











# Regional disparity on patient characteristics and perceptions after implantable cardioverter-defibrillator implantation: results from an EHRA patient survey

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## Aims

The aim of this study was to identify potential regional disparities in characteristics of implantable cardioverter-defibrillator (ICD) recipients, patient perceptions and perspectives after implantation and level of information provided to patients.

## Methods and results

The prospective, multicentre, and multinational European Heart Rhythm Association patient Survey 'Living with an ICD' included patients already implanted with an ICD (median ICD dwell time – 5 years, interquartile range 2–10). An online questionnaire was filled-in by patients invited from 10 European countries. A total of 1809 patients (the majority in their 40s to 70s, 65.5% men) were enrolled, with 877 (48.5%) from Western Europe (group 1), followed by 563 from Central/Eastern Europe (group 2, 31.1%), and 369 from Southern Europe (group 3, 20.4%). A total of 52.9% of Central/Eastern Europe patients reported increased satisfaction after ICD placement compared with 46.6% from Western and 33.1% from Southern Europe (1 vs. 2  $P = 0.047$ , 1 vs. 3  $P < 0.001$ , 2 vs. 3  $P < 0.001$ ). About 79.2% of Central/Eastern and 76.0% of Southern Europe patients felt optimally informed at the time of device implantation compared with just 64.6% from Western Europe (1 vs. 2  $P < 0.001$ , 1 vs. 3  $P < 0.001$ , 2 vs. 3  $P = \text{ns}$ ).

## Conclusions

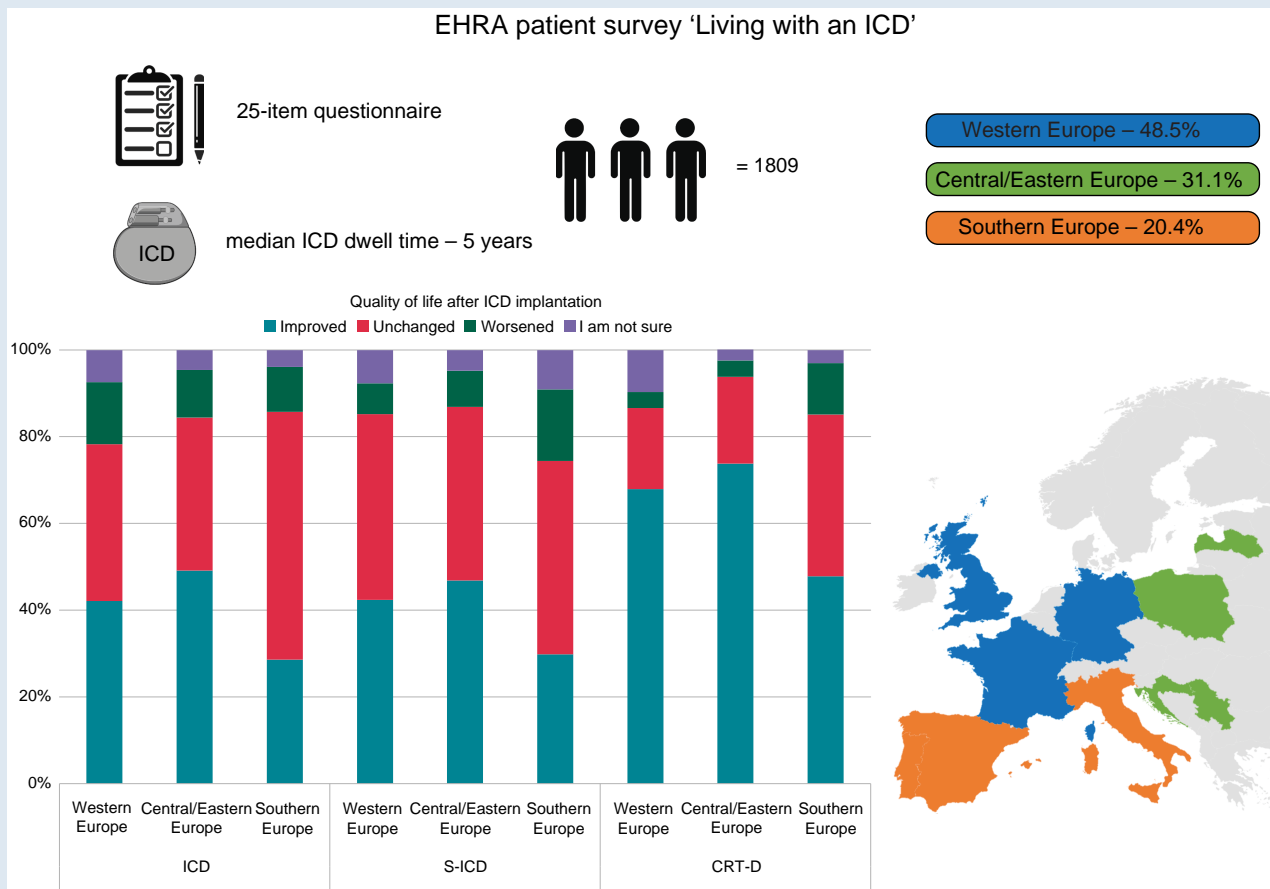
While physicians in Southern Europe should address the patients' concerns about the impact of the ICD on quality of life, physicians from Western Europe should focus on improving the quality of information provided to their prospective ICD patients. Novel strategies to address regional differences in patients' quality of life and provision of information are warranted.

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## Graphical Abstract



## Keywords

Geographical differences • Outcome • Registry

## Introduction

The implantable cardioverter-defibrillator (ICD) is one of the main therapeutic options for primary and secondary prevention of sudden cardiac death.<sup>1</sup> The European Society of Cardiology (ESC) guidelines recommend the use of an ICD in symptomatic heart failure patients with an ejection fraction  $\leq 35\%$  and in those who recovered from a ventricular arrhythmia causing haemodynamic instability. Despite uniform guidelines in Europe, there is considerable variability in guideline adherence and ICD implantation rates across the continent, i.e. from 5.9 ICDs per million people in Belarus to 408.5 ICDs per million people in Germany.<sup>2–4</sup> Moreover, differences in patient characteristics and management across countries are apparent.<sup>5</sup> This geographical variability is often multifactorial and includes socioeconomic, demographic, and healthcare system-related causes.

The ESC guidelines clearly state that patients' involvement in the decision-making process and information about specific implications for life with an ICD is a matter of great importance.<sup>1,6</sup> In a previous report, we identified major gaps regarding patients' knowledge and empowerment in this process.<sup>7</sup> Most of the research on European regional differences in ICD therapy focused on implantation rates and predictors of ICD underutilization.<sup>8–10</sup> However, data on differences in quality of life, patient engagement, and information provided are scarce.

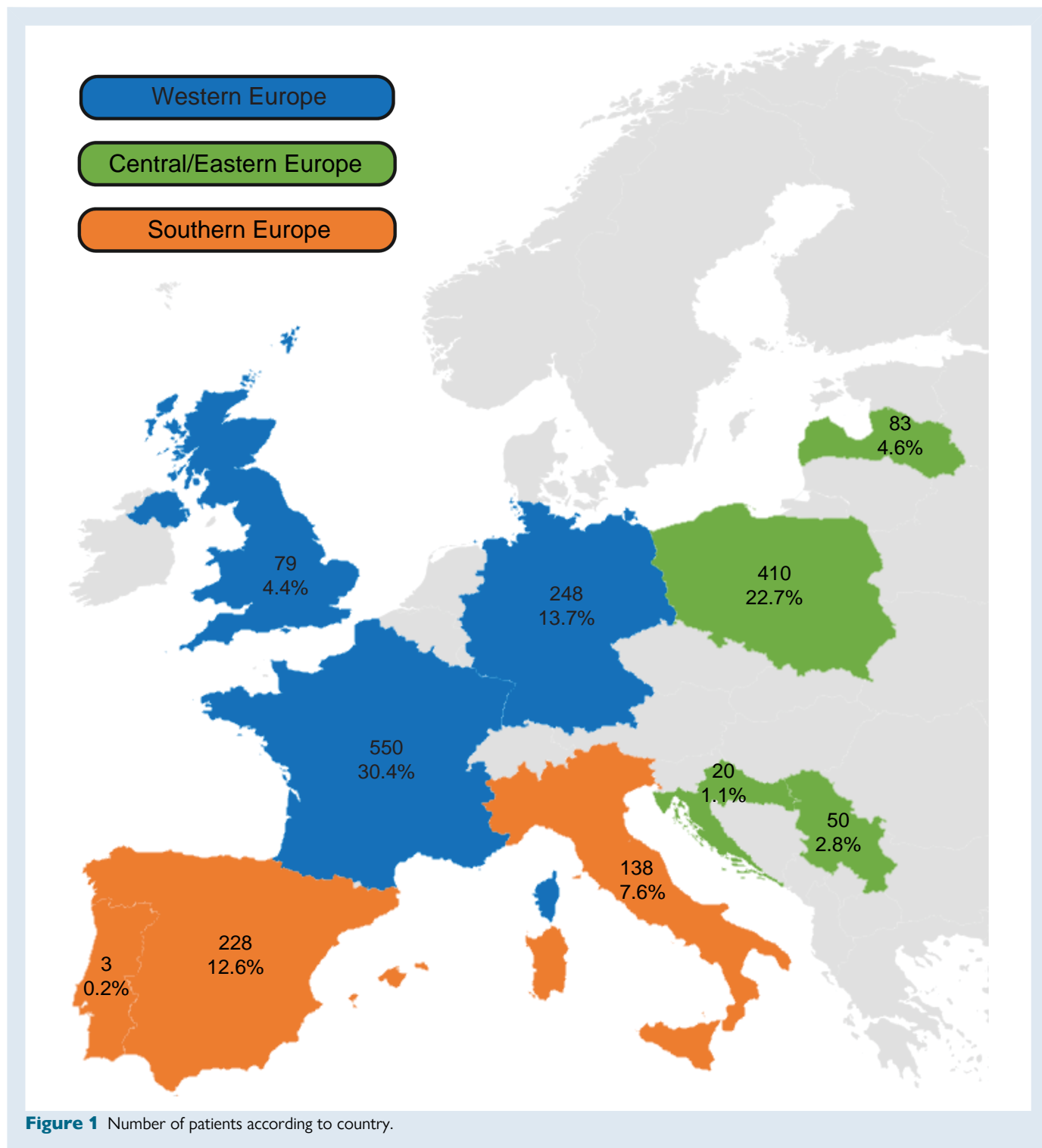
In this analysis of the 'Living with an ICD' patient survey, initiated and carried out by the European Heart Rhythm Association (EHRA), we assessed potential regional differences in characteristics

of ICD recipients, patient perceptions and perspectives after ICD implantation, level of information provided to patients, and their needs regarding education.

## Methods

In the prospective, multicentre, and multinational EHRA patient Survey 'Living with an ICD', we included patients already implanted with an ICD. The study design was previously described.<sup>11</sup> In brief, the EHRA Scientific Initiatives Committee created the questionnaire (see [Supplementary Material 1](#)), consisting of 25 questions translated to patients' native languages. The questionnaire covered the relevant aspects of ICD patients' perceptions and perspectives on the ICD and living with the ICD, as well as information provision before the implantation procedure. The study was conducted within many countries belonging to the EHRA Scientific Network, categorized according to the EuroVoc classification: France, Germany, UK (Western Europe), Croatia, Poland, Serbia (Central/Eastern Europe), Italy, Portugal, Spain (Southern Europe), and Latvia (Northern Europe). Due to underrepresentation of Northern Europe, we arbitrarily added the Latvian responses to Central/Eastern Europe.

The questionnaire was posted on an electronic platform, and the link was sent to the EHRA Research Network centres, national arrhythmia working groups, and patient associations working in each participating country whenever possible. Patients were asked to personally enter their replies directly via the electronic form or in paper form. They were encouraged to answer the survey autonomously whenever possible in order to reduce any potential bias arising from medical staff. The local ethics committee



approval was obtained where needed according to the local policy. The study was conducted between 12 April 2021 and 5 July 2021.

## Statistical analysis

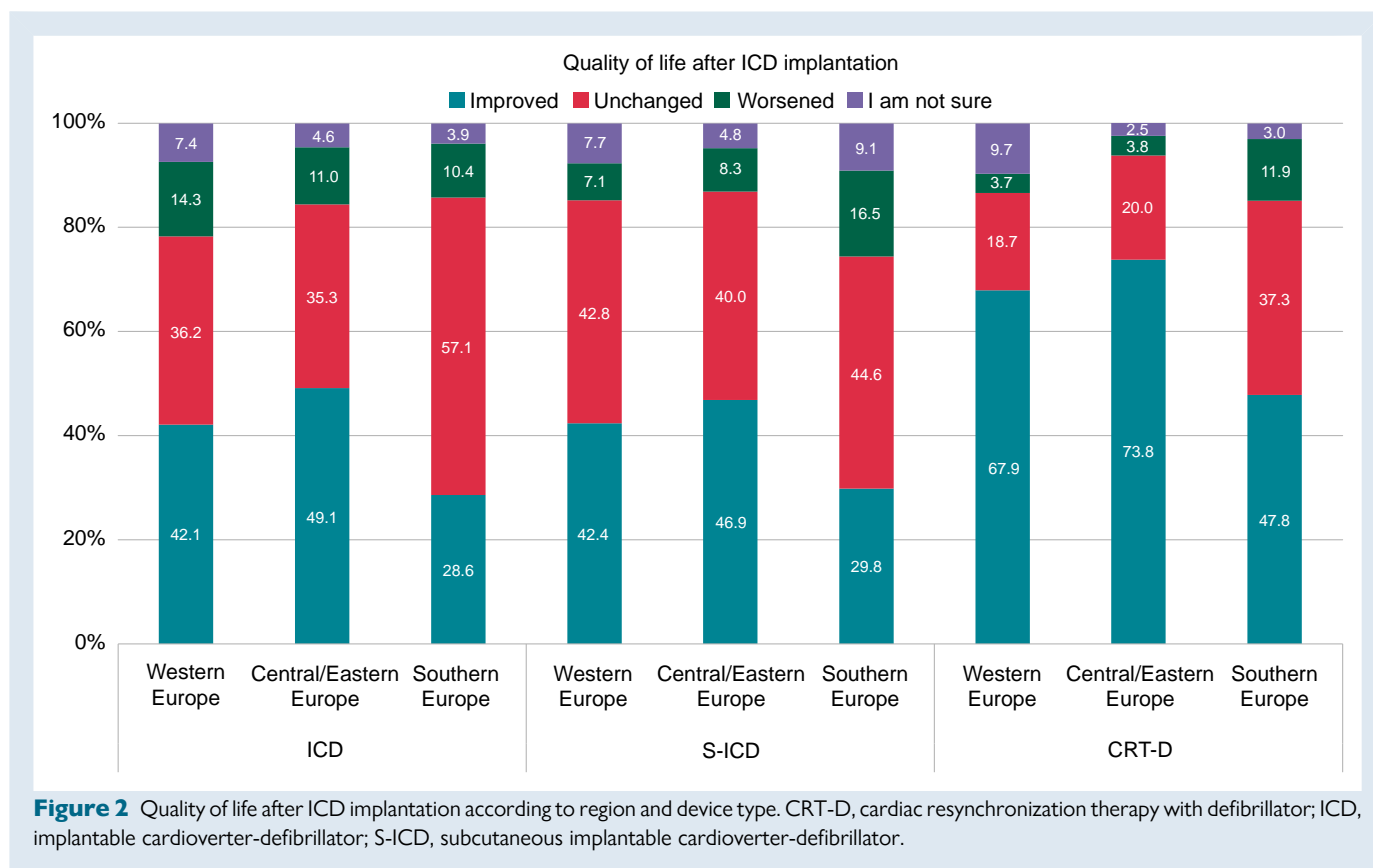
Values are expressed as numbers or percentages for categorical data or median (25th to 75th percentile) for continuous data. Distributions of categorical data were examined by the Pearson's chi-squared test or

Fisher's exact test, as appropriate. Continuous data were compared using Student's *t*-test or the Kruskal–Wallis and Mann–Whitney *U* test, as appropriate. The normal distribution of data was tested using the Kolmogorov–Smirnov test. The association between specific variables and patients' perceptions and perspectives on the ICD was evaluated using binary logistic regression and expressed as odds ratios with 95% confidence intervals. Factors significantly associated with improved patient satisfaction and ICD acceptance in univariate analysis were included in a backward stepwise multivariate binary logistic regression.

**Table 1** Demographic data and device history according to region

<b>N (%) Or median, IQR</b>	<b>Whole cohort 1809 (100)</b>	<b>Western Europe (1) 877 (48.5)</b>	<b>Central/ Eastern Europe (2) 563 (31.1)</b>	<b>Southern Europe (3) 369 (20.4)</b>	<b>P-value (1) vs. (2)</b>	<b>P-value (1) vs. (3)</b>	<b>P-value (2) vs. (3)</b>
Age					<0.001	<0.001	<0.001
0–20	7 (0.4)	2 (0.2)	2 (0.4)	3 (0.8)			
21–40	271 (15.0)	98 (11.2)	109 (19.4)	64 (17.3)			
41–60	682 (37.7)	318 (36.3)	169 (30.0)	195 (52.8)			
61–80	784 (43.3)	432 (49.3)	256 (45.5)	96 (26.0)			
≥81	65 (3.6)	27 (3.1)	27 (4.8)	11 (3.0)			
Sex (% female)	624 (34.5)	300 (34.2)	208 (36.9)	116 (31.4)	ns	ns	ns
Education level					<0.001	0.001	<0.001
Primary school	147 (8.1)	52 (5.9)	54 (9.6)	41 (11.1)			
Secondary school	608 (33.6)	238 (27.1)	293 (52.0)	77 (20.9)			
College	381 (21.1)	202 (23.0)	79 (14.0)	100 (27.1)			
University	673 (37.2)	385 (43.9)	137 (24.3)	151 (40.9)			
Employment status					ns	<0.001	<0.001
Student	21 (1.2)	7 (0.8)	5 (0.9)	9 (2.4)			
Employed	715 (39.5)	311 (35.5)	212 (37.7)	192 (52.0)			
Not employed	186 (10.3)	90 (10.3)	60 (10.7)	36 (9.8)			
Retired	887 (49.0)	469 (53.5)	286 (50.8)	132 (35.8)			
Marital status					<0.001	ns	0.023
Married or living with a partner	1351 (74.7)	636 (72.5)	433 (76.9)	282 (76.4)			
Single	320 (17.7)	192 (21.9)	66 (11.7)	62 (16.8)			
Widower or widow	87 (4.8)	27 (3.1)	46 (8.2)	14 (3.8)			
Living at home (as a child)	8 (0.4)	2 (0.2)	3 (0.5)	3 (0.8)			
Living alone with children	43 (2.4)	20 (2.3)	15 (2.7)	8 (2.2)			
Time from first ICD implantation	5 (2–10)	6 (2–11)	5 (2–8)	4 (1–8)	<0.001	<0.001	0.042
Patients with ICD shocks	704 (38.9)	349 (39.8)	233 (41.4)	122 (33.1)	ns	0.025	0.010
Device type							
ICD-VR, ICD-DR	829 (45.8)	392 (44.7)	283 (50.3)	154 (41.7)	0.001	ns	0.011
S-ICD	563 (31.1)	297 (33.9)	145 (25.8)	121 (32.8)			
CRT-D	281 (15.5)	134 (15.3)	80 (14.2)	67 (18.2)			
Do not know	136 (7.5)	54 (6.2)	55 (9.8)	27 (7.3)			
Remote monitoring					<0.001	<0.001	<0.001
Yes	1021 (56.4)	611 (69.7)	175 (31.1)	235 (63.7)			
No	675 (37.3)	256 (29.2)	303 (53.8)	116 (31.4)			
Do not know	113 (6.2)	10 (1.1)	85 (15.1)	18 (4.9)			
ICD indication							
Post-cardiac arrest (secondary prevention)	583 (32.2)	321 (36.6)	170 (30.2)	92 (24.9)	0.012	<0.001	ns
Prevention of sudden death	808 (44.7)	401 (45.7)	207 (36.8)	200 (54.2)	0.001	0.006	<0.001
Heart failure symptoms	665 (36.8)	297 (33.9)	272 (48.3)	96 (26.0)	<0.001	0.006	<0.001
Do not know	54 (3.0)	16 (1.8)	17 (3.0)	21 (5.7)	ns	<0.001	0.044
Complications							
None	1404 (77.6)	655 (74.7)	431 (76.6)	318 (86.2)	ns	<0.001	<0.001
Inappropriate shocks	209 (11.6)	106 (12.1)	77 (13.7)	26 (7.0)	ns	0.008	0.002
Malfunctioning lead	204 (11.3)	121 (13.8)	61 (10.8)	22 (6.0)	ns	<0.001	0.011
Unplanned re-operations	128 (7.1)	79 (9.0)	35 (6.2)	14 (3.8)	ns	0.001	ns

CRT-D, cardiac resynchronization therapy with defibrillator; ICD, implantable cardioverter-defibrillator; ICD-DR, dual chamber implantable cardioverter-defibrillator; ICD-VR, single chamber implantable cardioverter-defibrillator; IQR, interquartile range; S-ICD, subcutaneous implantable cardioverter-defibrillator.



A value of  $P < 0.05$  was considered statistically significant. The statistical analysis was performed using SPSS software, version 23.0 (IBM Corporation, Armonk, NY, USA).

## Results

### Patient population

A total of 1809 patients were enrolled, with the majority recruited from Western Europe (group 1,  $n = 877$ , 48.5%), followed by Central/Eastern Europe (group 2,  $n = 563$ , 31.1%), and Southern Europe (group 3,  $n = 369$ , 20.4%) (Figure 1). The study population and device data have been described previously.<sup>11</sup> Briefly, the final population in the 'Living with an ICD' survey included 1809 patients (1185 men, 65.5%) with an ICD implanted on average 5 years prior to enrollment (median 5 years, interquartile range 2–10). The baseline characteristics of patients according to European region are summarized in Table 1. Southern Europe patients were younger and more often employed than in other regions (both  $P < 0.001$ ). Central/Eastern Europe patients reported a lower level of education than Western and Southern patients (both  $P < 0.001$ ). Subcutaneous ICDs were used more extensively in Western and Southern Europe compared with Central/Eastern countries (33.9%, 32.8%, 25.8%, group 1 vs. 2  $P < 0.001$ , group 1 vs. 3  $P = \text{ns}$ , group 2 vs. 3  $P = 0.011$ ), whilst cardiac resynchronization therapy rate was similar (group 1—15.3%, group 2—14.2%, group 3—18.2%, respectively). Remote monitoring was twice as frequent in Western and Southern Europe than in Central/Eastern Europe (69.7%, 63.7%, 31.1%, group 1 vs. 2  $P < 0.001$ , group 1 vs. 3  $P < 0.001$ , group 2 vs. 3  $P < 0.001$ ). Moreover, 15.1% of respondents from Central/Eastern Europe did not know whether their device was controlled remotely (compared with just 1.1% and 4.9% in Western and Southern Europe, respectively, group 1 vs. 2  $P < 0.001$ , group 1

vs. 3  $P < 0.001$ , group 2 vs. 3  $P < 0.001$ ). Similarly, Central/Eastern Europe patients were more frequently unaware of their device type (group 1 vs. 2  $P < 0.001$ , group 1 vs. 3  $P = \text{ns}$ , group 2 vs. 3  $P < 0.001$ ). Respondents from Southern Europe experienced complications less frequently than in Western and Central/Eastern Europe (13.8%, 25.3%, 23.4%, respectively, group 1 vs. 2  $P = \text{ns}$ , group 1 vs. 3  $P < 0.001$ , group 2 vs. 3  $P < 0.001$ ).

### Patients' perceptions and perspectives

More than a half of Central/Eastern Europe patients (52.9%) experienced a relevant improvement in their quality of life compared with 46.6% from Western and only 33.1% from Southern Europe (group 1 vs. 2  $P = 0.047$ , group 1 vs. 3  $P < 0.001$ , group 2 vs. 3  $P < 0.001$ ). This difference was still present after stratifying patients according to device type (Figure 2). After stratifying patients according to ICD dwell time, we observed incremental percentages of respondents with increased satisfaction and acceptance of life with an ICD (<2 years—35.7%, 2–5 years—44.6%, >5 years—50.7%, <2 vs. 2–5  $P = 0.006$ , <2 vs. >5  $P < 0.001$ , 2–5 vs. >5  $P = 0.022$ ). In multivariate analysis, region was one of the independent predictors of increased satisfaction (Table 2). Other independent predictors of increased satisfaction and ICD acceptance included age >80 years old, primary education as the highest education level, longer ICD dwell time, feeling of being well informed before ICD implantation, and cardiac resynchronization therapy. Furthermore, the Southern Europe cohort expressed a lower degree of acceptance of the ICD limitations and the necessary lifestyle changes (61.1% vs. 70.3% in Western and 72.6% in Central/Eastern Europe, group 1 vs. 2  $P = \text{ns}$ , group 1 vs. 3  $P = 0.003$ , group 2 vs. 3  $P < 0.001$ ). The ICDs made more participants feel safer in Western and Central/Eastern Europe than in Southern Europe (82.3% vs. 82.1% vs. 72.6% respectively, group 1 vs. 2  $P = \text{ns}$ , group 1 vs. 3  $P < 0.001$ , group 2 vs. 3  $P = 0.001$ ). However, the percentage of patients regretting their decision

**Table 2** Univariate and multivariate logistic regression of factors associated with improved quality of life

Univariate analysis	Odds ratio	95% CI	P
Age >80 years old	2.1	1.2–3.5	0.005
Sex male vs. female	1.3	1.1–1.6	0.004
Region Western vs. Southern	1.8	1.4–2.3	<0.001
Region Central/Eastern vs. Southern	2.3	1.7–3.0	<0.001
Education secondary vs. primary	0.6	0.4–0.9	0.008
Education college vs. primary	0.5	0.3–0.8	0.001
Education university vs. primary	0.5	0.3–0.8	<0.001
No complications	1.0	0.8–1.3	0.684
ICD dwell time	1.03	1.01–1.04	<0.001
Remote monitoring	1.2	1.0–1.5	0.056
Feeling of being well informed before ICD	2.5	2.0–3.2	<0.001
CRT	2.5	1.9–3.3	<0.001
<b>Multivariate analysis</b>			
Age >80 years old	1.9	1.1–3.3	0.031
Region Western vs. Southern	2.1	1.6–2.8	<0.001
Region Central/Eastern vs. Southern	2.5	1.8–3.5	<0.001
Education secondary vs. primary	0.6	0.4–0.9	0.011
Education college vs. primary	0.6	0.4–0.9	<0.001
Education university vs. primary	0.5	0.3–0.7	<0.001
ICD dwell time	1.03	1.01–1.05	<0.001
Feeling of being well informed before ICD	2.5	2.0–3.2	<0.001
CRT	3.2	2.3–4.3	<0.001

CI, confidence interval; CRT, cardiac resynchronization therapy; ICD, implantable cardioverter-defibrillator.

about ICD implantation was low and similar in all cohorts (4.8% in Western, 6.0% in Central/Eastern, 6.5% in Southern Europe, group 1 vs. 2  $P = ns$ , group 1 vs. 3  $P = ns$ , group 2 vs. 3  $P = ns$ ).

## Information provided to patients before implantation

Even though the vast majority of patients reported knowing the reason their ICD was implanted (group 1—95.8%, group 2—97.9%, group 3—98.4%, respectively; group 1 vs. 2  $P = 0.043$ , group 1 vs. 3  $P = 0.028$ , group 2 vs. 3  $P = ns$ ), there was great variability in the level of information provided across Europe (Figure 3, Supplementary material 2). In general, Western Europe patients received less information than Central/Eastern and Southern Europe patients. Indeed, 79.2% of Central/Eastern Europe patients and 76.0% of Southern Europe patients felt optimally informed at the time of device implantation compared with just 64.6% from Western Europe (group 1 vs. 2  $P < 0.001$ , group 1 vs. 3  $P < 0.001$ , group 2 vs. 3  $P = ns$ ). Patients from Southern Europe patients were better informed than patients from other regions regarding driving restrictions, travelling with an ICD, and life expectancy of ICD patients.

The disparity in the quality of information provided to patients influenced their need for further information. Western Europe patients declared having the highest need for information regarding most aspects of ICD function compared with Central/Eastern and Southern European patients (see Supplementary material 3). Remote monitoring of the ICD was the only aspect about which Central/Eastern European patients were the most likely to wish to know more about (25.9% vs.

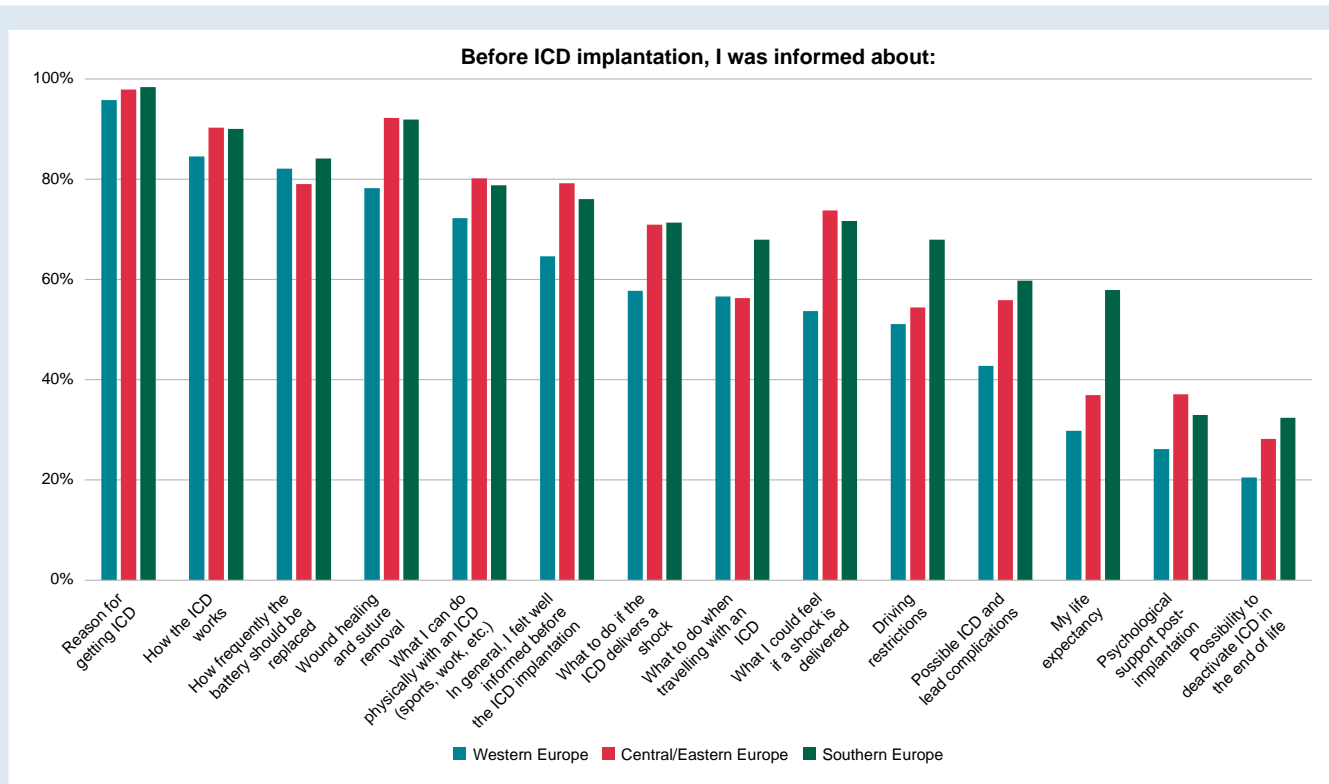
17.9% in Western Europe and 12.2% in Southern Europe, group 1 vs. 2  $P < 0.001$ , group 1 vs. 3  $P = 0.013$ , group 2 vs. 3  $P < 0.001$ ). Additionally, patient knowledge was related to age and education status. Older patients declared having sufficient information about the ICD more often than their younger counterparts (35.2% of 61 to 80-year-old patients vs. 17.3% of 18 to 40-year-old patients,  $P < 0.001$ ). A total of 38.1% of patients with primary education as their highest education level had sufficient information about ICD compared with just 26.2% of patients with a licentiate or upper degree ( $P = 0.004$ ).

Treatment discussion before ICD implantation and the patients' participation in the decision about ICD implantation varied substantially across Europe. Full explanation of the available treatment options was given to only 57.0% of Western European patients, compared with 76.7% from Central/Eastern Europe and 75.7% from Southern Europe (group 1 vs. 2  $P < 0.001$ , group 1 vs. 3  $P < 0.001$ , group 2 vs. 3  $P = ns$ , Figure 4A). A similar pattern was observed for patients' active involvement in the ICD implantation decision-making process—Western Europe 48.0%, Central/Eastern Europe 56.1%, Southern Europe 60.1%, group 1 vs. 2  $P < 0.001$ , group 1 vs. 3  $P = 0.001$ , group 2 vs. 3  $P = 0.017$ , Figure 4B).

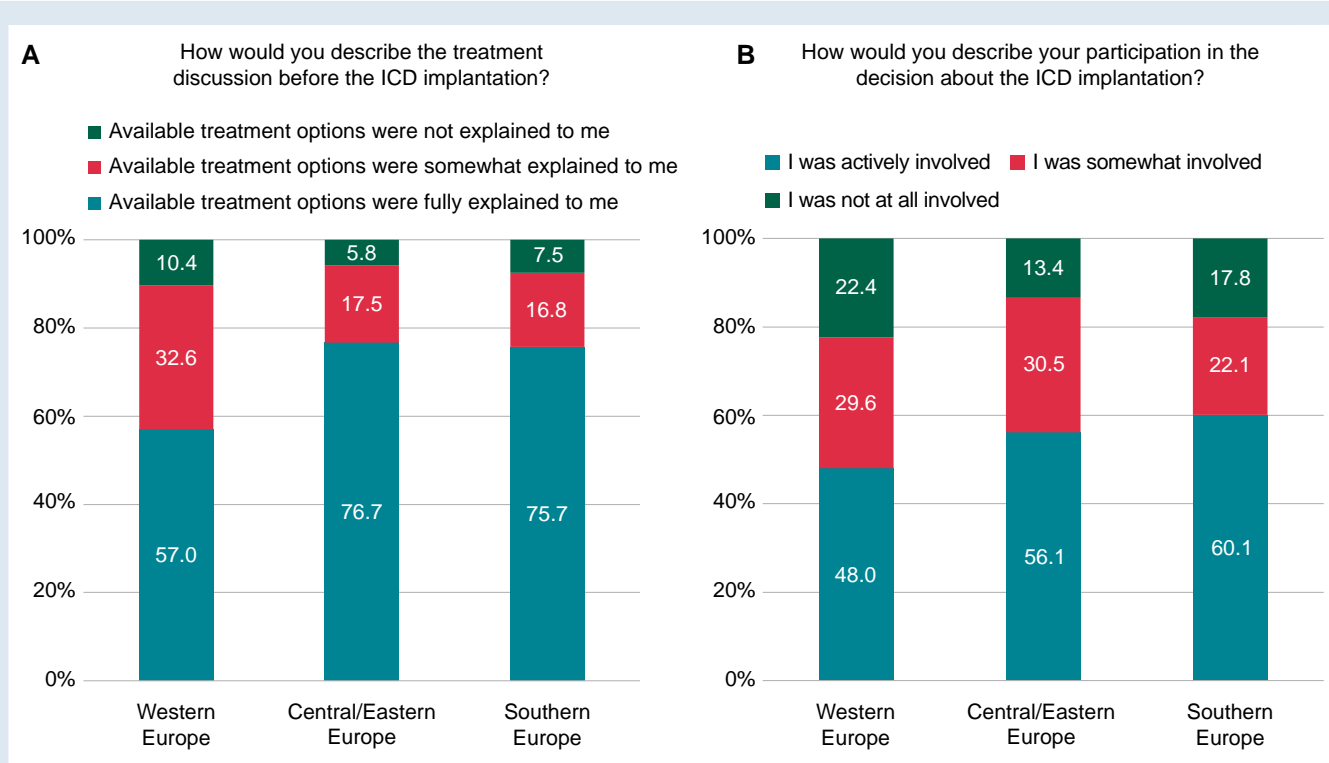
## Discussion

In this analysis from a large EHRA multinational patient survey, we provide the first general overview of regional European differences in characteristics of ICD recipients, patients' perceptions and perspectives on the ICD and life with an ICD, level of information provided to patients prior to and after implantation, and patient needs regarding education on living with an ICD. We found significant differences between regions in (i) patient characteristics (age, education, and employment status), type of device and remote monitoring, (ii) patient knowledge on their type of device, use of remote monitoring, driving restrictions, travelling with an ICD and life expectancy, (iii) provision of detailed information on the ICD prior to and after device implantation, and (iv) ICD impact on quality of life metrics, patient perceptions and perspectives, acceptance of the ICD limitations, and associated lifestyle changes. While patients from Western Europe felt in general less well informed about the ICD and available treatment options and had the highest need for additional information, those from Southern Europe had the lowest improvement in quality of life and degree of acceptance of the ICD limitations and the necessary lifestyle changes.

Although this study could at first suggest that the quality of information provision prior to ICD implantation does not associate with patient satisfaction after having the ICD, this is not necessarily the case, and the observed differences between European regions in quality of life and ICD acceptance should be interpreted with caution. The Southern European cohort was younger than the Western and Central/Eastern European ones, while the period between ICD implantation and study enrollment was shorter. This may help explain why patients from Southern Europe had the lowest degree of satisfaction and ICD acceptance despite being better informed in general and having the lowest rate of complications. Younger patients may find it more difficult to accept a device, which has the potential to negatively impact on their lifestyle and professional life, and to commit to the necessary lifestyle changes. However, it is noteworthy that multivariate analysis identified region as an independent predictor of increased patient satisfaction. Also, it is possible that patients who had had an ICD for a longer period of time were more likely to have already learned how to live with it and accept its limitations. Living with an ICD requires a period of adaptation, and this may vary according to the patient's age and lifestyle. In addition, age and level of education may influence patients' perceptions and perspectives on life with an ICD (understanding of ICD capabilities). The type and density of information provided to prospective ICD patients may require adaptation according to the



**Figure 3** Quality of information provided before ICD implantation according to region. ICD, implantable cardioverter-defibrillator.



**Figure 4** (A) Treatment discussion before ICD implantation according to region. (B) Participation in the decision about ICD implantation according to region. ICD, implantable cardioverter-defibrillator.

patient's age and the anticipated impact the ICD may have on their lifestyle and profession.

This ICD survey provides unique data on regional differences in information provided to patients before ICD implantation and treatment discussion. As shown in the multivariate analysis, age, educational level, as well as region and other factors independently influenced quality of life. Also, less information is provided to patients in Western Europe. These patients are given less information on treatment options and are less likely to participate in the decision-making process, which explains their higher need for better education about the ICD. The reasons for these observed regional inequalities are unclear. The Western cohort had a higher mean age and longer time since ICD implantation. It is possible that older patients may feel less need of detailed information since the device may not interfere in daily life as significantly as in younger subjects who, in general, live more actively. Furthermore, patients' empowerment in decision making may have been less common in earlier years since there were less data available on ICD implications, benefits, and risks. Communication should be improved and adapted to each individual patient situation (individual level), but at the same time, it would be important to make patient information more homogeneous across European countries (transnational level). The latter can only be achieved through international guidelines and recommendations (which are currently lacking).

Healthcare system factors may play an additional non-negligible role in explaining these regional disparities. Although Western countries have a higher mean gross domestic product and larger current health expenditure represented as percentage of gross domestic product, they have fewer cardiologists per million inhabitants than Central/Eastern and Southern Europe.<sup>2</sup> Notwithstanding, physicians in Western Europe may need to reassess the way they interact with prospective ICD patients and develop novel strategies to improve the quality of information provided to patients prior to ICD implantation. Candidates for the ICD must be thoroughly explained the implications, benefits, and risks of the device, the impact it may have on their quality of life, and the likelihood that the device may save their lives, in order to improve their acceptance of the device. In our previous paper,<sup>7</sup> we reported that most ICD patients would have liked to receive information about living with the device during face-to-face appointments, through Internet content or printed material. Patient associations and support groups for ICD recipients provide aid and information about cardiac implantable electronic devices, and we have shown that patients find these activities helpful.<sup>11</sup> Decision-aids used in the shared-decision-making process when considering ICD implantation for primary prevention of sudden cardiac death may increase the subjective feeling of being well informed.<sup>12</sup> Recently, modern technological solutions, such as virtual reality videos, have been shown to provide better information and reduce anxiety in patients submitted to atrial fibrillation ablation.<sup>13</sup> Similar technologies could be adapted to ICD patients.

## Limitations

The main limitation of this study is its observational nature based on voluntary participation of patients from ten European countries. Significant inclusion bias should be considered, but it is unclear which way this may have affected our results. The proportion of respondents compared with the volume of implanted patients is different from country to country (between 0.73% and 8.83%, [Supplementary Material 4](#)), which makes national comparisons impossible. In order to empower this analysis, we have therefore gathered many countries into three regions on a geographical basis. Our division of countries into three groups (Western, Central/Eastern, and Southern), and Latvia inclusion in Central/Eastern Europe due to underrepresentation of Northern Europe, while reasonable from economic and geographical points of view, may be questionable. Also, analysed geographical

populations were numerically unbalanced due to variable questionnaire distribution. Significant differences in the basal characteristics of the three populations may also have driven the results; however, such differences exist and certainly reflect real life. Since this survey questionnaire was shared with patients only, more advanced or detailed clinical or centre-based data were unavailable for analysis. These include data such as ICD programming, heart failure aetiology, or the number of ICD implants in each participating centre, which could have helped interpret our results. Additionally, we did not retrieve data on specific programs (if any) aimed to inform patients about the ICD, specific information provided in the informed consent documents, or how follow-ups (frequency of in-hospital appointments and remote monitoring) was organized.

## Conclusion

Regional European differences in patients' quality of life after ICD implantation and the level of information provision before and after ICD implantation were detected by this patient survey, and novel strategies to address these issues are warranted. While physicians in Southern Europe should address the concerns of a younger ICD population about the impact of the device on quality of life, physicians from Western Europe should focus on improving the quality of information provided to their ICD patients.

## Supplementary material

[Supplementary material](#) is available at *Europace* online.

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## Data availability

The data underlying this article will be shared on reasonable request to the corresponding author with permission of EHRA Scientific Initiatives Committee.

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