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ORIGINAL ARTICLE / TELE-EXPERTISE

Telecardiology: What's new from Italy?

Télécardiologie : quoi de neuf en Italie ?

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Summary In this report, we concisely describe recent innovations in the field of telemedicine applied to cardiovascular disease management achieved across Italy. Several networks based on pre-hospital triage of acute myocardial infarction by telemedicine electrocardiograms have been currently activated. Telemedicine support was also used for cardiovascular risk prevention and pre-participating screening of young non-competitive athletes, according to recent innovation in the legislative framework of sport medicine. Telemonitoring and telerehabilitation have been used for patients with chronic heart failure and even reimbursed in some regions.

MOTS CLÉS
Télécardiologie ;
Infarctus du myocarde aigu ;
Insuffisance cardiaque chronique

Résumé Dans ce rapport, nous décrivons de manière concise les innovations récentes dans le domaine de la télémédecine appliquée à la gestion des maladies cardiovasculaires réalisées en Italie. Plusieurs réseaux basés sur le triage pré-hospitalier de l'infarctus du myocarde aigu par électrocardiogrammes de télémédecine ont été actuellement activés. La télémédecine a également été utilisée pour la prévention des risques cardiovasculaires et l'évaluation préparticipante des jeunes athlètes non compétitifs, conformément aux récentes lois en médecine

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sportive. La télésurveillance et la téléréadaptation ont été utilisées chez des patients souffrant d'insuffisance cardiaque chronique et même remboursées dans certaines régions.

Telecardiology for pre-hospital triage of acute myocardial infarction in Italy

Few years ago, we had the pleasure to describe from the pages of the European research in telemedicine a model of implementation of pre-hospital electrocardiogram triage for the management of patients with acute myocardial infarction with ST-elevation (STEMI), applied in a region-wide public healthcare network [1]. All emergency medical service (EMS) ambulances were equipped with a device for pre-hospital registration of 12-lead electrocardiogram and a single telemedicine center located in the regional capital city of Bari was capable to send back interpreted pre-hospital electrocardiograms, to provide a quick consultation and to alert EMS for primary coronary angioplasty in the case of acute myocardial infarction [2]. The network covered more than 4-million inhabitants of Apulia in an area stretching from north to south for almost 500 kms.

The telecardiology network was also used for the pre-hospital diagnosis of arrhythmias [3] and atrial fibrillation [4].

The implementation of telecardiology approach and pre-hospital electrocardiogram was associated with a reduction in time to balloon of about 50 minutes and 56%, particularly marked in subjects farther from a cathlab; in such areas the rates of STEMI patients treated with primary coronary angioplasty (pPCI) within benchmark times recommended by international guidelines more than doubled, soaring to 70% (85% in the whole population enrolled in the study) [5].

Follow-up analysis showed a 27% reduction of 6-month death rates in the group of patients with higher risk profile of cardiovascular complications, thanks to pre-hospital electrocardiogram and telemedicine triage [6].

The telemedicine network was particularly efficient in the case of atypical presentation of acute myocardial infarction [7] or arrhythmias and is greatly appreciated by EMS crews which may rely on constant support of a remote cardiologist available 24/7 [8], with an excellent cost/efficacy profile [9].

Results in terms of time to treatment reduction are in line with those from other studies from other countries, as recently shown in a meta-analysis and meta-regression study. Such data shows that telemedicine triage with pre-hospital electrocardiograms near halves time to pPCI in STEMI patients [10] (Fig. 1). The longer the basal time to treatment without telemedicine triage, the larger the absolute time reduction thanks to pre-hospital electrocardiogram triage with telemedicine.

Favorably, several other networks for the treatment of STEMI have been implemented across Italy. Generally, the models are 3: the Apulia model, leveraging on a single telemedicine hub manned with cardiologists, the Piedmont model, based on a series of regional EMS telemedicine hubs, and, finally, other models, more simply and diffused, where the telemedicine hub interpreting pre-hospital electrocardiograms is the cathlab responsible for the possible pPCI [11–13] (Fig. 2 and Table 1).

Position papers and consensus on telemedicine

The great amount of initiatives, activities and networks in the field of telemedicine sprang in the recent past in Italy boosted the need for documents of agreement endorsed by Italian scientific societies, fixing aims and means by which telemedicine support may improve cardiovascular care and scientific evidence beneath. A position paper on telemedicine for cardiovascular disease continuum and a consensus document on telemedicine network have been therefore issued by the Italian society of cardiology (SIC) [14], the Italian society of hospital cardiologists (ANMCO) and the Italian society of telemedicine (SIT). Other documents were issued on devices used for telemedicine [15] and telemedicine in heart failure [16]. English versions of all documents are available [17], as an original contribution from Italy to European knowledge in the field of telecardiology.

Telemedicine for non-urgent cardiovascular disease (prevention, rehabilitation)

Telemedicine in Italy, however, does not mean barely pre-hospital triage of STEMI for timely pPCI. Pre-hospital phase is just the first of possible fields of application for telemedicine in cardiovascular disease. Studies on the use of remote electrocardiogram screening for primary and secondary prevention of cardiovascular risk [18] and the early diagnosis of cardiovascular urgencies in detainees have been already published [19].

Recent innovations in the regulatory framework boosted the use of telemedicine for pre-participation electrocardiogram screening of sport activity in young non-professional athletes [20,21].

A great ferment is also present in the field of telemedicine for the management of chronic heart failure (CHF) (Table 2). We recently showed the usefulness of telemedicine support for care manager nursing [22]. Larger experiences, however, have been held in the field of telemonitoring or telerehabilitation for CHF [23]. In this area, two possible models of telemedicine have been implemented, the Montescano model, based on the remote

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