

Original Investigation Reports

Assessment of use of technological resources in cardiac rehabilitation in Argentina. Continuation of Census of the Cardiology of Exercise Committee 2022. Reality of cardiac rehabilitation in Argentina in the last 10 years.

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ARTICLE INFORMATION

Received on January 9, 2026.

Accepted after review on June 9, 2026.

www.revistafac.org.ar

There are no conflicts of interest to disclose.

ABSTRACT

Introduction: cardiac rehabilitation (CR) is an essential therapeutic strategy to reduce cardiovascular morbidity and mortality and to improve quality of life. In Argentina, its implementation is limited by geographical disparities, infrastructure constraints, and shortages of human resources. Digital health technologies have emerged as a potential tool to expand access and optimize patient follow-up; however, their use has not been systematically assessed at national level.

Objective: to describe the use of technological resources in cardiac rehabilitation programs (CRPs) in Argentina and to characterize centers implementing these tools.

Materials and Methods: a collaborative, prospective, observational, multicenter, nationwide registry was conducted. Cardiac rehabilitation centers registered with the Argentine Federation of Cardiology were included. A structured online survey was administered to medical directors, collecting data on institutional characteristics, use of digital technologies, follow-up modalities, clinical outcomes, and patient acceptance. Data was analyzed using descriptive statistics.

Results: Twenty-five centers participated, predominantly private institutions (72%), distributed across several provinces. Technological tools were used by 56% of centers, mainly smartwatches (50%) and center-developed applications (29%). Most centers had been using these resources for more than three years, weekly or more frequently. Patients were predominantly classified as in moderate cardiovascular risk (64%). Clinical improvements were reported by 69% of centers, with high or moderate adherence and good patient acceptance. Remote follow-up was primarily conducted through instant messaging platforms and telephone calls.

Conclusions: the incorporation of digital technologies into cardiac rehabilitation in Argentina is increasing but remains heterogeneous. These tools are perceived as beneficial for improving access, adherence, and follow-up, representing an opportunity to promote more accessible and equitable models of care. Further studies are needed to standardize their use and ensure safety and effectiveness.

Keywords:

Cardiac rehabilitation,
Registry,
Technological resources.

INTRODUCTION

Cardiac rehabilitation (CR) constitutes a fundamental therapeutic intervention, recommended by the international clinical guidelines due to its impact on reduction of cardiovascular morbimortality, improvement of quality of life and functional reintegration of patients.^{1,2,3} In spite of the proven efficacy, its implementation is still limited, particularly in contexts with limited resources and wide geographical dispersion, as it occurs in Argentina.

According to the 2022 Survey of the Committee of Cardiology of Exercise of the Argentine Federation of Cardiology, in the last decade, an increase has been observed in the number of centers of CR in the country, although there are inequalities persisting in its geographical distribution, as well as limitations

in infrastructure and access.⁴ This scenario poses the need to explore innovative strategies, that would allow to enhance coverage and optimize the available resources.

In this scenario, the incorporation of digital technologies includes telemonitoring, mobile apps and portable devices, emerging as an alternative to supplement the traditional models of rehabilitation. Different studies have shown that these tools can improve functional capacity, quality of life and adherence to CR programs.^{5,6} Similarly, recent evidence suggests that its implementation could be associated with a reduction of hospitalizations in patients with heart failure.⁷

In spite of this evidence, the adoption of technologies in cardiac rehabilitation programs in Argentina has not been evaluated systematically.

AIMS

1. Describing the use of technologies in CR centers in Argentina.
2. Characterizing implementation modalities.
3. Exploring the variables reported by health care teams.

MATERIALS AND METHODS

A collaborative, prospective, observational, multicenter and national study, based on a survey.

Data collection was made between March and June, 2025.

The study population was constituted by cardiac rehabilitation centers registered in the Committee of Cardiac Rehabilitation and Cardiology of Exercise of the Argentine Federation of Cardiology (FAC), active at the time of the survey and that agreed to participate voluntarily. Centers with incomplete data were excluded.

A structured online questionnaire was used (Google Forms), addressed at the people in charge of every center. The instrument included closed and multiple choice questions about the characteristics of the center, human resources, modality of care, use of technologies, tools used and remote follow-up strategies.

The questionnaire was developed by the research team and previously tested through a pilot test.

The studied variables, degree of adherence, acceptance and clinical improvements were defined based on the perception of the treating teams. Acceptance was characterized as very good, good or regular. The degree of adherence on the use of technologies by the patients was categorized as high (>75%) or moderate (50-75%). Clinical improvements were defined according to the subjective global evaluation of clinical evolution.

A descriptive statistical analysis was made through InfoStat, version 2020.

RESULTS

There were 25 centers of cardiac rehabilitation participating, distributed in different provinces of the country (*Figure 1*); 72% corresponded to the private field, 20% to the public sector and 8% to a mixed modality.

The average of patients that participated in the CR sessions per month was 25 (range 4-300). Sixty percent of patients were older than 60 years.

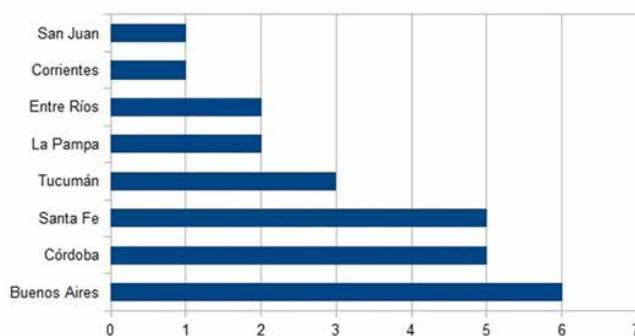


FIGURE 1.
Distribución de los centros de rehabilitación cardíaca

All centers had cardiologists; 84% had physical education professors, 60% had kinesiologists, 60% had nutritionists and 44% had psychologists.

Taking into account the modality of operation, it was observed that 84% was in person and 16% hybrid or virtual.

Fifty-six percent of the centers used technologies to monitor patients. The most used tools were: smartwatches 50%, their own apps 29%, telemetry 14% and web platforms 7% (*Figure 2*).

Sixty-four percent of patients that were using these tools were of moderate risk, 29% of high risk and 7% of low risk.

Using these technologies had been done for more than 3 years in 57% of centers.

As to the reported variables, the degree of adherence was considered high in 54% and moderate in 46%. Acceptance was very good in 43%, good in 50% and regular in 7%. Sixty-nine percent of the centers reported clinical improvements perceived according to the report by the health care team.

The remote follow-up was made mainly by messaging apps in 64%, phone calls in 21%, apps with automatic feedback in 14% and videoconferences in 7%.

DISCUSSION

Results show that more than half of CR centers in Argentina have incorporated technologies, although with heterogeneity in their implementation. This finding is consistent with international trends, showing a transition toward hybrid health care models.^{8,9}

The recommendations of the American Association of Cardiovascular and Pulmonary rehabilitation emphasize how these in-person and remote modalities supplement each other, which is reflected in these results.⁸

The predominant use of devices such as smartwatches and mobile apps suggests an adoption based on the availability rather than in standardization. The variability observed highlights the need to develop uniform criteria for quality and safety.^{9,10}

Although the centers report improvements in adherence and clinical outcomes, these observations should be interpreted cautiously, and be based on objective measurements.^{11,12}

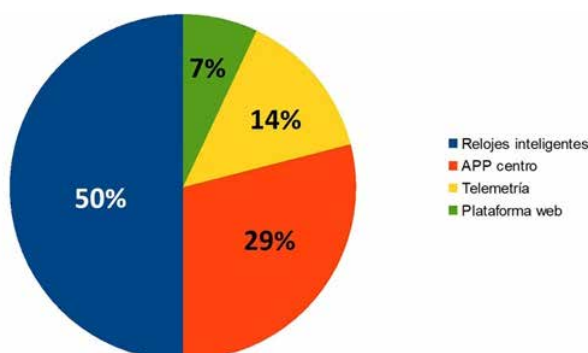


FIGURE 2.
Recursos tecnológicos utilizados

The implementation of these tools also poses challenges, including professional training, regulation and equity in access.^{13,14,15} Nonetheless, it represents a chance to extend the coverage of CR, especially in scenarios with geographical limitations.

Limitations

The study presents inherent limitations due to its cross-sectional design, based on a survey, including selection and information biases. The variables reported were not measured by validated instruments.

Ethical considerations

The study was made in agreement with the Declaration of Helsinki and National Law N° 25.326. Participation was voluntary and anonymous.

CONCLUSIONS

In Argentina, approximately half of cardiac rehabilitation centers use technologies in their programs. The use of technological resources is a practice adopted by more than half of the CR centers surveyed in Argentina (56%), being characterized by a predominant use of smartwatches and apps, with a mainly weekly follow-up through instant messaging and calls. The implementation of these technologies was associated to a favorable perception by health care teams, reporting high levels of acceptance, adherence and clinical improvements in the evolution of patients. Although they consolidate an expanding alternative to optimize follow-up, standardization strategies are required for their regulation at national level. Their implementation is heterogeneous and supplementary to the model in person.

By the way, future studies are required to evaluate their clinical impact, by standardized methodologies.

BIBLIOGRAPHY

1. Anderson L, Oldridge N, Thompson DR, et al. Exercise-based cardiac rehabilitation for coronary heart disease: Cochrane systematic review and meta-analysis. *J Am Coll Cardiol* **2016**; 67: 1 – 12.
2. Visseren F, Mach F, Smulders Y, et al. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. *Eur Heart J* **2021**; 42: 3227 - 3337.
3. Brown T, Pack Q, Ellen A, et al. Core Components of Cardiac Rehabilitation Programs: 2024 Update: A Scientific Statement from the American Heart Association and the American Association of Cardiovascular and Pulmonary Rehabilitation. *Circulation* **2024**; 150: e328 – e347.
4. Martinez J, Quiroga P, Gonzalez. Censo Comité de Cardiología del ejercicio 2022. Realidad de la rehabilitación cardíaca en Argentina en los últimos 10 años. *Rev Fed Arg Cardiol* **2023**; 52: 199 - 202.
5. Laustsen S, Oestergaard L, van Tulder M, et al. Telemonitored exercise-based cardiac rehabilitation improves physical capacity and health-related quality of life. *J Telemed Telecare* **2020**; 26: 36 - 44.
6. Frederix I, Hansen D, Coninx K, et al. Effect of comprehensive cardiac telerehabilitation on one-year cardiovascular rehospitalization rate, medical costs and quality of life: A cost-effectiveness analysis. *Eur J Prev Cardiol* **2016**; 23: 674 - 682.
7. Kitsiou S, Paré G, Jaana M. Effects of home telemonitoring interventions on patients with chronic heart failure: an overview of systematic reviews. *J Med Internet Res* **2015**; 17: e63.
8. American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR). Guidelines for Cardiac Rehabilitation Programs. Sixth Edition with Web Resource **2020**; pp 368. Disponible en <https://www.aacvpr.org/Publications> Acceso 9 de Junio de 2026.
9. Rawstorn J, Gant N, Direito A, et al. Telehealth exercise-based cardiac rehabilitation: a systematic review and meta-analysis. *Heart* **2016**; 102: 1183 - 1192.
10. Thomas R, Beatty A, Beckie T, et al. Home-Based Cardiac Rehabilitation: A Scientific Statement from the American Association of Cardiovascular and Pulmonary Rehabilitation, the American Heart Association, and the American College of Cardiology. *Circulation* **2019**; 140: e69 - e89.
11. Del Rosario M, Lovell N, Fildes J, et al. Evaluation of an mHealth-based adjunct to outpatient cardiac rehabilitation. *IEEE J Biomed Health Inform* **2018**; 22:1938 – 1948.
12. Varnfield M, Karunanithi M, Lee C. Smartphone-based home care model improved use of cardiac rehabilitation in post-myocardial infarction patients: Results from a randomised controlled trial. *Heart* **2014**; 100: 1770 – 1779.
13. Piepoli M, Hoes A, Agewall S, et al. European Guidelines on cardiovascular disease prevention in clinical practice: The Sixth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of 10 societies and by invited experts): Developed with the special contribution of the European Association for Cardiovascular Prevention & Rehabilitation (EACPR). *Eur J Prev Cardiol* **2016**; 23: NP1 - NP96.
14. Dierckx R, Inglis S, Clark R, et al. Telemedicine in heart failure: new insights from the Cochrane meta-analyses. *Eur J Heart Fail* **2015**; 19: 304 - 306.
15. Gallagher R, Chow C, Parker H, et al. The effect of a game-based mobile app 'My HeartMate' to promote lifestyle change in coronary disease patients: a randomized controlled trial. *Eur Heart J Digit Health* **2022**; 4: 33 - 42.