



ORIGINAL ARTICLE

## Cardiac rehabilitation in Portugal: Results from the 2013-14 national survey<sup>☆</sup>



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### KEYWORDS

Cardiac rehabilitation;  
Secondary prevention;  
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### Abstract

**Introduction:** In recent years, cardiac rehabilitation (CR) programs have evolved from being limited to exercise training to comprehensive secondary prevention programs. Given the solid scientific evidence supporting them, they are given a class I recommendation in the American and European guidelines for various cardiovascular diseases, but they continue to be underused in Portugal.

**Objective:** To analyze the situation of CR programs in Portugal in 2013-14 and to assess developments in recent years.

**Methods:** In November 2014, a questionnaire was sent to the centers offering CR programs that included the following items: name of the center; composition of the team; phases and components; number of participants and diagnoses; and funding bodies. The percentage of patients with myocardial infarction admitted to phase II CR programs in 2013 was calculated based on data from the Directorate-General of Health (DGS).

**Results:** Twenty-three centers offering CR programs were identified, 12 public and 11 private. The number of centers rose from 16 in 2007 to 23 in 2014. In 2013, 1927 patients participated in phase II programs, nearly three times the number rehabilitated in 2007 (638 patients). Myocardial infarction was the referral diagnosis in 999 patients, accounting for 51.8% of admissions. On the basis of DGS data, 8% of patients with myocardial infarction were admitted to phase II CRPs in 2013, as opposed to 3% in 2007.

**Conclusion:** The number of patients admitted to CR programs, as well as the number of centers, increased considerably between 2007 and 2014 in Portugal. Despite these favorable developments, further improvements are still needed.

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**PALAVRAS-CHAVE**

Reabilitação  
cardíaca;  
Prevenção  
secundária;  
Inquérito nacional

**Reabilitação cardíaca em Portugal. Inquérito 2013-2014****Resumo**

**Introdução:** Nos últimos anos os programas de reabilitação cardíaca (PRC) evoluíram, deixaram de se basear apenas no exercício físico e são atualmente programas abrangentes de prevenção secundária. Dada a evidência científica sólida que os suporta, mereceram recomendação classe I para várias patologias cardiovasculares, nas recomendações americanas e europeias. Contudo, no entanto, a ser subutilizados em Portugal.

**Objetivos:** Conhecer os PRC nacionais em 2013-14 e analisar a sua evolução.

**Material e métodos:** Em novembro de 2014 foi enviado aos centros um questionário com os seguintes itens: identificação do centro; constituição da equipa; fases e componentes; número de participantes, respetivas patologias e entidades pagadoras. Considerando os dados da Direção Geral de Saúde (DGS), calculou-se a percentagem de doentes com alta após enfarte admitidos em PRC, fase 2, em 2013.

**Resultados:** Identificaram-se 23 centros com PRC, 12 públicos e 11 privados. O número de centros evoluiu de 16 em 2007 para 23 em 2014. Em 2013 participaram em PRC, fase 2, 1927 doentes, o triplo dos 638 reabilitados em 2007. O enfarte foi o diagnóstico de admissão de 999 doentes, representando 51,8% das admissões. Considerando os dados da DGS, constata-se que 8% dos doentes com alta após enfarte frequentaram PRC, fase 2, em 2013. Em 2007 esse valor era de 3%.

**Conclusão:** O volume de doentes em PRC e o número de centros aumentou consideravelmente em Portugal entre 2007-2014. Apesar da evolução favorável é necessário continuar a desenvolver estratégias de divulgação e implementação de PRC no nosso país.

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**Introduction**

Mortality from coronary artery disease (CAD) has decreased in recent decades in developed countries, but morbidity associated with CAD has increased. Improvements in diagnostic techniques and treatment in the acute phase of myocardial infarction (MI) have improved survival in these patients,<sup>1,2</sup> which makes it particularly important to develop strategies for secondary prevention.

At the same time, cardiac rehabilitation (CR) programs have evolved from being limited to exercise training to comprehensive secondary prevention programs. They now include certain essential components: patient assessment, therapeutic optimization, diet/nutritional counseling, risk factor management, psychosocial management and vocational advice, physical activity counseling and exercise training.<sup>3,4</sup> Such comprehensive CR programs aim not only to improve functional capacity but also to foster healthy behaviors and compliance with therapy, with a view to delaying progression of atherosclerotic disease and preventing future cardiac events.

Various studies and meta-analyses have demonstrated the benefits of CR, particularly in CAD patients, in whom they have reduced overall mortality by 20%, cardiac mortality by 26%, and rehospitalization by 25%.<sup>5-7</sup> Based on this evidence, CR is a class I recommendation for CAD in both the American Heart Association/American College of Cardiology Foundation and the European Society of

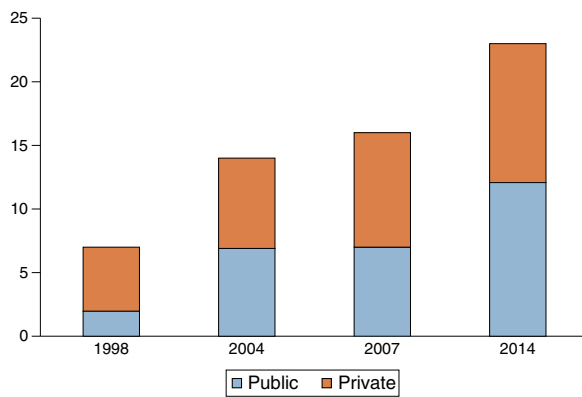
Cardiology guidelines.<sup>8-12</sup> In recent years, this recommendation has been extended to heart failure (HF) patients.<sup>13</sup>

Despite the well-documented benefits of CR, it continues to be underused and few programs have been implemented in Portugal. The Portuguese Society of Cardiology's Working Group on Exercise Physiology and Cardiac Rehabilitation has periodically performed national surveys assessing CR in Portugal, first in 1998, and again in 2004 and 2007.<sup>14-16</sup> The survey reported here continues this work, assessing the situation regarding CR in Portugal in 2013-14 and analyzing how it has developed by comparing the results with previous surveys.

**Methods**

In November 2014, a questionnaire including the following items was sent to all centers offering CR programs:

- General information on the center (name, location, public or private, year of beginning CR programs)
- Composition of team and coordinators
- Description of CR phases offered
- Program components
- Total number of participants and distribution by diagnosis in 2013
- Funding bodies.



1998	2004	2007	2014
7 (2/5)	14 (7/7)	16 (7/9)	23 (12/23)

**Figure 1** Developments in the number of cardiac rehabilitation centers in Portugal.

The responses were analyzed and compared with the results of previous surveys. Based on Directorate-General of Health (DGS) data for hospital morbidity<sup>17</sup> and the total number of patients with MI admitted for CR by each center, the percentage of patients admitted for a phase II CR program following discharge after MI in 2013 was calculated.

## Results

### Cardiac rehabilitation centers

Twenty-three centers offered CR programs in 2014, 12 public and 11 private (Table 1). There were nine new centers compared to 2007, six public (Hospital de São João, Hospital de Vila Franca de Xira, Hospital de Faro, Hospital Beatriz Ângelo, Hospital Pulido Valente and Hospital Garcia de Orta) and three private (Hospital da Luz, Instituto de Cardiologia Preventiva de Almada and Clínica da Cruz Vermelha, Sabrosa), while three centers (one public and two private) had discontinued CR programs. Following the merger of military hospitals, the CR program of the Belém Military Hospital was moved to the Estrela Military Hospital at the end of 2010 and continued operating there until 2013, and was then transferred to the Hospital das Forças Armadas, Lumiar, in 2014.

The number of public centers has therefore significantly increased, from only two in 1998 to seven in 2004 and 2007 and 12 in 2014 (Figure 1), but considerable asymmetry persists in the geographical distribution of CR centers, with nine located in the North region, 13 in Greater Lisbon and one in the South region. There are still no CR centers in inland areas (the Central region and the Alentejo) (Figure 2).

### Team composition and coordinators

As found in previous surveys, all centers have multidisciplinary teams, and all include a cardiologist. There is



**Figure 2** Cardiac rehabilitation centers in Portugal in 2014.

also a physiatrist in 74% of centers, a physiotherapist in 87%, an exercise physiologist in 22%, a nutritionist/dietitian in 87%, a psychologist in 61%, a psychiatrist in 30%, a cardiopulmonary technician in 57% and a nurse in 48%. Eight centers have various other health professionals, including internists, pneumologists, vascular surgeons, endocrinologists and social workers (Table 2).

The program is coordinated by a cardiologist in eight centers (35%), a physiatrist in two (9%), jointly by a cardiologist and a physiatrist in seven (30%), a cardiologist and an exercise physiologist in three (13%), a cardiologist and a physiotherapist in one (4%), a cardiologist and a cardiac rehabilitation nurse in one (4%), and an internist in one (4%) (Table 1).

### Program phases and components

#### Phases

In 2013 eight centers offered phase I programs (hospital phase), 19 offered phase II (early outpatient phase) and 13 offered phase III (long-term maintenance phase), of varying duration. Only centers offering phase III exercise training were included in the analysis, but some other centers continue to provide clinical assessments, consultations, complementary exams and guidance on level of physical activity at six and 12 months. Two new centers began offering CR in 2014: Hospital Pulido Valente in Lisbon and Hospital Garcia de Orta in Almada. Both

**Table 1** Cardiac rehabilitation centers in Portugal in 2014.

	Location	Year of beginning activity	Coordinator	Specialty
<i>Public centers</i>				
Hospital das Forças Armadas Polo de Lisboa (Belém/Estrela)	Lisbon	1988	Conceição Silveira	Cardiologist
Centro Hospitalar Vila Nova de Gaia/Espinho	Vila Nova de Gaia	1993	Madalena Teixeira Fátima Miranda	Cardiologist Physiatrist
Centro Hospitalar do Porto, Hospital de Santo António	Porto	2000	Preza Fernandes Sofia Viamonte	Cardiologist Physiatrist
Centro Hospitalar Entre Douro e Vouga, Unidade S.M. Feira, Hospital São Sebastião	Santa Maria da Feira	2000	Tiago Sotto Mayor Catarina Aguiar Branco	Cardiologist Physiatrist
Unidade Local de Saúde de Matosinhos, Hospital Pedro Hispano	Matosinhos	2001	Paula Almeida	Physiatrist
Centro Hospitalar Lisboa Central, Hospital de Santa Marta	Lisbon	2004	Ana Abreu	Cardiologist
Centro Hospitalar de São João	Porto	2008	Afonso Rocha	Physiatrist
Hospital de Vila Franca de Xira	Vila Franca de Xira	2009	Luís Nuno Batista Nuno Tavares	Cardiologist Human kinetics specialist
Centro Hospitalar do Algarve, Hospital de Faro	Faro	2012	Salomé Pereira	Cardiologist
Hospital Beatriz Ângelo	Loures	2013	Duarte Espregueira Mendes Miguel Almeida Ribeiro	Cardiologist Cardiologist
Centro Hospitalar Lisboa Norte, Hospital Pulido Valente	Lisbon	2014	Ana Borges António Arsénio (2014) Machado Rodrigues (2015)	Physiatrist Cardiologist Cardiologist
Hospital Garcia de Orta	Almada	2014	Maria Luísa Bento	Cardiologist
<i>Private centers</i>				
Clínica Dr. Dídio de Aguiar	Lisbon	1982	Joaquim Pestana Aguiar Luís do Rosário	Sports medicine (exercise physiologist) Cardiologist
Instituto do Coração	Lisbon	1988	Miguel Mendes	Cardiologist
Faculdade de Motricidade Humana (Corlis)	Lisbon	1991	Helena Santa Clara Miguel Mendes	Exercise physiologist Cardiologist
Fisimaia	Maia	1992	José Paulo Fontes Eunice Vouga	Cardiologist Physiatrist
Diprofísio	Porto	1993	Madalena Teixeira Ana Ramalhão	Cardiologist Physiotherapist
SAMS	Lisbon	2004	Rui Conduto Cecília Vaz Pinto	Cardiologist Physiatrist
Clínica Fisiatria MCCB Dr. Maria do Carmo Aguiar Branco	Gaia	2006	Marlene Fonseca Catarina Aguiar Branco	Cardiologist Physiatrist
Clínica das Conchas	Lisbon	2007	Jorge Arsénio Ruivo	Internist
Hospital da Luz	Lisbon	2010	Daniel Ferreira	Cardiologist
Instituto de Cardiologia Preventiva de Almada	Almada	2012	Manuel Carrageta	Cardiologist
Clínica da Cruz Vermelha, Sabrosa	Sabrosa	2012	Fátima Marques Helder Ribeiro	Rehabilitation nurse Cardiologist

**Table 2** Composition of cardiac rehabilitation teams.

Cardiologist	100%
Physiatrist	74%
Psychiatrist	30%
Psychologist	61%
Nutritionist/dietitian	87%
Physiotherapist	87%
Cardiopulmonary technician	57%
Nurse	48%
Human kinetics specialist/exercise physiologist	22%
Other	35%

offer phase II programs and the latter also has a phase I program.

### Components

Exercise training is offered in all centers but is of varying duration. In most centers, phase II programs include 24-36 sessions, two or three times a week over 8-12 weeks. Only two centers, with large numbers of participants, offer shorter programs of eight sessions only. Programs for HF patients are usually longer (Table 3).

Risk factor management is now offered in almost all centers, having increased from 75% in 2007 to 96%. The other components are available in a significant percentage of centers, as shown in Table 4.

**Table 3** Duration of phase II programs and total number of exercise training sessions.

	Location	Phase II: no. of exercise training sessions
<i>Public centers</i>		
Hospital das Forças Armadas Polo de Lisboa (Belém/Estrela)	Lisbon	3 times a week, 12 weeks; 36 sessions
Centro Hospitalar Vila Nova de Gaia/Espinho	Vila Nova de Gaia	3 times a week CAD: 24 sessions, 8 weeks HF: 48 sessions, 16 weeks
Centro Hospitalar do Porto, Hospital de Santo António	Porto	Twice a week; 8-24 sessions
Centro Hospitalar Entre Douro e Vouga, Unidade S.M. Feira, Hospital São Sebastião	Santa Maria da Feira	2-3 times a week, 12-24 weeks; 24-72 sessions
Unidade Local de Saúde de Matosinhos, Hospital Pedro Hispano	Matosinhos	Twice a week, 6-14 weeks (10); 12-28 sessions (20)
Centro Hospitalar Lisboa Central, Hospital de Santa Marta	Lisbon	2-3 times a week, 12 weeks; 36 sessions
Centro Hospitalar de São João	Porto	Twice a week; 16-24 sessions
Hospital de Vila Franca de Xira	Vila Franca de Xira	3 times a week
Centro Hospitalar do Algarve, Hospital de Faro	Faro	3 times a week, 8 weeks; 24 sessions
Hospital Beatriz Ângelo	Loures	Twice a week CAD: 8 sessions HF: 24 sessions
Centro Hospitalar Lisboa Norte, Hospital Pulido Valente	Lisbon	3 times a week, 12 weeks; 36 sessions
Hospital Garcia de Orta	Almada	3 times a week, 12 weeks; 36 sessions
<i>Private centers</i>		
Clínica Dr. Dídio de Aguiar	Lisbon	Not specified
Instituto do Coração	Lisbon	3 times a week, 8-12 weeks
Faculdade de Motricidade Humana (Corlis)	Lisbon	Phase III only
Fisimaia	Maia	Twice a week, 12 weeks; 24 sessions
Diprofísio	Porto	3 times a week, 12 weeks; 36 sessions
SAMS	Lisbon	3 times a week, 12 weeks; 36 sessions
Clínica Fisiatria MCCB Dr. Maria do Carmo Aguiar Branco	Gaia	2-3 times a week; 24-72 sessions
Clínica das Conchas	Lisbon	Phase III only
Hospital da Luz	Lisbon	3 times a week; 36 sessions
Instituto de Cardiologia Preventiva de Almada	Almada	3 times a week; 36 sessions
Clínica da Cruz Vermelha, Sabrosa	Sabrosa	Twice a week; Minimum 22 sessions

CAD: coronary artery disease; HF: heart failure.



**Table 4** Cardiac rehabilitation program components.

Components	No. of centers	%
<i>Exercise training</i>	23	100%
<i>Risk factor management (hypertension and dyslipidemia)</i>	22	96%
Not specified	1	
<i>Diet/nutritional counseling and weight control</i>	22	96%
Not specified	1	
<i>Appointment with a nutritionist/dietician</i>	20	87%
<i>Smoking cessation counseling</i>	22	96%
Not specified	1	
<i>Appointment with a specialist</i>	15	65%
<i>Psychological counseling</i>	19	83%
Not specified	1	
<i>Appointment with a psychologist</i>	14	61%

### Number of participants, distribution by diagnosis and total activity in 2013

In 2013, 1927 patients participated in phase II CR programs, 1659 in public and 268 in private centers. The number of rehabilitated patients thus tripled in Portugal between 2007 (638) and 2013 (1927). This increase was due mainly to the rise in the number of patients rehabilitated in public centers (from 455 in 2007 to 1659 in 2013). Two factors contributed to this increase: new centers that between them rehabilitated 427 patients; and a tripling of the number rehabilitated in existing centers, from 455 in 2007 to 1232 in 2013. The increase in patients rehabilitated in private centers was less marked (from 183 in 2007 to 268 in 2013) (Table 5).

CAD was the most common referral diagnosis, accounting for over two-thirds of admissions: 51.8% following MI, 6.5% after coronary surgery, 2.9% after elective percutaneous coronary intervention, and 7.9% due to stable CAD. HF was the reason for referral in 12.7% of patients, followed by risk factor management in 8.2% and arterial disease or vascular surgery in 3.3% (Table 6).

Comparison with the 2007 survey showed that MI continued to be the predominant referral diagnosis, with similar percentages (50% in 2007 and 51.8% in 2013), while HF, a more recent indication for CR, increased from 5% to 12.7%.

Based on DGS data for hospital morbidity, 12 832 patients were discharged after MI in 2013.<sup>17</sup> According to the results of the present survey, 999 patients with MI were admitted to phase II CR programs in that year, corresponding to 8%, up from 3% in 2007.

### Funding bodies

Given that most patients attending phase II CR programs in 2013 did so in public centers, the national health system was the funding body in 90% of cases. The patients themselves bore the cost in 4.6%, ADSE in 1.7%, ADM in 1%, and other health subsystems such as ADMG, SADPSP, SAMS, health insurance or other in <1% each (Table 7).

### Discussion

The present survey identified 23 centers in Portugal offering CR programs in 2014, 12 public and 11 private. This represents a significant increase in the number of public centers over the years, from only two in 1998 (Belém Military Hospital, a pioneering public center that began activity in 1988, and Centro Hospitalar de Vila Nova de Gaia, which began offering CR in 1993) to seven in 2004 and 2007, and 12 in 2014.

There was also a significant rise in the number of patients attending phase II programs, the number tripling between 2007 and 2013, from 683 to 1927. Public centers were largely responsible for this increase, rehabilitating 86% of patients, while private centers rehabilitated only 14%. It was not possible to compare patient numbers for the other CR program phases since these were not quantified in earlier surveys.

MI was the most common diagnosis of participants in CR programs, as in previous surveys. Nevertheless, based on DGS data for hospital morbidity, only 8% of MI patients attended phase II programs in Portugal in 2013. This figure, while clearly better than the 3% identified in the 2007 survey, is still lower than the European average.<sup>18</sup> In the European Cardiac Rehabilitation Inventory Survey by Bjarnason-Wehrens et al. in 2009, the mean percentage of eligible patients admitted to CR programs in Europe was 30%, while in the UK, Sweden, Luxemburg and Germany the figure was around 50%. Almost half of the countries included in this survey had legislation regarding phase II CR; for example, in Germany, CR following MI has been guaranteed by law since 1974, and has led to the development of a network of 170 CR centers.<sup>18</sup> There are several reasons for the low percentage of patients undergoing CR in Portugal, including an insufficient number of CR centers and their asymmetrical geographical distribution, incompatibility between program timetables and working hours, economic restraints (such as patients' share of treatment costs and travel expenses), and a lack of awareness of CR on the part of patients and physicians, leading to low rates of referral.

We hope that publishing the results of the latest survey will encourage the establishment of new CR programs, particularly in centers outside of Porto and Lisbon, thus helping to reduce the considerable asymmetry in geographical distribution that currently exists. It is essential to develop a national network of centers offering CR. All hospitals with cardiology departments should have phase I and II programs,<sup>19</sup> and be actively involved in phase III, possibly in association with health centers in the community. Most hospitals already have the various health professionals

**Table 5** Total numbers of participants in cardiac rehabilitation programs in Portugal in 2013.

Center	Phase I: no. of patients with MI	Phase II: total no. of patients (MI)	Phase III: total no. of patients
<b>Public centers</b>			
<i>North region</i>		1314 (612)	
Centro Hospitalar Vila Nova de Gaia/Espinho	308	129 (100)	NS
Centro Hospitalar do Porto, Hospital de Santo António	360	301 (182)	NA
Centro Hospitalar entre Douro e Vouga, U.S.M. Feira Hospital São Sebastião	112	636 (112)	693
Unidade Local de Saúde de Matosinhos, Hospital Pedro Hispano	NA	100 (82)	NS
Centro Hospitalar de São João	494 <sup>a</sup>	148 (136)	NA
<i>Greater Lisbon and South regions</i>		345 (285)	
Hospital das Forças Armadas, Polo de Lisboa (Belém/Estrela)	NA	6 (3) <sup>b</sup>	36
Centro Hospitalar Lisboa Central, Hospital de Santa Marta	70	60 (40)	NA
Hospital de Vila Franca de Xira	94	20 (20)	NA
Hospital Beatriz Ângelo	230	228 (198)	NA
Centro Hospitalar do Algarve, Hospital de Faro	536	31 (24)	NA
<b>Private centers</b>			
<i>North region</i>		149 (66)	
Fisimaia	NA	34(14)	32
Diprofísio	NA	6 (4)	24
Clínica de Fisiatria MCCB Dr. Maria do Carmo Aguiar Branco	NA	67 (26)	67
Clínica da Cruz Vermelha, Sabrosa	NA	42 (22)	63
<i>Greater Lisbon</i>		119 (36)	
Clínica Dr. Dídio Aguiar	NA	36 (16)	NS
Instituto do Coração	NA	9 (6)	18
Faculdade de Motricidade Humana (Corlis)	NA	NA	20
SAMS	NA	4 (2)	NA
Clínica das Conchas	NA	NA	4
Hospital da Luz	NA	12 (4)	NA
Instituto de Cardiologia Preventiva de Almada	NA	58 (8)	10
<b>Total</b>		<b>1927 (999)</b>	

MI: myocardial infarction; NA: not applicable (this phase not offered); NS: not specified.

<sup>a</sup> Education, risk factor management and nutritional counseling.

<sup>b</sup> Due to the merger of military hospitals, the emergency department of Unidade Hospitalar da Estrela, which at that time provided CR, closed on March 31, 2013, which affected referral of new patients.

needed to form a multidisciplinary CR team, but these are usually occupied in other duties and few have specific training in this area. As well as training, investment is also needed in facilities and equipment such as ergometers and telemetry monitors, and so the involvement and commitment of health authority decision-making bodies are also essential.

At the same time, it is important that existing CR programs should continue to grow and that more eligible patients with diagnoses other than MI, notably those who have undergone cardiac surgery or elective percutaneous coronary intervention, should be referred, while not neglecting those with HF and

those with cardiac resynchronization therapy (CRT) devices or implantable cardioverter-defibrillators (ICDs).

Improved access to CR could in some cases be achieved by implementing home-based programs based on the model widely used in the UK. Such programs, designed for low-risk patients, are structured interventions with regular patient monitoring, including visits by CR team members to the patient's home and contact by telephone or the internet. A recent review demonstrated that home-based programs appear to be equally effective as those offered in hospitals or clinics. There were no significant differences in outcomes up to 12 months of follow-up or in healthcare costs.<sup>20</sup> Each

**Table 6** Distribution by diagnosis of participants in phase II cardiac rehabilitation programs.

MI	51.8%
Coronary surgery	6.5%
Stable CAD	7.9%
Elective PCI	2.9%
Valve surgery	2.5%
HF	12.7%
Heart transplantation	0%
Risk factor management	8.2%
Arterial disease or vascular surgery	3.3%
ICD/CRT	1.1%
Other	0.6%
Not specified	2.4%

CAD: coronary artery disease; CRT: cardiac resynchronization therapy; ICD: implantable cardioverter-defibrillator; MI: myocardial infarction; PCI: percutaneous coronary intervention.

**Table 7** Funding bodies for phase II cardiac rehabilitation programs.

NHS	90%
ADSE	1.7%
ADM	1%
ADMG	<1%
SADPSP	<1%
Health insurance	<1%
SAMS	<1%
At patients' own cost	4.6%
Other	<1%

NHS: national health system.

Only ten centers responded to this item on the questionnaire, five public and five private, but together these accounted for around 60% of patients attending phase II cardiac rehabilitation programs in 2013.

center should develop the model most suited to their particular situation.

Another way to improve access and adherence to CR would be to pass specific legislation promoting secondary prevention and CR programs aimed at, for example, reducing or abolishing patients' share of treatment costs, subsidizing travel expenses and scheduling sessions to fit in with working hours.

Initiatives to raise awareness of and provide training in CR also have an important role, both for the general population and patients and for health professionals, particularly physicians. Including a CR component in the training program of cardiology interns would dispel the skepticism and unfounded concerns that still exist and help to make CR an integral part of the spectrum of cardiovascular disease treatment.

Although much remains to be done, the latest survey identified several positive developments that show that CR in Portugal is consistently evolving in line with international guidelines. The programs have become more comprehensive: besides exercise training, almost all now include risk factor management. Other components such as advice on

diet/nutrition and weight control, psychosocial assessment and smoking cessation counseling are available in a large proportion of centers. Patients with conditions that are more recent indications for CR, including those with CRT devices or ICDs, are now being admitted to CR programs and the percentage of patients with HF as the referral diagnosis has risen from 5% to 12.7%. Most phase II programs last 8-12 weeks (two or three sessions a week, making a total of 24-36 sessions), as found in the rest of Europe<sup>18</sup> and the US,<sup>21</sup> where Medicare has provided coverage for up to three weekly sessions for 12 weeks after MI, coronary bypass surgery or stable coronary disease since 1982, and coverage was later expanded to other indications.<sup>21</sup> Shorter programs offer less opportunity for sustained lifestyle changes.

Despite the positive developments in Portugal, challenges remain. Investment in cardiovascular disease prevention is essential and CR plays a crucial role in this. Decision-making bodies should be made more aware of the importance of CR programs, which have been shown to be cost-effective.<sup>22,23</sup>

## Conclusions

The number of centers offering CR programs and the volume of patients rehabilitated increased considerably between 2007 and 2013-14. The percentage of MI patients referred for CR increased from 3% to 8%, and HF patients are increasingly admitted to such programs. The latest survey showed that CR has shown consistent growth and evolved in line with international guidelines. Nevertheless, Portugal remains below the European average in CR, and further improvements are still needed.

## Ethical disclosures

**Protection of human and animal subjects.** The authors declare that no experiments were performed on humans or animals for this study.

**Confidentiality of data.** The authors declare that no patient data appear in this article.

**Right to privacy and informed consent.** The authors declare that no patient data appear in this article.

## Conflicts of interest

The authors have no conflicts of interest to declare.

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 Hospital Beatriz Ângelo – Dr. Miguel Almeida Ribeiro  
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 Hospital Garcia de Orta – Dr. Maria Luísa Bento  
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