

Literature review

Systematic literature review as knowledge base for the research efforts towards the inception of a National Programme for Cardiovascular Rehabilitation and of a National Electronic Register for Cardiovascular Diseases

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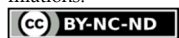
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Abstract: Frequently, cardiovascular pathologies lead to disability states, affecting the patient's life quality, having a great socio-economic influence on public health systems. In order to identify the current situation of cardiovascular rehabilitation in Romania, we set out to create a systematic literature review on this subject matter. Aim. We aimed at a structured National protocol for cardiovascular rehabilitation, as for a national electronic register for cardiovascular diseases. Methods. We fulfilled, for the above mentioned purpose, a systematic literature review of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) type. The data query has been achieved in June 2023 and updated in March 2025 using several keyword combinations/ phrases, searched contextually. For this selection, we took into account: open access articles, written in English, published in ISI indexed journals between 01.01.2018 – 31.12.2022, extendend until 31.12.2024. Results. Five eligible articles were identified and operated in order to achieve this systematic literature review. Discussion. Accordingly, we noticed that there is no National electronic register for cardiovascular pathology in Romania, nor a National protocol for cardiovascular rehabilitation – the need for this type of a programme being imperative. Conclusions. Consequently, based on our efforts and given the fact that we approached an insufficiently researched niche, we consider our paper to contribute to such an endeavor.

Keywords: Romanian National electronic register, cardiovascular programme, systematic literature review, cardiovascular rehabilitation, PRISMA

1. Introduction

Cardiovascular diseases are the leading cause of death worldwide, being a real challenge for public healthcare systems. [1], [2] Patients with such disorders often develop physical, mental, emotional or/and social problems that may affect their life quality, thus leading to disabilities that may affect the good development of daily activities. [3]

In such a global context, there is great emphasis on prevention, but also on the concept of cardiovascular rehabilitation. Thus, in the first half of the 18th century, the main indication for patients who survived an acute myocardial infarction was to

maintain bed rest for at least one month. This indication was preserved until the second half of the 20th century. The measure was maintained for a period between 4-6 weeks, patients being forbidden to even walk independently to the bathroom, provisions that considerably affected their life quality. [4]

With the development of therapeutic procedures for such patients, including the emergence and the large-scale use of revascularization methods, the concept of cardiovascular rehabilitation has more recently emerged, demonstrating that physical activity after an acute myocardial infarction is extremely beneficial. [5] Since the 1970s, the concept of cardiovascular rehabilitation has become known on an international level, defending doctors and specialized groups who monitor the effects of such interventions on the health state of such patients. [4]

The main focus of the studies in the field was the effect of cardiovascular rehabilitation regarding the increase of effort ability of patients and, implicitly, their life quality. With the emergence of exercise testing devices and later those for cardiopulmonary effort testing, the effect of rehabilitation on exercise ability was much easily demonstrated through the analysis of some objective parameters that measure the functional capacity as well as VO₂max, METs and 6-Minute Walk Test (6MWT); these parameters improved greatly in those who followed cardiovascular rehabilitation measures than in those patients who did not benefit from such interventions. [6], [7]

Currently, cardiovascular rehabilitation interventions are personalized depending on the parameters measured with the cardiopulmonary effort test, this being “the gold standard for the diagnostic evaluation of exercise intolerance, as for individualized prescription of structured physical training” [8]. In addition to increasing effort capacity, the cardiovascular rehabilitation interventions also focus on the alteration of risk factors, such as: dyslipidemia, hypertension, diabetes mellitus, etc., which constitutes a functional connection *sine qua non* between two health-promoting chronointerventional determinants: prophylaxis and rehabilitation. Given this setting, the need for multidisciplinary teams is mandatory: they are composed of rehabilitation physicians, cardiologists, physiotherapists, nutrition specialists, psychologists, and paramedical personnel. [9]

Acknowledging the beneficial effects of cardiovascular rehabilitation, both on the health state of the patients and on cost reduction at the level of public healthcare systems, rehabilitation has become 1st class recommendation from some very important cardiology associations worldwide (“The European Society of Cardiology, The American Heart Association, and the American College of Cardiology”). [10]

In our effort to found a national programme for cardiovascular patients, we studied the bibliographic sources in the field to identify the experience of other countries regarding these interventions. We noticed that only approximately 68% of developed countries benefit from cardiovascular rehabilitation programmes. [11]

A study conducted in France revealed that the prevalence and mortality rate one year after an acute myocardial infarction differ according to the social level of patients, drawing attention to the need for such interventions to increase the promotion of cardiovascular rehabilitation. [12] Another study conducted in the United Kingdom confirms the fact that cardiovascular rehabilitation has a beneficial effect on the psycho-social health of the patient also during home rehabilitation programmes, not only during hospitalization. The same study reveals the fact that the classical means of developing such cardiovascular rehabilitation programmes in Europe is the one under observation, with an average duration of up to one year, the main intervention promoted being physical exercise. [13]

Although the benefits of cardiovascular rehabilitation are proven and indisputable, patient adherence to these programmes is still low and it ranges from country to country. [14] For example, in China, patient availability for cardiovascular rehabilitation “is increasing, but remains low” [15]

A study reveals that in Portugal, the number of centers that offer cardiovascular rehabilitation services has been increasing since 2014, but, however, cardiovascular rehabilitation is underutilized. [16] Portugal also follows the same programme model implemented at an European level, in which physical exercise is the main pillar, but it does not neglect the integration of the other rehabilitation interventions, such as: correction of cardiovascular risk factors, nutritional counseling, counseling regarding quitting smoking, psychological counseling, etc. – in order to have a holistic approach on the cardiovascular patient. [16] It seems that Portuguese cardiovascular rehabilitation programmes comprise 3 phases, but the interventions differ from center to center, since there is not a national standardized programme. [16]

Thus, for example, at the level of the European Union, towards which we naturally adhere, including from this point of view to more successful compatibility – there are only 3 countries (Germany, Sweden and Holland), that have both structural/standardized national programmes for cardiovascular rehabilitation as well as a register. Respectively, in Holland, there is a national electronic register – integrated into the healthcare system – for the monitoring of the results and the quality of the cardiovascular rehabilitation programme – and in Germany and Sweden there are registers regarding the performance of cardiovascular rehabilitation in terms of the quality services and performances of specialized centers in this regard. The programmes in the 3 mentioned countries comply with the indications of the European Society of Cardiology (ESC). [17], [18], [19]

Specifically, in Germany, the national standardized programme is carried out through ongoing hospitalization or outpatient clinics in specialized state facilities. Most patients after infarction are automatically included in the programme, as early as possible after the acute cardiovascular event, and there is financial support in this regard. There is great emphasis on a “structured, supervised and individually adapted exercise programme”, overseen by the physician. Apart from the physical exercise programme, other interventions are also included for the adaptation of cardiovascular risk factors, for the increase of life quality and psychosocial activity, with emphasis on multidisciplinary. [17]

In Sweden, cardiovascular rehabilitation is also integrated into the public healthcare system, being extended throughout the country, and most patients after infarction being included in such a programme. Patients’ access is quite easy and there is a national electronic register (SWEDEHEART) that facilitates the development of the evidence-based practice. [18]

In Holland, there is a well-structured and mandatory post-infarction or post-intervention programme and standardized protocols with national implementation. In order to encourage patients to adhere to such a programme supervised by a physician, all insurance companies reimburse the necessary sums for cardiovascular rehabilitation in an ambulatory care setting only if the patient was supervised and guided by a cardiologist throughout the implementation of the interventions. Here, there is also the same typical protocol with a duration of approximately 6-12 weeks, consisting in multidisciplinary interventions focused on both the implementation of a physical exercise programme, and on the change of life style, of cardiovascular risk factors, etc. [19]

In this context, there are increasing discussions about the need of some methods that increase patient adherence to such programmes, but that also encourage the patients to complete the programmes, as there are cases when the patients abandon the interventions before the completion of the procedures within the programme. [14]

In such an international context, in which patients included in studies regarding cardiovascular rehabilitation are of wide variability, the existence of some national elec-

tronic registers for such patients becomes an urging need in order to be able to standardize the cardiovascular rehabilitation programmes, bearing in mind the idea that by improving the applied methods, better results can be achieved. [20]

2. Methods

Given the fact that we have not freely identified in the specialty literature articles and information regarding the existence of a National Programme or a National electronic register for cardiovascular rehabilitation in Romania, we have made the first steps in developing a systematic literature review journal on this topic.

The preparation of such a journal is essential for both the identification of the current state of knowledge on this topic and for the identification of certain research opportunities in the field. [21]

In order to be able to prepare this systematic literature review journal, we used the widely accepted filtration/ selection method: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), which essentially follows the paradigm of the updated version of its schematic diagram from 2020 (Figure 1) [21].

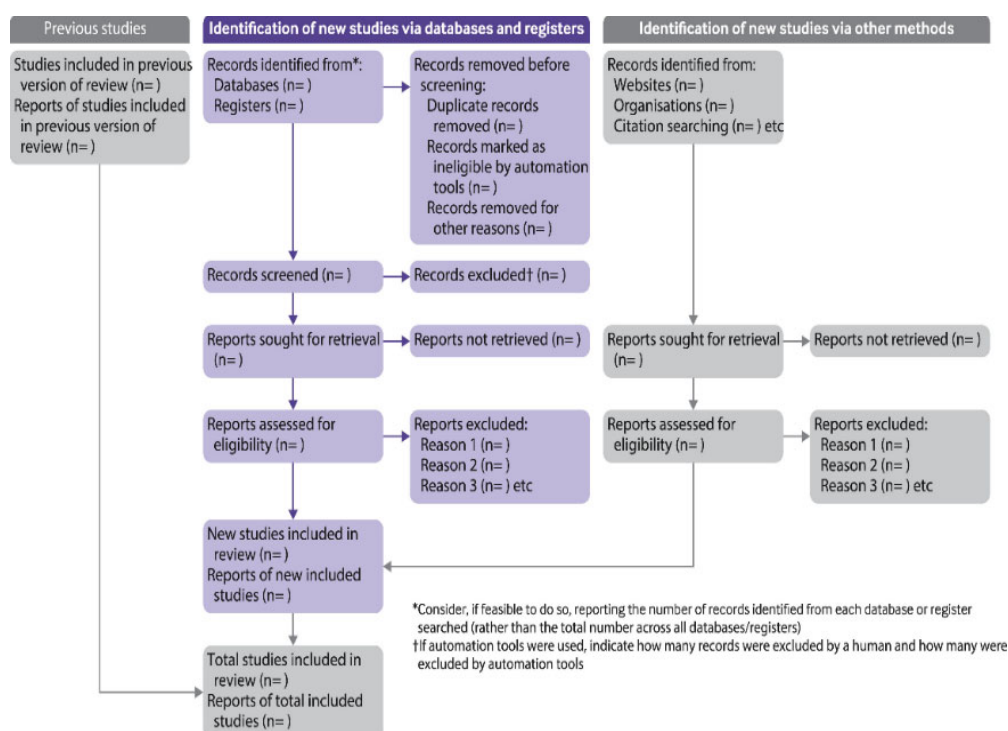


Figure 1. Schematic diagram PRISMA (2020)

By using this method, we searched international medical databases such as: COCHRANE[22], NCBI PubMed[23], NCBI PMC[24], ELSEVIER[25], PEDro (Physiotherapy Evidence Database)[26] and respectively ISI Web of Knowledge/Science[27] (in order to check if the eligible articles are published in journals that are indexed in these international databases).

The first search in the above mentioned databases took place in June 2023, according to the key words phrases presented in Table 1, in a contextual manner.

National Cardiac Rehabilitation Programme	National Cardiac Prevention Programme	National Cardiac Prevention and Rehabilitation Electronic Register
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National Cardiovascular Rehabilitation Programme	National Cardiovascular Prevention Programme	National Cardiac Prevention and Rehabilitation Electronic Register
Cardiac Rehabilitation Programme	Cardiac Prevention Programme	National Cardiac Prevention and Rehabilitation Programme
Cardiovascular Rehabilitation Programme	Cardiovascular Prevention Programme	National Cardiac Prevention and Rehabilitation Programme
Romanian Cardiac Rehabilitation Programme	Romanian Cardiac Prevention Programme	National Cardiac Prevention and Romanian Rehabilitation Programme
Romanian Cardiovascular Rehabilitation Programme	Romanian Cardiovascular Prevention Programme	National Cardiac Prevention and Romanian Rehabilitation Programme
National Cardio-vascular Rehabilitation Programme	National Cardio-vascular Prevention Programme	National Cardiac Prevention and Rehabilitation Electronic Register
Cardiovascular Rehabilitation Programme	Cardio-vascular Prevention Programme	National Cardiac Prevention and Rehabilitation Programme
Romanian Cardiovascular Rehabilitation Programme	Romanian Cardio-vascular Prevention Programme	National Cardiac Prevention and Romanian Rehabilitation Programme

Table 1. Combinations of key words phrases used contextually when searching databases

We selected open-access articles, written in English, published in ISI Web of Knowledge/Science indexed journals, initially taking into account the articles between 01.01.2018 – 31.12.2022, and in March 2025, we performed a new search in the respective databases, extending the search until 31.12.2024.

3. Results

Based on the combinations of key words/ phrases mentioned above, used contextually, after the filtration/ selection process of eligible/ contributive articles, the PRISM diagram was generated (**Figure 2**). Following the steps in PRISMA methodology, we selected five eligible articles, presented in **Table 2**, which were also used in the preparation of this systematic literature review journal. In order to complete our documentation process, we also used bibliographic sources freely identified in the literature.

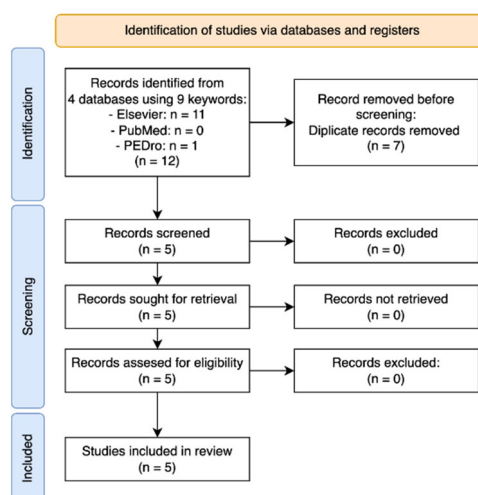


Figure 2. The PRISMA diagram generated after the filtration/ selection process of eligible/ contributive articles, based on the combinations of key words/ phrases – mentioned above – used contextually

No.	ARTICLE	LINK	FIRST SEARCH		SECOND SEARCH	
			START DATE	END DATE	START DATE	END DATE
1.	Rongjing Ding, Randal Thomas, Dong Zhao, Sidney Smith, Zhixin Zhang, Lopez-Jimenez Francisco, Ray Squires, Lemin Wang, Dayi Hu: Availability and characteristics of cardiac rehabilitation programmes in China: a follow-up national survey writing group of Chinese society of cardiac prevention and rehabilitation; Journal of the American College of Cardiology, Volume 71, Issue 11, Supplement, 2018	https://www.sciencedirect.com/science/article/pii/S0735109718324239	01.01.2018	31.12.2022	01.01.2023	31.12.2024
2.	José Paulo Fontes, Eduardo M. Vilela, Anai Durazzo, Madalena Teixeira: Current state of cardiac rehabilitation in Portugal: Results of the 2019 national survey, Revista Portuguesa de Cardiologia (English Edition), Volume 40, Issue 11, 2021, Pages 877-887	https://www.sciencedirect.com/science/article/pii/S2174204921003299	01.01.2018	31.12.2022	01.01.2023	31.12.2024
3.	Alex S. Harrison, Patrick Doherty: Does the mode of delivery in Cardiac Rehabilitation determine the extent of psychosocial health outcomes?, International Journal of Cardiology, Volume 255, 2018, Pages 136-139	https://www.sciencedirect.com/science/article/pii/S0167527317345916	01.01.2018	31.12.2022	01.01.2023	31.12.2024
4.	Mickael Piccard, Adrien Roussot, Jonathan Cottenet, Yves Cottin, Marianne Zeller, Catherine Quantin: Spatial distribution of in- and out-of-hospital mortality one year after acute myocardial infarction in France; American Journal of Preventive Cardiology, Volume 2, 2020, 100037	https://www.sciencedirect.com/science/article/pii/S2666667720300374	01.01.2018	31.12.2022	01.01.2023	31.12.2024
5.	Santiago de Araújo Pio C, Chaves GSS, Davies P, Taylor RS, Grace SL: Interventions to promote patient utilization of cardiac rehabilitation (Review); Cochrane Database of Systematic Reviews 2019, Issue 2. Art. No.: CD007131. DOI: 10.1002/14651858.CD007131.pub4.	https://pubmed.ncbi.nlm.nih.gov/30706942/	01.01.2018	31.12.2022	01.01.2023	31.12.2024

Table 2. Eligible/ contributive articles selected through PRISMA method

4. Discussion

Romania has a remarkable potential regarding cardiovascular rehabilitation, benefiting from the presence of some “*natural physical/ chemical health-promoting/ therapeutic-recuperative factors (FF/CS/TRN)*” unique in Europe, such as mofetta, but also other natural factor categories such as: “*the complex of natural factors of the Romanian Black Sea shore, the sulfurous and carbonated waters used for the external treatment*”. [28] (p. 322)

The main balneo-climatologic resorts for cardiovascular purposes in Romania are: Borsec, Vatra-Dornei, Tuşnad, Covasna, and Buziaş. [28] (p. 327) Apart from the medical-recuperative units in these resorts, there are few other centers in Romania that offer patients with cardiovascular pathology the possibility to benefit from specific recuperative interventions.

Therefore, the establishment of one National Programme of cardiovascular rehabilitation on the one hand, based on a specific protocol of a structured/ standardized profile, prepared in 2024 (**Figure A1**) as part of a prolific collaboration between the Academic Clinical Units (“Carol Davila” University of Medicine and Pharmacy – UMFCU) of Cardiology and respectively of Neuromuscular Rehabilitation at “Bagdasar-Arseni” Clinical Emergency Hospital (SCUBA) in Bucharest, as well as, given a similar excellent collaboration also supported by the IT infrastructure of UMFCU of a National electronic register of cardiovascular diseases, constitute a need which is met during a priority interdisciplinary approach to which we have committed ourselves and on which we are constantly working.

Specifically, we hope that this broad and multidisciplinary approach will effectively contribute to the standardization and optimization of this cardiovascular pathology approach, including from the rehabilitation point of view, at the level of all the centers in the country, as well as to have a permanently updated record of cardiovascular patients, including the possibility of using the monitored medical data for scientific purposes.

5. Conclusions

Studying the selected data from the relevant literature studies, we found that there is no structured/ standardized National Programme of cardiovascular rehabilitation in Romania and no National electronic register of cardiovascular diseases. Although “*National registries are an important strategy to characterize service delivery, quality and outcomes*” [29], there are very few European countries with such a register. [29]

Thus, one of the first steps in achieving these two needs/ desires mentioned in the discussion part, we initiated a doctoral study aiming at the preparation of a structural proposal of a standardized cardiovascular rehabilitation programme on a national level on the one hand, and on the other hand, aiming at making consistent contributions to the inception and implementation of a national electronic register for cardiovascular diseases.

Author Contributions: “Conceptualization, M.M, G.O., C.A and Ş.B.Ş.; methodology, G.O., M.M., V.C., C.A. D.T.; software, V.C., D.-A.T.; validation, G.O., M.C., C.A., A.L., A.I. and M.M.; formal analysis G.O., Ş.B.Ş., M.M., C.A.; investigation, M.M., G.O., Ş.B.Ş., C.A., I.A., A.S., C.P., A.L., D.-A.T, C.M., V.C.; resources, G.O., Ş.B.Ş., M.M., C.A. ; data curation, G.O., Ş.B.Ş, M.M.; writing—original draft preparation, M.M.;; writing—review and editing, G.O., Ş.B.Ş, C.A., I.A., A.L., A.S., C.P., L.A.; visualization, D.T., I.A, A.L., A.S., C.P.; supervision, G.O., C.A. ; project administration, G.O., C.A., Ş.B.Ş.. All authors have read and agreed to the published version of the manuscript.”

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding authors, D.-A.T and A.L.

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Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix - Figure A1:



SPITALUL CLINIC DE URGENȚĂ "BAGDASAR - ARSENI" BUCUREȘTI
 Șoseaua Berceni nr. 12, sector 4, cod 041915
 telefon: 021.334.30.54, centrala: 021.334.30.75, fax: 021.334.73.50
 cod fiscal: 4943871
 e-mail: directie@bagdasar-arseni.ro
UNITATE ACREDITATĂ ÎN CICLUL II CU UN PROCENT DE 89,03 %



DECIZIA Nr. 340/08.05.2024

Având în vedere:

- Legea nr. 95/2006 privind reforma în domeniul sănătății, republicată, cu modificările și completările ulterioare;
- Legea nr. 46/2003, privind drepturile pacienților, cu modificările și completările ulterioare;
- Ordinul Ministerului Sănătății nr. 446/2017 pentru aprobarea Standardelor, Procedurii și metodologiei de evaluare și acreditare a spitalelor;
- Ordinului SGG nr. 600/2018 pentru aprobarea Codului controlului intern managerial al entităților publice;
- Aprobarea protocolului în ședința Consiliului Medical din data de 17.04.2024,

Managerul Spitalului Clinic de Urgență "Bagdasar - Arseni" București,
 numit prin Ordinul Ministrului Sănătății nr. 3070/08.09.2023,

DECIDE:

Art. 1. Începând cu data de 10.05.2024 intră în vigoare **PROTOCOL PRIVIND PROGRAMUL DE RECUPERARE CARDIO-VASCULARĂ** cu aplicabilitate în structurile organizatorice prevăzute în anexa 10 la protocolul anexat și aprobat.

Art. 2. Responsabilitățile ce decurg din implementarea protocolului constituie anexă la fișa postului pentru personalul implicat în activitatea reglementată.

Art. 3. Nerespectarea obligațiilor de serviciu atrage după sine răspunderea disciplinară, conform Legii nr. 53 / 2003, republicată și actualizată – Codul Muncii.

Art. 4. Reprezentanții Serviciului MCSS vor aduce la cunoștință reprezentanților structurilor nominalizate în anexa procedurii prevederile prezentei decizii, în termen de două zile lucrătoare de la data emiterii deciziei.

Art. 5. Decizia a fost întocmită în 2 (două) exemplare originale, unul pentru SMCSS și un exemplar pentru Serviciul R.U.N.O.S..

MANAGER,
Andi NODIȚ

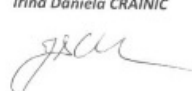


VIZAT,

Cons. Juridic Mihaela PĂRĂU



Întocmit,
Șef Serviciu M.C.S.S.
Irina Daniela CRAINIC



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