

Telecardiology

Roberto Rocci MD

Medical Director, CDI spa, Italy

CDI is a privately owned organisation that runs outpatient centres in Italy. CDI has five operative centres in Milan and one in Rome. CDI's mission is to offer a solution to health problems, thereby avoiding hospitalisation of patients. The main areas of activity are clinical medicine and preventive medicine. Services offered are: clinical laboratory, pathology, nuclear medicine, radiology, computerised tomography (CT) scan, magnetic resonance, sonography, endoscopy, day surgery, preventive medicine, specialist consultations, physiotherapy, dentistry and occupational medicine. CDI has 300 employees and 500 consultant physicians. Its main centre in Milan provides over 1,600,000 services per year to approximately 400,000 patients.

At the end of 1996 CDI decided to offer specialist consultation directly to users through telemedicine. The first step has been to activate a cardiac monitoring centre. Trans-telephonic electrocardiography is a diagnostic method technically and clinically established. Despite a large amount of experimental work, few services are active, at least in Italy, and offered on a continuous basis. At CDI we report on an operative centre that offers a telecardiology service (Cardio-on-line) to health workers and physicians on a routine basis.

Cardio-on-line

Cardio-on-line (CoL) is a service that offers real-time interpretation of ECGs transmitted by telephone to a cardiac monitoring centre. The CoL monitoring centre is able to receive standard 12-lead ECGs transmitted by terrestrial, cellular or satellite telephones from users equipped with small apparatus that enable registration and transmission. Registering for the apparatus is easy and can also be done by individuals without specific technical or cardiological training.

At the monitoring centre, at least one cardiologist is on duty 24 hours a day. Cardiologists immediately interpret the ECGs and provide such support to service users, as well as consultation on the need for further specialist evaluation of patients or for hospitalisation.

Technology employed

Receiving station

The monitoring centre has multiple personal computer (PC) workstations connected on a Windows NT network. Each has a signal processing board and application software (Aerotel Medical Systems) that has been tailored to CDI's organisational needs. Software allows the instant review of ECGs received by telephone, comparison of previous transmissions of the same patient and report generation. The report is sent to the subscriber by fax.

ECG recorder/transmitter

Each subscriber has a recorder/transmitter apparatus (Heartview P12 — Aerotel Medical Systems). The pocket-sized apparatus has a three-wire patient cable and four metal chest electrodes and allows recording of a 12-lead standard ECG by changing the position of the device. The same apparatus transmits to the monitoring centre through the telephone.

Service users

The majority of CoL users are general practitioners from all over Italy. The service enables them to register ECGs during their office and home visits and to receive immediate interpretations directly from the cardiologist with whom they can discuss results.

Calls are motivated by the need to evaluate the symptoms reported by patients, eg, arrhythmia, or periodic controls of chronically ill or at risk patients. In 1997 CoL received about 6,000 calls. Now, in the second year of its activity, the monitoring centre is answering about 30 calls a day and the volume of activity is growing.

Consultation results have been evaluated by sampling 1,000 calls made in 1997. We summarise results:

Symptoms evaluation 29 per cent

chest pain	36 per cent
arrhythmia	24 per cent
palpitations	20 per cent
lipothymia	five per cent
<u>periodic controls 41 per cent</u>	
hypertension	29 per cent
ischaemic heart disease	11 per cent
diabetes	four per cent
chronic pulmonary disease	four per cent
obesity	three per cent
hyperthyroidism	two per cent
medical evaluation prior to sport activity	seven per cent

The main use of the monitoring service as reported by users is the possibility to identify acute situations, provide timely assistance and the opportunity to evaluate patients with specialist aid directly in their office — thereby avoiding the need to send patients to specialist clinics which often means being put on long waiting lists, inconvenience and lost working hours for patients.

Our experience is concordant with that reported by the monitoring centre of Edgware General Hospital in London, UK: more than 80 per cent of the consultations at the monitoring centre are resolute and require no need for further evaluation or hospitalisation.¹ CoL activity confirms that direct communication between general practice and specialist medicine is useful.

Communication difficulties between general practitioners (GPs) and specialists are common in many countries. Specialist consultations, especially when offered to outpatients by hospitals, are often characterised by long waiting lists. Telemedicine is a way to improve communication and will reduce inconve-

nience to patients when it achieves more widespread use. We also anticipate an improvement in quality of the activity of a GP as a result of the more direct care of patients and the more selective use of hospitalisation.

The CoL monitoring centre participates in TIMTEM, a telemedicine project of the University of Pisa, Italy (Department of Surgery Post-graduate School of Emergency Surgery). The aim of this project is to improve the care of people living on islands by creating a model that can be 'exported' to rural areas. The island of Tilos (Greece) has been chosen as the operative site of the TIMTEM project.

The island has about 300 inhabitants, and the island's physician and one nurse are responsible for the only medical aid available. The majority of emergencies are treated either in Rodos Hospital (which is four hours away) or in Athens Hospital. The first phase of the project concerns clinical and echographic mapping of the population. The screening of the population included:

- collection of anagraphic data;
- clinical history;
- physical examination;
- blood pressure evaluation;
- ECGs;
- neck, breast and abdomen sonography;

- if necessary, doppler and colour doppler evaluation.

Electrocardiograms were recorded with the Heartview P12 device (by Aerotel Medical Systems Ltd) and immediately transmitted by telephone to the CoL centre in Milan, where a cardiologist provided an immediate report by telephone and faxed over the printed ECG. Two-hundred-and-sixty-eight (96 per cent) of the 280 current inhabitants living on the island were enrolled in the study. Clinical and cardiological screening showed four out of 268 people with high-risk cardiologic pathologies.² ■

References

- 1 D Shanit, A Cheng, RA Greenbaum: 'Telecardiology: supporting the decision-making process in general practice' *Journal of Telemedicine and Telecare* 2, pp7-13, 1996
- 2 E Cavina, A Aliferis, O Goletti, R Balestri, PV Lippolis, G Zocco, M Franceschi, A Cotrozzi, S Economu, E Christofidis — TIMTEM: 'A Telemedicine Project on a Greek Island' Preliminary Results

For more information, contact: Roberto Rocci, MD, Medical Director, CDI Spa, Via Saint Bon 20, 20147 Milano, Italy. E-mail: rocci@cdi.it