



ORIGINAL ARTICLE

Portuguese National Registry on Cardiac Electrophysiology, 2013 and 2014[☆]



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Ablação

Abstract The authors present the results of the national registry of electrophysiology of the Portuguese Association for Arrhythmology, Pacing and Electrophysiology (APAPE) for 2013 and 2014. The registry is annual and voluntary, and data are collected retrospectively. Data for electrophysiological studies, ablations and cardioverter-defibrillator implantations for 2013 and 2014 are presented. These data are compared with results from previous years and the implications of these developments are analyzed and discussed.

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Registo nacional de eletrofisiologia cardíaca (2013/2014)

Resumo Apresentam-se os dados referentes ao registo nacional de eletrofisiologia cardíaca da Associação Portuguesa de Arritmologia, Pacing e Electrofisiologia (APAPE) para os anos de 2013 e 2014. Trata-se de um registo anual, voluntário, observacional, com colheita retrospectiva dos dados.

São apresentados os dados dos estudos eletrofisiológicos, ablações e implantação de cardioversores desfibrilhadores para os anos considerados. Avalia-se a evolução ao longo dos anos destes procedimentos e discutem-se as potenciais implicações destes resultados.

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Introduction

Data from the annual registry of cardiac electrophysiology of the Portuguese Association for Arrhythmology, Pacing and Electrophysiology (APAPE) are presented for 2013 and 2014.

The registry has been maintained continuously since the first report was published in 2000, based on 1999 data,¹ coinciding with the early years of APAPE, which was established in 1999. The Portuguese Institute of Cardiac Rhythm (IPRC) has collaborated in the publication of these data since 2005. The present report covers 14 years of interventional electrophysiology in Portugal, an activity that began here 23 years ago.

The registry is voluntary and aims to include all Portuguese centers (public and private) that perform catheter ablations and/or implantable cardioverter-defibrillator (ICD) implantations.

This observational registry sets out to describe Portuguese activity in the field of electrophysiology. Data are published annually or biannually, enabling analysis of developments since the beginning of the 21st century. It is important to maintain the registry as it provides an overall picture of the situation in Portugal in terms of the number and volume of activity of participating centers and the number and type of procedures performed, as well as developments over time. The data will also be useful to determine the training capacity of the various centers and to provide information to health authorities regarding activity in this sector.

Data from the registry are also included in the European Heart Rhythm Association (EHRA) White Book, an annual publication (now in its eighth edition) that aims to describe the situation in different European countries in the treatment of arrhythmias.²

Preliminary data from the registry for 2013 and 2014 were presented at the annual APAPE meetings in February 2014 and February 2015, respectively, and are now published together.

Methods

Data collection is retrospective, based on a questionnaire sent (usually in January or February) to all Portuguese centers performing catheter ablations and/or ICD implantations, requesting data for the previous year. Responses are submitted electronically by centers with computerized databases and manually by the others.

The total number of procedures and their distribution by center are analyzed, broken down into the number of electrophysiological studies (EPS) (with or without ablation), the number of ablation procedures and types of arrhythmia treated, and the number and types of ICD implanted.

Results

All participating centers replied to the questionnaire, the results being divided into EPS and ablations, and ICD implantations.

Electrophysiological studies and ablations

The main data for each of the years under analysis are shown in [Table 1](#).

In 2013, 17 electrophysiology laboratories (six in private centers and the remainder in public hospitals) performed 2713 EPS, followed by ablation in 2062 patients. The number of diagnostic EPS (without ablation) was thus 651 (24% of the total). The mean number of ablations per center was 121.3 in 2013, with a median of 53. Seven centers (41%) performed more than 100 ablations, and four (23.5%) performed less than 10.

In 2014, 3112 EPS were performed, followed by ablation in 2325 patients. The number of EPS laboratories rose to 25 (11 in private centers), and the mean number of ablations per center was 93, with a median of 33. Seven centers (28%) performed more than 100 ablation procedures in 2014, and nine (36%) performed less than 10.

The distribution of procedures by center and the types of arrhythmia treated in 2014 are shown in [Figure 1](#).

The distribution by type of arrhythmia treated in 2013 and 2014 can be seen in [Figure 2](#), the most common being atrial fibrillation (AF), followed by atrioventricular nodal reentrant tachycardia (AVNRT), during the two years under analysis. AF ablation accounted for 26.9% of procedures in 2013 and 29.6% in 2014.

Implantable cardioverter-defibrillators

[Table 2](#) shows the figures for ICD implantations during the two years under study, only first implantations being considered in the analysis in order to standardize the data.

In 2013, 1138 first ICD implantations were performed in 26 centers, while in 2014 there were 1256 first implantations in 30 centers, an increase of 9.4% over the previous year. [Figure 3](#) shows the number of implantations of ICDs and cardiac resynchronization therapy defibrillators by center in 2014.

It can be seen that the number of centers implanting ICDs increased by four between 2013 and 2014. The mean number of ICD implantations per center was 43.8 in 2013 and slightly lower in 2014 (41.9), while the median fell from 33 to 31.

Table 1 Electrophysiological studies and ablation procedures in 2013 and 2014.

	2013	2014
No. of centers	17	25
Private centers	6	11
EPS (n)	2713	3112
Ablations (n)	2062	2325
Mean ablations per center	121.3	93
Median ablations per center	53	33
No. of centers performing >100 ablations per year	7	7
No. of centers performing <10 ablations per year	4	9

EPS: electrophysiological studies.

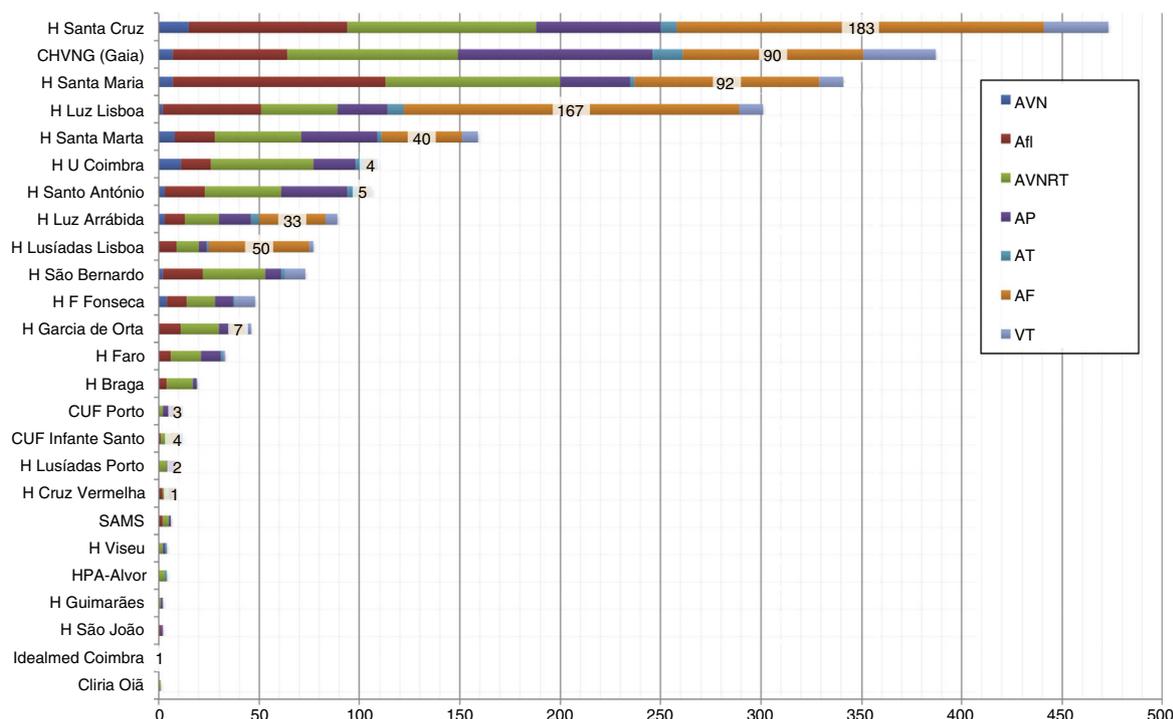


Figure 1 Number and type of ablation by center in 2014, together with the total number of AF ablations in each center. AF: atrial fibrillation; Afl: atrial flutter; AP: accessory pathway; AT: atrial tachycardia; AVN: atrioventricular node; AVNRT: atrioventricular nodal reentrant tachycardia; VT: ventricular tachycardia.

The centers that began participating in the registry in 2014 had a low volume of implantations, with eight centers (all private) implanting less than 10 units.

It should be mentioned that 37.5% and 38.6% of ICDs implanted in 2013 and 2014, respectively, were ventricular resynchronization devices.

Discussion

The data received from all Portuguese centers performing ablation procedures and/or ICD implantations in 2013 and 2014 show that the number of ablations has continued to increase, a trend seen since the beginning of the registry (Figure 4). The total number of ablation procedures increased significantly in 2014 (11.3% higher than in

the previous year), as did the number of centers performing such procedures. Nevertheless, the number of centers with a large volume of activity in this area remained stable, seven centers performing more than 100 ablation procedures in both 2013 and 2014. The increased proportion of low-volume centers is reflected in the mean and median figures per center, which fell in 2014.

AF ablation is increasingly the most common procedure (Figure 2), accounting for more than a quarter of the total (27% in 2013 and 29% in 2014). However, only two centers performed more than 100 such procedures annually, making them medium-volume centers for AF ablation, and two more were close to this figure. These four centers accounted for 78% of AF ablations in Portugal in 2014. The total number

Table 2 First implantable cardioverter-defibrillator implantations in 2013 and 2014.

	2013	2014
No. of centers	26	30
Private centers	6	10
Total ICD implants (n)	1138	1256
CRT-D (as % of total)	37.5	38.6
Mean number of devices per center	43.8	41.9
Median number of devices per center	33	31
No. of centers implanting <10 devices per year	6	8

CRT-D: cardiac resynchronization therapy defibrillator; ICD: implantable cardioverter-defibrillator.

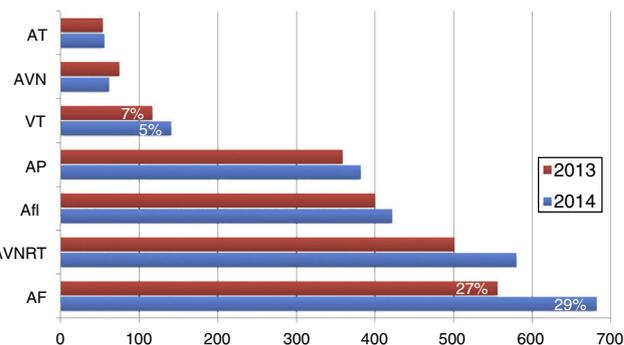


Figure 2 Number and type of ablation by center in 2013 and 2014. AF: atrial fibrillation; Afl: atrial flutter; AP: accessory pathway; AT: atrial tachycardia; AVN: atrioventricular node; AVNRT: atrioventricular nodal reentrant tachycardia; VT: ventricular tachycardia.

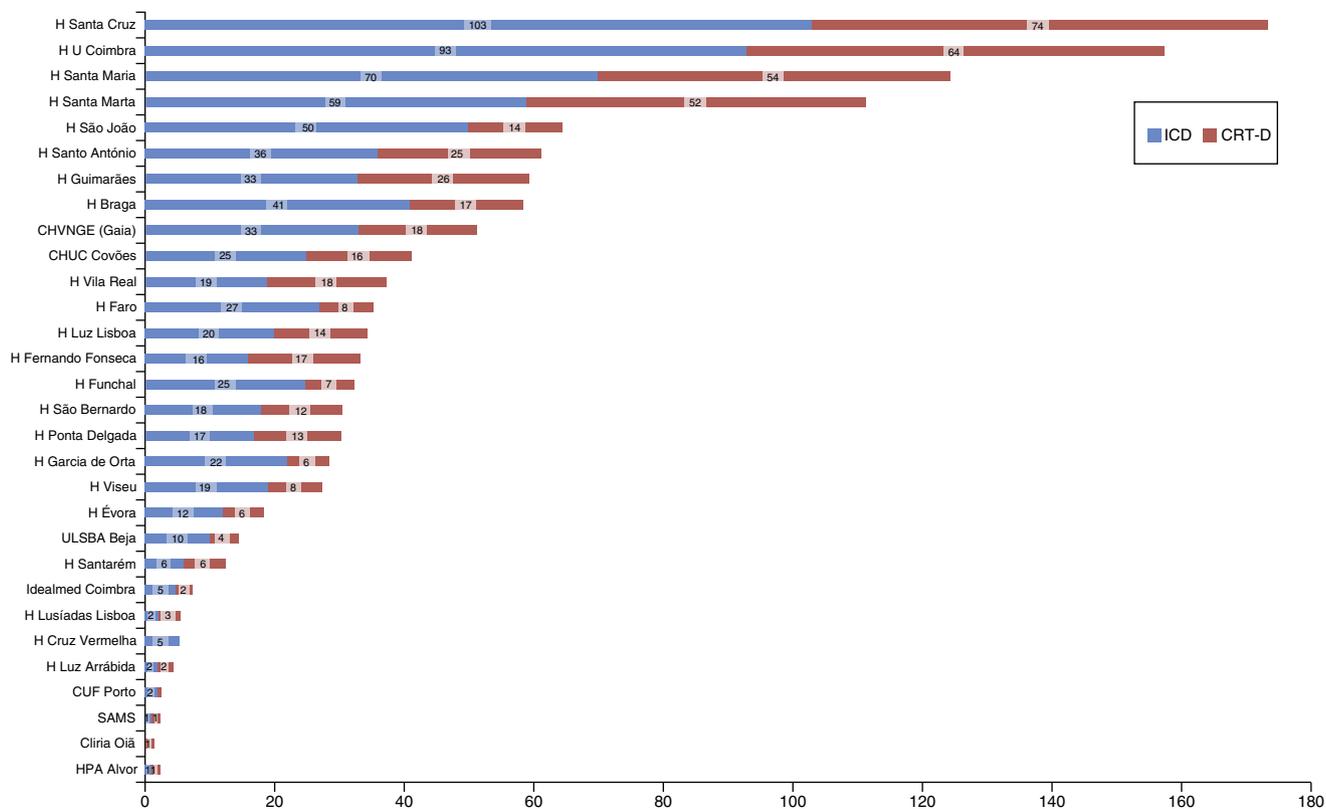


Figure 3 Number of first implantations of single- and dual-chamber implantable cardioverter-defibrillators (blue) and ventricular resynchronization devices (red) by center in 2014. CRT-D: cardiac resynchronization therapy defibrillator; ICD: implantable cardioverter-defibrillator.

of AF ablations in a particular center affects the number of complications, as the latter decrease with experience; it also affects a center’s training capacity, since 50 procedures as first operator is the recommended minimum for an electrophysiologist training for AF ablation.^{3,4}

The number of ablation procedures for ventricular tachycardia (VT) remained low, accounting for only a small percentage of procedures. The total number of VT ablations was higher in 2014 than in the previous year, but their relative proportion decreased from 7% to 5%, a reflection of the

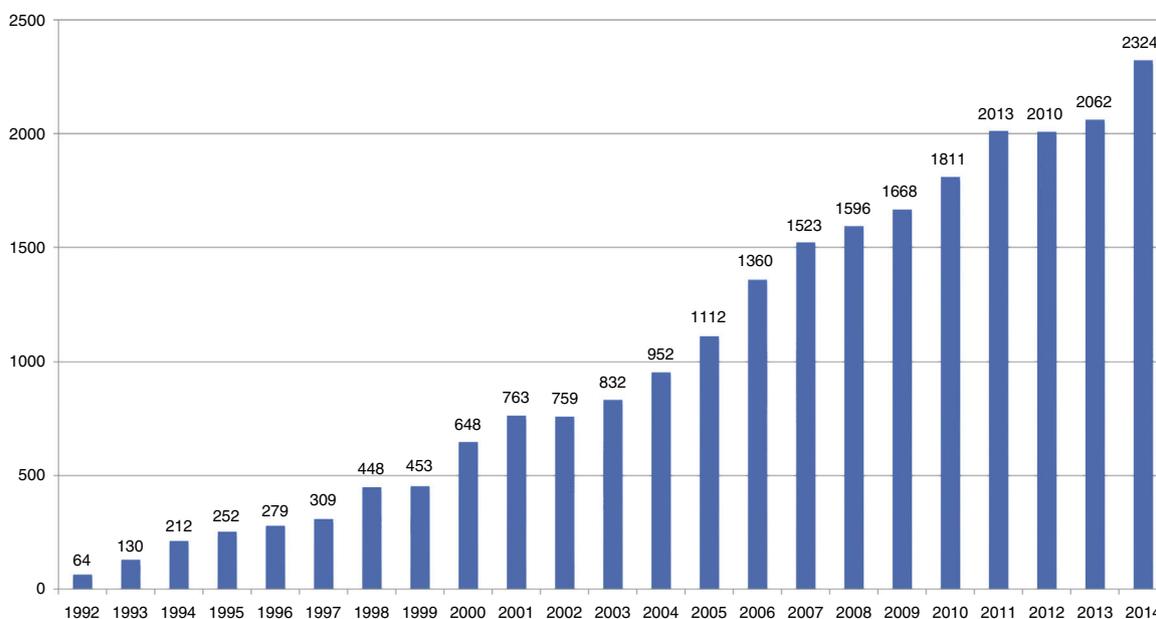


Figure 4 Total number of ablations per year from 1992 to 2014.

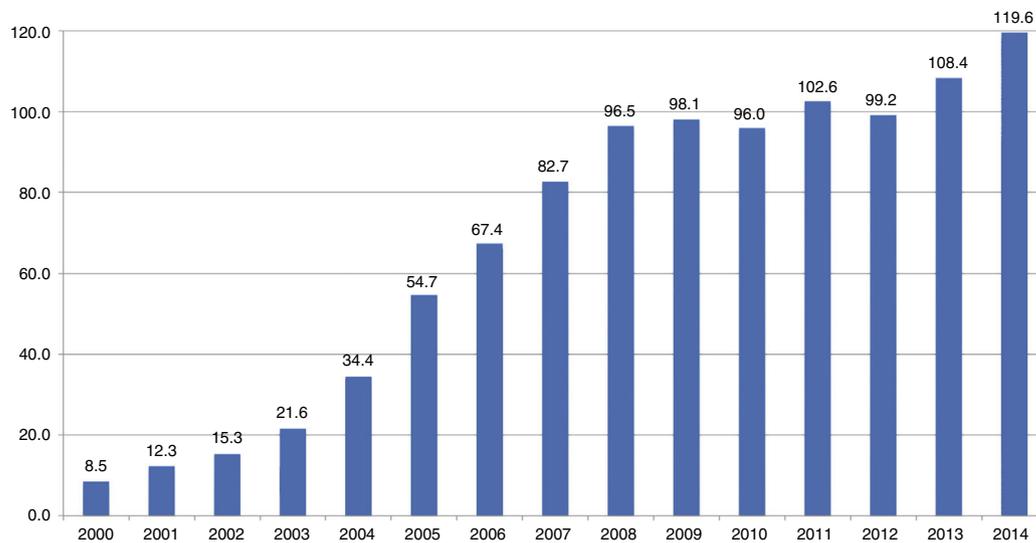


Figure 5 Number of first implantations of implantable cardioverter-defibrillators per million population from 2000 to 2014.

greater increase in AF and AVNRT ablations. This figure is lower than expected given the number of ICD implantations per year and that at least 10% of patients with ICDs require VT ablation at some stage during follow-up.⁵

The number of ICD implantations has risen progressively since the technique was first introduced in Portugal (Figure 5). This trend slowed somewhat in 2013 with practically no increase compared to 2012, but growth was again seen in 2014, with a 14.9% increase over the previous year. The rate of first implantations per million population in Portugal in 2014 was 120 units, which was above the European mean of 99 per million population in that year. Based on the EHRA division into quartiles, Portugal is in the third quartile (74-166 new units per year), similar to the UK and Spain but lower than countries in the highest quartile (>166 new units per year).⁶

Cardiac resynchronization therapy device implantations as a proportion of the total have continued to increase, probably due to a broadening of the indications for these devices.

The number of centers performing ICD implantations has also grown, reaching 30 in 2014. However, only four of these centers implanted more than 100 units per year, while nine implanted less than 10 units.

In conclusion, electrophysiology in Portugal has seen steady growth in the number of catheter ablations, together with an increase in the complexity of treatments, of which ablation of AF is the most common. ICD implantations have also steadily increased since the beginning of the registry.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed in humans and/or animals for this research.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

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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References

1. Adragão P, Bonhorst D. Associação Portuguesa de Arritmologia, Pacing e Electrofisiologia (APAPE). Registo Nacional de Electrofisiologia de Intervenção para 1999. *Rev Port Cardiol.* 2000;19:1189–93.
2. Kuck KH, Hindricks G, Padeletti L, et al. The EHRA Whitebook 2015. Retrieved from www.escardio.org/EHRA.
3. Chen J, Dagues N, Hocini M, et al. Catheter ablation for atrial fibrillation: results from the first European Snapshot Survey on Procedural Routines for Atrial Fibrillation Ablation (ESS-PRAFA) Part II. *Europace.* 2015:1727–32.
4. Deshmukh A, Patel NJ, Pant S, et al. In-hospital complications associated with catheter ablation of atrial fibrillation in the United States between 2000 and 2010: analysis of 93 801 procedures. *Circulation.* 2013;128:2104–12.
5. Conti S, Pala S, Biagioli V, et al. Electrical storm: a clinical and electrophysiological overview. *World J Cardiol.* 2015;7:555–62.
6. Raatikainen MJP, Arnar DO, Zeppenfeld K, et al. Current trends in the use of cardiac implantable electronic devices and interventional electrophysiological procedures in the European Society of Cardiology member countries: 2015 report from the European Heart Rhythm Association. *Europace.* 2015:iv1–72.