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EDITORIAL COMMENT

The APAPE National Registry of Cardiac Implantable Devices – A Tool of Vitality and Progress for Portuguese Cardiology

O Registo Nacional APAPE de Dispositivos Cardíacos Implantáveis –Um Instrumento de Vitalidade e Progresso para a Cardiologia Portuguesa

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Portuguese cardiology is experiencing a remarkable renewal, driven by substantial growth in the field of cardiac electronic implantable devices (CIEDs) and interventional electrophysiology, as highlighted by the latest national registry promoted by the Portuguese Association of Arrhythmology, Pacing and Electrophysiology (APAPE) for the biennium 2021-2022. This registry not only reflects the technical and organizational capabilities of Portuguese centers but also positively distinguishes the country in European in terms of procedure numbers – notably for pacemakers, implantable cardioverter-defibrillators (ICDs), and cardiac resynchronization therapy systems (CRT) – all above the European median

Sustained growth after a period of stagnation

After three years marked by stagnation, coinciding with the COVID-19 pandemic, the sector has experienced remarkable growth. In 2022, 16 845 procedures were performed, of which 13 318 were implantations and 3 527 were replacements. The number of participating centers also increased, reaching a historic maximum of 49 in 2021 and 48 in 2022, expanding the program's coverage in Portugal. This development highlights not only the post-pandemic recovery but also the growing adherence of both public and private centers to the APAPE registry initiative.

Regional distribution and device types

The distribution of devices by center shows that the implantation network is spreading across whole country, reinforcing equitable access to the most advanced arrhythmology therapies. The number of conventional pacemaker implantations increased by 1.66% between 2021 and 2022, with particular emphasis on the growing adoption of leadless systems. There was a 20% increase in their adoption during the period under analysis. The use of CRT-P devices also grew by 8%, while in contrast, CRT-D systems decreased approximately 3.5%, the only segment that countered the overall trend in growth

Monitoring and new platforms

A major logistical advance was the implementation of a new online platform for collecting and managing registry data, facilitating center access to national information and simultaneously promoting a culture of continuous monitoring and quality assurance. Reflecting international trends, about one-third of centers already perform conduction system pacing, and remote monitoring, especially of ICDs, which has been growing significantly.

Portugal versus Europe: A strong position

Portugal remains well positioned compared to other European countries. In 2022, the country reached 974 pacemaker implantations per million inhabitants, while the median

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among European Society of Cardiology (ESC) member countries is 607.3 per million. For ICDs, there were 182 implantations per million, above the European median of 121.1; and for CRT systems (CRT-P and CRT-D), Portugal recorded 119 implantations per million, also above the European median. This performance demonstrates the swift incorporation of international recommendations into national clinical practice

Current challenges and future perspectives

Despite the advances, challenges remain:

- Ensuring specialized training to support technical growth.
- Keeping hospital infrastructure and digital support platforms up-to-date.
- Promoting equitable access and combating regional and socioeconomic disparities.
- Implementing health policies that foster innovation and the sector's financial sustainability.
- Looking to the future, digital technologies, artificial intelligence, and personalized therapies are expected to define new paradigms for managing cardiac devices, further improving patient prognosis.

The value of National Registries for Research and Clinical Quality

National registries, such as APAPE's, have proven in several countries to be essential tools for benchmarking clinical outcomes, detecting issues related to complications and supporting policy decisions in health. Enabling international comparisons, they facilitate the implementation of best practices and rapid corrections of deviations, as well as supporting epidemiological research and continuous medical education.

Conclusion: Moving towards a future of excellence

The APAPE national registry, reflecting not only the resilience but also the vitality of national cardiology in CIEDs, strengthens the role of Portuguese science and the Portuguese Journal of Cardiology as platforms for disseminating original and innovative data. May this dynamic growth persist, marked by clinical excellence, technological innovation, and investment in remote monitoring and professional training continue! It is up to scientific, care, and political communities to value and enhance this registry to benefit patients and the national health system.

Ethical Statement

This manuscript is grounded in data derived from the APAPE National Registry of Cardiac Implantable Devices (CIEDs) for the biennium 2021–2022, authored and promoted by the Portuguese Association of Arrhythmology, Pacing and

Electrophysiology (APAPE). The registry is a national, multicenter initiative that aggregates de-identified procedural and device-related information to benchmark practice, monitor quality, and inform health policy.

Data collection and reporting adhere to the highest standards of ethical research conduct and patient confidentiality. Individual patient identifiers were removed or anonymized in accordance with applicable laws and institutional review board requirements. The registry protocol emphasizes data protection, data accuracy, and the responsible use of information for quality improvement and scientific advancement.

The analysis presented respects fair and transparent reporting of methods and results, including clear descriptions of registry scope (procedures, replacements, center participation), device categories (pacemakers, ICDs, CRT-P, CRT-D, leadless systems), and regional distribution. No patient-level interventions or experimental procedures were conducted within this work.

In recognizing the role of national registries, this manuscript supports the principles of openness, reproducibility, and international comparability. Any limitations related to registry data—such as potential underreporting, data completeness, or center-specific practices—are acknowledged to provide an accurate context for interpretation.

The conclusions emphasize the value of national registries for benchmarking, quality assurance, epidemiological research, and informed health policy decisions, with the ultimate aim of improving patient prognosis and equitable access to advanced therapies.

Ethical compliance statement: The study complies with applicable national and international ethical standards for registry-based research and adheres to the journal's policies on data use and publication.

CONFLICTS OF INTEREST

The author has no conflicts of interest to declare.

References

1. Santarém Semedo P, Fonseca P, Ribeiro S, et al. National Registry of Cardiac Electronic Implantable Devices 2021-2022. Rev Port Cardiol. 2025 Aug;44:489–99, http://dx.doi.org/10.1016/j.repc.2025.02.009.
2. Timmis A, Aboyans V, Vardas P, et al. ESC National Cardiac Societies European Society of Cardiology the 2023 Atlas of Cardiovascular Disease Statistics. Eur Heart J. 2024;45:4019–62.
3. Zecchin M, Ciminello E, Mari V, et al. A global analysis of implants and replacements of pacemakers and cardioverter-defibrillators before, during, and after the COVID-19 pandemic in Italy. Intern Emerg Med. 2024;19:107–14.
4. Gupta N, Kiley M, Anthony F, et al. Multi-Center. Community-Based Cardiac Implantable. Electronic Device Registry: Rationale and Design. J Am Heart Assoc. 2016;5:e002798.
5. Vamos M, Erath J, Benz A, et al. Editorial: Developments in cardiac implantable electronic device therapy. Front Cardiovasc Med. 2023;10:1175086.
6. Sanfins V. Implantation of resynchronization and/or defibrillation devices in patients with heart failure: Real-life data from the Síncrone study. Rev Port Cardiol (Engl Ed). 2019 Jan;38:43–4, http://dx.doi.org/10.1016/j.repc.2019.01.001.
7. Pombo J, García J, Bertmoeu-González V, et al. Spanish Pacemaker Registry 18th Official Report of the Car-

diac Pacing Section of the Spanish Society of Cardiology (2020). Rev Esp Cardio) (Engl Ed). 2021 Dec;74:1084–94, http://dx.doi.org/10.1016/j.rec.2021.10.002. Epub 2021 Oct 29.
8. Oliveira M, Fernandes M, Reis H, et al. Remote versus in-office monitoring for implantable cardioverter defibrillators: Results from a randomized pragmatic controlled study in Portugal. Rev Port 9. Cardiol. 2022 Dec;41:987–97, http://dx.doi.org/10.1016/j.repc.2021.08.017. Epub 2022 Oct 11[file:1].