

REVIEW

Cardiovascular rehabilitation in Romania

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Abstract: Cardiovascular rehabilitation (CR) is part of cardiovascular prevention and the objectives are the improvement of functional capacity, control of cardiovascular risk factors, adoption of a healthy lifestyle, education and adherence to the recommended therapies, aiming the reduction of the risk of adverse events, disability, cardiovascular mortality and the increase in quality of life. In Romania, CR is delivered only in a hospital basis, at 2nd phase of rehabilitation in patients, in five dedicated centers that have the necessary equipment and a multidisciplinary team, but an insufficient number of beds compared to a great number of patients with an indication for rehabilitation. Issues related to addressability, adherence, incomplete legislation regarding ambulatory rehabilitation, and lack of recognition of CR as a part of cardiology or internal medicine are still unsolved.

Keywords: cardiac rehabilitation, secondary prevention, indications.

Rezumat: Recuperarea cardiovasculară este parte a prevenției cardiovasculare și are ca obiective ameliorarea capacității funcționale, controlul factorilor de risc cardiovascular, adoptarea unui stil de viață sănătos, educație și aderență la terapia recomandată, cu scopul reducerii riscului de evenimente adverse, a dizabilității, a mortalității cardiovasculare și creșterea calității vieții. În România, recuperarea cardiovasculară este efectuată exclusiv în spital, la pacienți în faza 2 de recuperare, în cinci centre specializate, care au dotarea și echipa multidisciplinară necesare, dar un număr insuficient de paturi raportat la numărul mare de pacienți cu indicație de recuperare. Probleme legate de adresabilitate, aderență, lacune legislative în ce privește recuperarea ambulatorie, precum și nerecunoașterea recuperării cardiovasculare ca parte a cardiologiei sau medicinei interne rămân încă nerezolvate.

Cuvinte cheie: recuperare cardiacă, prevenție secundară, indicații.

HISTORICAL CONTEXT

The traditional treatment of myocardial infarction was represented, until the 1930s, by six weeks of absolute bed rest, and this time was considered to be necessary for the healing of infarcted area¹. In the late 1940s, the so-called “armchair therapy” (periods of resting in an armchair instead of bed rest) began to be accepted, and then, in 1950s, short daily walking of 3-5 minutes for four weeks were recommended after the acute event. It was also in the 1950s when Levine and Lown produced great controversies and opposition from the medical world as they advocated early mobilization of patients after myocardial infarction². In 1968, Saltin and coworkers demonstrated the negative effects of a long bed rest and proved the importance of physical exercise in the outcome of the patients³.

The first program of progressive physical activity after an uncomplicated myocardial infarction was developed in 1952 by Newman and coworkers. In the 1960s, a series of studies published by Braunwald, Sarnoff, Sonnenblick, Hellerstein, Naughton, and Ekblom described the physiological background of the cardiovascular benefits of physical exercise and developed cardiac rehabilitation programs. At the beginning of the 1970s, Varnauskas and coworkers revealed the cellular and mitochondrial alterations induced by physical training; these studies continued till now-a-days and new scientific proves in favor of physical rehabilitation after myocardial infarction were published⁴.

In 1967, the scientific bases of CR were settled at Noordwijk aan Zee (Holland) and the practical approach modalities were described. New CR centers

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appeared, in Europe, United States and other regions of the world⁵. After 1970s, CR widens its core components with diet approach, psychotherapy, group rehabilitation, health education and becomes multidisciplinary, comprehensive^{6,7}.

The indications of CR were gradually extended, beyond the classical one represented by uncomplicated myocardial infarction. The studies demonstrated positive effects in heart failure, stable angina, arterial hypertension, peripheral vascular diseases. Cardiovascular surgery and invasive procedures developed spectacularly and such patients were referred to CR too. Old patients with cardiovascular diseases are more frequently included in rehabilitation and need the individualization of the training programs⁸.

In Romania, rehabilitation of cardiovascular diseases has a tradition of more than 50 years. Before the 1960s, in Cluj-Napoca, a medical gym dedicated to cardiac patients was established. Ten years later, at Ascar Clinic Bucuresti, and then at the Cardiology Department of Fundeni Hospital (Bucuresti), the first unit of preventive cardiology and rehabilitation was established, under the coordination of prof. I. Orha, who was the first one that elaborated, in Romania, a program and a methodology of rehabilitation for cardiac patients⁶.

In the 1970s, the concept of medical rehabilitation is expanding, and the objective was the fast social, familial and professional reinsertion of the patients; during these years the rehabilitation hospitals were built in the university centers of Iași, Cluj-Napoca, Timișoara, Târgu-Mureș, and the Cardiovascular Rehabilitation Hospital in Covasna. It cannot be overlooked the enthusiasm associated with high professionalism and dedication of the pioneers of CR from these centers, and specialist trainers too: prof. I. Branea (Timișoara), prof. D. Zdrengea (Cluj-Napoca), prof. P. Kikely (Târgu-Mureș), prof. G.I. Pandele (Iași), dr. G. Benedek (Covasna), prof. E. Apetrei (București)⁶.

In 1991, after the reorganization of the Romanian Society of Cardiology, the Working Group of Cardiac Rehabilitation is born, under the coordination of prof. I. Branea. As the *Romanian Society of Cardiology* affiliated to the *European Society of Cardiology*, the *Working Group of Cardiac Rehabilitation* became part of the *European Association of Cardiovascular Prevention and Rehabilitation* and redefined itself, according to the progress of the concept, as *Working Group of Cardiovascular Prevention and Rehabilitation*. Scientific exchanges with European experts in this field became

more intensive and resulted in a progressive increase of knowledge and competence of the cardiac rehabilitation centers from the country. The constant and enthusiastic support of prof. H. Saner (Switzerland), I. Graham (Ireland), J. Perk (Sweden) has to be mentioned in particular.

Concerning the scientific, research, and expertise level, the activity of the Working Group became more and more obvious. In 1999, the Guideline of rehabilitation for cardiovascular patients was included in the first *Medical Practice Guidelines* elaborated by the Cardiology Commission⁹. There have been edited and permanently updated manuals, monographies, books, chapters dedicated to cardiovascular prevention and rehabilitation, in Romania and in collaboration with European specialists. The Romanian participation at European meetings in this field is constant, due to young specialists coordinated by dedicated mentors, like prof. D. Gaiță (Timișoara), prof. Dana Pop (Cluj-Napoca), prof. F. Mitu (Iași), dr. Mihaela Suceveanu (Covasna), dr. D. Gherasim (București, who left us prematurely), prof. M. Popescu (Oradea), all of them former or current presidents (or secretaries) of the *Working Group of Cardiovascular Prevention and Rehabilitation*¹⁰⁻¹³.

CR: definition, objectives, indications, phases, components

World Health Organization defines CR as “the sum of activities and interventions necessary in order to ensure the best physical, mental, and social conditions such that patients with chronic or post-acute cardiovascular disease may keep, by their own efforts, their place in the society and may have an active life”. CR aims to prevent the disabilities determined by the presence of the cardiac disease, other cardiovascular adverse events, hospitalizations and deaths¹⁴.

The objectives of CR are: improvement of the functional capacity of the patients, psychological adaptation at the chronic disease, and adoption of measures for lifestyle changes, development of a long-term behavior that favorably influences the prognostic, maintaining of the independence in the daily activities¹⁵.

Certain indications, class IA recommendation, presented in actual international guidelines for CR are: chronic ischemic heart disease (myocardial infarction, stable angina), surgical or invasive cardiac interventions (surgical or percutaneous revascularization, surgical or percutaneous valvular interventions, and corrected cardiac defects), vascular interventions (aortic or peripheral arteries), heart failure (stable hemodynamic patients), heart transplantation. The gui-

delines add new recommendations, like patients with cardiac devices (pacemakers, implanted defibrillators, resynchronization therapy), or ventricular assisted devices. Cardiovascular recommendation guidelines include also patients with diabetes mellitus and metabolic syndrome^{16,17}.

CR is divided into three phases¹⁸:

1st phase includes patients hospitalized for acute coronary syndrome or after surgical cardiac or vascular interventions. The objective is the prevention of prolonged bed rest complications and early mobilization of the patients; during this period they receive the first recommendations regarding diet and lifestyle advice.

2nd phase includes patients after the acute episode that completed 1st phase and patients newly diagnosed with chronic heart disease, chronic heart failure. At the beginning of this stage, they undergo a clinical and functional assessment, are stratified according to cardiovascular risk, then the short and long-term objectives are settled, and the first rehabilitation measures are initiated. The duration of 2nd phase is 8 (12) weeks till one year. This phase can be delivered in specialized CR centers (patients with high or moderate risk), in an ambulatory department (patients with moderate or low risk) or at home (patients with low risk).

3rd phase, or long-term rehabilitation, aims to maintain the benefits achieved in 2nd phase. It can be delivered in specialized services (ambulatory or in-hospital) or at home.

The core components of a CR program are: supervised physical training, drug therapy, smoking cessation, dietary advice, education in favor of a healthy lifestyle, psychological and behavioral therapy. Rehabilitation can be achieved only in a multidisciplinary approach.

CR in Romania: the current state

Now-a-days, inpatient CR in Romania is delivered in the following centers: Cluj-Napoca – 89 beds (10 of them dedicated to intensive care), Iași – 45 beds, Timișoara – 35 beds, Târgu-Mureș – 25 beds, Covasna – 677 beds. Cardiovascular Rehabilitation Hospital from Covasna has a unique profile, as it is located in a balneoclimateric resort in the mountains area, in a place called “Valley of the Fairies”, and is addressed to patients in 2nd or 3rd phase of rehabilitation from all the country.

CR programs are delivered according to the guidelines. Patients are evaluated, included in a risk class

and individualized training programs, therapy group, relaxation techniques are then recommended. The departments of cardiovascular rehabilitation from the university centers and the Cardiovascular Rehabilitation Hospital from Covasna have the equipment needed for the assessment of the patients, concerning cardiac performance, exercise capacity, associated clinical conditions that could influence the rehabilitation programs.

The assessment of the patients includes clinical history, symptoms, physical examination, electrocardiogram, cardiac imaging (echocardiography), blood testing, and Holter monitoring or ambulatory blood pressure measurement if needed. Exercise testing is usually indicated before the prescription of the physical training. All departments have exercise testing equipment, and some of them (departments from Iași, Cluj-Napoca, Timișoara) also have cardiopulmonary exercise testing equipment, which represent the gold standard in the assessment of functional capacity (Figure 1). Physiotherapy rooms have specific equipment, including cicloergometer systems with monitoring of cardiac rate, blood pressure and electrocardiogram and kinetotherapists are trained in developing CR programs¹⁹ (Figure 2).

The rehabilitation team is multidisciplinary and includes trained cardiologists or internal medicine specialists, kinetotherapists, dieticians, psychologists, nurses. Rehabilitation programs are individualized, according to the indication, the risk class of the patient, the exercise tolerance, and associated conditions.

Benefits of CR

The 2016 Cochrane meta-analysis, which included 14486 patients with myocardial infarction, angina, or myocardial revascularization, highlighted a decrease in cardiovascular mortality with 26%, in hospital admissions with 18% and an improvement of the quality of life in favor of those who attended CR programs²⁰. The efficacy of CR is similar to secondary prevention medication such as aspirin, beta blockers, angiotensin converting enzyme inhibitors, statins²¹ (Table 1).

More recent trials and meta-analyses showed that multifactorial rehabilitation programs that included secondary prevention measures like smoking cessation, dietary interventions, risk factors management, psychosocial management, patient and family education, cardio protective medication, together with exercise training are more effective in influencing cardiovascular mortality and morbidity²².

	All-cause mortality (RR)	Cardiovascular mortality (RR)	Myocardial infarction (RR)
Cardiac rehabilitation	0.96 (0.88-1.04)	0.74 (0.64-0.86)	0.90 (0.79-1.04)
Aspirin	0.67 (0.51-0.87)	0.87 (0.78-0.98)	0.69 (0.60-0.80)
Statins	0.91 (0.88-0.93)	0.80 (0.74-0.87)	0.79 (0.76-0.82)
Beta blockers	0.93 (0.80-1.08)	0.91 (0.76-1.09)	1.10 (0.87-1.41)
ACE-I	0.84 (0.72-0.98)	0.74 (0.59-0.94)	0.99 (0.87-1.12)

ACE-I: angiotensin converting enzyme inhibitors; RR: relative risk (Modified after 21)

CR in Romania: challenges

Cardiovascular rehabilitation in Romania is underused, and the explanations are linked to CR referral, patients and health system.

Barriers linked to the CR referral relates to the formulation of CR indication by the physicians, essential for a patient's admission in a rehabilitation program. Unfortunately, few physicians recommend their patients to follow a CR program, despite the well-known benefits. In EUROASPIRE III study, only 44.9% of eligible patients received the indication, and the percentages are highly different between countries (from 80 – 90% in Lithuania, Ireland to 1% or less in Greece, Spain). In Romania, less than 10% of eligible patients receive the recommendation for CR program^{23,24}. Patients more likely for CR referral are those with myocardial revascularization or cardiac valve interventions, male gender, younger ages (under 60-70 years old), higher education and social status; at the opposite side are patients with heart failure, cardiac devices, old ages, women, the presence of comorbidities or lower social status.

Barriers linked to the patient relate to the adherence to the rehabilitation programs. The same EUROASPIRE III study revealed that only 33.9% of eligible patients who received the recommendation were effectively included in the programs, and in Romania the percentage is under 10%. There are more explanations: lack of information concerning the benefits of CR, distance from the rehabilitation center, lack of means of transportation and precarious infrastructure, low numbers of rehabilitation centers and longtime till the admission, low compliance to the medical recommendations concerning the drug treatment and change of the lifestyle. The adherence is lower in elderly, women, socially deprived individuals in and county areas.

Barriers linked to the health system relate to the number of the units of cardiovascular rehabilitation and the legislation. In the public health system, the CR departments are those already mentioned above, in regional centers from Iași, Cluj-Napoca, Târgu-Mureș,

Timișoara, Covasna, with a total of 871 beds, receiving patients in 2nd and 3rd phases of rehabilitation.

The Eurostat 2016 data show that Romania reported 112.9 percutaneous coronary interventions/100000 inhabitants, 22.8 coronary artery bypass grafting/100000 inhabitants and 8.6 femuro-popliteous bypass grafting/100000 inhabitants. At a population of 19.76 million inhabitants, these mean 22309 percutaneous coronary interventions, 4505 coronary artery bypass grafting, and 1699 femuro-popliteous bypass grafting in 2016²⁵.

In 2016, 46 patients with percutaneous coronary interventions and 78 patients with coronary artery bypass grafting were referred to the Cardiovascular Rehabilitation Department from Iași. Data from the other centers for 2016 could not be obtained due to the problems related to different informatic systems. Cardiovascular Rehabilitation Hospital Covasna reported, in 2018, 545 patients admitted with the diagnosis of coronary artery bypass grafting. In an attempt to extrapolate these statistical data, it appears that less than 10% of patients with coronary interventions underwent a CR program. Information concerning pati-



Figure 1. Cardiopulmonary exercise testing before rehabilitation (Department of Cardiovascular Rehabilitation, Rehabilitation Hospital Iași).

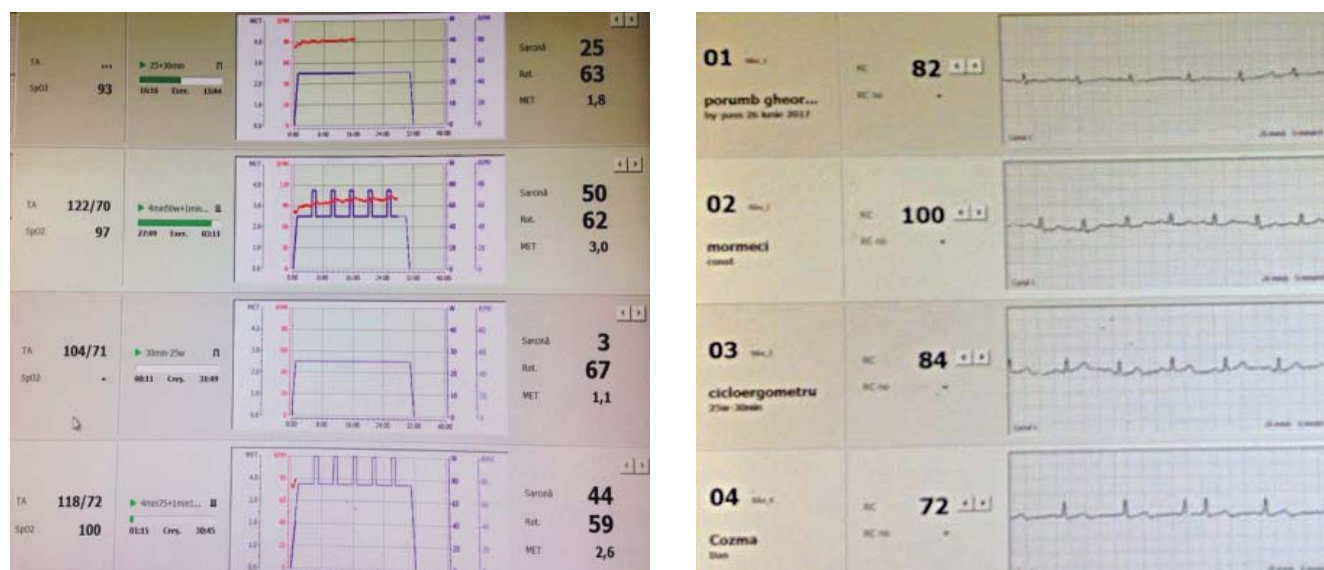


Figure 2. Individualized training programs and monitoring in the physiotherapy room (Department of Cardiovascular Rehabilitation, Rehabilitation Hospital Iasi).

ents with myocardial infarction, heart failure, vascular interventions is missing.

In contrast, there are 165 cardiac rehabilitation centers in Germany, with 12000 beds, that cover the costs for almost 42000 patients (data reported in 2004)²⁶.

Issues related to the legislation and the lack of recognition of this subspecialty are added to the lacunar statistical data. At the moment, CR services are recognized and reimbursed only for hospitalized patients in 2nd phase. There is no legislation referring to ambulatory or home CR services, although these are cost-effective for cardiac patients at moderate or low risk who want to return to an active life. There is also no legislation concerning 3rd phase of rehabilitation. Most of the European states have legislation for at least one

type of cardiac rehabilitation, particularly ambulatory rehabilitation for low risk individuals.

In these conditions, the future of CR in Romania remains uncertain, with a negative impact upon the prognosis of cardiovascular patients, and this means a higher burden for the health system. CR and secondary prevention are mandatory for the improvement of health status, and are the only interventions that can reduce consistently, for a long term, the costs of care for these patients.

Cardiovascular diseases represent the leading cause of death and disability in our country; thus, the development of cardiac prevention and rehabilitation centers, inside the rehabilitation hospitals already existing, and/or independent centers, could be a correct and cost-effective solution for the health care system.

Conflict of interest: none declared.

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