenosi aortica)), 'Gruppo' (pSCD), 'Braccio' (TCARE), 'Tipo di contatto' (Richiesto dal P2), 'Motivo del contatto' (Cala), 'Giudizio di stabilità' (S), and 'Misure intraprese' (Nessuna). There are also fields for 'FC precedente', 'PA precedente', 'Peso precedente', 'FC', 'PA', and 'Peso'. The 'Osservazioni' field contains the text 'Pa stabile Non riferisce disturbi'. At the bottom, there is a 'Lista Eventi Selezionabili' section with a 'Precedente' dropdown menu set to 'ESAMI_MONOTRACCIA' and a 'Nuovo' button. The window has a standard Windows taskbar at the bottom with the system clock showing 23/10/01 10:15.



Population

	<i>Usual care</i> (n= 230)	<i>HBT</i> (n= 230)
Age (y)	56±10	58±10
Male	198 (86%)	193 (84%)
III – IV NYHA	70 (30.5%)	106 (46%)
Ischemic disease	106 (46%)	129 (56%)
Other	124 (54%)	101 (44%)
VO₂-peak (ml/kg/min)	12.8 ± 3	13.7 ±3.4
EF (%)	26.0 ± 7.6	28.4 ± 6.9
ECG:		
-Sinusal rhythm	167 (72.6%)	190 (82.6%)
-Atrial fibrillation	38 (16.5%)	31 (13.5%)
-All type Pace maker	25 (10.9%)	9 (3.9%)
NA (mg/dl)	137.7 ± 3.4	138.7 ± 3.1
Creatinine (mg/dl)	1.37 ± 0.4	1.38 ± 0.7
Discharged Therapy:		
-Ace-inhibitors	218 (95%)	216 (94%)
-Betablocking	138 (60%)	195 (85%)

Results (2)

	<i>Usual Care (n=230)</i>	<i>HBT (n=230)</i>	
N° of hospitalized patients (%)	83 (36.2)	55 (23.9)	
-Relative Risk		0.56	p<0.01
-confid. Interval 95%		0.38 – 0.82	
Hospitalizations	142	91	-36 % p<0.01
HF Hospital readmissions probability	42 %	28 %	

Results (3)

	<i>UC (n=230)</i>	<i>HBT (n=230)</i>	
Instability (n° of pts) (%)	93 (40.6)	55 (24.3)	P<0.001
Instability (total)	147	101	-31.2 % -P<0.001
Dead patients (%)	29 (12.7)	18 (8.0)	
-RR		0.44	P<0.06
-CI 95%		0.20 – 0.97	

Cost analysis

Daily cost/pts 0.65 €
Annual cost/pts 185 € ± 39

	<i>Usual Care</i>	<i>HBT</i>	
HF Hospital readmissions mean cost (€)	1298 ± 2322	843 ± 1733	-35% P<0.01
Annual cost to prevent an hospital readmission (€)		638	IC 95% 1080-2430



**A pilot study of nurse-led
home-based
telecardiology for patients
with chronic heart failure**

A systematic review of the literature on home monitoring for patients with heart failure

- Forty-two studies met the selection criteria on 383 articles selected.
- Home monitoring appears :
 1. to be technically effective for following the patient remotely;
 2. to be easy to use, and it is widely accepted by patients and health professionals;
 3. to be economically viable.

A systematic review of the literature on home monitoring for patients with heart failure

- Home monitoring of HF patients have been shown to have a positive impact on:
 1. the clinical process, supported by a significant improvement of patient follow-up by adjustment of treatment, diet or behavior, as well as hospital readmissions and emergency visits reduction;
 2. the patient's health, supported by a relevant improvement in quality of life, a reduction of days in hospital, and a decrease in mortality;
 3. and costs resulting from the use of health resources.

Economic benefits: Time

**GPs,
Cardiologists,
Hospitals**

7-10 min

Call Center

Patients

Goals

- Telecardiology goals for Lombardy can be summarised as enabling cardiologists, general practitioners and nurses to improve their services for patients by:
- Prompt identification of conditions and changes in conditions
- Prompt and appropriate response
- Reduced negative impact on families and carers from inappropriate healthcare.

Telecardiology in Italy: Benefits from a telemedicine network connecting chronic patients, General Practitioners and Health Provider Organisations.

Benefits for citizens, patients and carers include:

- Avoid 35% of hospital inpatient admissions and 12% outpatient visits for hospital care that is not needed;
- Increase access to hospital services for patients where conventional electro-cardiogram information is not available to support the need for hospital services inpatient admissions by 14% and outpatient visits by 4%;
- Avoid 99% of visits to general practitioners because clinical data and electro-cardiograms from telecardiology enable decisions to be taken with fewer general practitioner visits needed to collect test results that are delivered some two weeks after the initial consultation;

Benefits for citizens, patients and carers

- Visit general practitioners 8% more often for therapy that could not be provided by conventional services because no clinical electrocardiogram information was available
- Avoid 15 days wait for the beginning or modification of therapy for 14% of patients
- Reduce travel time and costs for patients and carers;
- Reduce anxiety for patients and carers;
- Improve life styles for patients, families and carers.

Telecardiology in Italy: Benefits from a telemedicine network connecting chronic patients, General Practitioners and Health Provider Organisations.

In December 2005, the Lombardy Region decided to implement telecardiology for patients with chronic heart failure in groups III and IV of the New York Heart Association classification, and with an ejection fraction $<40\%$, and having had one hospital admission in the previous six months. It also agreed to pilot services at a price of €660, held for six months, for every patient in the appropriate diagnosis related groups in VIII/1375, issued on 14 December 2005. Lombardy Region pays this price for each patient with chronic heart disease in these diagnosis related groups, and so provides the resources for the Health Telematic Network to sustain its telecardiology service. Lombardy Region's strategic decisions were made in December 2005, with details finalised up to March 2006.



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D.G.R. 11.05.2006 n° VIII/2471

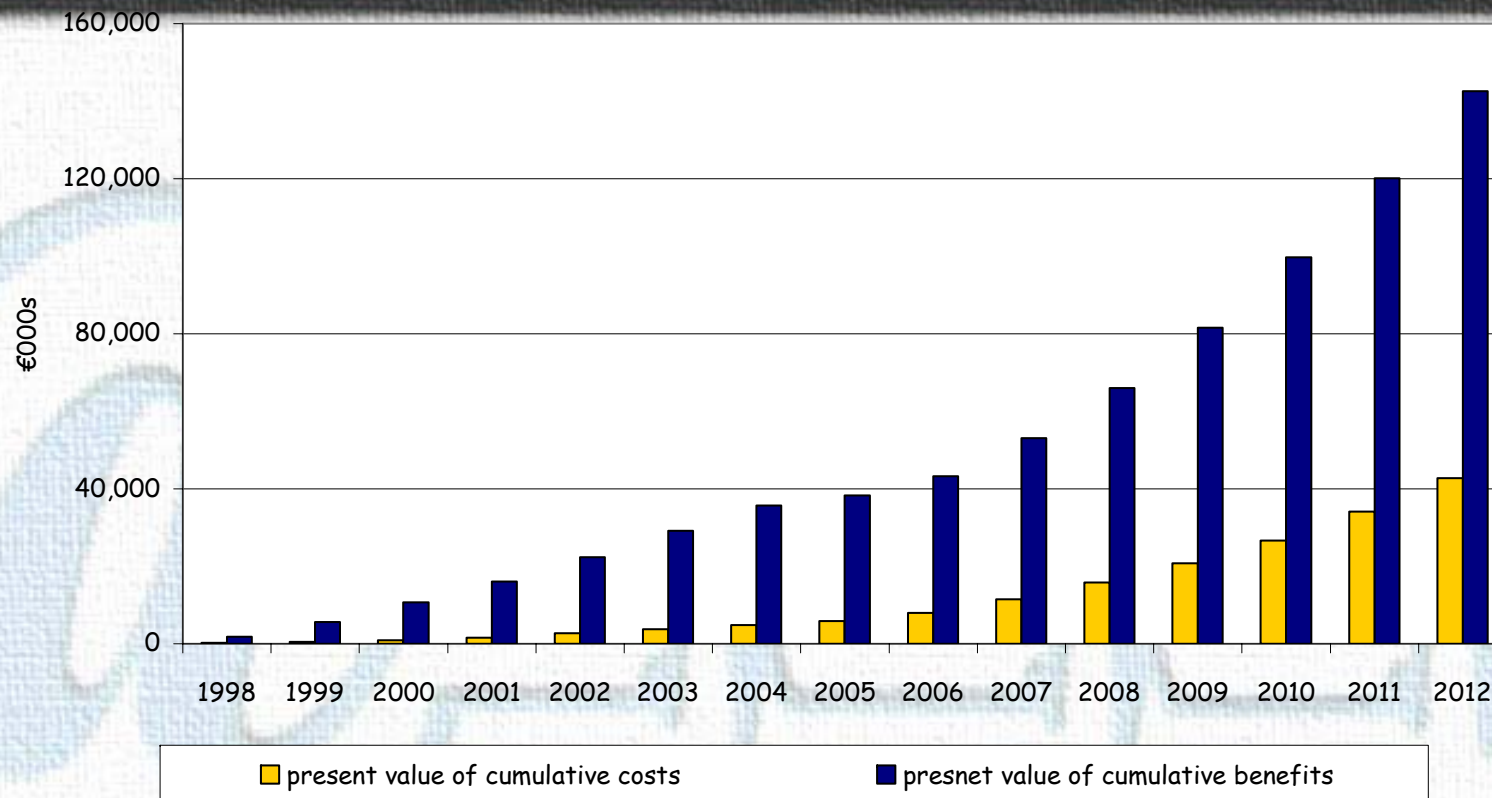
Determinazioni in ordine alla gestione del servizio socio-sanitario regionale per l'esercizio 2006

“Percorso di Telesorveglianza Sanitaria Domiciliare per pazienti con scompenso cardiaco cronico medio-grave”

Autorizzazione a 36 strutture ospedaliere che hanno presentato richiesta per l'attuazione sperimentale dei modelli di gestione innovativa in ambito cardiologico.

Tariffazione sperimentale € 660,00/pz/sei mesi

Telecardiology in Italy: Benefits from a telemedicine network connecting chronic patients, General Practitioners and Health Provider Organisations.

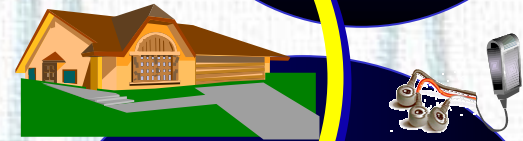
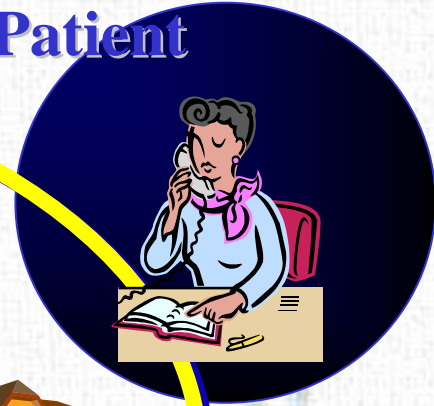


The economic impact of extending telecardiology across the whole Lombardy Region, steadily over about six years up to 2012, is material. Much of the investment needed in information and communication technology, electrocardiogram equipment and service infrastructure has already been set in place by Health Telematic Network. The total net benefits are considerable, with an estimated annual benefit cost ratio of more than 3.3:1 by 2012.

Call Center



Patient



Hospital



GPs



IRCCS Fondazione Maugeri Network



- **Hospitals**
- **Rehabilitation Hospitals**
- **Rest Houses**
- **General Practitioners**
- **Patients**

