

## Original article

## Cross-sectional Study of Cardiac Resynchronization Therapy in Spain. Indications, Implant Techniques, Optimization and Follow-up

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## ABSTRACT

**Introduction and objectives:** A cross-sectional study of cardiac resynchronization therapy use in Spain was performed to analyze problems with indications, implantation, and patient follow-up.**Methods:** Spanish cardiac resynchronization therapy implanter centers were identified, then the department members were surveyed and the data were recorded by each implantation team.**Results:** Eighty-eight implanter centers were identified; of these, 85 (96.6%) answered the survey. A total of 2147 device implantations were reported, comprising 85.6% of the overall number of 2518 implantations estimated by the European Confederation of Medical Suppliers Associations for the same period. The reported implantation rate was 46 per million inhabitants versus an estimated implantation rate of 51 per million (European average, 131). Cardiac resynchronization therapy devices accounted for 84% of implantations, and upgrades to previously implanted devices, 16%. The majority of cardiac resynchronization therapy devices were implanted in men (70.7%). The mean age was 68 (12) years, and the mean left ventricular ejection fraction was 26.4% (5%). Most patients (67%) were in New York Heart Association functional class III. The group of patients for whom cardiac resynchronization therapy was indicated according to the latest update of the guidelines was significant: 17.3% among New York Heart Association class II patients and more than 21.6% among patients with atrial fibrillation. In all, electrophysiologists accounted for 73.8% of implanters, followed by surgeons, accounting for 21.4%.**Conclusions:** The latest update of the guidelines is being progressively implemented in Spain, according to data obtained in patients in New York Heart Association class II or with atrial fibrillation. Nevertheless, the number of cardiac resynchronization therapy device implants is still well below the European average.

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## Análisis transversal de la resincronización cardiaca en España. Indicaciones, técnicas de implante, optimización y seguimiento

## RESUMEN

**Introducción y objetivos:** Realizar un estudio transversal de la terapia de resincronización cardiaca en España, analizando los problemas en las indicaciones, el implante y el seguimiento del paciente.**Métodos:** Identificar los centros españoles que realizan implantes de resincronización solicitando un cuestionario (septiembre de 2010 a septiembre de 2011) a cada equipo.**Resultados:** Se identificó un total de 88 centros, de los que 85 (96,6%) cumplieron la hoja de recogida de datos. El número de implantes de resincronizador (marcapasos o desfibriladores) fue de 2.147 (el 85,6% del total estimado de 2.518 por la *European Confederation of Medical Suppliers Associations* en ese periodo). El número de implantes/millón de habitantes comunicados fue 46 y el estimado, 54 (media en Europa, 131). Los implantes/recambios de resincronizador suponen el 84% y las mejoras del modo de estimulación *upgrade* de dispositivos previos, un 16%. La mayor parte de los resincronizadores se implantaron en varones (70,7%), con medias de edad de 68 ± 12 años y de fracción de eyección ventricular izquierda del 26,4 ± 5%. La mayoría de los pacientes (67%) estaban en clase funcional III de la *New York Heart Association*. El grupo de pacientes con nueva indicación según la última actualización de guías es ya significativo, con el 17,3% entre los pacientes en clase II y el 21,6% de los pacientes con fibrilación auricular. El 73,8% de los implantadores son electrofisiólogos, seguidos por los cirujanos (21,4%).

## Palabras clave:

Insuficiencia cardiaca

Marcapasos

Desfibrilador

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**Conclusiones:** Las nuevas indicaciones recomendadas se están implantando progresivamente según los datos obtenidos en pacientes en clase II o fibrilación auricular. Sin embargo, el número de implantes de resincronizador en España aún está lejos de la media europea.

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## Abbreviations

CRT: cardiac resynchronization therapy  
ICD: implantable cardioverter-defibrillator

## INTRODUCTION

Cardiac resynchronization therapy (CRT) has proven to be effective for the treatment of patients with acute heart failure and wide QRS complex.<sup>1–4</sup> This article analyzes various aspects such as activity, as well as variables such as adherence to the latest update of the clinical guidelines, problems with their implementation, patient selection, CRT implantation and techniques, optimization, and follow-up data on patients with CRT therapy. We also report on CRT implants carried out between September 2010 (date of the latest guidelines) and September 2011. Most hospitals performing CRT implantation in Spain (appendix) participated in the survey. These data allowed us to compare and analyze differences between Spain and other European countries and to identify differences among the autonomous communities.

## METHODS

All data were obtained using a 59-question survey. Fieldwork was undertaken to identify all hospitals in each autonomous community that performed CRT device implantation. The fieldwork included all public and private hospitals that volunteered to participate and had an organized system for CRT implantation; hospitals with only sporadic activity were not included. A member from each implanter team voluntarily completed the survey, and the information was introduced into a specially created database. A contract statistician handled the anonymous statistical analysis of the data. The authors of this article were responsible for analyzing the data or reviewing the article and are responsible for its publication.

The population data used to calculate rates per million inhabitants for both Spain and the Spanish autonomous communities were obtained from estimations at 1 January 2011 by the Spanish National Institute of Statistics (*Instituto Nacional de Estadística*).<sup>5</sup> For European populations, the US Census Bureau<sup>6</sup> was used. To estimate data representativity, we calculated the percentage of CRT devices shipped compared with the total number of devices implanted in Spain during the same time period. This number is based on data reported by CRT marketers to the European Confederation of Medical Suppliers Associations (EUCOMED),<sup>7</sup> with small variations due to the different methods and times of quantitation. The percentages for each of the variables analyzed were calculated from the total number of implanters reporting information on the variable.

## Statistical Analysis

The continuous variables are expressed as no., mean (SD) (minimum-maximum), and median 25th percentile–75th

percentile. The categorical variables are expressed as frequency and percentage. IBM® SPSS® v. 20 was used for the statistical analysis.

## RESULTS

### Implanter Centers

A total of 88 CRT implanter hospitals/teams were identified; 85 (96.6%) answered the survey. Of these, 78 were public hospitals and 7 were private. The Table lists the number of implanter hospitals and the number of implants according to autonomous community, as well as the rate per million inhabitants. The results described correspond to the analysis of this sample, which we believe is closely representative of all current CRT therapy in Spain.

### Sample Analyzed

The total number of CRT device implants (first-time implants, replacements, CRT with/without implantable cardioverter-defibrillator [ICD]) reported was 2147 (621 pacemakers and 1486 ICD). According to EUCOMED data, 2518 devices (1833 ICDs and 685 pacemakers-CRT) were implanted during the same period (October 2010–September 2011), accounting for 85.6% of all implants in Spain. Therefore, based on the National Statistics Institute population census of 46 162 024 inhabitants for 2011, the total number of implants per million inhabitants reported was 46. According to EUCOMED, the total number of implants per million

**Table**

Autonomous Community Where the Cardiac Resynchronization Therapy Devices Reported Were Implanted, Number of Implanter Centers, Number of Implants, and Units per Million Inhabitants

	Implant centers, No. (no./million inhabitants)	Units	Units/million inhabitants
Total for Spain	87 (1.88)	2147	46
Andalusia	14 (1.69)	373	45
Aragon	2 (1.52)	21	15
Principality of Asturias	1 (0.94)	29	27
Balearic Islands	3 (2.73)	43	39
Canary Islands	4 (1.89)	87	41
Cantabria	1 (1.73)	51	88
Castile and León	6 (2.42)	130	52
Castile-La-Mancha	5 (2.44)	65	31
Catalonia	9 (1.23)	265	36
Valencian Community	10 (1.99)	289	57
Extremadura	2 (1.85)	64	59
Galicia	4 (2.73)	58	21
Community of Madrid	18 (2.82)	414	64
Region of Murcia	2 (1.36)	52	35
Chartered Community of Navarre	2 (3.21)	72	115
Basque Country	5 (2.35)	131	61
La Rioja	1 (3.2)	8	26

Some of the differences among various autonomous communities are explained by patient referrals between the communities, rather than underusage of the therapy.

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