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The EHRA White Book 2016

The Current Status of Cardiac Electrophysiology
in ESC Member Countries

G. Hindricks, J. Camm, B. Merkely, P. Raatikainen, D. O. Arnar



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Preface – The EHRA White Book 2016

The ninth edition of the White Book of the European Heart Rhythm Association (EHRA) provides comprehensive data on electrophysiological procedures and implantation of cardiac implantable electronic devices (CIEDs) in the European Society of Cardiology (ESC) area. The White Book has become a key reference for those seeking information about invasive arrhythmia therapies. No other publication provides up-to-date information on the procedure numbers and educational requirements along with key demographic information and national healthcare statistics.

The EHRA White Book represents a successful and tangible attempt by the leading European professional arrhythmia society to serve its principal mission – to improve the quality of life of the European population by reducing the impact of cardiac arrhythmias and reduce sudden cardiac death. The EHRA White Book is an important reference to monitor the trends in treatment of cardiac arrhythmias in ESC countries as well as to identify possible obstacles to ESC Guidelines implementation in each country.

The data collection is mostly the result of voluntary participation of each National Working Group on Arrhythmias or the National Cardiac Societies. In the vast

majority of the ESC countries, well established centralised databases of both CIEDs and catheter ablation procedures do exist. The databases are often created and maintained by the National Working Group on Arrhythmias and Electrophysiology and/or the National Cardiac Society. However, in some ESC countries no registries are available and the data may be limited. In these cases estimates are provided and clearly indicated where this is the case. The EHRA White Book might serve as motivation and a template for these countries to adopt a systematic approach to key data on arrhythmia therapy. Despite the heterogeneous source of information, there is consistency in the data collection over the years that enables comparison on a year to year basis. This year's edition includes data from 50 countries of the 56 ESC countries.

The EHRA White Book has been made possible thanks to the efforts of several key contributors. EHRA is grateful to the chairs and co-chairs of the National Working Groups for their continuous support and contribution to White Book. We also like to thank the EHRA staff at the European Heart House, and last but not least the project sponsor, BIOTRONIK SE & Co. KG company and in particular Anja Thümen and Robert Wüstenberg. To all of them, we extend our deepest gratitude and appreciation.

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2. Scope and Methodology



2. Scope and Methodology

The EHRA White Book 2016 is the 9th edition of a project that was launched in an attempt to understand the national realities with regard to treatment of cardiac arrhythmias.

Every year EHRA invites all the countries member of the European Society of Cardiology to participate in this project. This year the data were collected in the period from February 2016 to May 2016. Like in the past most of the ESC countries provided up-to-date data for this year's edition.

In this edition, the following sections are available for all participating countries:

1. Statistics information
2. Country
3. Healthcare system
4. Education & Quality Control
5. Pacemakers
6. Cardiac resynchronization therapy devices
7. Implantable cardiac defibrillator
8. Loop recorders
9. Lead extractions
10. Device specific information
11. Interventional electrophysiology
12. Guidelines
13. Sources

Since the beginning of the project in 2008 the data for the EHRA White Book have been collected by surveying national cardiology societies and working groups of cardiac pacing and electrophysiology of each country.

The chairmen of the societies and/or working groups were responsible for compiling information about their country based on a questionnaire. The data gathered by the societies and working groups were mainly from national registries and national health institutions.

Simultaneously, a secondary investigation was conducted to cross verify and build the quantitative and qualitative information contained in the book. Once the data collection was complete, the national societies or working groups were asked to authorise the publication of the information.

3. Sources for Demographic Information



3. Sources for demographic information

The demographic information for each country was taken from the following sources:

Age pyramid

| | | |
|--|---|-------------------|
| United States Census Bureau (Homepage) | http://www.census.gov/ipc/www/idb/informationGateway.php | February 12, 2016 |
|--|---|-------------------|

Healthcare data

| | | |
|---|--|-------------------|
| Hospitals (per 100 000 population) | European health for all database (HFA-DB) http://data.euro.who.int/hfadbf/ | February 16, 2016 |
| Beds (per 100 000 population) | European health for all database (HFA-DB) http://data.euro.who.int/hfadbf/ | February 16, 2016 |
| Density of physicians (per 1000 population) | European health for all database (HFA-DB) http://data.euro.who.int/hfadbf/ | February 16, 2016 |
| Density of nurses (per 1000 population) | European health for all database (HFA-DB) http://data.euro.who.int/hfadbf/ | February 16, 2016 |

Demographic information

| | | |
|-------------------------------------|---|-------------------|
| Population | United States Census Bureau (Homepage) http://www.census.gov/ipc/www/idb/informationGateway.php | February 17, 2016 |
| Population annual growth rate (%) | United States Census Bureau (Homepage) http://www.census.gov/ipc/www/idb/informationGateway.php | February 17, 2016 |
| Life expectancy at birth (in years) | United States Census Bureau (Homepage) http://www.census.gov/ipc/www/idb/informationGateway.php | February 17, 2016 |
| Death rate (per 1000 population) | European health for all database (HFA-DB) http://data.euro.who.int/hfadbf/ | February 16, 2016 |
| Live births (per 1000 population) | European health for all database (HFA-DB) http://data.euro.who.int/hfadbf/ | February 17, 2016 |

Economic information

| | | |
|--|--|-------------------|
| Gross domestic product (U.S. dollar-billions) | International Monetary Fund (IMF) http://www.imf.org/external/ns/cs.aspx?id=28 | February 17, 2016 |
| Gross domestic product per capita (U.S. dollar-units) | International Monetary Fund (IMF) http://www.imf.org/external/ns/cs.aspx?id=28 | February 17, 2016 |
| Total expenditure on health as % of GDP | European health for all database (HFA-DB) http://data.euro.who.int/hfadbf/ | February 17, 2016 |
| General government expenditure on health as % of total expenditure on health | WHO -World Health Statistics Report 2015; Section 7; | February 17, 2016 |
| Private expenditure on health as % of total expenditure on health | WHO -World Health Statistics Report 2015; Section 7; | February 17, 2016 |

4. ESC Countries Overview

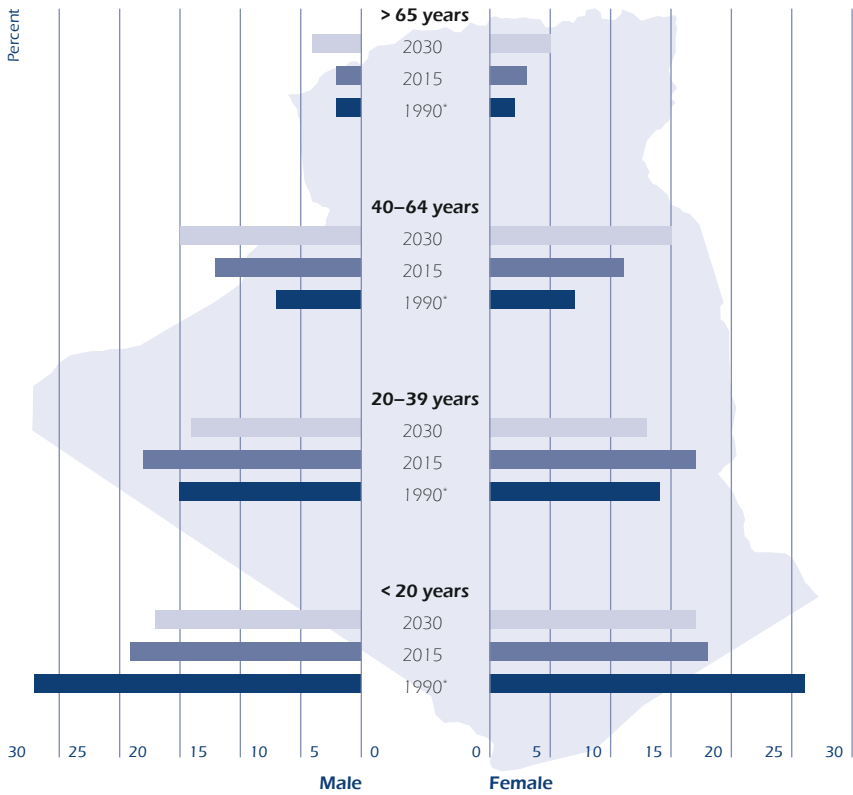


ALGERIA



1. Statistics

Age pyramid for Algeria



* 1990 or last available

| Healthcare data | | Year |
|--|---------------|---------------|
| Hospitals (per 100.000 population) | not available | not available |
| Beds (per 100.000 population) | not available | not available |
| Density of physicians (per 1.000 population) | not available | not available |
| Density of nurses (per 1.000 population) | not available | not available |

| Demographic information | | Year |
|-------------------------------------|---------------|---------------|
| Population | 39.542.166 | 2015 |
| Population annual growth rate (%) | 1,9 | 2015 |
| Life expectancy at birth (in years) | 77 | 2015 |
| Death rate (per 1.000 population) | not available | not available |
| Live births (per 1.000 population) | not available | not available |

| Economic information | | Year |
|--|---------------|---------------|
| Gross domestic product (U.S dollar-billions) | 175,08 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 4.345,43 | 2015* |
| Total expenditure on health as % of GDP | not available | not available |
| General government expenditure on health as % of total expenditure on health | 73,5 | 2012 |
| Private expenditure on health as % of total expenditure on health | 26,5 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| | not available | not available |

3. Healthcare System

Public facilities and some small to middle sized private clinics

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: To provide vaccinations, coverage of communicable diseases and the main chronic diseases (diabetes...)

| Percentage of insured and uninsured citizens | 2014 | 2015 |
|--|------|------|
|--|------|------|

| | | |
|------------------|-----|-----|
| Insured citizens | 70% | 70% |
|------------------|-----|-----|

| | | |
|--------------------|-----|-----|
| Uninsured citizens | 30% | 30% |
|--------------------|-----|-----|

| Distribution of insurance modality | 2014 | 2015 |
|------------------------------------|------|------|
|------------------------------------|------|------|

| | | |
|--------------------------|------|------|
| Public insurance company | 100% | 100% |
|--------------------------|------|------|

| | | |
|---------------------------|----|----|
| Private insurance company | 0% | 0% |
|---------------------------|----|----|

| | | |
|--------------------|----|----|
| Private co-payment | 0% | 0% |
|--------------------|----|----|

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|--|
|--|--|

| | |
|-------------|----|
| ICD devices | No |
|-------------|----|

| | |
|------------|-----|
| Pacemakers | Yes |
|------------|-----|

| | |
|----------|----|
| Ablation | No |
|----------|----|

Comments: Pacemakers in private structures. ICD and ablation only in public hospitals

| Reimbursement availability for physicians and hospitals | | | | |
|---|--|--|--|--|
|---|--|--|--|--|

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|--------------------------|--|-------------------------------------|---|--------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Comments: Physicians receive salaries in public structures;
Coverage by hospitals according to their own budget



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |
| Comments: Consensus between physicians to follow ESC guidelines | |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input checked="" type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|-----|--------------|
| | | Specialist |
| Catheter ablation | Yes | Cardiologist |
| ICD or pacemaker implants | Yes | Cardiologist |

| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|
|---|----|

| Required period of training to perform implantations | No |
|--|----|
|--|----|

| Suggested period of training to perform implantations | Yes |
|---|--------|
| | 1 year |

| | |
|---|-------------|
| National quality control system availability | No |
| Willingness to install quality control system | Yes |
| Responsible person for quality control | |
| To be defined | |
| Training centres availability | |
| Pacemaker | 11 |
| ICD implantation | 7 |
| CRT implantation | 3 |
| Electrophysiological studies and catheter ablation | 2 |
| Atrial fibrillation ablation | 0 |
| Number of universities (Schools of Medicine) | 10 |
| Percentage of academic centres among all practicing EP centres | 100% |
| Percentage of academic centres among all practicing implanting devices centres | 100% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|-------------|
| | 2014 | 2015 |
| Implanting centres | 19 | 19 |
| Total Pacemaker units implanted | 2.508 | 2.915 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 1.957 | 2.303 |
| Replacements | 551 | 612 |
| Specialist performing implants | | |
| Cardiologists | Yes | 99% |
| Surgeons | Yes | 1% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 8 | 8 |
| Total CRT units implanted | 56 | 108 |
| Thereof, CRT pacemaker | 20 | 53 |
| Thereof, CRT ICD | 36 | 55 |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 8 | 9 |
| Total ICD units implanted | 60 | 91 |
| Thereof, Single chamber | 25 | 76 |
| Thereof, Dual chamber | 35 | 15 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 50 | 85 |
| Replacements | 10 | 6 |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 2 | 1 |
| Total loop recorders implanted | 6 | 15 |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 2 | 3 |
| Total lead extraction procedures | 56 | 41 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 97 % |
| Surgeons | Yes | 3 % |

10. Device specific

| Availability of remote monitoring of devices | | No answer |
|--|----|---------------|
| National registry for | | |
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|------|------|
| | 2014 | 2015 |
| Number of ablation centres | 2 | 3 |
| Number of ablations performed | 240 | 303 |
| Mean number of ablations per centre | 120 | 101 |
| Number of AF ablations | 0 | 0 |
| Number of ablation centres (> 50 AF ablations) | 0 | 0 |
| Number of VT/VF ablations | 5 | 8 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 0 | 0 |
| Number of LAA closures | 0 | 0 |
| Number of centres (LAA closures) | 0 | 0 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 3 | 5 |
| Number of physicians under training to become independent electrophysiologists | 5 | 4 |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | No |
| U.S. | No |
| European | Yes |

| Obstacles to guideline implementation | Ranking of importance | | | | |
|--|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|
| | 1 | 2 | 3 | 4 | 5 |
| Lack of centres | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lack of referral | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Low awareness of guidelines | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|---|
| Algerian Society of Cardiology Working Group on Cardiac arrhythmias |
|---|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

| |
|--------------------------------------|
| Survey from professional association |
|--------------------------------------|

| |
|------------|
| Sales data |
|------------|

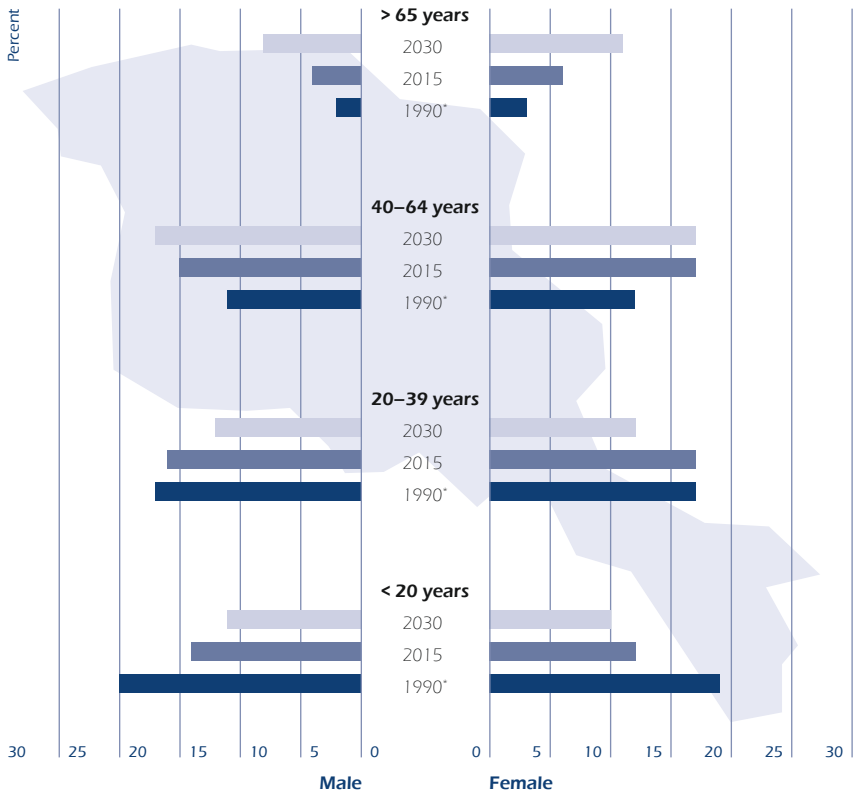
| |
|------------|
| Estimation |
|------------|

ARMENIA



1. Statistics

Age pyramid for Armenia



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 4,3 | 2013 |
| Beds (per 100.000 population) | 406,0 | 2013 |
| Density of physicians (per 1.000 population) | 2,8 | 2013 |
| Density of nurses (per 1.000 population) | 5,0 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 3.056.382 | 2015 |
| Population annual growth rate (%) | -0,1 | 2015 |
| Life expectancy at birth (in years) | 74 | 2015 |
| Death rate (per 1.000 population) | 9,1 | 2012 |
| Live births (per 1.000 population) | 13,8 | 2013 |

| Economic information | | Year |
|--|----------|-------|
| Gross domestic product (U.S dollar-billions) | 10,61 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 3.546,95 | 2015* |
| Total expenditure on health as % of GDP | 4,5 | 2013 |
| General government expenditure on health as % of total expenditure on health | 41,8 | 2012 |
| Private expenditure on health as % of total expenditure on health | 58,2 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|------|
| | 2014 | 2015 |
| | 48% | 48% |

3. Healthcare System

The Armenian healthcare system contains of two parts: state and private health system. Medical care is financed by state in some: 1) children 0-7 years old, 2) some emergency medical care (co-payment); 3) military men (co-payment); 4) risk groups (very few income).

| Basic insurance availability | No |
|------------------------------|----|
|------------------------------|----|

| Percentage of insured and uninsured citizens | | |
|--|------|------|
| | 2014 | 2015 |
| Insured citizens | 25% | 33% |
| Uninsured citizens | 75% | 67% |

| Distribution of insurance modality | | |
|------------------------------------|------|------|
| | 2014 | 2015 |
| Public insurance company | 0% | 0% |
| Private insurance company | 100% | 100% |
| Private co-payment | 0% | 0% |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|-----|
| ICD devices | Yes |
| Pacemakers | Yes |
| Ablation | Yes |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|---|-------------------------------------|--|--------------------------|---|--------------------------|--------------------------|--------------------------|
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|-------------------------------------|--------------------------|---|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Cardiology |
| Training centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Yerevan State medical University after M.Heracy |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input checked="" type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | |
|---------------------------|------------|
| | Specialist |
| Catheter ablation | No |
| ICD or pacemaker implants | No |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|

| | |
|--|----|
| Required period of training to perform implantations | No |
|--|----|

| | |
|---|----|
| Suggested period of training to perform implantations | No |
|---|----|

| | |
|--|----|
| National quality control system availability | No |
|--|----|

| | |
|---|------------|
| Willingness to install quality control system | Yes |
| Responsible person for quality control | |
| Perhaps the Armenian Arrhythmological Association | |
| Training centres availability | |
| Pacemaker | 1 |
| ICD implantation | 1 |
| CRT implantation | 1 |
| Electrophysiological studies and catheter ablation | 1 |
| Atrial fibrillation ablation | 1 |
| Number of universities (Schools of Medicine) | 1 |
| Percentage of academic centres among all practicing EP centres | 50% |
| Percentage of academic centres among all practicing implanting devices centres | 50% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|-------------|
| | 2014 | 2015 |
| Implanting centres | 3 | 2 |
| Total Pacemaker units implanted | 129 | 117 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 101 | 107 |
| Replacements | 28 | 10 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 3 | 2 |
| Total CRT units implanted | 4 | 10 |
| Thereof, CRT pacemaker | 0 | 1 |
| Thereof, CRT ICD | 4 | 9 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 3 | 3 |
| Total ICD units implanted | 25 | 21 |
| Thereof, Single chamber | 4 | 5 |
| Thereof, Dual chamber | 21 | 16 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 14 | 17 |
| Replacements | 11 | 4 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 2 | 2 |
| Total loop recorders implanted | 12 | 0 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 0 | 0 |
| Total lead extraction procedures | 0 | 0 |
| Specialist performing lead extractions | | |
| Cardiologists | No | 0% |
| Surgeons | No | 0% |

10. Device specific

| Availability of remote monitoring of devices | | No |
|--|----|---------------|
| Reasons why remote monitoring is not available: We have not the monitoring system of devices | | |
| National registry for | | |
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|------|------|
| | 2014 | 2015 |
| Number of ablation centres | 3 | 3 |
| Number of ablations performed | 132 | 48 |
| Mean number of ablations per centre | 44 | 16 |
| Number of AF ablations | 11 | 1 |
| Number of ablation centres (> 50 AF ablations) | 0 | 0 |
| Number of VT/VF ablations | 12 | 2 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 1 | 0 |
| Number of LAA closures | 0 | 0 |
| Number of centres (LAA closures) | 0 | 0 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 8 | 4 |
| Number of physicians under training to become independent electrophysiologists | 1 | 2 |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-----------------------|
| National | No | | | | | |
| U.S. | No | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of reimbursement, limited financial resources | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Armenian Arrhythmological Association |

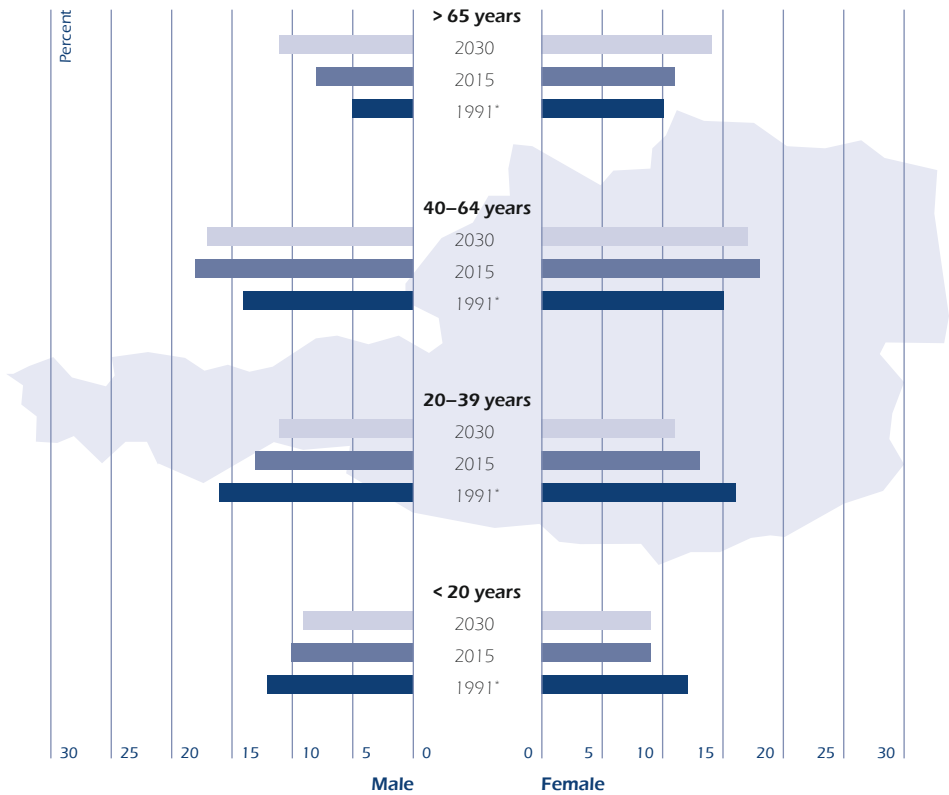
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
| EHRA White Book 2015 |
| Official statistics |
| Survey from professional association |

AUSTRIA



1. Statistics

Age pyramid for Austria



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 3,3 | 2013 |
| Beds (per 100.000 population) | 764,7 | 2013 |
| Density of physicians (per 1.000 population) | 5,0 | 2013 |
| Density of nurses (per 1.000 population) | 8,0 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 8.665.550 | 2015 |
| Population annual growth rate (%) | 0,6 | 2015 |
| Life expectancy at birth (in years) | 81 | 2015 |
| Death rate (per 1.000 population) | 9,2 | 2014 |
| Live births (per 1.000 population) | 9,6 | 2014 |

| Economic information | | Year |
|--|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 372,61 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 43.546,60 | 2015* |
| Total expenditure on health as % of GDP | 11,0 | 2013 |
| General government expenditure on health as % of total expenditure on health | 75,9 | 2012 |
| Private expenditure on health as % of total expenditure on health | 24,1 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|------|
| | 2014 | 2015 |
| | 43% | 42% |

3. Healthcare System

The Austrian healthcare system is characterized by the federalist structure of the country, the delegation of competencies to self-governing stakeholders in the social insurance system as well as by cross-stakeholder structures at federal and Länder level which possess competencies in cooperative planning, coordination and financing. According to the Federal Constitution, almost all areas of the healthcare system are primarily the regulatory responsibility of the federal government. The most important exception is the hospital sector. In this area, the federal government is only responsible for enacting basic law, legislation on implementation and enforcement is the responsibility of the nine Länder. In the outpatient sector, but also in the rehabilitation sector and in the field of medicines, healthcare is organized by negotiations between the 21 health insurance funds and the Federation of Austrian Social Insurance Institutions on the one hand and the chambers of physicians and pharmacists (which are organized as public-law bodies) and the statutory professional associations of midwives or other health professions on the other. The various sectors of the health care system have traditionally been characterized by different stakeholders and regulation- and financing mechanisms. However, in recent years there have been increased efforts to introduce decision-making and financing flows which are effective across all sectors. Since 2002, all the Länder (except Vienna) as well as some of the private non-profit owners have privatized their hospitals, mainly in the form of organizational privatizations. The various private operating companies have one thing in common: they are responsible for the management of hospitals, whereas the Länder or local authorities as (majority) owners usually act as a guarantor. The Austrian healthcare system has developed almost completely into a model which is mainly based on decentralized contracts with all service providers. [Health systems in transition, Hofmarcher 2006]

| Basic insurance availability | | Yes |
|---|------|------|
| All citizens with a minimum salary / payment of 416 Euro qualify for public healthcare insurance. | | |
| Percentage of insured and uninsured citizens | | |
| | 2014 | 2015 |
| Insured citizens | 98% | 98% |
| Uninsured citizens | 2% | 2% |
| Distribution of insurance modality | | |
| | 2014 | 2015 |
| Public insurance company | 65% | 99% |
| Private insurance company | 0% | 0% |
| Private co-payment | 35% | 0% |
| Possibility to subscribing to private health insurance plans | | Yes |
| Co-payment necessary for the following therapy | | |
| ICD devices | | No |
| Pacemakers | | No |
| Ablation | | No |

Reimbursement availability for physicians and hospitals

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|-------------------------------------|--|--------------------------|---|--------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Treatment availability

| | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

National certification availability

| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
|----------------------------|---------------------------------|---|-------------------------------------|--------------------------|--------------------------|
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | ICD and PM Accreditation |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | EP Accreditation |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

National Cardiac Society supporting EHRA certification system

| | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | | Specialist |
|---|-----|--|-----------------------|
| Catheter ablation | Yes | | Cardiologist |
| ICD or pacemaker implants | Yes | | Cardiologist, surgeon |
| Official national competency guidelines for electrophysiological studies or catheter ablation | | | No |
| Required period of training to perform implantations | | | No |
| Suggested period of training to perform implantations | | | No |
| National quality control system availability | | | No |
| Willingness to install quality control system | | | Yes |
| Responsible person for quality control | | | No answer |
| Training centres availability | | | |
| Pacemaker | | | 57 |
| ICD implantation | | | not available |
| CRT implantation | | | not available |
| Electrophysiological studies and catheter ablation | | | 19 |
| Atrial fibrillation ablation | | | 13 |
| Number of universities (Schools of Medicine) | | | 5 |
| Percentage of academic centres among all practicing EP centres | | | 26% |
| Percentage of academic centres among all practicing implanting devices centres | | | 9% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 57 | 57 |
| Total Pacemaker units implanted | 8.272 | 7.905 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | 5.944 | 5.711 |
| Replacements | 2.328 | 2.194 |
| Specialist performing implants | | |
| Cardiologists | Yes | 50% |
| Surgeons | Yes | 50% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|-------|-------|
| | 2014 | 2015 |
| Implanting centres | 18 | 18 |
| Total CRT units implanted | 1.236 | 1.364 |
| Thereof, CRT pacemaker | 420 | 470 |
| Thereof, CRT ICD | 816 | 894 |
| Specialist performing implants | | |
| Cardiologists | Yes | 50% |
| Surgeons | Yes | 50% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 21 | 21 |
| Total ICD units implanted | 1.362 | 1.393 |
| Thereof, Single chamber | not available | not available |
| Thereof, Dual chamber | not available | not available |
| Thereof, Subcutaneous ICD | not available | not available |
| First implants | 976 | 1.045 |
| Replacements | 386 | 348 |
| Specialist performing implants | | |
| Cardiologists | Yes | 10% |
| Surgeons | Yes | 90% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 25 | 25 |
| Total loop recorders implanted | 509 | 893 |
| Specialist performing implants | | |
| Cardiologists | Yes | 80% |
| Surgeons | Yes | 20% |

9. Lead extractions

| Lead extractions procedures and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 5 | 5 |
| Total lead extraction procedures | 280 | 250 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 10% |
| Surgeons | Yes | 90% |

10. Device specific

| | | |
|---|-----|---------------|
| Availability of remote monitoring of devices | | Yes |
| National registry for | | |
| | | Official name |
| ICD | Yes | |
| Pacing | Yes | |
| Electrophysiology | Yes | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|---|---------------|------------|
| | 2014 | 2015 |
| Number of ablation centres | 17 | 19 |
| Number of ablations performed | 2.622 | 2.777 |
| Mean number of ablations per centre | 154 | 146 |
| Number of AF ablations | 878 | 966 |
| Number of ablation centres (> 50 AF ablations) | 12 | 8 |
| Number of VT/VF ablations | 83 | 95 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 3 | 4 |
| Number of LAA closures | not available | 50 |
| Number of centres (LAA closures) | not available | 10 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 35 | 46 |
| Number of physicians under training to become independent electrophysiologists | 10 | 17 |
| Availability of a national registry for interventional electrophysiology | | Yes |
| Official name: EP Registry of the Working Group of Rhythmology | | |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | No |
| U.S. | No |
| European | Yes |

| Obstacles to guideline implementation | | | | | | Ranking of importance |
|--|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 1 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Lack of referral | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 3 |
| Low awareness of guidelines | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 2 |

1 = no obstacle, 5 = great obstacle

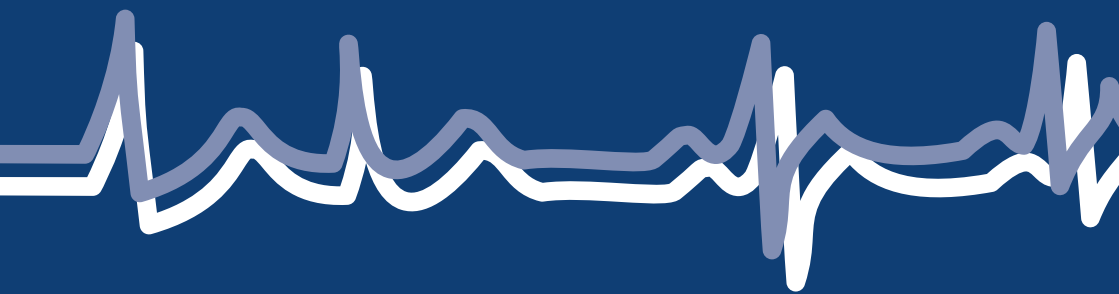
1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Working Group of Rhythmology, Austrian Society of Cardiology |

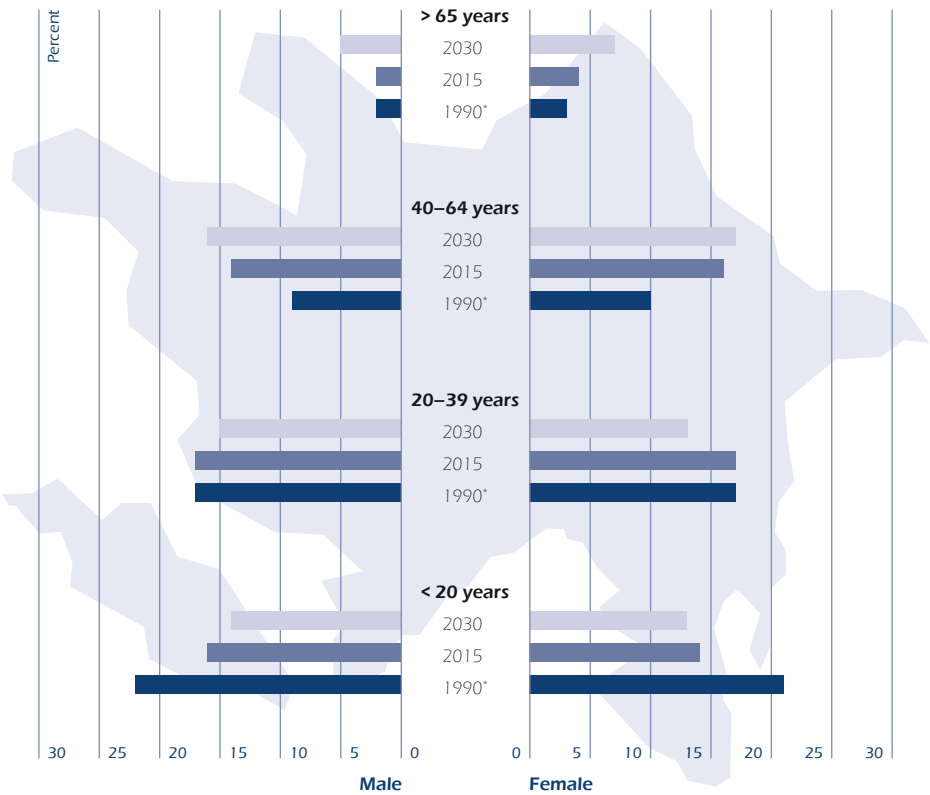
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
| EHRA White Book 2015 |
| Official statistics |
| Survey from professional association |
| Estimation |

AZERBAIJAN



1. Statistics

Age pyramid for Azerbaijan



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 5,9 | 2013 |
| Beds (per 100.000 population) | 468,8 | 2013 |
| Density of physicians (per 1.000 population) | 3,4 | 2013 |
| Density of nurses (per 1.000 population) | 6,6 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 9.780.780 | 2015 |
| Population annual growth rate (%) | 1,0 | 2015 |
| Life expectancy at birth (in years) | 72 | 2015 |
| Death rate (per 1.000 population) | 5,9 | 2007 |
| Live births (per 1.000 population) | 18,3 | 2013 |

| Economic information | | Year |
|--|----------|-------|
| Gross domestic product (U.S dollar-billions) | 63,98 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 6.794,43 | 2015* |
| Total expenditure on health as % of GDP | 5,6 | 2013 |
| General government expenditure on health as % of total expenditure on health | 22,6 | 2012 |
| Private expenditure on health as % of total expenditure on health | 77,4 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|---------------|------|
| | 2014 | 2015 |
| | not available | 50 % |

3. Healthcare System

Medicine is free of charge for all citizens in governmental hospitals.

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

| Percentage of insured and uninsured citizens | | |
|--|------|------|
| | 2014 | 2015 |
| Insured citizens | 100% | 100% |
| Uninsured citizens | 0% | 0% |

| Distribution of insurance modality | | |
|------------------------------------|------|------|
| | 2014 | 2015 |
| Public insurance company | 80% | 80% |
| Private insurance company | 10% | 10% |
| Private co-payment | 10% | 10% |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|-----|
| ICD devices | Yes |
| Pacemakers | No |
| Ablation | Yes |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|---|--------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input checked="" type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|-------------------------------------|--------------------------|---|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Certification of the Ministry of Health |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input checked="" type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | |
|---------------------------|------------|
| | Specialist |
| Catheter ablation | No |
| ICD or pacemaker implants | No |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|

| | |
|--|----|
| Required period of training to perform implantations | No |
|--|----|

| | |
|---|----|
| Suggested period of training to perform implantations | No |
|---|----|

| | |
|---|------------|
| National quality control system availability | No |
| Willingness to install quality control system | Yes |
| Responsible person for quality control | |
| Ministry of health | |
| Training centres availability | |
| Pacemaker | 6 |
| ICD implantation | 3 |
| CRT implantation | 1 |
| Electrophysiological studies and catheter ablation | 2 |
| Atrial fibrillation ablation | 2 |
| Number of universities (Schools of Medicine) | 1 |
| Percentage of academic centres among all practicing EP centres | 2% |
| Percentage of academic centres among all practicing implanting devices centres | 6% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|-------------|
| | 2014 | 2015 |
| Implanting centres | 10 | 8 |
| Total Pacemaker units implanted | 184 | 395 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | not available | 352 |
| Replacements | not available | 43 |
| Specialist performing implants | | |
| Cardiologists | Yes | 90% |
| Surgeons | Yes | 10% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 3 | 2 |
| Total CRT units implanted | 18 | 24 |
| Thereof, CRT pacemaker | 0 | 0 |
| Thereof, CRT ICD | 18 | 24 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 7 | 7 |
| Total ICD units implanted | 20 | 21 |
| Thereof, Single chamber | 8 | 8 |
| Thereof, Dual chamber | 12 | 13 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | not available | not available |
| Replacements | not available | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 1 | 1 |
| Total loop recorders implanted | 1 | 1 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 1 | 1 |
| Total lead extraction procedures | 8 | 5 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

10. Device specific

| Availability of remote monitoring of devices | | No |
|--|---------------|----|
| Reasons why remote monitoring is not available: Unclear | | |
| National registry for | | |
| | Official name | |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 3 | 5 |
| Number of ablations performed | 384 | 398 |
| Mean number of ablations per centre | 128 | 80 |
| Number of AF ablations | 2 | 6 |
| Number of ablation centres (> 50 AF ablations) | 2 | not available |
| Number of VT/VF ablations | 56 | not available |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 2 | 2 |
| Number of LAA closures | not available | 0 |
| Number of centres (LAA closures) | 0 | 0 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 2 | 2 |
| Number of physicians under training to become independent electrophysiologists | not available | not available |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--|
| National | No | | | | | |
| U.S. | Yes | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | Ranking of importance | | | | | |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Lack of operators | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|--|
| Azerbaijan Society of Cardiology, Arrhythmia Working Group |
|--|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

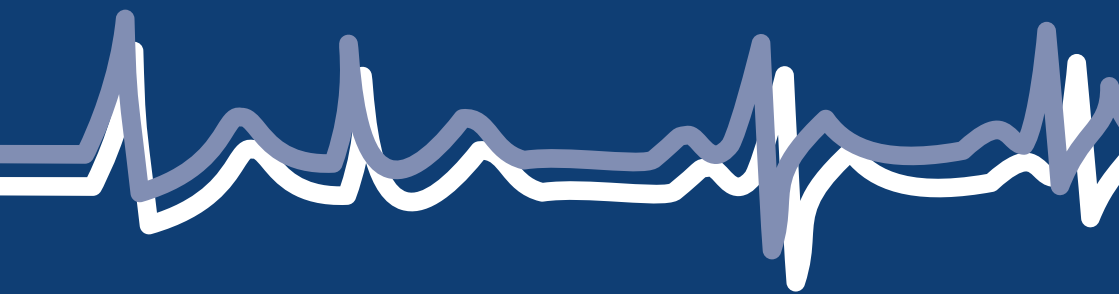
| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

| |
|---------------------|
| Official statistics |
|---------------------|

| |
|--------------------------------------|
| Survey from professional association |
|--------------------------------------|

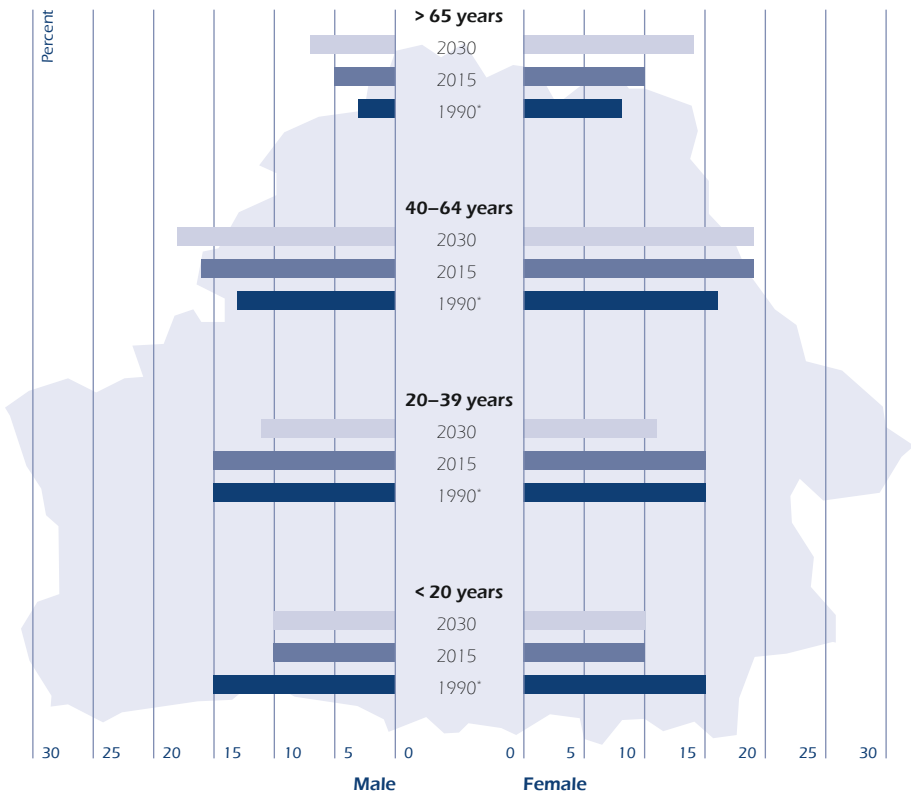
| |
|------------|
| Sales data |
|------------|

BELARUS



1. Statistics

Age pyramid for Belarus



* 1990 or last available

| Healthcare data | | Year |
|--|---------|------|
| Hospitals (per 100.000 population) | 6,8 | 2013 |
| Beds (per 100.000 population) | 1.104,6 | 2013 |
| Density of physicians (per 1.000 population) | 2,2 | 2013 |
| Density of nurses (per 1.000 population) | 6,2 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 9.589.689 | 2015 |
| Population annual growth rate (%) | -0,2 | 2015 |
| Life expectancy at birth (in years) | 73 | 2015 |
| Death rate (per 1.000 population) | 14,3 | 2011 |
| Live births (per 1.000 population) | 12,5 | 2013 |

| Economic information | | Year |
|--|----------|-------|
| Gross domestic product (U.S dollar-billions) | 62,02 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 6.583,39 | 2015* |
| Total expenditure on health as % of GDP | 6,1 | 2013 |
| General government expenditure on health as % of total expenditure on health | 77,2 | 2012 |
| Private expenditure on health as % of total expenditure on health | 22,8 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|-------|--------|
| | 54,3% | 55,15% |

3. Healthcare System

National Health System

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: Citizenship

| Percentage of insured and uninsured citizens | | |
|--|--|--|
|--|--|--|

| | 2014 | 2015 |
|--------------------|------|------|
| Insured citizens | 100% | 100% |
| Uninsured citizens | 0% | 0% |

| Distribution of insurance modality | | |
|------------------------------------|--|--|
|------------------------------------|--|--|

| | 2014 | 2015 |
|---------------------------|---------------|---------------|
| Public insurance company | 100% | 100% |
| Private insurance company | not available | not available |
| Private co-payment | not available | not available |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|--|
|--|--|

| | |
|-------------|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
|---|--|--|--|--|--|--|--|--|

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimburse- ment, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimburse- ment neither incentive | | No answer | |
|--------------------------|---|--------------------------|--|--------------------------|---|-------------------------------------|-------------------------------------|-------------------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

Comments: Leadless Pacing and Subcutaneous ICD not available in the country



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|-------------------------------------|-------------------------------------|---------------------------------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Roentgen-Endovascular surgery Diploma |
| Invasive electrophysiology | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Roentgen-Endovascular surgery Diploma |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|-----|---------------------------------------|
| | | Specialist |
| Catheter ablation | Yes | Roentgen-Endovascular surgery Diploma |
| ICD or pacemaker implants | Yes | Roentgen-Endovascular surgery Diploma |

| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|
|---|----|

| | |
|---|------------------|
| Required period of training to perform implantations | Yes |
| | 4 months |
| Suggested period of training to perform implantations | Yes |
| | 1 year |
| National quality control system availability | No |
| Willingness to install quality control system | No answer |
| Responsible person for quality control | |
| Health Ministry | |
| Training centres availability | |
| Pacemaker | 1 |
| ICD implantation | 1 |
| CRT implantation | 1 |
| Electrophysiological studies and catheter ablation | 1 |
| Atrial fibrillation ablation | 1 |
| Number of universities (Schools of Medicine) | 4 |
| Percentage of academic centres among all practicing EP centres | 60% |
| Percentage of academic centres among all practicing implanting devices centres | 80% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 10 | 10 |
| Total Pacemaker units implanted | 2.970 | 3.149 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | 2.417 | 2.607 |
| Replacements | 553 | 542 |
| Specialist performing implants | | |
| Cardiologists | No | 0% |
| Surgeons | Yes | 100% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 6 | 6 |
| Total CRT units implanted | 49 | 100 |
| Thereof, CRT pacemaker | not available | not available |
| Thereof, CRT ICD | not available | not available |
| Specialist performing implants | | |
| Cardiologists | No | 0% |
| Surgeons | Yes | 100% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 10 | 10 |
| Total ICD units implanted | 172 | 133 |
| Thereof, Single chamber | not available | not available |
| Thereof, Dual chamber | not available | not available |
| Thereof, Subcutaneous ICD | not available | not available |
| First implants | not available | not available |
| Replacements | not available | not available |
| Specialist performing implants | | |
| Cardiologists | No | 0% |
| Surgeons | Yes | 100% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 1 | 1 |
| Total loop recorders implanted | 58 | 57 |
| Specialist performing implants | | |
| Cardiologists | No | 0% |
| Surgeons | Yes | 100% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 10 | 3 |
| Total lead extraction procedures | 6 | 11 |

| Specialist performing lead extractions | | |
|--|-----|------|
| Cardiologists | No | 0% |
| Surgeons | Yes | 100% |

10. Device specific

| | |
|---|------------|
| Availability of remote monitoring of devices | Yes |
|---|------------|

| National registry for | | |
|-----------------------|----|---------------|
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |

| | |
|---|-----------|
| Availability of a national quality insurance system or complication registry | No |
|---|-----------|

| | |
|---|-----------|
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | No |
|---|-----------|

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 6 | 7 |
| Number of ablations performed | 807 | 993 |
| Mean number of ablations per centre | 135 | 142 |
| Number of AF ablations | 69 | 106 |
| Number of ablation centres (> 50 AF ablations) | 1 | 2 |
| Number of VT/VF ablations | 20 | 5 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 1 | 0 |
| Number of LAA closures | 5 | 12 |
| Number of centres (LAA closures) | 1 | 2 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | not available | not available |
| Number of physicians under training to become independent electrophysiologists | 1 | 0 |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-----------------------|
| National | Yes | | | | | |
| U.S. | No | | | | | |
| European | No | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4 |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 |
| 1 = no obstacle, 5 = great obstacle | | | | | | 1 = top, 6 = lowest |

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|--|
| Belorussian Heart Rhythm Association a branch of Belorussian Scientific Society of Cardiologists |
|--|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

| |
|---------------------|
| Official statistics |
|---------------------|

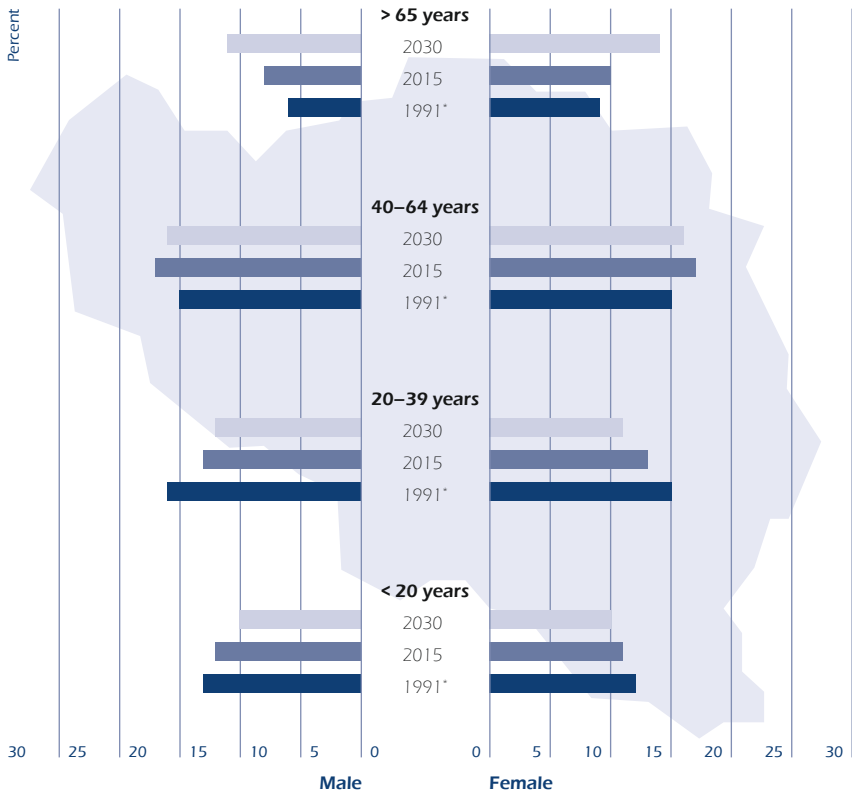
| |
|------------|
| Estimation |
|------------|

BELGIUM



1. Statistics

Age pyramid for Belgium



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 1,7 | 2014 |
| Beds (per 100.000 population) | 622,9 | 2014 |
| Density of physicians (per 1.000 population) | 3,0 | 2013 |
| Density of nurses (per 1.000 population) | 9,7 | 2010 |

| Demographic information | | Year |
|-------------------------------------|------------|------|
| Population | 11.323.973 | 2015 |
| Population annual growth rate (%) | 0,8 | 2015 |
| Life expectancy at birth (in years) | 81 | 2015 |
| Death rate (per 1.000 population) | 9,8 | 2012 |
| Live births (per 1.000 population) | 11,2 | 2013 |

| Economic information | | Year |
|--|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 458,65 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 40.456,32 | 2015* |
| Total expenditure on health as % of GDP | 11,2 | 2013 |
| General government expenditure on health as % of total expenditure on health | 75,2 | 2012 |
| Private expenditure on health as % of total expenditure on health | 24,8 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| | not available | not available |

3. Healthcare System

National and obligatory for everybody

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: citizenship

| Percentage of insured and uninsured citizens | | |
|--|--|--|
|--|--|--|

| | 2014 | 2015 |
|--------------------|------|------|
| Insured citizens | 99 % | 99 % |
| Uninsured citizens | 1 % | 1 % |

| Distribution of insurance modality | | |
|------------------------------------|--|--|
|------------------------------------|--|--|

| | 2014 | 2015 |
|---------------------------|------|------|
| Public insurance company | 90 % | 90 % |
| Private insurance company | 0 % | 0 % |
| Private co-payment | 10 % | 10 % |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|--|
|--|--|

| | |
|-------------|-----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | Yes |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
|---|--|--|--|--|--|--|--|--|

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|-------------------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

Comments: ICD: prescription under national guidelines and limited budget per center; ILR: recorder reimbursed for a limited number per year, physician and hospital not reimbursed.

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input checked="" type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|-----|-----------------------------------|
| | | Specialist |
| Catheter ablation | Yes | Cardiac surgery has to be on site |
| ICD or pacemaker implants | Yes | Cardiac surgery has to be on site |

| Official national competency guidelines for electrophysiological studies or catheter ablation | Yes |
|---|-----|
| Ministry healthcare | |

| Required period of training to perform implantations | No |
|--|----|
|--|----|

| Suggested period of training to perform implantations | No |
|---|----|
|---|----|

| | |
|---|---------------|
| National quality control system availability | Yes |
| Pacemaker | Yes |
| ICD implantation | Yes |
| CRT implantation | Yes |
| Cathether ablation | Yes |
| Responsible person for quality control | |
| PM and ICD: Ministry Healthcare • Ablation: Working Group (BeHRA) | |
| Training centres availability | |
| Pacemaker | not available |
| ICD implantation | not available |
| CRT implantation | not available |
| Electrophysiological studies and catheter ablation | not available |
| Atrial fibrillation ablation | not available |
| Number of universities (Schools of Medicine) | 7 |
| Percentage of academic centres among all practicing EP centres | 20% |
| Percentage of academic centres among all practicing implanting devices centres | 7% |

5. Pacemakers

| | | |
|---|---------------|---------------|
| Pacemaker units implanted and number of implanting centres | | |
| | 2014 | 2015 |
| Implanting centres | 104 | 104 |
| Total Pacemaker units implanted | 12.912 | 13.073 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 8.935 | 9.094 |
| Replacements | 3.977 | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | not available |
| Surgeons | Yes | not available |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|-------|---------------|
| | 2014 | 2015 |
| Implanting centres | 40 | 40 |
| Total CRT units implanted | 1.332 | 1.485 |
| Thereof, CRT pacemaker | 458 | 528 |
| Thereof, CRT ICD | 874 | 957 |
| Specialist performing implants | | |
| Cardiologists | Yes | not available |
| Surgeons | Yes | not available |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|-------|---------------|
| | 2014 | 2015 |
| Implanting centres | 23 | 23 |
| Total ICD units implanted | 1.636 | 1.531 |
| Thereof, Single chamber | 980 | 907 |
| Thereof, Dual chamber | 631 | 542 |
| Thereof, Subcutaneous ICD | 25 | 82 |
| First implants | 1.188 | 1.081 |
| Replacements | 448 | 450 |
| Specialist performing implants | | |
| Cardiologists | Yes | not available |
| Surgeons | Yes | not available |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | not available | not available |
| Total loop recorders implanted | not available | 400 |
| Specialist performing implants | | |
| Cardiologists | Yes | not available |
| Surgeons | Yes | not available |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | not available | not available |
| Total lead extraction procedures | not available | not available |

| Specialist performing lead extractions | | |
|--|-----|---------------|
| Cardiologists | Yes | not available |
| Surgeons | Yes | not available |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|--|-----|
|--|--|-----|

| National registry for | | |
|-----------------------|-----|-----------------------|
| | | Official name |
| ICD | Yes | QERMID@DEFIBRILLATORS |
| Pacing | Yes | QERMID@PACEMAKERS |
| Electrophysiology | No | |

| Availability of a national quality insurance system or complication registry | | No |
|--|--|----|
|--|--|----|

| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |
|--|--|----|
|--|--|----|

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 44 | not available |
| Number of ablations performed | 6.126 | 7.091 |
| Mean number of ablations per centre | 139 | not available |
| Number of AF ablations | 2.560 | 3.273 |
| Number of ablation centres (> 50 AF ablations) | 22 | 16 |
| Number of VT/VF ablations | not available | not available |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | not available | not available |
| Number of LAA closures | not available | not available |
| Number of centres (LAA closures) | not available | not available |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | not available | not available |
| Number of physicians under training to become independent electrophysiologists | not available | not available |
| Availability of a national registry for interventional electrophysiology | | Yes |
| BEHRA national ablation database | | |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|-----------------------|
| National | | | | | | Yes |
| U.S. | | | | | | Yes |
| European | | | | | | Yes |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of referral | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of trained personnel | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Low awareness of guidelines | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of operators | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

1 = no obstacle, 5 = great obstacle

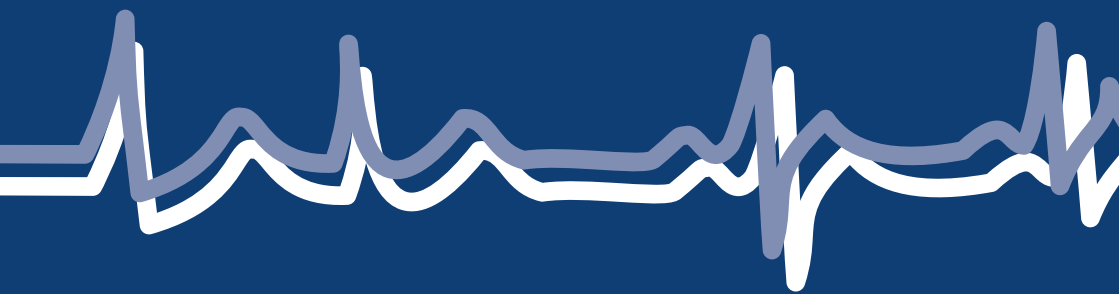
1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| BeHRA |

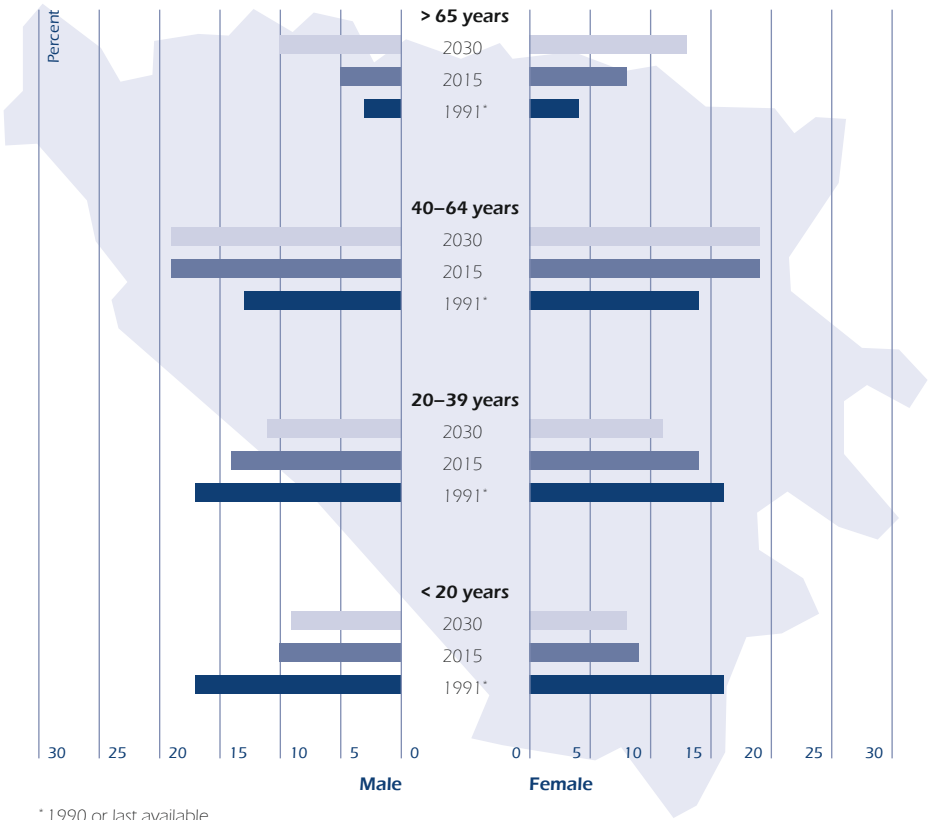
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
| EHRA White Book 2015 |
| Official statistics |
| Survey from professional association |
| Estimation |

BOSNIA & HERZEGOVINA



1. Statistics

Age pyramid for Bosnia & Herzegovina



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 1,0 | 2013 |
| Beds (per 100.000 population) | 349,9 | 2013 |
| Density of physicians (per 1.000 population) | 1,9 | 2013 |
| Density of nurses (per 1.000 population) | 5,5 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 3.867.055 | 2015 |
| Population annual growth rate (%) | -0,1 | 2015 |
| Life expectancy at birth (in years) | 77 | 2015 |
| Death rate (per 1.000 population) | 9,1 | 2011 |
| Live births (per 1.000 population) | 7,8 | 2013 |

| Economic information | | Year |
|---|----------|-------|
| Gross domestic product (U.S dollar-billions) | 15,57 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 4.029,85 | 2015* |
| Total expenditure on health as% of GDP | 9,6 | 2013 |
| General government expenditure on health as% of total expenditure on health | 71,2 | 2012 |
| Private expenditure on health as% of total expenditure on health | 28,8 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|------|
| | 2014 | 2015 |
| | 53% | 52% |

3. Healthcare System

The National Healthcare system in BH is provided through an established network of health centers of Family Medicine (primary care). As a secondary and tertiary care, General hospitals, University Clinical Centers, University hospitals and special institutions are providing services. A few private healthcare are incorporated to the healthcare system.

| Basic insurance availability | No |
|------------------------------|----|
|------------------------------|----|

| Percentage of insured and uninsured citizens | | |
|--|------|------|
| | 2014 | 2015 |
| Insured citizens | 75% | 75% |
| Uninsured citizens | 25% | 25% |

| Distribution of insurance modality | | |
|------------------------------------|------|---------------|
| | 2014 | 2015 |
| Public insurance company | 75% | 75% |
| Private insurance company | 0% | not available |
| Private co-payment | 25% | 25% |

| Possibility to subscribing to private health insurance plans | No |
|--|----|
|--|----|

| Co-payment necessary for the following therapy | |
|--|-----------|
| ICD devices | Yes |
| Pacemakers | Yes |
| Ablation | No answer |

Comments: It is mandatory the payment of 20% of all implant costs for patients under 65 years old.

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|---|--------------------------|--|--------------------------|---|-------------------------------------|-------------------------------------|-------------------------------------|
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | |
|---------------------------|------------------------------|
| | Specialist |
| Catheter ablation | No answer |
| ICD or pacemaker implants | Yes Cardiologist, Surgeon |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|

| | |
|--|-----|
| Required period of training to perform implantations | Yes |
|--|-----|

| | |
|---|-----------|
| Suggested period of training to perform implantations | No answer |
|---|-----------|

| | |
|---|------------------|
| National quality control system availability | No answer |
| Willingness to install quality control system | No answer |
| Responsible person for quality control | |
| Head of the Pacemaker Center/Department | |
| Training centres availability | |
| Pacemaker | 0 |
| ICD implantation | 0 |
| CRT implantation | 0 |
| Electrophysiological studies and catheter ablation | 0 |
| Atrial fibrillation ablation | 0 |
| Number of universities (Schools of Medicine) | 5 |
| Percentage of academic centres among all practicing EP centres | 0% |
| Percentage of academic centres among all practicing implanting devices centres | 50% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|-------------|
| | 2014 | 2015 |
| Implanting centres | 5 | 6 |
| Total Pacemaker units implanted | 831 | 854 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 758 | 793 |
| Replacements | 73 | 61 |
| Specialist performing implants | | |
| Cardiologists | Yes | 85% |
| Surgeons | Yes | 15% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 2 | 2 |
| Total CRT units implanted | 23 | 17 |
| Thereof, CRT pacemaker | 13 | 11 |
| Thereof, CRT ICD | 10 | 6 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 5 | 6 |
| Total ICD units implanted | 55 | 87 |
| Thereof, Single chamber | 45 | 78 |
| Thereof, Dual chamber | 10 | 9 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 48 | 81 |
| Replacements | 7 | 6 |
| Specialist performing implants | | |
| Cardiologists | Yes | 85% |
| Surgeons | Yes | 15% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 1 | 1 |
| Total loop recorders implanted | 11 | 5 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 0 | 0 |
| Total lead extraction procedures | 0 | 0 |
| Specialist performing lead extractions | | |
| Cardiologists | No | not available |
| Surgeons | No | not available |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|----|---------------|
| National registry for | | |
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 0 | 1 |
| Number of ablations performed | 0 | not available |
| Mean number of ablations per centre | not available | not available |
| Number of AF ablations | 0 | 0 |
| Number of ablation centres (> 50 AF ablations) | 0 | 0 |
| Number of VT/VF ablations | 0 | not available |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 0 | not available |
| Number of LAA closures | 0 | 0 |
| Number of centres (LAA closures) | 0 | 0 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 0 | 0 |
| Number of physicians under training to become independent electrophysiologists | 0 | 2 |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|--------------------------|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|-----------------------|
| National | No | | | | | |
| U.S. | No | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

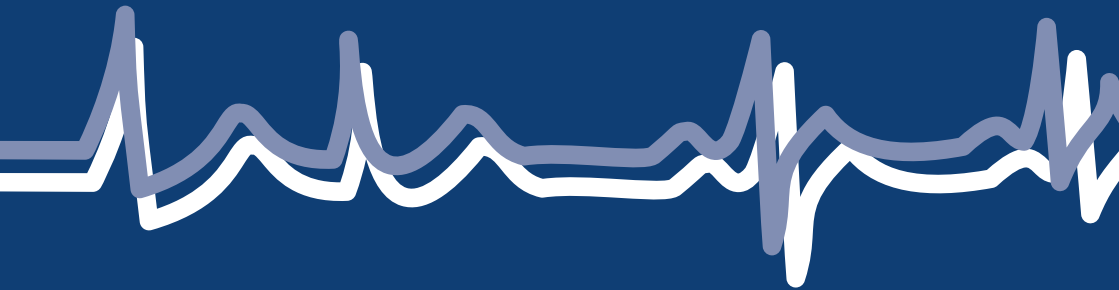
1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

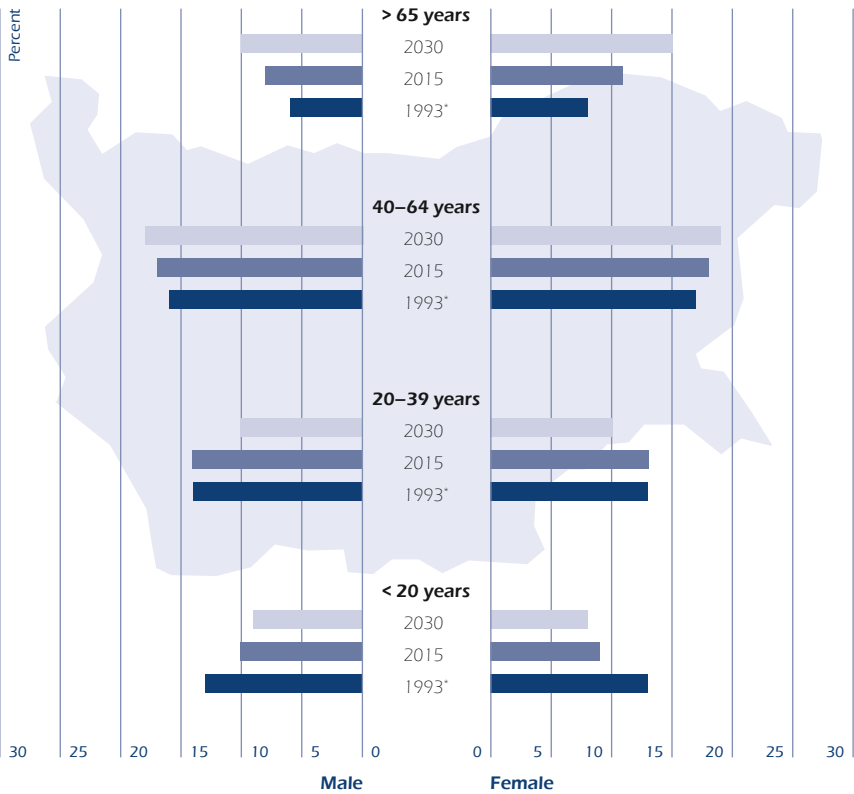
| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Working Group for Cardiac Pacing / Association of Cardiologist in Bosnia and Herzegovina (President: Asist. Prof. Dr. Boris Goronja, FESC) |
| Working Group for Cardiac Pacing / Cardiac Sociaty of Republic of Srpska (President: Asist. Prof. Dr. Dragan Uncanin, FESC; FACC) |
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
| EHRA White Book 2015 |
| Survey from professional association |

BULGARIA



1. Statistics

Age pyramid for Bulgaria



* 1990 or last available



| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 4,7 | 2013 |
| Beds (per 100.000 population) | 681,6 | 2013 |
| Density of physicians (per 1.000 population) | 4,0 | 2013 |
| Density of nurses (per 1.000 population) | 4,9 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 7.186.893 | 2015 |
| Population annual growth rate (%) | -0,6 | 2015 |
| Life expectancy at birth (in years) | 74 | 2015 |
| Death rate (per 1.000 population) | 15,0 | 2012 |
| Live births (per 1.000 population) | 9,4 | 2014 |

| Economic information | | Year |
|--|----------|-------|
| Gross domestic product (U.S dollar-billions) | 47,17 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 6.581,91 | 2015* |
| Total expenditure on health as % of GDP | 7,6 | 2013 |
| General government expenditure on health as % of total expenditure on health | 56,3 | 2012 |
| Private expenditure on health as % of total expenditure on health | 43,7 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|------|
| | 2014 | 2015 |
| | 64 % | 65 % |

3. Healthcare System

The healthcare system is financed by a single health insurance fund – The National Health Insurance Fund. Paying health insurance to this fund is mandatory for all Bulgarian citizens in the age 18-retirement age. This fund covers the outpatient and inpatient healthcare. In addition there are some private funds that are used as additional health insurance funds to provide higher level of health insurance. Paying installments to the latter is not mandatory.

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: all citizens qualify for public insurance. In citizens in working age (aged 18 until retirement) are insured if they pay the installments regularly. Children, minors and the retired are insured by the state.

| Percentage of insured and uninsured citizens | | |
|--|------|------|
| | 2014 | 2015 |
| Insured citizens | 80% | 80% |
| Uninsured citizens | 20% | 20% |

| Distribution of insurance modality | | |
|------------------------------------|------|------|
| | 2014 | 2015 |
| Public insurance company | 75% | 75% |
| Private insurance company | 1% | 1% |
| Private co-payment | 24% | 24% |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|-----|
| ICD devices | Yes |
| Pacemakers | No |
| Ablation | Yes |

Comments: ICD implantation needs co-payment because the reimbursement rate is too low to cover the whole cost for the implant. • Pacemaker implantation does not require co-payment in the majority of the centers. • Some ablation procedure (usually complex ablations requiring three dimensional mapping) were co-paid at some centers.

Reimbursement availability for physicians and hospitals

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|-------------------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Comments: ICD implantation is reimbursed only partially so that the hospital receives reimbursement which does not cover the whole cost of the device. • CRT-P devices are fully reimbursed. • Ablations are reimbursed with a fixed amount of money not taking into account the real cost of all the consumables. • Leadless pacing, S-ICDs and ILRs were not reimbursed. As an exception partial reimbursement could be possible.

Treatment availability

| | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

National certification availability

| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
|----------------------------|-------------------------------------|---|--------------------------|--------------------------|---|
| Device therapy | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | The National standard for device therapy and invasive electrophysiology |
| Invasive electrophysiology | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | The National standard for device therapy and invasive electrophysiology |
| Allied professionals | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | The National standard for device therapy and invasive electrophysiology |
| Training centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | The National standard for device therapy and invasive electrophysiology |

Comments: There is limited reimbursement for ICDs and CRT-D devices. Co-payment needed.

| | | |
|--|--|-------------------------------------|
| National Cardiac Society supporting EHRA certification system | | |
| Yes, the Society demands EHRA certification for practice | | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | | <input checked="" type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | | <input type="checkbox"/> |
| No | | <input type="checkbox"/> |
| No answer | | <input type="checkbox"/> |

| | | |
|--------------------------------|-----|---|
| Specialist required for | | |
| | | Specialist |
| Catheter ablation | Yes | Cardiologist |
| ICD or pacemaker implants | Yes | Cardiologist, Cardiac surgeon could perform pacemaker implantation only |

| | |
|--|------------|
| Official national competency guidelines for electrophysiological studies or catheter ablation | Yes |
| The National standard for device therapy and invasive electrophysiology | |

| | |
|---|------------|
| Required period of training to perform implantations | Yes |
| | 2 years |

| | |
|--|------------|
| Suggested period of training to perform implantations | Yes |
| | 2 years |

| | |
|---|-----------|
| National quality control system availability | No |
|---|-----------|

| | |
|--|------------|
| Willingness to install quality control system | Yes |
|--|------------|

| | |
|---|--|
| Responsible person for quality control | |
| There is nobody specifically responsible for quality control in the field of EP and devices | |

| | |
|--|---|
| Training centres availability | |
| Pacemaker | 2 |
| ICD implantation | 2 |
| CRT implantation | 1 |
| Electrophysiological studies and catheter ablation | 2 |
| Atrial fibrillation ablation | 2 |



| | |
|--|---|
| Number of universities (Schools of Medicine) | 5 |
|--|---|

| | |
|--|-----|
| Percentage of academic centres among all practicing EP centres | 60% |
|--|-----|

| | |
|--|-----|
| Percentage of academic centres among all practicing implanting devices centres | 37% |
|--|-----|

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|--|---------------|-------|
| | 2014 | 2015 |
| Implanting centres | 17 | 19 |
| Total Pacemaker units implanted | 3.726 | 3.953 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 3.128 | 3.269 |
| Replacements | 598 | 605 |
| Specialist performing implants | | |
| Cardiologists | Yes | 90% |
| Surgeons | Yes | 10% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 7 | 9 |
| Total CRT units implanted | 303 | 296 |
| Thereof, CRT pacemaker | 268 | 253 |
| Thereof, CRT ICD | 35 | 43 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 9 | 10 |
| Total ICD units implanted | 47 | 51 |
| Thereof, Single chamber | 24 | 35 |
| Thereof, Dual chamber | 23 | 16 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 32 | 36 |
| Replacements | 15 | 15 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|---------------|
| | 2014 | 2015 |
| Implanting centres | 1 | not available |
| Total loop recorders implanted | 5 | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 0 | not available |
| Total lead extraction procedures | 0 | not available |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

10. Device specific

| | |
|---|------------|
| Availability of remote monitoring of devices | Yes |
|---|------------|

| National registry for | | |
|------------------------------|-----|--|
| | | Official name |
| ICD | Yes | Professional National Registry – “Bg Pace” |
| Pacing | Yes | Professional National Registry – “Bg Pace” |
| Electrophysiology | Yes | Professional National Registry – “Bg Ephy” |

| | |
|---|------------|
| Availability of a national quality insurance system or complication registry | Yes |
|---|------------|

Official name: Professional National Registry – “Bg Pace” Professional National Registry – “Bg Ephy”

| | |
|---|-----------|
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | No |
|---|-----------|

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 4 | 5 |
| Number of ablations performed | 663 | 961 |
| Mean number of ablations per centre | 166 | 192 |
| Number of AF ablations | 79 | 147 |
| Number of ablation centres (> 50 AF ablations) | 1 | 1 |
| Number of VT/VF ablations | 18 | 6 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 1 | 0 |
| Number of LAA closures | not available | not available |
| Number of centres (LAA closures) | not available | not available |

| Number of electrophysiologists | | |
|--|---|----|
| Number of electrophysiologists performed catheter ablation independently | 6 | 10 |
| Number of physicians under training to become independent electrophysiologists | 7 | 5 |

| | |
|---|------------|
| Availability of a national registry for interventional electrophysiology | Yes |
|---|------------|

Official name: Professional National Registry – “Bg Ephy”

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | No |
| U.S. | No |
| European | Yes |

| Obstacles to guideline implementation | | | | | | Ranking of importance |
|--|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 1 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Low awareness of guidelines | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Lack of operators | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |

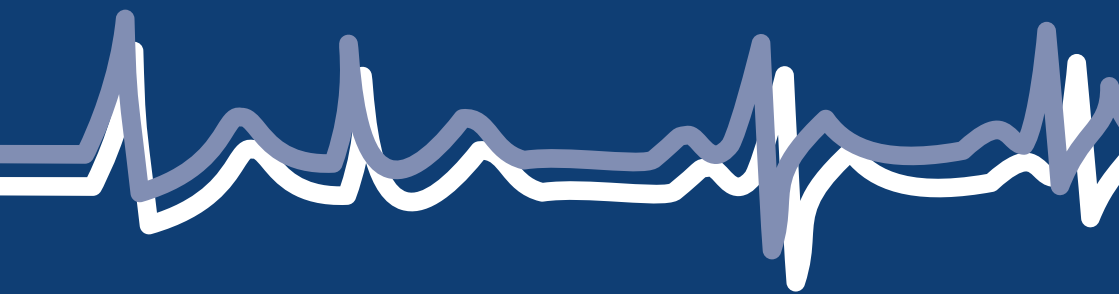
1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

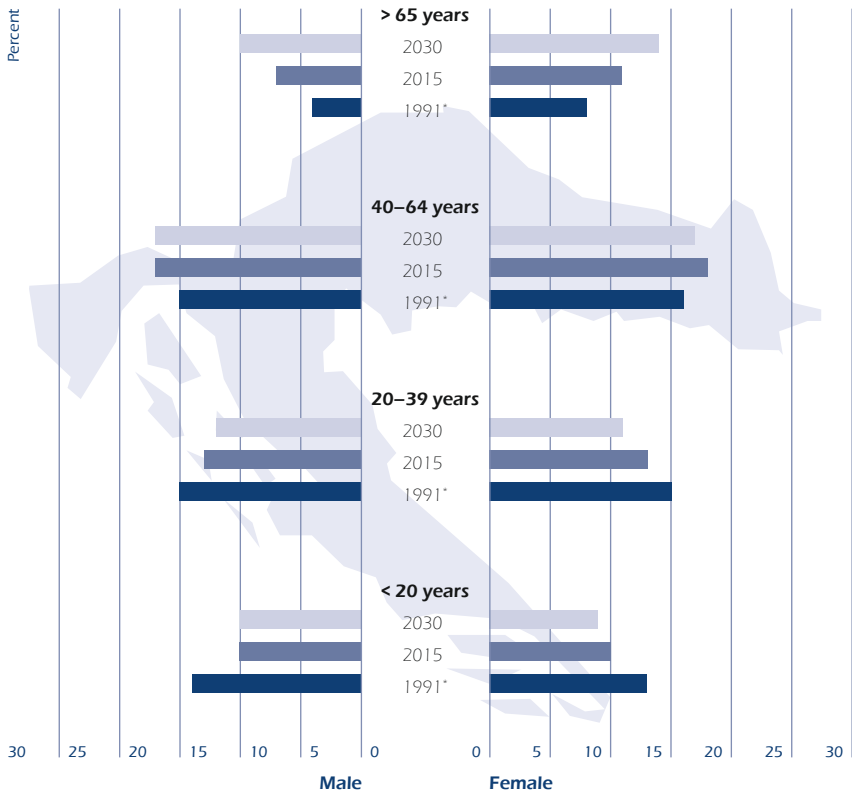
| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Professional association Electrophysiology and Cardiac Pacing |
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
| EHRA White Book 2015 |
| Official statistics |
| Survey from professional association |
| Other |

CROATIA



1. Statistics

Age pyramid for Croatia



* 1990 or last available

| Healthcare data | | Year |
|---|-------|------|
| Hospitals (per 100 000 population) | 1,6 | 2013 |
| Beds (per 100 000 population) | 585,9 | 2013 |
| Density of physicians (per 1000 population) | 3,0 | 2013 |
| Density of nurses (per 1000 population) | 6,6 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 4.464.844 | 2015 |
| Population annual growth rate (%) | -0,1 | 2015 |
| Life expectancy at birth (in years) | 77 | 2015 |
| Death rate (per 1000 population) | 11,8 | 2013 |
| Live births (per 1000 population) | 9,4 | 2013 |

| Economic information | | Year |
|--|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 48,93 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 11.551,37 | 2015* |
| Total expenditure on health as % of GDP | 7,3 | 2013 |
| General government expenditure on health as % of total expenditure on health | 80,1 | 2012 |
| Private expenditure on health as % of total expenditure on health | 19,9 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|------|------|
| | 49 % | 49 % |

3. Healthcare System

The Croatian healthcare system is based on the stately owned Health Insurance Institute in addition to poorly developed private insurances.

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

| Percentage of insured and uninsured citizens | | |
|--|------|------|
| | 2014 | 2015 |
| Insured citizens | 90% | 90% |
| Uninsured citizens | 10% | 10% |

| Distribution of insurance modality | | |
|------------------------------------|------|------|
| | 2014 | 2015 |
| Public insurance company | 90% | 90% |
| Private insurance company | 5% | 5% |
| Private co-payment | 5% | 5% |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|---|--------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|--------------------------|-------------------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|------------|-------------------------|
| | Specialist | |
| Catheter ablation | Yes | Cardiologist |
| ICD or pacemaker implants | Yes | Cardiologist or Surgeon |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|

| | |
|--|----|
| Required period of training to perform implantations | No |
|--|----|

| | |
|---|----|
| Suggested period of training to perform implantations | No |
|---|----|

| | |
|---|------------------|
| National quality control system availability | No |
| Willingness to install quality control system | No answer |
| Responsible person for quality control | |
| National Cardiac Society | |
| Training centres availability | |
| Pacemaker | 5 |
| ICD implantation | 5 |
| CRT implantation | 5 |
| Electrophysiological studies and catheter ablation | 4 |
| Atrial fibrillation ablation | 3 |
| Number of universities (Schools of Medicine) | 4 |
| Percentage of academic centres among all practicing EP centres | 80% |
| Percentage of academic centres among all practicing implanting devices centres | 58% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 18 | 17 |
| Total Pacemaker units implanted | 2.601 | 2.855 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | 2.180 | 2.416 |
| Replacements | 421 | 439 |
| Specialist performing implants | | |
| Cardiologists | Yes | 90% |
| Surgeons | Yes | 10% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 11 | 8 |
| Total CRT units implanted | 124 | 261 |
| Thereof, CRT pacemaker | 85 | 125 |
| Thereof, CRT ICD | 39 | 136 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 12 | 11 |
| Total ICD units implanted | 173 | 388 |
| Thereof, Single chamber | 135 | 344 |
| Thereof, Dual chamber | 38 | 44 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 152 | 348 |
| Replacements | 21 | 40 |
| Specialist performing implants | | |
| Cardiologists | Yes | 95% |
| Surgeons | Yes | 5% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 6 | 6 |
| Total loop recorders implanted | 17 | 24 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 6 | 5 |
| Total lead extraction procedures | 31 | 49 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

10. Device specific

| Availability of remote monitoring of devices | | No |
|--|----|---------------|
| National registry for | | |
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|---|---------------|-------|
| | 2014 | 2015 |
| Number of ablation centres | 5 | 6 |
| Number of ablations performed | 852 | 1.348 |
| Mean number of ablations per centre | 170 | 225 |
| Number of AF ablations | 223 | 385 |
| Number of ablation centres (> 50 AF ablations) | 3 | 3 |
| Number of VT/VF ablations | 28 | 40 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 2 | 2 |
| Number of LAA closures | not available | 2 |
| Number of centres (LAA closures) | not available | 1 |

| Number of electrophysiologists | | |
|--|---|----|
| Number of electrophysiologists performed catheter ablation independently | 9 | 10 |
| Number of physicians under training to become independent electrophysiologists | 3 | 7 |

| Availability of a national registry for interventional electrophysiology | No |
|--|----|
|--|----|

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-----------|--|--|--|--|--|
| National | No | | | | | |
| U.S. | No answer | | | | | |
| European | Yes | | | | | |

| Obstacles to guideline implementation | | | | | | Ranking of importance |
|--|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Lack of referral | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of operators | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Croatian Cardiac Society, Working Group on Arrhythmias and Cardiac Pacing |

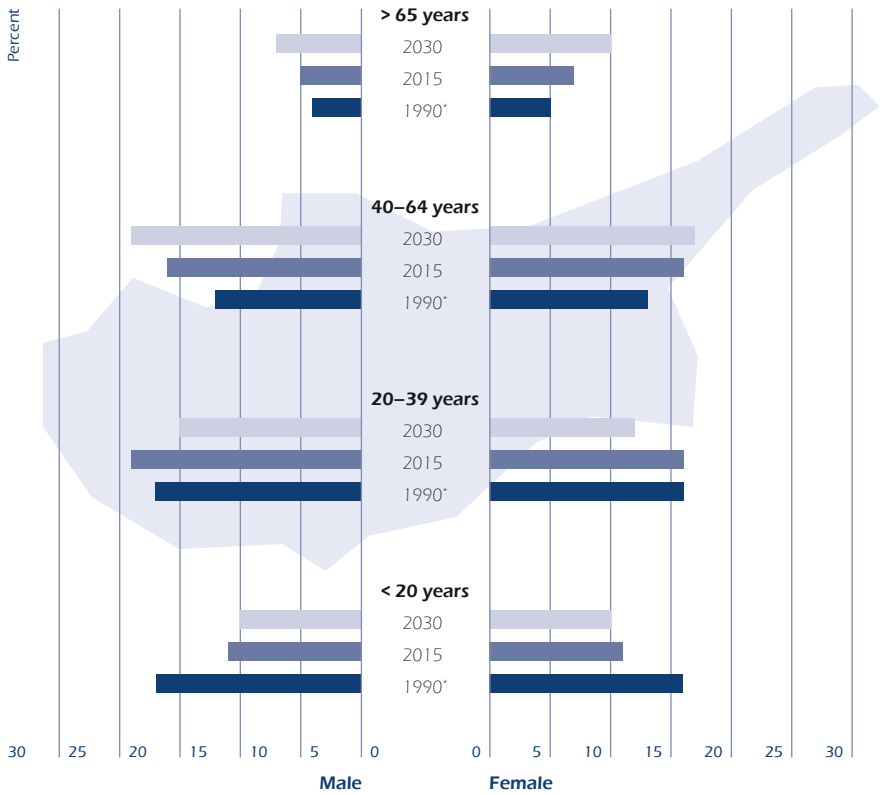
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
| EHRA White Book 2015 |
| Croatian Health Insurance Institute |
| Working Group on Arrhythmias and Cardiac Pacing of Croatian Cardiac Society |

CYPRUS



1. Statistics

Age pyramid for Cyprus



* 1990 or last available

| Healthcare data | | Year |
|---|-------|------|
| Hospitals (per 100 000 population) | 9,5 | 2013 |
| Beds (per 100 000 population) | 341,7 | 2013 |
| Density of physicians (per 1000 population) | 3,2 | 2013 |
| Density of nurses (per 1000 population) | 5,2 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 1.189.197 | 2015 |
| Population annual growth rate (%) | 1,4 | 2015 |
| Life expectancy at birth (in years) | 79 | 2015 |
| Death rate (per 1000 population) | 6,4 | 2012 |
| Live births (per 1000 population) | 10,8 | 2013 |

| Economic information | | Year |
|--|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 19,38 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 21.531,02 | 2015* |
| Total expenditure on health as % of GDP | 7,4 | 2013 |
| General government expenditure on health as % of total expenditure on health | 47,0 | 2012 |
| Private expenditure on health as % of total expenditure on health | 53,0 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|------|
| | 2014 | 2015 |
| | 30% | 30% |

3. Healthcare System

Free medical care is provided by government hospitals and health centres based on income criteria.

| Basic insurance availability | | | | | | | No | |
|--|---|--------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| Percentage of insured and uninsured citizens | | | | | | | | |
| | | | | | | | 2014 | 2015 |
| Insured citizens | | | | | | | 85 % | 85 % |
| Uninsured citizens | | | | | | | 15% | 15% |
| Distribution of insurance modality | | | | | | | | |
| | | | | | | | 2014 | 2015 |
| Public insurance company | | | | | | | 100% | 85% |
| Private insurance company | | | | | | | 0% | 15% |
| Private co-payment | | | | | | | 0% | 0% |
| Possibility to subscribing to private health insurance plans | | | | | | | Yes | |
| Co-payment necessary for the following therapy | | | | | | | | |
| ICD devices | | | | | | | No | |
| Pacemakers | | | | | | | No | |
| Ablation | | | | | | | No | |
| Reimbursement availability for physicians and hospitals | | | | | | | | |
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Comments: The above applies to the state sector only. In state hospitals the physician is given a flat salary for all work carried out. Private centres operate with varying incentives • The state hospitals provide the therapies as judged by the physicians. The therapies are paid for centrally by the ministry of health.

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input checked="" type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | | Specialist |
|---------------------------|-----|--|---------------------|
| Catheter ablation | Yes | | Electrophysiologist |
| ICD or pacemaker implants | Yes | | Cardiologist |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|

| | |
|--|----|
| Required period of training to perform implantations | No |
|--|----|

| | |
|---|----|
| Suggested period of training to perform implantations | No |
|---|----|

| | |
|---|------------------|
| National quality control system availability | No |
| Willingness to install quality control system | No answer |
| Responsible person for quality control | |
| The medical centers where the procedure takes place | |
| Training centres availability | |
| Pacemaker | 2 |
| ICD implantation | 2 |
| CRT implantation | 2 |
| Electrophysiological studies and catheter ablation | 1 |
| Atrial fibrillation ablation | 1 |
| Number of universities (Schools of Medicine) | 3 |
| Percentage of academic centres among all practicing EP centres | 33% |
| Percentage of academic centres among all practicing implanting devices centres | 20% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 5 | 5 |
| Total Pacemaker units implanted | 250 | 280 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | not available | not available |
| Replacements | not available | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 4 | 4 |
| Total CRT units implanted | 29 | 30 |
| Thereof, CRT pacemaker | not available | not available |
| Thereof, CRT ICD | not available | not available |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 4 | 4 |
| Total ICD units implanted | 73 | 75 |
| Thereof, Single chamber | not available | not available |
| Thereof, Dual chamber | not available | not available |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | not available | not available |
| Replacements | not available | not available |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 2 | 5 |
| Total loop recorders implanted | 12 | 15 |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 1 | 2 |
| Total lead extraction procedures | 3 | 4 |

| Specialist performing lead extractions | | |
|--|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

10. Device specific

| Availability of remote monitoring of devices | | No |
|---|--|----|
| Reasons why remote monitoring is not available: Short distances and close relationship between patient and doctor render unnecessary remote monitoring. | | |

| National registry for | | |
|-----------------------|----|---------------|
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |

| Availability of a national quality insurance system or complication registry | | No |
|--|--|----|
|--|--|----|

| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |
|--|--|----|
|--|--|----|

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|------|------|
| | 2014 | 2015 |
| Number of ablation centres | 3 | 3 |
| Number of ablations performed | 142 | 60 |
| Mean number of ablations per centre | 47 | 20 |
| Number of AF ablations | 53 | 10 |
| Number of ablation centres (> 50 AF ablations) | 0 | 0 |
| Number of VT/VF ablations | 0 | 0 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 0 | 0 |
| Number of LAA closures | 0 | 0 |
| Number of centres (LAA closures) | 0 | 0 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 5 | 5 |
| Number of physicians under training to become independent electrophysiologists | 0 | 0 |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | No |
| U.S. | No |
| European | Yes |

| Obstacles to guideline implementation | Ranking of importance | | | | |
|--|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|
| | 1 | 2 | 3 | 4 | 5 |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lack of operators | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|--|
| Cyprus Working Group on Cardiac Electrophysiology and Pacing |
|--|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
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| EHRA White Book 2015 |
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|---------------------|
| Official statistics |
|---------------------|

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|--------------------------------------|
| Survey from professional association |
|--------------------------------------|

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|---------------------|
| Sample short survey |
|---------------------|

| |
|------------|
| Estimation |
|------------|

| |
|------------------------|
| Personal communication |
|------------------------|

CZECH REPUBLIC



1. Statistics

Age pyramid for Czech Republic



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 2,4 | 2013 |
| Beds (per 100.000 population) | 645,9 | 2013 |
| Density of physicians (per 1.000 population) | 3,7 | 2013 |
| Density of nurses (per 1.000 population) | 8,4 | 2013 |

| Demographic information | | Year |
|-------------------------------------|------------|------|
| Population | 10.644.842 | 2015 |
| Population annual growth rate (%) | 0,2 | 2015 |
| Life expectancy at birth (in years) | 79 | 2015 |
| Death rate (per 1.000 population) | 10,4 | 2013 |
| Live births (per 1.000 population) | 10,2 | 2013 |

| Economic information | | Year |
|--|-----------|-------|
| Gross domestic product (U.S. dollar-billions) | 182,46 | 2015* |
| Gross domestic product per capita (U.S. dollar-units) | 17.330,08 | 2015* |
| Total expenditure on health as % of GDP | 7,2 | 2013 |
| General government expenditure on health as % of total expenditure on health | 84,0 | 2012 |
| Private expenditure on health as % of total expenditure on health | 16,0 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|---------------|------|
| | not available | 0% |

3. Healthcare System

National Health System

| Basic insurance availability | | | Yes | | | | | |
|--|---|--------------------------|--|-------------------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | | | | | | | | |
| Percentage of insured and uninsured citizens | | | | | | | | |
| | 2014 | | 2015 | | | | | |
| Insured citizens | 99,9 % | | 99,9 % | | | | | |
| Uninsured citizens | 0,1 % | | 0,1 % | | | | | |
| | | | | | | | | |
| Distribution of insurance modality | | | | | | | | |
| | 2014 | | 2015 | | | | | |
| Public insurance company | 99,8% | | 99,8% | | | | | |
| Private insurance company | 0,1 % | | 0,1 % | | | | | |
| Private co-payment | 0,1 % | | 0,1 % | | | | | |
| | | | | | | | | |
| Possibility to subscribing to private health insurance plans | | | | | No | | | |
| | | | | | | | | |
| Co-payment necessary for the following therapy | | | | | | | | |
| ICD devices | | | | | No | | | |
| Pacemakers | | | | | No | | | |
| Ablation | | | | | No | | | |
| | | | | | | | | |
| Reimbursement availability for physicians and hospitals | | | | | | | | |
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|--------------------------|--------------------------|--------------------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ICD and PM Accreditation |
| Invasive electrophysiology | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | EP Accreditation |
| Allied professionals | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input checked="" type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | | Specialist |
|---------------------------|-----|--|--|
| Catheter ablation | Yes | | Cardiologist, licence for EP, licence for ablation |
| ICD or pacemaker implants | Yes | | Cardiologist, licence for device implantation |

| Official national competency guidelines for electrophysiological studies or catheter ablation | Yes |
|---|-----|
| Czech Society of Cardiology, Czech Heart Rhythm Association | |

| Required period of training to perform implantations | Yes |
|--|--|
| | Requires certain number of implantations |

| Suggested period of training to perform implantations | No |
|---|----|
|---|----|

| | |
|---|----------------------|
| National quality control system availability | No |
| Willingness to install quality control system | No answer |
| Responsible person for quality control | |
| State Institute for Drug Control | |
| Training centres availability | |
| Pacemaker | 37 |
| ICD implantation | 17 |
| CRT implantation | 17 |
| Electrophysiological studies and catheter ablation | 10 |
| Atrial fibrillation ablation | 10 |
| Number of universities (Schools of Medicine) | 7 |
| Percentage of academic centres among all practicing EP centres | not available |
| Percentage of academic centres among all practicing implanting devices centres | not available |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 37 | 37 |
| Total Pacemaker units implanted | 9.447 | 8.969 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | 6.614 | 6.377 |
| Replacements | 2.833 | 2.592 |
| Specialist performing implants | | |
| Cardiologists | Yes | 95% |
| Surgeons | Yes | 5% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|-------|-------|
| | 2014 | 2015 |
| Implanting centres | 17 | 18 |
| Total CRT units implanted | 1.872 | 1.952 |
| Thereof, CRT pacemaker | 416 | 465 |
| Thereof, CRT ICD | 1.456 | 1.487 |
| Specialist performing implants | | |
| Cardiologists | Yes | 95% |
| Surgeons | Yes | 5% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 17 | 18 |
| Total ICD units implanted | 2.138 | 2.039 |
| Thereof, Single chamber | 1.588 | 1.475 |
| Thereof, Dual chamber | 550 | 564 |
| Thereof, Subcutaneous ICD | not available | not available |
| First implants | 1.618 | 1.627 |
| Replacements | 520 | 412 |
| Specialist performing implants | | |
| Cardiologists | Yes | 95% |
| Surgeons | Yes | 5% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|---------------|
| | 2014 | 2015 |
| Implanting centres | 20 | not available |
| Total loop recorders implanted | 650 | 280 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 5 | 6 |
| Total lead extraction procedures | 180 | 300 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 80% |
| Surgeons | Yes | 20% |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|---------------|-----------------------------------|
| National registry for | | |
| | Official name | |
| ICD | Yes | ICD online registry |
| Pacing | Yes | PM online registry |
| Electrophysiology | Yes | Catheter ablation online registry |
| Availability of a national quality insurance system or complication registry | | Yes |
| Official name: State Institute for Drug Control | | |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | Yes |
| State Institute for Drug Control | | |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 22 | 23 |
| Number of ablations performed | 5.855 | 6.158 |
| Mean number of ablations per centre | 266 | 268 |
| Number of AF ablations | 2.297 | 2.537 |
| Number of ablation centres (> 50 AF ablations) | 10 | 12 |
| Number of VT/VF ablations | 289 | 297 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 9 | 7 |
| Number of LAA closures | not available | 94 |
| Number of centres (LAA closures) | 4 | 7 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | not available | not available |
| Number of physicians under training to become independent electrophysiologists | not available | not available |
| Availability of a national registry for interventional electrophysiology | | Yes |
| Catheter ablation online registry | | |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | Yes |
| U.S. | No |
| European | Yes |

| Obstacles to guideline implementation | 1 | 2 | 3 | 4 | 5 | Ranking of importance |
|--|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|-----------------------|
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of referral | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Low awareness of guidelines | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of operators | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|---|
| Czech Society of Cardiology, Czech Heart Rhythm Association |
|---|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

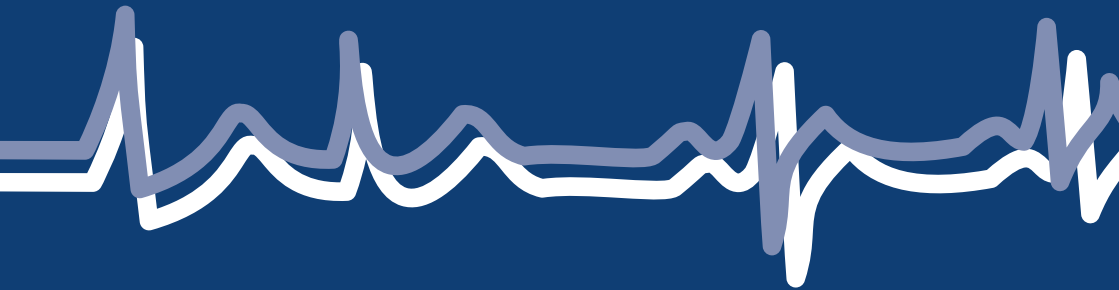
| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

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|------------|
| Sales data |
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| Estimation |
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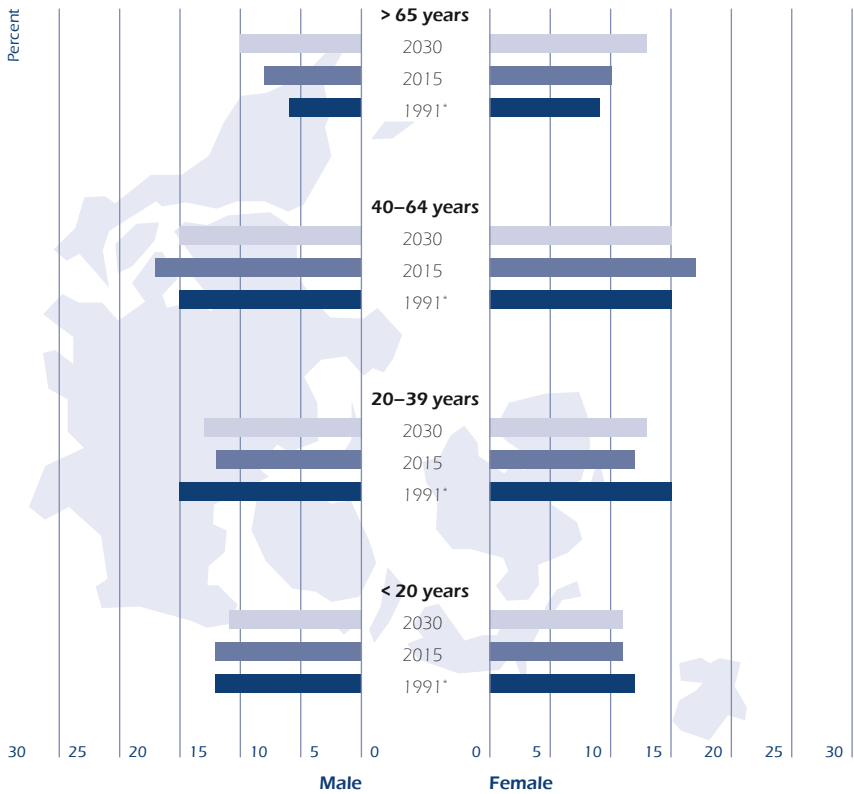
| |
|--|
| ICD, PM and Catheter ablation registries |
|--|

DENMARK



1. Statistics

Age pyramid for Denmark



* 1990 or last available

| Healthcare data | | Year |
|--|---------------|---------------|
| Hospitals (per 100.000 population) | not available | not available |
| Beds (per 100.000 population) | 307,4 | 2013 |
| Density of physicians (per 1.000 population) | 3,6 | 2012 |
| Density of nurses (per 1.000 population) | 16,6 | 2012 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 5.581.503 | 2015 |
| Population annual growth rate (%) | 0,2 | 2015 |
| Life expectancy at birth (in years) | 79 | 2015 |
| Death rate (per 1.000 population) | 9,3 | 2012 |
| Live births (per 1.000 population) | 10,0 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 291,04 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 51.423,61 | 2015* |
| Total expenditure on health as% of GDP | 10,6 | 2013 |
| General government expenditure on health as% of total expenditure on health | 85,8 | 2012 |
| Private expenditure on health as% of total expenditure on health | 14,2 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|---------------|------|
| | 2014 | 2015 |
| | not available | 21 % |

3. Healthcare System

There is a tax financed public healthcare system.

| Basic insurance availability | | Yes | | | | | | |
|--|---|--|---|--------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|
| | | | | | | | | |
| Percentage of insured and uninsured citizens | | | | | | | | |
| | 2014 | 2015 | | | | | | |
| Insured citizens | 100% | 100% | | | | | | |
| Uninsured citizens | 0% | 0% | | | | | | |
| | | | | | | | | |
| Distribution of insurance modality | | | | | | | | |
| | 2014 | 2015 | | | | | | |
| Public insurance company | 100% | 100% | | | | | | |
| Private insurance company | 0% | 0% | | | | | | |
| Private co-payment | 0% | 0% | | | | | | |
| | | | | | | | | |
| Possibility to subscribing to private health insurance plans | | | Yes | | | | | |
| | | | | | | | | |
| Co-payment necessary for the following therapy | | | | | | | | |
| ICD devices | | | No | | | | | |
| Pacemakers | | | No | | | | | |
| Ablation | | | No | | | | | |
| | | | | | | | | |
| Reimbursement availability for physicians and hospitals | | | | | | | | |
| | Physician/Hospital receives per process reimbursement | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | Physician/Hospital does not receive reimbursement neither incentive | No answer | | | | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |



| Treatment availability | |
|--|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |
| Comments: There are no restrictions for device implants, but only for ablation procedures. | |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input checked="" type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|-----|--|
| | Yes | Specialist |
| Catheter ablation | Yes | Cardiologist with special training/education in invasive electrophysiology |
| ICD or pacemaker implants | Yes | Cardiologist with special training/education in device implantation |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
| Required period of training to perform implantations | No |

| | |
|---|------------|
| Suggested period of training to perform implantations | Yes |
| | 1 year |
| National quality control system availability | Yes |
| Pacemaker | Yes |
| ICD implantation | Yes |
| CRT implantation | Yes |
| Cathether ablation | Yes |
| Responsible person for quality control | |
| Danish Health Authority | |
| Training centres availability | |
| Pacemaker | 13 |
| ICD implantation | 6 |
| CRT implantation | 5 |
| Electrophysiological studies and catheter ablation | 6 |
| Atrial fibrillation ablation | 6 |
| Number of universities (Schools of Medicine) | 4 |
| Percentage of academic centres among all practicing EP centres | 83% |
| Percentage of academic centres among all practicing implanting devices centres | 45% |

5. Pacemakers

| | | |
|---|---------------|--------------|
| Pacemaker units implanted and number of implanting centres | | |
| | 2014 | 2015 |
| Implanting centres | 11 | 15 |
| Total Pacemaker units implanted | 4.823 | 4.818 |
| Thereof, Leadless Pacemaker | not available | 3 |
| First implants | 3.654 | 3.802 |
| Replacements | 1.169 | 1.013 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 5 | 5 |
| Total CRT units implanted | 965 | 985 |
| Thereof, CRT pacemaker | 415 | 441 |
| Thereof, CRT ICD | 550 | 544 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|-------|
| | 2014 | 2015 |
| Implanting centres | 6 | 6 |
| Total ICD units implanted | 1.208 | 1.208 |
| Thereof, Single chamber | 945 | 918 |
| Thereof, Dual chamber | 263 | 275 |
| Thereof, Subcutaneous ICD | not available | 15 |
| First implants | 882 | 887 |
| Replacements | 326 | 321 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 11 | 13 |
| Total loop recorders implanted | not available | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 4 | 4 |
| Total lead extraction procedures | not available | not available |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 85% |
| Surgeons | Yes | 15% |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|-----|-----------------------------------|
| National registry for | | |
| | | Official name |
| ICD | Yes | Danish Pacemaker and ICD Register |
| Pacing | Yes | Danish Pacemaker and ICD Register |
| Electrophysiology | Yes | ablation.dk |
| Availability of a national quality insurance system or complication registry | | Yes |
| Official name: Danish Health Authority; State Agency of Medicine | | |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | Yes |
| Official name: "Regarding device recalls: Danish Pacemaker and ICD Registry; Regarding lead extractions: none" | | |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 6 | 6 |
| Number of ablations performed | 3.867 | 3.925 |
| Mean number of ablations per centre | 645 | 654 |
| Number of AF ablations | 1.698 | 1.882 |
| Number of ablation centres (> 50 AF ablations) | 6 | 6 |
| Number of VT/VF ablations | 148 | 145 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 5 | 5 |
| Number of LAA closures | not available | not available |
| Number of centres (LAA closures) | 3 | 4 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 25 | 27 |
| Number of physicians under training to become independent electrophysiologists | not available | not available |
| Availability of a national registry for interventional electrophysiology | | Yes |
| Official name: ablation.dk | | |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|---|---|---|---|---|-----------------------|
| National | | | | | | Yes |
| U.S. | | | | | | Yes |
| European | | | | | | Yes |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | ☑ | ☐ | ☐ | ☐ | ☐ | |
| Lack of reimbursement, limited financial resources | ☑ | ☐ | ☐ | ☐ | ☐ | |
| Lack of referral | ☑ | ☐ | ☐ | ☐ | ☐ | |
| Lack of trained personnel | ☑ | ☐ | ☐ | ☐ | ☐ | |
| Low awareness of guidelines | ☑ | ☐ | ☐ | ☐ | ☐ | |
| Lack of operators | ☑ | ☐ | ☐ | ☐ | ☐ | |
| 1 = no obstacle, 5 = great obstacle | | | | | | 1 = top, 6 = lowest |

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|--|
| Danish Society of Cardiology (DCS), DCS Working Group on Arrhythmia, Pacemaker and ICD |
|--|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

| |
|--|
| Official statistics – Danish Pacemaker and ICD Register, ablation.dk |
|--|

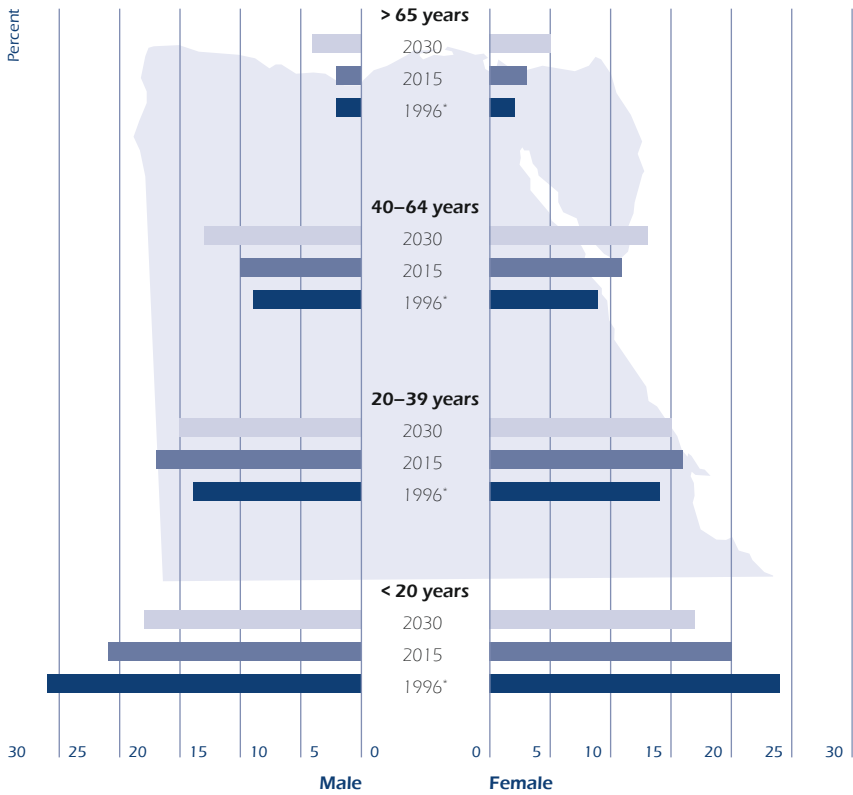
| |
|--|
| Survey from professional association – Danish Society of Cardiology, Working Group on Arrhythmia, Pacemaker and ICD |
|--|

EGYPT



1. Statistics

Age pyramid for Egypt



* 1990 or last available

| Healthcare data | Year | |
|--|---------------|---------------|
| Hospitals (per 100.000 population) | not available | not available |
| Beds (per 100.000 population) | not available | not available |
| Density of physicians (per 1.000 population) | not available | not available |
| Density of nurses (per 1.000 population) | not available | not available |

| Demographic information | Year | |
|-------------------------------------|---------------|---------------|
| Population | 88.487.396 | 2015 |
| Population annual growth rate (%) | 1,8 | 2015 |
| Life expectancy at birth (in years) | 74 | 2015 |
| Death rate (per 1.000 population) | not available | not available |
| Live births (per 1.000 population) | not available | not available |

| Economic information | Year | |
|--|---------------|---------------|
| Gross domestic product (U.S dollar-billions) | not available | 2015* |
| Gross domestic product per capita (U.S dollar-units) | not available | 2015* |
| Total expenditure on health as % of GDP | not available | not available |
| General government expenditure on health as % of total expenditure on health | 39,0 | 2012 |
| Private expenditure on health as % of total expenditure on health | 61,0 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|---------------|---------------|
| | not available | not available |

3. Healthcare System

Egypt has a heterogeneous health system: there are different public/private providers and financing agents. The main agents are: the governmental sector (including ministry of health institutes, university and teaching hospitals, the military and police hospitals), the public sector (known as health insurance organization, the curative care organization) and finally the private sector.

| Basic insurance availability | | No |
|--|------|------|
| Percentage of insured and uninsured citizens | | |
| | 2014 | 2015 |
| Insured citizens | 67 % | 65 % |
| Uninsured citizens | 33 % | 35 % |
| Distribution of insurance modality | | |
| | 2014 | 2015 |
| Public insurance company | 64 % | 64 % |
| Private insurance company | 1 % | 1 % |
| Private co-payment | 35 % | 35 % |
| Possibility to subscribing to private health insurance plans | | Yes |
| Co-payment necessary for the following therapy | | |
| ICD devices | | Yes |
| Pacemakers | | Yes |
| Ablation | | Yes |

Comments: it depends on the insurance plan, in certain insurance plan the patient should pay certain percentage of the bill of whatever medical service he's receiving

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|---|-------------------------------------|--|--------------------------|---|--------------------------|-------------------------------------|-------------------------------------|
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| ICD primary prevention | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| ICD secondary prevention | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

Comments: Though the physicians receive reimbursement in governmental & university hospitals the reimbursements are quite insufficient



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|-------------------------------------|------------------------------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | EPS and Pacing Diploma of the ECRA |
| Invasive electrophysiology | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | EPS and pacing Diploma of the ECRA |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|------------|--|
| | Specialist | |
| Catheter ablation | Yes | Cardiologist/electrophysiologist, with the exception of one center, which is critical care unit, Cairo university, where critical care specialists are allowed to train in & perform EP & device implantation procedures |
| ICD or pacemaker implants | Yes | Cardiologists or electrophysiologists, except in only one centre which is critical care unit, Cairo university where critical care specialists are allowed to train in & practice device therapy |

| | |
|--|-------------|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
| Required period of training to perform implantations | Yes |
| | 3 years |
| Suggested period of training to perform implantations | Yes |
| | 3 years |
| National quality control system availability | No |
| Willingness to install quality control system | No |
| Responsible person for quality control | None |
| Training centres availability | |
| Pacemaker | 28 |
| ICD implantation | 13 |
| CRT implantation | 13 |
| Electrophysiological studies and catheter ablation | 11 |
| Atrial fibrillation ablation | 4 |
| Number of universities (Schools of Medicine) | 22 |
| Percentage of academic centres among all practicing EP centres | 60% |
| Percentage of academic centres among all practicing implanting devices centres | 70% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|--|--------------------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 33 | 33 |
| Total Pacemaker units implanted | 3,320 | 3,552 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | 3,040 | 3,222 |
| Replacements | 280 | 330 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |
| Other | Critical Care Physicians | 0% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|--|------|
| | 2014 | 2015 |
| Implanting centres | 16 | 17 |
| Total CRT units implanted | 530 | 545 |
| Thereof, CRT pacemaker | 420 | 429 |
| Thereof, CRT ICD | 110 | 116 |
| Specialist performing implants | | |
| Cardiologists | Yes | 70% |
| Surgeons | No | 0% |
| Other | Critical Care Physicians, Cairo University | 30% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|--|------|
| | 2014 | 2015 |
| Implanting centres | 16 | 17 |
| Total ICD units implanted | 236 | 253 |
| Thereof, Single chamber | 188 | 201 |
| Thereof, Dual chamber | 48 | 52 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 212 | 224 |
| Replacements | 24 | 29 |
| Specialist performing implants | | |
| Cardiologists | Yes | 90% |
| Surgeons | No | 0% |
| Other | Critical Care Physicians, Cairo University | 10% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 5 | 0 |
| Total loop recorders implanted | 7 | 0 |
| Specialist performing implants | | |
| Cardiologists | No | 0% |
| Surgeons | No | 0% |
| Other | None | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|--|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 4 | 3 |
| Total lead extraction procedures | 28 | 20 |
| Specialist performing implants | | |
| Cardiologists | Yes | 90% |
| Surgeons | No | 0% |
| Other | Critical Care Physicians, Cairo University | 10% |

10. Device specific

| | | |
|---|----|---------------|
| Availability of remote monitoring of devices | | Yes |
| National registry for | | |
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|---|-------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 15 | 15 |
| Number of ablations performed | 1,354 | 1,448 |
| Mean number of ablations per centre | 90 | 97 |
| Number of AF ablations | 60 | 65 |
| Number of ablation centres (> 50 AF ablations) | 0 | 0 |
| Number of VT/VF ablations | 10 | 13 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 0 | 0 |
| Number of LAA closures | 19 | not available |
| Number of centres (LAA closures) | 3 | not available |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 22 | 22 |
| Number of physicians under training to become independent electrophysiologists | 15 | 4 |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | No |
| U.S. | No |
| European | Yes |

| Obstacles to guideline implementation | | | | | | Ranking of importance |
|--|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of operators | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Egyptian Society of Cardiology, Egyptian Cardiac Rhythm Association (ECRA) |

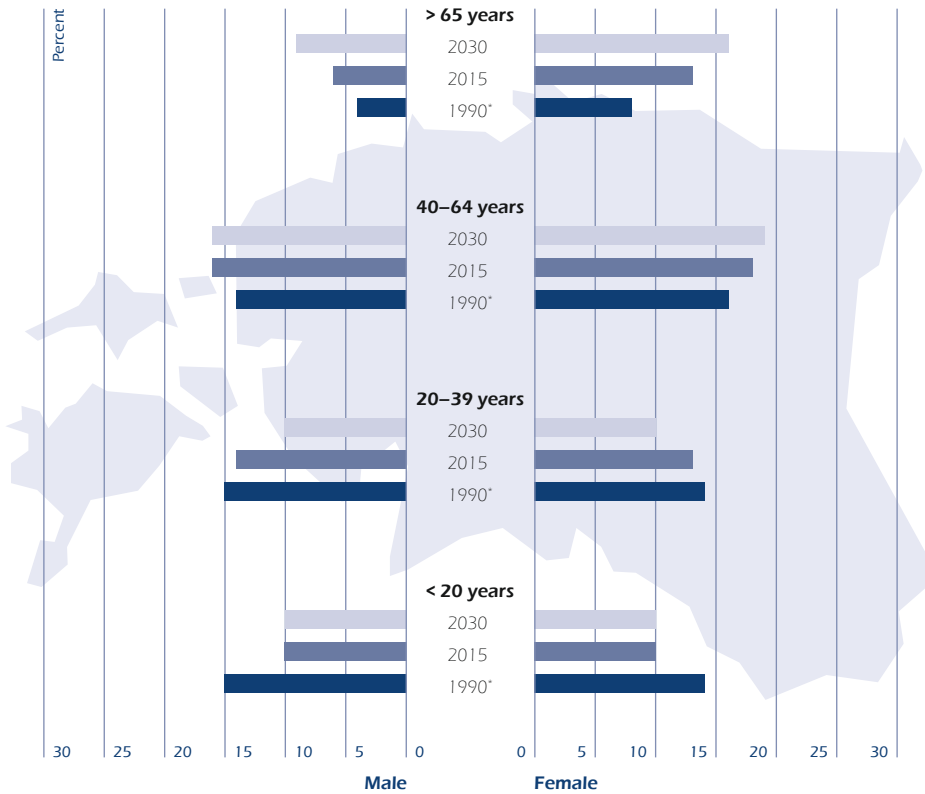
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
| EHRA White Book 2015 |
| Survey from professional association |
| Sales data |
| Estimation |

ESTONIA



1. Statistics

Age pyramid for Estonia



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 2,4 | 2013 |
| Beds (per 100.000 population) | 500,5 | 2013 |
| Density of physicians (per 1.000 population) | 3,3 | 2013 |
| Density of nurses (per 1.000 population) | 6,5 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 1.265.420 | 2015 |
| Population annual growth rate (%) | -0,6 | 2015 |
| Life expectancy at birth (in years) | 77 | 2015 |
| Death rate (per 1.000 population) | 11,4 | 2011 |
| Live births (per 1.000 population) | 10,3 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 22,93 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 17.425,30 | 2015* |
| Total expenditure on health as% of GDP | 5,7 | 2013 |
| General government expenditure on health as% of total expenditure on health | 78,7 | 2012 |
| Private expenditure on health as% of total expenditure on health | 21,3 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|---------------|---------------|
| | not available | not available |

3. Healthcare System

Estonian health insurance relies on the principle of solidarity. The Health Insurance Fund covers the costs of health services required by the person in case of illness regardless of the amount of social tax paid for the person concerned. The Fund uses the social tax paid for the working population, also for covering the cost of health services provided to persons who have no income with regard to work activities. The employers are required by the law to pay social tax for all persons employed, whereby the rate of this tax is 33 % of the taxable amount, and of which 20 % is allocated for pension insurance and 13 % for health insurance.

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: An insured person is a permanent resident of the Republic of Estonia or a person living in Estonia by virtue of a temporary residence permit or by the right of permanent residence, who pays the social tax for himself/herself or for whom the payer of social tax is required to pay social tax. Insured persons are: a person working on the basis of an employment contract; a public servant; a member of the management or supervisory board of a legal entity; a person employed on the basis of a contract under the law of obligations; a person registered at Estonian Unemployment Insurance Fund; a person, who participated in the elimination of the consequences of a nuclear disaster, a conscript, the non-working spouse of a diplomat or a public servant, the curator of a disabled person; a person receiving child care allowance, a dependant spouse, for whom the government pays social tax, a person receiving social allowance. According to the Health Insurance Act persons for whom no social tax is paid are considered as having equal status to the insured person. The persons having equal status are: a pregnant woman, a person under 19 years of age, a person receiving state pension granted in Estonia, an insured person's dependent spouse, who is no more than 5 years away from attaining the age limit for old-age pension, pupils (there are age limits), a student, who is permanent resident.

| Percentage of insured and uninsured citizens | 2014 | 2015 |
|--|------|---------------|
| Insured citizens | 95 % | not available |
| Uninsured citizens | 5 % | not available |

| Distribution of insurance modality | 2014 | 2015 |
|------------------------------------|-------|---------------|
| Public insurance company | 100 % | not available |
| Private insurance company | 0 % | not available |
| Private co-payment | 0 % | not available |

| Possibility to subscribing to private health insurance plans | No answer |
|--|-----------|
|--|-----------|

| Co-payment necessary for the following therapy | |
|--|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

Reimbursement availability for physicians and hospitals

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|-------------------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Treatment availability

| | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

National certification availability

| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
|----------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

National Cardiac Society supporting EHRA certification system

| | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | | Specialist |
|---|-----|--|-------------------|
| Catheter ablation | Yes | | Cardiologist |
| ICD or pacemaker implants | Yes | | Cardiologist |
| Official national competency guidelines for electrophysiological studies or catheter ablation | | | No |
| Required period of training to perform implantations | | | Yes |
| | | | 100 implantations |
| Suggested period of training to perform implantations | | | Yes |
| | | | 100 implantations |
| National quality control system availability | | | No |
| Willingness to install quality control system | | | No |
| Responsible person for quality control | | | |
| Head of department of cardiology | | | |
| Training centres availability | | | |
| Pacemaker | | | 2 |
| ICD implantation | | | 2 |
| CRT implantation | | | 2 |
| Electrophysiological studies and catheter ablation | | | 2 |
| Atrial fibrillation ablation | | | 1 |
| Number of universities (Schools of Medicine) | | | 1 |
| Percentage of academic centres among all practicing EP centres | | | 50% |
| Percentage of academic centres among all practicing implanting devices centres | | | 20% |



5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|--|---------------|-------|
| | 2014 | 2015 |
| Implanting centres | 5 | 5 |
| Total Pacemaker units implanted | 1.054 | 1.085 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 912 | 954 |
| Replacements | 142 | 131 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 2 | 2 |
| Total CRT units implanted | 51 | 73 |
| Thereof, CRT pacemaker | 27 | 49 |
| Thereof, CRT ICD | 24 | 24 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 2 | 2 |
| Total ICD units implanted | 96 | 91 |
| Thereof, Single chamber | 13 | 22 |
| Thereof, Dual chamber | 83 | 69 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 88 | 85 |
| Replacements | 8 | 6 |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 2 | 2 |
| Total loop recorders implanted | 6 | 3 |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | not available | not available |
| Total lead extraction procedures | not available | not available |

| Specialist performing lead extractions | | |
|--|-----|---------------|
| Cardiologists | Yes | not available |
| Surgeons | Yes | not available |

10. Device specific

| Availability of remote monitoring of devices | Yes |
|--|-----|
|--|-----|

| National registry for | | |
|-----------------------|----|---------------|
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |



| | |
|---|-----------|
| Availability of a national quality insurance system or complication registry | No |
|---|-----------|

| | |
|---|------------|
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | Yes |
|---|------------|

Official name: State Agency of Medicine

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|---|------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 2 | 2 |
| Number of ablations performed | 411 | 426 |
| Mean number of ablations per centre | 206 | 213 |
| Number of AF ablations | 98 | 110 |
| Number of ablation centres (> 50 AF ablations) | 1 | 1 |
| Number of VT/VF ablations | 7 | 13 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 0 | 1 |
| Number of LAA closures | 2 | not available |
| Number of centres (LAA closures) | 1 | not available |

| Number of electrophysiologists | | |
|--|---|---|
| Number of electrophysiologists performed catheter ablation independently | 5 | 5 |
| Number of physicians under training to become independent electrophysiologists | 0 | 0 |

| | |
|---|-----------|
| Availability of a national registry for interventional electrophysiology | No |
|---|-----------|

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | No |
| U.S. | No |
| European | Yes |

| Obstacles to guideline implementation | | | | | | Ranking of importance |
|--|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of operators | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

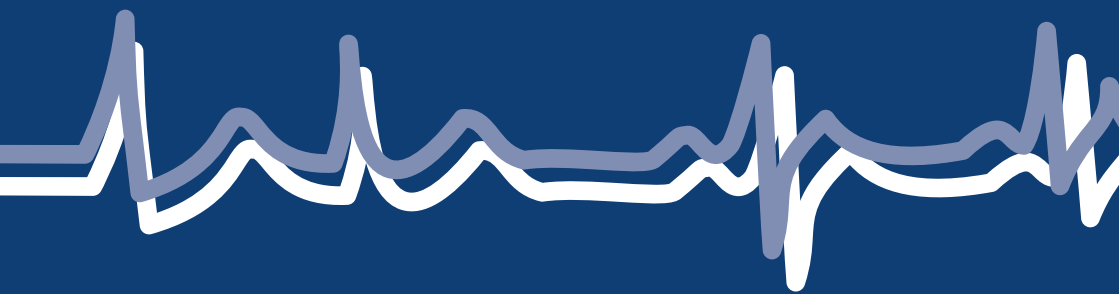
1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

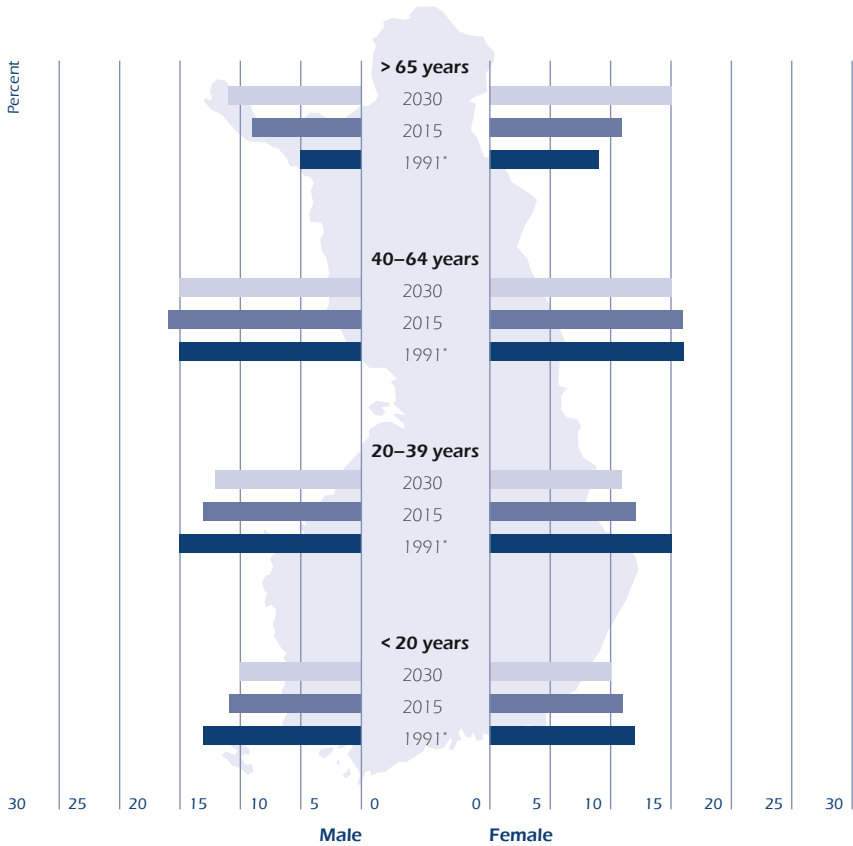
| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Estonian Society of Cardiology, Working Group of Arrhythmias |
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
| EHRA White Book 2015 |
| Survey from professional association |

FINLAND



1. Statistics

Age pyramid for Finland



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 4,8 | 2013 |
| Beds (per 100.000 population) | 485,9 | 2013 |
| Density of physicians (per 1.000 population) | 3,0 | 2013 |
| Density of nurses (per 1.000 population) | 14,5 | 2012 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 5.476.922 | 2015 |
| Population annual growth rate (%) | 0,4 | 2015 |
| Life expectancy at birth (in years) | 81 | 2015 |
| Death rate (per 1.000 population) | 9,5 | 2013 |
| Live births (per 1.000 population) | 10,7 | 2013 |

| Economic information | | Year |
|--|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 230,69 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 42.159,31 | 2015* |
| Total expenditure on health as % of GDP | 9,4 | 2013 |
| General government expenditure on health as % of total expenditure on health | 75,0 | 2012 |
| Private expenditure on health as % of total expenditure on health | 25,0 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|------|
| | 2014 | 2015 |
| | 39% | 23% |

3. Healthcare System

Finland has a compulsory health care system which is tax based. It provides comprehensive coverage for the entire population. The Ministry of Social Affairs and Health issues the legislation on health and social care policies and monitors the implementation. At local level, the municipal health committee and council make decisions on the planning and organization of healthcare.

| | |
|-------------------------------------|------------|
| Basic insurance availability | Yes |
|-------------------------------------|------------|

| Percentage of insured and uninsured citizens | | |
|---|-------------|-------------|
| | 2014 | 2015 |
| Insured citizens | 100% | 100% |
| Uninsured citizens | 0% | 0% |

| Distribution of insurance modality | | |
|---|-------------|-------------|
| | 2014 | 2015 |
| Public insurance company | 75,2% | 75,6% |
| Private insurance company | 3% | 3% |
| Private co-payment | 21,8% | 21,4% |

| | |
|---|------------|
| Possibility to subscribing to private health insurance plans | Yes |
|---|------------|

| Co-payment necessary for the following therapy | |
|---|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|--|---|--------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Comments: "The physicians do not receive any additional reimbursement for any procedures performed in the public health care hospitals."; "The hospital charge the municipalities for services according to annually set prices. Billing is usually based on DRG, but per procedure billing is used by some hospitals."



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | |
|---------------------------|------------|
| | Specialist |
| Catheter ablation | No |
| ICD or pacemaker implants | No |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|

| | |
|--|----|
| Required period of training to perform implantations | No |
|--|----|

| | |
|---|----|
| Suggested period of training to perform implantations | No |
|---|----|

| | |
|---|-------------|
| National quality control system availability | Yes |
| Pacemaker | Yes |
| ICD implantation | Yes |
| CRT implantation | Yes |
| Cathether ablation | Yes |
| Responsible person for quality control | |
| National Supervisory Authority for Welfare and Health | |
| Training centres availability | |
| Pacemaker | 20 |
| ICD implantation | 19 |
| CRT implantation | 15 |
| Electrophysiological studies and catheter ablation | 9 |
| Atrial fibrillation ablation | 8 |
| Number of universities (Schools of Medicine) | 5 |
| Percentage of academic centres among all practicing EP centres | 56 % |
| Percentage of academic centres among all practicing implanting devices centres | 25 % |

5. Pacemakers

| | | |
|---|---------------|---------------|
| Pacemaker units implanted and number of implanting centres | | |
| | 2014 | 2015 |
| Implanting centres | 20 | 20 |
| Total Pacemaker units implanted | 5.536* | 5.821 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | 4.253* | 4.578 |
| Replacements | 1.283* | 1.243 |
| *CRT-P included | | |
| Specialist performing implants | | |
| Cardiologists | Yes | 95 % |
| Surgeons | Yes | 5 % |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 15 | 15 |
| Total CRT units implanted | 526 | 527 |
| Thereof, CRT pacemaker | 181 | 184 |
| Thereof, CRT ICD | 345 | 343 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 19 | 18 |
| Total ICD units implanted | 1.161 | 1.198 |
| Thereof, Single chamber | not available | not available |
| Thereof, Dual chamber | not available | not available |
| Thereof, Subcutaneous ICD | not available | 16 |
| First implants | 839 | 887 |
| Replacements | 322 | 311 |
| Specialist performing implants | | |
| Cardiologists | Yes | 95% |
| Surgeons | Yes | 5% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 20 | 19 |
| Total loop recorders implanted | 295 | 368 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 5 | 5 |
| Total lead extraction procedures | 17 | not available |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 100% |
| Surgeons | Yes | 0% |

10. Device specific

| | | |
|---|----|---------------|
| Availability of remote monitoring of devices | | Yes |
| National registry for | | |
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | Yes |
| Official name: National Supervisory Authority for Welfare and Health (Valvira) | | |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | Yes |
| Official name: National Supervisory Authority for Welfare and Health (Valvira) | | |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|-------|-------|
| | 2014 | 2015 |
| Number of ablation centres | 9 | 9 |
| Number of ablations performed | 2.222 | 2.550 |
| Mean number of ablations per centre | 247 | 283 |
| Number of AF ablations | 736 | 926 |
| Number of ablation centres (> 50 AF ablations) | 5 | 6 |
| Number of VT/VF ablations | 82 | 162 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 5 | 4 |
| Number of LAA closures | 63 | 123 |
| Number of centres (LAA closures) | 5 | 5 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 15 | 21 |
| Number of physicians under training to become independent electrophysiologists | 8 | 7 |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|-----------------------|
| National | Yes | | | | | |
| U.S. | No | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of reimbursement, limited financial resources | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Low awareness of guidelines | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of operators | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|--|
| The Finnish Cardiac Society, National Working Group for Arrhythmias and Pacing |
|--|

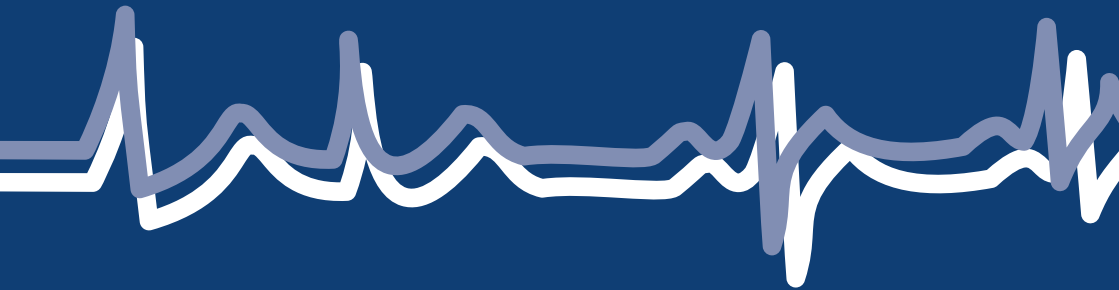
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

| |
|---|
| Official statistics – Statistics Finland, Ministry of Social Affairs and Health |
|---|

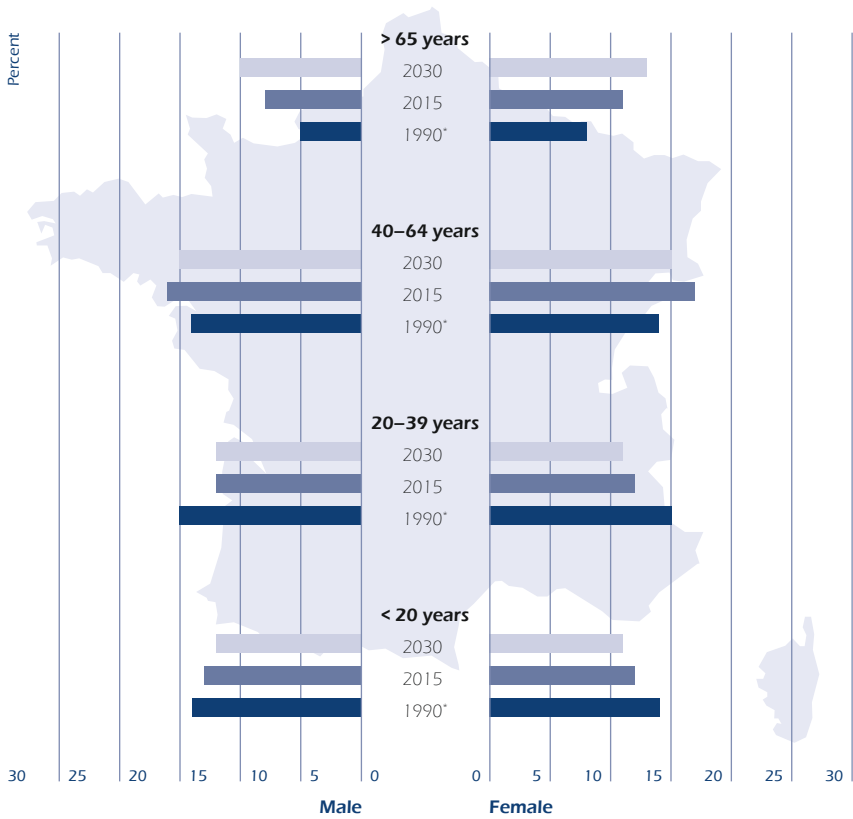
| |
|---|
| Survey from professional association – Finnish Cardiac Society Estimation |
|---|

FRANCE



1. Statistics

Age pyramid for France



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 5,3 | 2013 |
| Beds (per 100.000 population) | 647,7 | 2013 |
| Density of physicians (per 1.000 population) | 3,2 | 2014 |
| Density of nurses (per 1.000 population) | 10,3 | 2014 |

| Demographic information | | Year |
|-------------------------------------|------------|------|
| Population | 66.553.766 | 2015 |
| Population annual growth rate (%) | 0,4 | 2015 |
| Life expectancy at birth (in years) | 82 | 2015 |
| Death rate (per 1.000 population) | 8,5 | 2011 |
| Live births (per 1.000 population) | 12,3 | 2013 |

| Economic information | | Year |
|--|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 2.422,65 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 37.728,41 | 2015* |
| Total expenditure on health as % of GDP | 11,7 | 2013 |
| General government expenditure on health as % of total expenditure on health | 77,4 | 2012 |
| Private expenditure on health as % of total expenditure on health | 22,6 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|------|--------|
| | 26% | 22,6%* |

* 2011-2013 data

3. Healthcare System

Sécurité sociale: French National Health System

| | |
|-------------------------------------|------------|
| Basic insurance availability | Yes |
|-------------------------------------|------------|

| Percentage of insured and uninsured citizens | | |
|--|------|------|
| | 2014 | 2015 |
| Insured citizens | 100% | 100% |
| Uninsured citizens | 0% | 0% |

| Distribution of insurance modality | | |
|------------------------------------|------|---------------|
| | 2014 | 2015 |
| Public insurance company | 55% | 100% |
| Private insurance company | 0% | not available |
| Private co-payment | 45% | not available |

| | |
|---|------------|
| Possibility to subscribing to private health insurance plans | Yes |
|---|------------|

| Co-payment necessary for the following therapy | |
|--|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|---|-------------------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Comments: This reimbursement only concerns private hospitals. There is no physician reimbursement in public hospitals unless the activity is performed during private practice.



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|-------------------------------------|--------------------------|--|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Diplôme Inter Universitaire (DIU) de rythmologie et de stimulation cardiaque |
| Invasive electrophysiology | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | DIU de rythmologie et de stimulation cardiaque |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input checked="" type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | Specialist |
|---------------------------|-----|---|
| Catheter ablation | Yes | Cardiologist with dedicated certification |
| ICD or pacemaker implants | Yes | Cardiologist with dedicated certification |

| Official national competency guidelines for electrophysiological studies or catheter ablation | Yes |
|---|-----|
| Official name: Cardiac Rhythm and Pacing Group of the French Society of Cardiology | |

| | |
|---|--|
| Required period of training to perform implantations | Yes |
| | 2 years |
| Suggested period of training to perform implantations | No |
| National quality control system availability | No |
| Willingness to install quality control system | Yes |
| Responsible person for quality control | |
| | The HAS (Haute Autorité de Santé) agency |
| Training centres availability | |
| Pacemaker | not available |
| ICD implantation | not available |
| CRT implantation | not available |
| Electrophysiological studies and catheter ablation | not available |
| Atrial fibrillation ablation | not available |
| Number of universities (Schools of Medicine) | 47 |
| Percentage of academic centres among all practicing EP centres | 55% |
| Percentage of academic centres among all practicing implanting devices centres | 60% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 451 | 453 |
| Total Pacemaker units implanted | 67.000 | 64.176 |
| Thereof, Leadless Pacemaker | not available | 124 |
| First implants | 55.000 | not available |
| Replacements | 12.000 | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 90% |
| Surgeons | Yes | 10% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|-------|--------|
| | 2014 | 2015 |
| Implanting centres | 146 | 174 |
| Total CRT units implanted | 9.570 | 10.432 |
| Thereof, CRT pacemaker | 3.500 | 3.888 |
| Thereof, CRT ICD | 6.070 | 6.544 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 162 | 161 |
| Total ICD units implanted | 13.700 | 7.825 |
| Thereof, Single chamber | not available | not available |
| Thereof, Dual chamber | not available | not available |
| Thereof, Subcutaneous ICD | not available | not available |
| First implants | 11.000 | not available |
| Replacements | 2.700 | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 95% |
| Surgeons | Yes | 5% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 80 | not available |
| Total loop recorders implanted | not available | 3.600 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|-------|-------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 50 | 30 |
| Total lead extraction procedures | 2.200 | 3.000 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 90% |
| Surgeons | Yes | 10% |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|----|---------------|
| National registry for | | |
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | Yes |
| Official name: Agence Nationale de Sécurité des Médicaments et des Produits de santé | | |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 130 | 196 |
| Number of ablations performed | 33.300 | 39.596 |
| Mean number of ablations per centre | 256 | 202 |
| Number of AF ablations | 11.000 | 10.138 |
| Number of ablation centres (> 50 AF ablations) | 70 | 57 |
| Number of VT/VF ablations | not available | 741 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 50 | 23 |
| Number of LAA closures | not available | 700 |
| Number of centres (LAA closures) | not available | 47 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | not available | not available |
| Number of physicians under training to become independent electrophysiologists | not available | not available |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------------------|
| National | No | | | | | |
| U.S. | No | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of reimbursement, limited financial resources | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of referral | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of trained personnel | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Low awareness of guidelines | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of operators | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|---|
| Official name: Groupe de Rythmologie et de Stimulation de la Société Française de Cardiologie |
|---|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

| |
|---------------------|
| Official statistics |
|---------------------|

| |
|--------------------------------------|
| Survey from professional association |
|--------------------------------------|

| |
|------------|
| Sales data |
|------------|

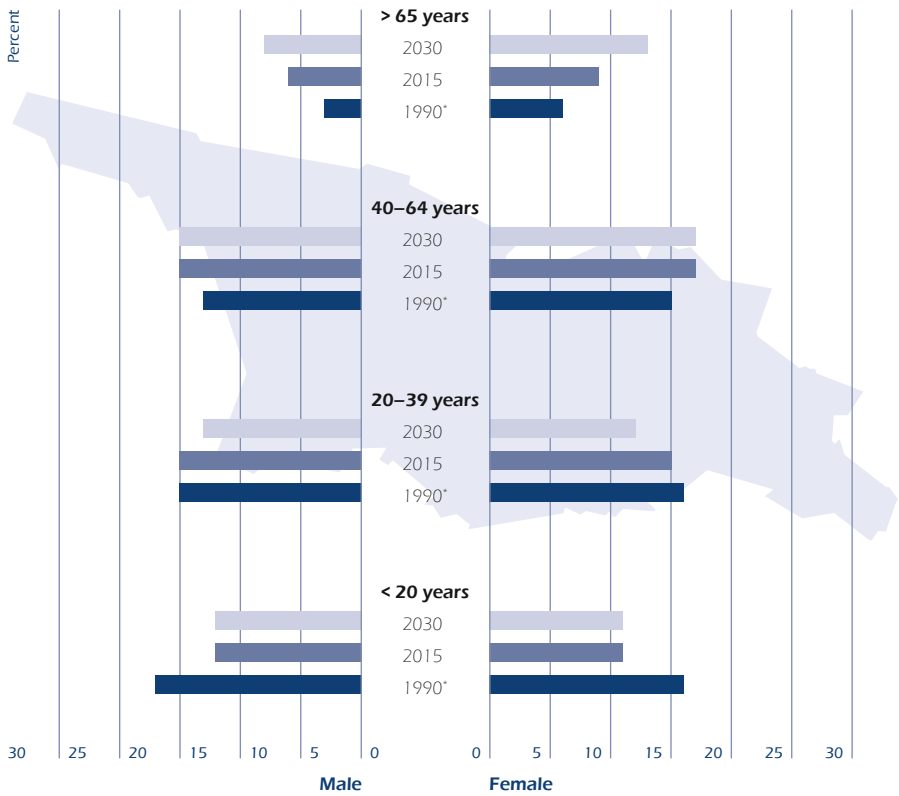
| |
|------------|
| Estimation |
|------------|

GEORGIA



1. Statistics

Age pyramid for Georgia



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 5,3 | 2013 |
| Beds (per 100.000 population) | 258,5 | 2013 |
| Density of physicians (per 1.000 population) | 4,1 | 2013 |
| Density of nurses (per 1.000 population) | 3,4 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 4.931.226 | 2015 |
| Population annual growth rate (%) | -0,1 | 2015 |
| Life expectancy at birth (in years) | 76 | 2015 |
| Death rate (per 1.000 population) | 13,2 | 2014 |
| Live births (per 1.000 population) | 16,3 | 2014 |

| Economic information | | Year |
|--|----------|-------|
| Gross domestic product (U.S dollar-billions) | 13,75 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 3.719,98 | 2015* |
| Total expenditure on health as % of GDP | 9,4 | 2013 |
| General government expenditure on health as % of total expenditure on health | 18,0 | 2012 |
| Private expenditure on health as % of total expenditure on health | 82,0 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|------|---------------|
| | 38 | not available |

3. Healthcare System

National Health System and private insurance

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: Every citizen has basic insurance

| Percentage of insured and uninsured citizens | | |
|--|--|--|
|--|--|--|

| | 2014 | 2015 |
|--------------------|---------------|---------------|
| Insured citizens | not available | not available |
| Uninsured citizens | not available | not available |

| Distribution of insurance modality | | |
|------------------------------------|--|--|
|------------------------------------|--|--|

| | 2014 | 2015 |
|---------------------------|---------------|---------------|
| Public insurance company | not available | not available |
| Private insurance company | not available | not available |
| Private co-payment | not available | not available |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|--|
|--|--|

| | |
|-------------|-----|
| ICD devices | Yes |
| Pacemakers | Yes |
| Ablation | Yes |

| Reimbursement availability for physicians and hospitals | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|
|---|--|--|--|--|--|--|--|--|--|

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|-------------------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Comments: Reimbursement is only for the retired people, the population living below poverty level and some target groups (e.g. students, etc.)



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|-------------------------------------|--------------------------|--|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Subspecialty "Cardiac electrophysiology and the management of arrhythmias" |
| Invasive electrophysiology | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Subspecialty "Cardiac electrophysiology and the management of arrhythmias" |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Accreditation for training in subspecialty "Cardiac electrophysiology and the management of arrhythmias" |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input checked="" type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---|------------|--|
| | Specialist | |
| Catheter ablation | Yes | Cardiac electrophysiologist |
| ICD or pacemaker implants | Yes | Cardiac electrophysiologist or cardiac surgeon |
| Official national competency guidelines for electrophysiological studies or catheter ablation | | No |
| Required period of training to perform implantations | | No |
| Suggested period of training to perform implantations | | No |
| National quality control system availability | | No |
| Willingness to install quality control system | | Yes |
| Responsible person for quality control | | |
| Hospitals | | |
| Training centres availability | | |
| Pacemaker | | 1 |
| ICD implantation | | 1 |
| CRT implantation | | 1 |
| Electrophysiological studies and catheter ablation | | 1 |
| Atrial fibrillation ablation | | 1 |
| Number of universities (Schools of Medicine) | | 4 |
| Percentage of academic centres among all practicing EP centres | | 50% |
| Percentage of academic centres among all practicing implanting devices centres | | 30% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 9 | 15 |
| Total Pacemaker units implanted | 608 | 817 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | not available | not available |
| Replacements | not available | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 90% |
| Surgeons | Yes | 10% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 7 | 10 |
| Total CRT units implanted | 55 | 62 |
| Thereof, CRT pacemaker | 11 | 10 |
| Thereof, CRT ICD | 44 | 52 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 8 | 12 |
| Total ICD units implanted | 104 | 140 |
| Thereof, Single chamber | 81 | 118 |
| Thereof, Dual chamber | 23 | 22 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 100 | 135 |
| Replacements | 4 | 5 |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|---------------|
| | 2014 | 2015 |
| Implanting centres | 9 | not available |
| Total loop recorders implanted | 4 | 5 |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 1 | not available |
| Total lead extraction procedures | 3 | not available |

| Specialist performing lead extractions | | |
|--|-----|---------------|
| Cardiologists | Yes | not available |
| Surgeons | Yes | not available |

10. Device specific

| Availability of remote monitoring of devices | No |
|--|----|
|--|----|

| National registry for | | |
|-----------------------|----|---------------|
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |

| | |
|---|-----------|
| Availability of a national quality insurance system or complication registry | No |
|---|-----------|

| | |
|---|-----------|
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | No |
|---|-----------|

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 7 | 8 |
| Number of ablations performed | 356 | 403 |
| Mean number of ablations per centre | 51 | 50 |
| Number of AF ablations | 50 | 64 |
| Number of ablation centres (> 50 AF ablations) | 0 | 0 |
| Number of VT/VF ablations | not available | not available |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | not available | not available |
| Number of LAA closures | 0 | not available |
| Number of centres (LAA closures) | 0 | not available |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 7 | 8 |
| Number of physicians under training to become independent electrophysiologists | 1 | not available |
| Availability of a national registry for interventional electrophysiology | No | |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | No |
| U.S. | Yes |
| European | Yes |

| Obstacles to guideline implementation | | | | | | Ranking of importance |
|---|--------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 1 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 2 |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4 |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 3 |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

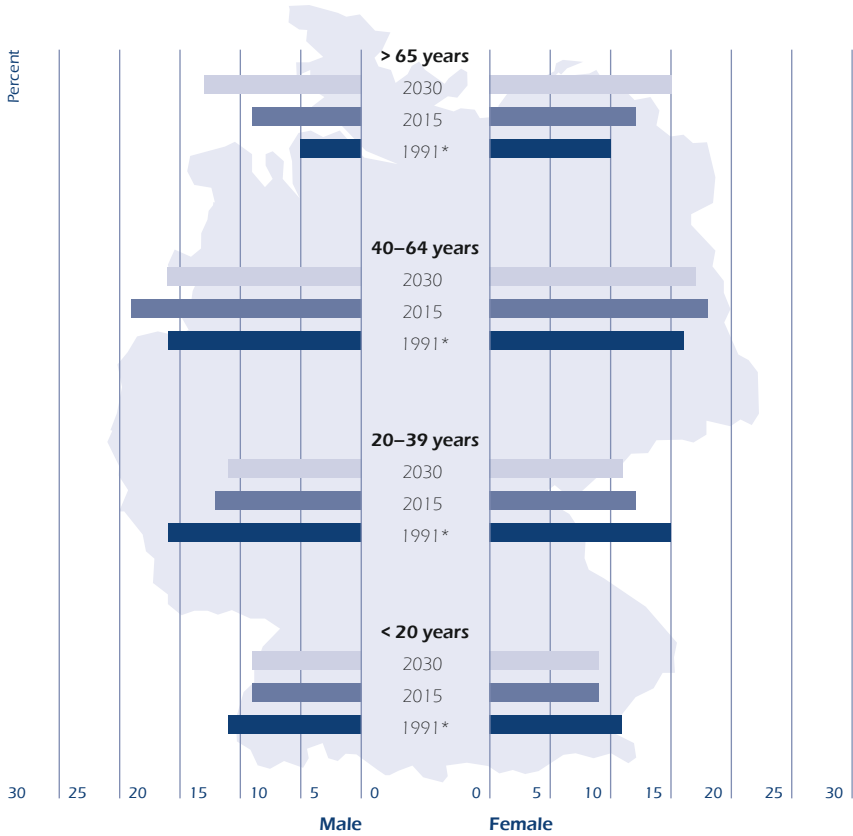
| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Georgian Heart Rhythm Association |
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
| EHRA White Book 2015 |
| Georgian Heart Rhythm Association |

GERMANY



1. Statistics

Age pyramid for Germany



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 4,0 | 2013 |
| Beds (per 100.000 population) | 827,8 | 2013 |
| Density of physicians (per 1.000 population) | 4,1 | 2013 |
| Density of nurses (per 1.000 population) | 13,2 | 2013 |

| Demographic information | | Year |
|-------------------------------------|------------|------|
| Population | 80.854.408 | 2015 |
| Population annual growth rate (%) | -0,2 | 2015 |
| Life expectancy at birth (in years) | 81 | 2015 |
| Death rate (per 1.000 population) | 11,1 | 2013 |
| Live births (per 1.000 population) | 8,5 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 3.371,00 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 41.267,31 | 2015* |
| Total expenditure on health as% of GDP | 11,3 | 2013 |
| General government expenditure on health as% of total expenditure on health | 76,7 | 2012 |
| Private expenditure on health as% of total expenditure on health | 23,3 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|-------|
| | 2014 | 2015 |
| | 40% | 44,7% |

3. Healthcare System

public insurance full cover, in addition private insurance companies

| Basic insurance availability | | Yes | | | | | | |
|---|---|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|--------------------------|
| Requirements for citizens to qualify for public insurance: general coverage | | | | | | | | |
| Percentage of insured and uninsured citizens | | | | | | | | |
| | 2014 | 2015 | | | | | | |
| Insured citizens | 99% | 99% | | | | | | |
| Uninsured citizens | 1% | 1% | | | | | | |
| Distribution of insurance modality | | | | | | | | |
| | 2014 | 2015 | | | | | | |
| Public insurance company | 87% | 87% | | | | | | |
| Private insurance company | 11% | 13% | | | | | | |
| Private co-payment | 2% | not available | | | | | | |
| Possibility to subscribing to private health insurance plans | | Yes | | | | | | |
| Co-payment necessary for the following therapy | | | | | | | | |
| ICD devices | | No | | | | | | |
| Pacemakers | | No | | | | | | |
| Ablation | | No | | | | | | |
| Reimbursement availability for physicians and hospitals | | | | | | | | |
| | Physician/Hospital receives per process reimbursement | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|--------------------------|--------------------------|---|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Sachkunde Device-Therapie, Curriculum Aktive Rhythmusimplantate |
| Invasive electrophysiology | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Curriculum Elektrophysiologie |
| Allied professionals | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input checked="" type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|-----|--|
| | | Specialist |
| Catheter ablation | Yes | Cardiologist |
| ICD or pacemaker implants | Yes | Cardiologist, cardiac or thoracic surgeon, internal medicine |

| | |
|--|---------------|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
| Required period of training to perform implantations | No |
| Suggested period of training to perform implantations | Yes |
| | 18 months |
| National quality control system availability | Yes |
| Pacemaker | Yes |
| ICD implantation | Yes |
| CRT implantation | Yes |
| Cathether ablation | No |
| Responsible person for quality control | |
| AQUA institute | |
| Training centres availability | |
| Pacemaker | 136 |
| ICD implantation | 136 |
| CRT implantation | 136 |
| Electrophysiological studies and cathether ablation | 108 |
| Atrial fibrillation ablation | not available |
| Number of universities (Schools of Medicine) | 37 |
| Percentage of academic centres among all practicing EP centres | 20% |
| Percentage of academic centres among all practicing implanting devices centres | 10% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|--|-------------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 980 | 1.135 |
| Total Pacemaker units implanted | 92.021 | 106.700 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | 75.575 | 81.092 |
| Replacements | 17.740 | 25.608 |
| Specialist performing implants | | |
| Cardiologists | Yes | 60% |
| Surgeons | Yes | 28% |
| Other | Internal Medicine | 12% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|-------------------|--------|
| | 2014 | 2015 |
| Implanting centres | 670 | 250 |
| Total CRT units implanted | 10.378 | 21.139 |
| Thereof, CRT pacemaker | 1.294 | 3.305 |
| Thereof, CRT ICD | 9.084 | 17.834 |
| Specialist performing implants | | |
| Cardiologists | Yes | 68% |
| Surgeons | Yes | 20% |
| Other | Internal Medicine | 12% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|-------------------|--------|
| | 2014 | 2015 |
| Implanting centres | 670 | 745 |
| Total ICD units implanted | 23.898 | 28.914 |
| Thereof, Single chamber | 12.186 | 18.241 |
| Thereof, Dual chamber | 6.365 | 10.673 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 18.551 | 18.805 |
| Replacements | 5.347 | 9.109 |
| Specialist performing implants | | |
| Cardiologists | Yes | 67% |
| Surgeons | Yes | 21% |
| Other: | Internal Medicine | 12% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|---------------|--------|
| | 2014 | 2015 |
| Implanting centres | not available | 843 |
| Total loop recorders implanted | not available | 16.900 |
| Specialist performing implants | | |
| Cardiologists | Yes | 92% |
| Surgeons | Yes | 2% |
| Other | Neurologist | 6% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|-------|-------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 560 | 126 |
| Total lead extraction procedures | 4.963 | 2.357 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 17% |
| Surgeons | Yes | 83% |

10. Device specific

| | |
|---|------------|
| Availability of remote monitoring of devices | Yes |
|---|------------|

National registry for

| | | Official name |
|-------------------|-----|---------------------------|
| ICD | No | |
| Pacing | Yes | German pacemaker Registry |
| Electrophysiology | No | |

Availability of a national quality insurance system or complication registry

| | |
|---------------------|------------|
| Official name: AQUA | Yes |
|---------------------|------------|

Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions

| | |
|--|-----------|
| | No |
|--|-----------|

11. Interventional electrophysiology

Number of ablations performed and number of centres

| | 2014 | 2015 |
|---|---------------|--------|
| Number of ablation centres | 100 | 346 |
| Number of ablations performed | 60.000 | 63.790 |
| Mean number of ablations per centre | 600 | 184 |
| Number of AF ablations | 40.000 | 33.628 |
| Number of ablation centres (> 50 AF ablations) | 80 | 156 |
| Number of VT/VF ablations | not available | 6.686 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 10 | 138 |
| Number of LAA closures | 3.500 | 4.428 |
| Number of centres (LAA closures) | 100 | 212 |

Number of electrophysiologists

| | | |
|--|---------------|---------------|
| Number of electrophysiologists performed catheter ablation independently | not available | not available |
| Number of physicians under training to become independent electrophysiologists | not available | not available |

Availability of a national registry for interventional electrophysiology

| | |
|--|-----------|
| | No |
|--|-----------|

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | Yes |
| U.S. | Yes |
| European | Yes |

| Obstacles to guideline implementation | Ranking of importance | | | | |
|--|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|
| | 1 | 2 | 3 | 4 | 5 |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lack of reimbursement, limited financial resources | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Low awareness of guidelines | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lack of operators | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| German Cardiac Society, Working Group on Arrhythmias |

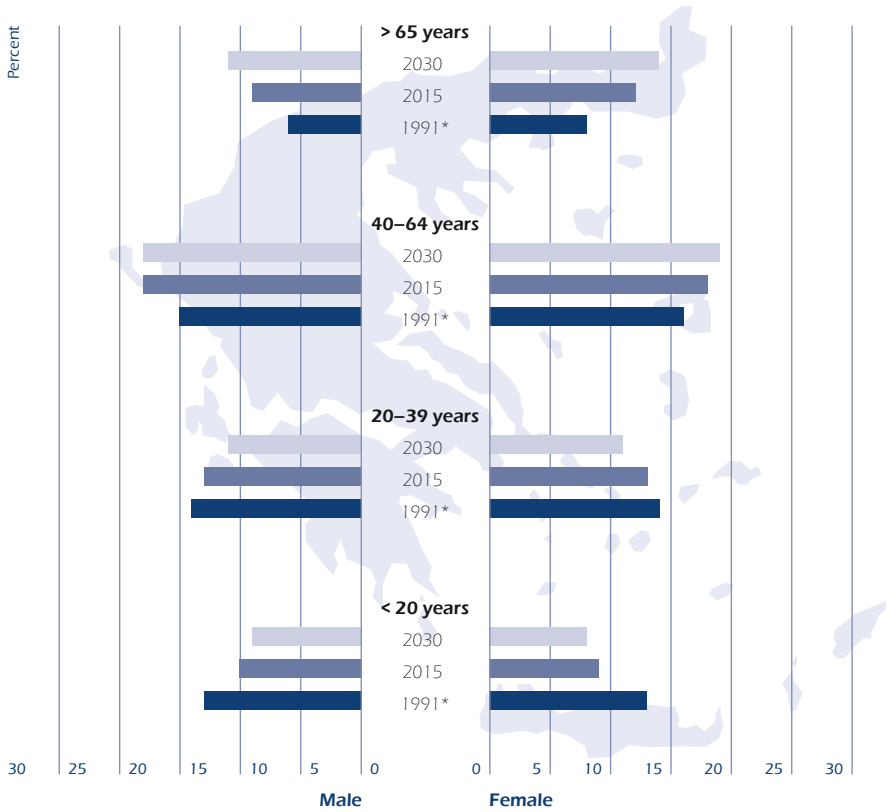
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
| EHRA White Book 2015 |
| Deutscher Herzbericht, AQUA, Statistisches Bundesamt |
| Sales data |
| Estimation |

GREECE



1. Statistics

Age pyramid for Greece



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 2,8 | 2011 |
| Beds (per 100.000 population) | 475,9 | 2011 |
| Density of physicians (per 1.000 population) | 6,2 | 2013 |
| Density of nurses (per 1.000 population) | 3,8 | 2011 |

| Demographic information | | Year |
|-------------------------------------|------------|------|
| Population | 10.775.643 | 2015 |
| Population annual growth rate (%) | 0,0 | 2015 |
| Life expectancy at birth (in years) | 80 | 2015 |
| Death rate (per 1.000 population) | 10,5 | 2012 |
| Live births (per 1.000 population) | 8,5 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 192,98 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 17.656,92 | 2015* |
| Total expenditure on health as% of GDP | 9,8 | 2013 |
| General government expenditure on health as% of total expenditure on health | 67,1 | 2012 |
| Private expenditure on health as% of total expenditure on health | 32,9 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| | not available | not available |

3. Healthcare System

The Greek healthcare system is characterized by the coexistence of NHS, a compulsory social insurance and a voluntary private health insurance system. The NHS provides universal coverage to the population and offers equal access to health services for all and social cohesion.

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: Citizens have to pay yearly their contribution to the public insurance system.

| Percentage of insured and uninsured citizens | 2014 | 2015 |
|--|------|------|
|--|------|------|

| | | |
|--------------------|-----|-----|
| Insured citizens | 80% | 75% |
| Uninsured citizens | 20% | 25% |

| Distribution of insurance modality | 2014 | 2015 |
|------------------------------------|------|------|
|------------------------------------|------|------|

| | | |
|---------------------------|-----|-----|
| Public insurance company | 89% | 90% |
| Private insurance company | 10% | 10% |
| Private co-payment | 1% | 0% |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|--|
|--|--|

| | |
|-------------|-----------|
| ICD devices | No answer |
| Pacemakers | No answer |
| Ablation | No answer |

| Reimbursement availability for physicians and hospitals | | | | |
|---|--|--|--|--|
|---|--|--|--|--|

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|-------------------------------------|--|--------------------------|---|--------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|-------------------------------------|--------------------------|---|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Certification from a Comitee for Pacing and Electrophysiology of the Ministry of Health |
| Invasive electrophysiology | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Certification from a Comitee for Pacing and Electrophysiology of the Ministry of Health |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Certification from a Comitee for Pacing and Electrophysiology of the Ministry of Health |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | | Specialist |
|---|-----|--|--------------|
| Catheter ablation | Yes | | Cardiologist |
| ICD or pacemaker implants | Yes | | Cardiologist |
| Official national competency guidelines for electrophysiological studies or catheter ablation | | | No |
| Required period of training to perform implantations | | | Yes |
| | | | 1 year |
| Suggested period of training to perform implantations | | | Yes |
| | | | 1 year |
| National quality control system availability | | | No |
| Willingness to install quality control system | | | Yes |
| Responsible person for quality control | | | None |
| Training centres availability | | | |
| Pacemaker | | | 15 |
| ICD implantation | | | 8 |
| CRT implantation | | | 8 |
| Electrophysiological studies and catheter ablation | | | 8 |
| Atrial fibrillation ablation | | | 8 |
| Number of universities (Schools of Medicine) | | | 7 |
| Percentage of academic centres among all practicing EP centres | | | 25% |
| Percentage of academic centres among all practicing implanting devices centres | | | 12% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|--|---------------|-------|
| | 2014 | 2015 |
| Implanting centres | 56 | 56 |
| Total Pacemaker units implanted | 8.000 | 8.800 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 5.900 | 6.490 |
| Replacements | 2.100 | 2.310 |
| Specialist performing implants | | |
| Cardiologists | Yes | 97 % |
| Surgeons | Yes | 3 % |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 16 | 16 |
| Total CRT units implanted | 580 | 638 |
| Thereof, CRT pacemaker | 80 | 88 |
| Thereof, CRT ICD | 500 | 550 |
| Specialist performing implants | | |
| Cardiologists | Yes | 98 % |
| Surgeons | Yes | 2 % |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|-------|
| | 2014 | 2015 |
| Implanting centres | 24 | 24 |
| Total ICD units implanted | 1.080 | 1.188 |
| Thereof, Single chamber | 250 | 275 |
| Thereof, Dual chamber | 830 | 913 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 818 | 899 |
| Replacements | 262 | 289 |

| Specialist performing implants | | |
|--------------------------------|-----|-----|
| Cardiologists | Yes | 98% |
| Surgeons | Yes | 2% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 16 | 16 |
| Total loop recorders implanted | 150 | 165 |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 4 | 4 |
| Total lead extraction procedures | 50 | 55 |

| Specialist performing lead extractions | | |
|--|-----|-----|
| Cardiologists | Yes | 90% |
| Surgeons | Yes | 10% |



10. Device specific

| Availability of remote monitoring of devices | No |
|--|----|
|--|----|

Reasons why remote monitoring is not available: Reasons related to cost

| National registry for | | | Official name |
|-----------------------|-----|---|---------------|
| ICD | Yes | Working Group of Electrophysiology and Pacing of Greek Society of Cardiology Registry | |
| Pacing | Yes | Working Group of Electrophysiology and Pacing of Greek Society of Cardiology Registry | |
| Electrophysiology | Yes | Working Group of Electrophysiology and Pacing of Greek Society of Cardiology Registry | |

| Availability of a national quality insurance system or complication registry | No |
|--|----|
|--|----|

| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | No |
|--|----|
|--|----|

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|-------|
| | 2014 | 2015 |
| Number of ablation centres | 29 | 29 |
| Number of ablations performed | 1.653 | 1.710 |
| Mean number of ablations per centre | 57 | 59 |
| Number of AF ablations | 560 | 650 |
| Number of ablation centres (> 50 AF ablations) | 6 | 6 |
| Number of VT/VF ablations | 180 | 185 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 6 | 6 |
| Number of LAA closures | 10 | 8 |
| Number of centres (LAA closures) | 2 | 2 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 75 | 76 |
| Number of physicians under training to become independent electrophysiologists | not available | 8 |

| Availability of a national registry for interventional electrophysiology | Yes |
|--|-----|
| Official name: Working Group of Electrophysiology and Pacing of Greek Society of Cardiology Registry | |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | No |
| U.S. | No |
| European | Yes |

| Obstacles to guideline implementation | | | | | | Ranking of importance |
|--|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of referral | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of trained personnel | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Low awareness of guidelines | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Lack of operators | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |

1 = no obstacle, 5 = great obstacle

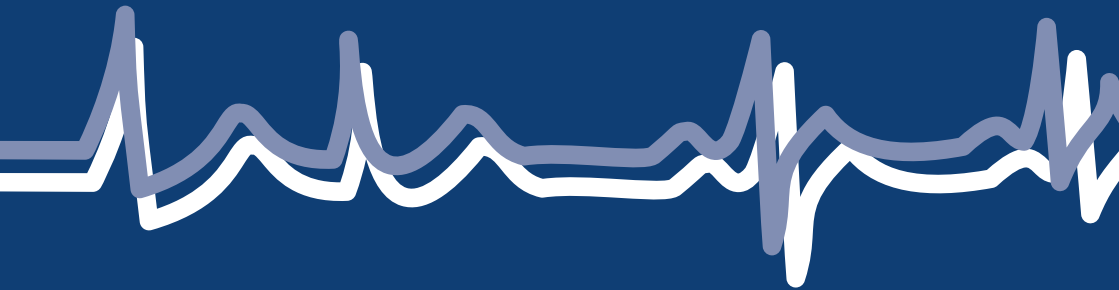
1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|--|
| Working Group of Electrophysiology and Pacing of Greek Society of Cardiology |

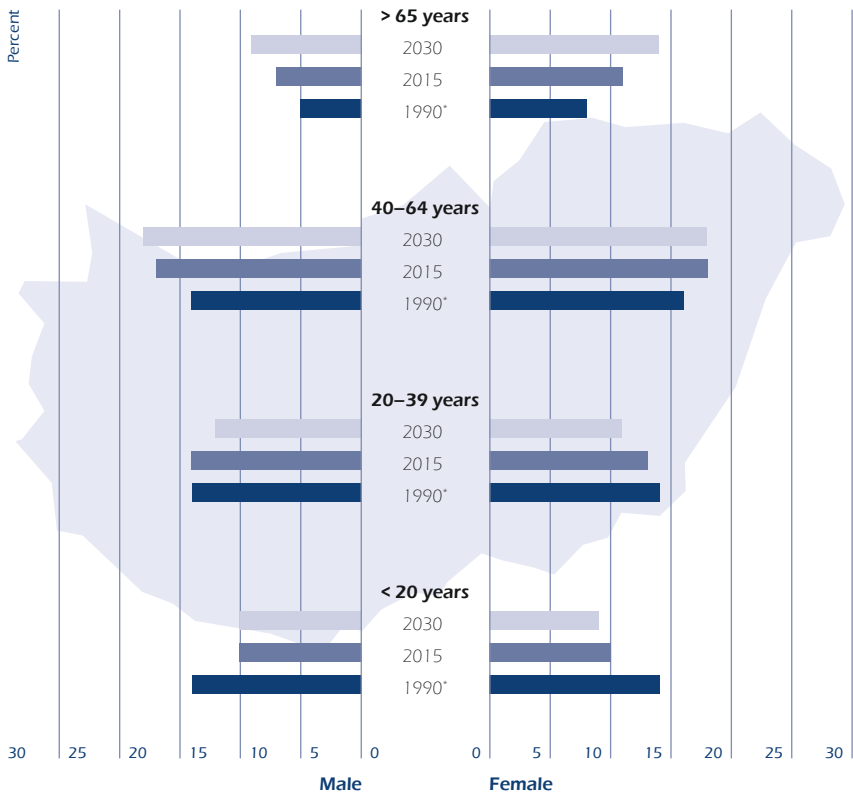
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
| EHRA White Book 2015 |
| Survey from professional association |
| Sales data |
| Estimation |
| Working Group of Electrophysiology and Pacing of Greek Society of Cardiology |

HUNGARY



1. Statistics

Age pyramid for Hungary



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 1,8 | 2013 |
| Beds (per 100.000 population) | 703,7 | 2013 |
| Density of physicians (per 1.000 population) | 3,2 | 2013 |
| Density of nurses (per 1.000 population) | 6,6 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 9.897.541 | 2015 |
| Population annual growth rate (%) | -0,2 | 2015 |
| Life expectancy at birth (in years) | 76 | 2015 |
| Death rate (per 1.000 population) | 12,8 | 2013 |
| Live births (per 1.000 population) | 9,0 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 118,49 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 12.020,63 | 2015* |
| Total expenditure on health as% of GDP | 8,1 | 2013 |
| General government expenditure on health as% of total expenditure on health | 62,6 | 2012 |
| Private expenditure on health as% of total expenditure on health | 37,4 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|---------------|------|
| | 2014 | 2015 |
| | not available | 46 % |

3. Healthcare System

The Hungarian healthcare system is organised through a National Health Insurance Fund which is available for all citizens registered at the Fund.

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: Age under 18 or retired; or valid job contract; or regular payment of the insurance fee.

| Percentage of insured and uninsured citizens | 2014 | 2015 |
|--|------|------|
| Insured citizens | 98% | 98% |
| Uninsured citizens | 2% | 2% |

| Distribution of insurance modality | 2014 | 2015 |
|------------------------------------|------|------|
| Public insurance company | 99% | 99% |
| Private insurance company | 1% | 1% |
| Private co-payment | 0% | 0% |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|---|-------------------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Arrhythmologist Licence for Pacemaker/ICD/CRT (Device Therapy) |
| Invasive electrophysiology | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Arrhythmologist Licence for Cardiac Electrophysiology and Ablation |
| Allied professionals | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Arrhythmologist Licence for Pacemaker/ICD/CRT (Device Therapy) for Allied Professionals |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input checked="" type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | |
|---------------------------|--|
| | Specialist |
| Catheter ablation | Yes Cardiologist, cardiologist fellow |
| ICD or pacemaker implants | Yes Cardiologist, cardiologist fellow, heart surgeon, anaesthesiologist |

| | |
|--|------------------|
| Official national competency guidelines for electrophysiological studies or catheter ablation | Yes |
| Hungarian Society of Cardiology | |
| Required period of training to perform implantations | No |
| Suggested period of training to perform implantations | Yes |
| 2 years | |
| National quality control system availability | No |
| Willingness to install quality control system | No answer |
| Responsible person for quality control | No answer |
| Training centres availability | |
| Pacemaker | 6 |
| ICD implantation | 6 |
| CRT implantation | 6 |
| Electrophysiological studies and catheter ablation | 6 |
| Atrial fibrillation ablation | 6 |
| Number of universities (Schools of Medicine) | 4 |
| Percentage of academic centres among all practicing EP centres | 36% |
| Percentage of academic centres among all practicing implanting devices centres | 22% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|--|-------|-------|
| | 2014 | 2015 |
| Implanting centres | 18 | 18 |
| Total Pacemaker units implanted | 6.393 | 6.432 |
| Thereof, Leadless Pacemaker | 32 | 24 |
| First implants | 4.880 | 4.893 |
| Replacements | 1.513 | 1.539 |
| Specialist performing implants | | |
| Cardiologists | Yes | 95 % |
| Surgeons | Yes | 5 % |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|-------|
| | 2014 | 2015 |
| Implanting centres | 13 | 14 |
| Total CRT units implanted | 941 | 1.091 |
| Thereof, CRT pacemaker | 471 | 496 |
| Thereof, CRT ICD | 470 | 595 |
| Specialist performing implants | | |
| Cardiologists | Yes | 97 % |
| Surgeons | Yes | 3 % |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 13 | 13 |
| Total ICD units implanted | 956 | 986 |
| Thereof, Single chamber | 729 | 689 |
| Thereof, Dual chamber | 227 | 294 |
| Thereof, Subcutaneous ICD | 0 | 3 |
| First implants | 753 | 835 |
| Replacements | 203 | 151 |

| Specialist performing implants | | |
|--------------------------------|-----|-----|
| Cardiologists | Yes | 97% |
| Surgeons | Yes | 3% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 12 | 12 |
| Total loop recorders implanted | 120 | 169 |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 8 | 8 |
| Total lead extraction procedures | 97 | 105 |

| Specialist performing lead extractions | | |
|--|-----|-----|
| Cardiologists | Yes | 95% |
| Surgeons | Yes | 5% |

10. Device specific

| Availability of remote monitoring of devices | Yes |
|--|-----|
|--|-----|

| National registry for | | |
|-----------------------|-----|-------------------------------------|
| | | Official name |
| ICD | Yes | Hungarian Online Pacemaker Registry |
| Pacing | Yes | Hungarian Online Pacemaker Registry |
| Electrophysiology | No | |



| | |
|---|------------|
| Availability of a national quality insurance system or complication registry | Yes |
|---|------------|

Official name: Hungarian Online Pacemaker Registry and individual paper based data collection from centers

| | |
|---|------------|
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | Yes |
|---|------------|

Official name: National Health Insurance Fund

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|--|--|
|--|--|--|

| | 2014 | 2015 |
|---|-------|-------|
| Number of ablation centres | 11 | 11 |
| Number of ablations performed | 3.469 | 3.723 |
| Mean number of ablations per centre | 315 | 338 |
| Number of AF ablations | 1.081 | 1.204 |
| Number of ablation centres (> 50 AF ablations) | 6 | 7 |
| Number of VT/VF ablations | 81 | 87 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 4 | 3 |
| Number of LAA closures | 67 | 33 |
| Number of centres (LAA closures) | 6 | 5 |

| Number of electrophysiologists | | |
|---------------------------------------|--|--|
|---------------------------------------|--|--|

| | | |
|--|----|---------------|
| Number of electrophysiologists performed catheter ablation independently | 25 | 25 |
| Number of physicians under training to become independent electrophysiologists | 15 | not available |

| | |
|---|-----------|
| Availability of a national registry for interventional electrophysiology | No |
|---|-----------|

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|--|--|
|--|--|

| | |
|----------|-----------|
| National | Yes |
| U.S. | No answer |
| European | Yes |

| Obstacles to guideline implementation | | | | | | Ranking of importance |
|---|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 3 |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Working Group on Cardiac Arrhythmias and Pacing, Hungarian Society of Cardiology |
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
| EHRA White Book 2015 |
| Official statistics – National Health Insurance Fund |
| Survey from professional association - Working Group on Cardiac Arrhythmias and Pacing, Hungarian Society of Cardiology |

ICELAND



1. Statistics

Age pyramid for Iceland



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 2,4 | 2014 |
| Beds (per 100.000 population) | 317,1 | 2014 |
| Density of physicians (per 1.000 population) | 3,6 | 2014 |
| Density of nurses (per 1.000 population) | 16,2 | 2014 |

| Demographic information | | Year |
|-------------------------------------|---------|------|
| Population | 331.918 | 2015 |
| Population annual growth rate (%) | 1,2 | 2015 |
| Life expectancy at birth (in years) | 83 | 2015 |
| Death rate (per 1.000 population) | 6,3 | 2009 |
| Live births (per 1.000 population) | 13,4 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 16,74 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 51.068,20 | 2015* |
| Total expenditure on health as% of GDP | 9,1 | 2013 |
| General government expenditure on health as% of total expenditure on health | 80,5 | 2012 |
| Private expenditure on health as% of total expenditure on health | 19,5 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|------|
| | 2014 | 2015 |
| | 45% | 36% |

3. Healthcare System

National Health System with universal access

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: Permanent residency

| Percentage of insured and uninsured citizens | 2014 | 2015 |
|--|------|------|
|--|------|------|

| | | |
|--------------------|------|------|
| Insured citizens | 100% | 100% |
| Uninsured citizens | 0% | 0% |

| Distribution of insurance modality | 2014 | 2015 |
|------------------------------------|------|------|
|------------------------------------|------|------|

| | | |
|---------------------------|------|------|
| Public insurance company | 100% | 100% |
| Private insurance company | 0% | 0% |
| Private co-payment | 0% | 0% |

| Possibility to subscribing to private health insurance plans | No |
|--|----|
|--|----|

| Co-payment necessary for the following therapy | |
|--|--|
|--|--|

| | |
|-------------|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|
|---|--|--|--|--|--|--|--|--|--|

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|-------------------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Comments: For atrial fibrillation ablations only



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input checked="" type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|-----|------------------------------|
| | | Specialist |
| Catheter ablation | Yes | Cardiologist |
| ICD or pacemaker implants | Yes | Cardiologist/Cardiac Surgeon |

| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|
|---|----|

| | |
|---|------------------|
| Required period of training to perform implantations | No |
| Suggested period of training to perform implantations | No |
| National quality control system availability | No |
| Willingness to install quality control system | No answer |
| Responsible person for quality control | No answer |
| Training centres availability | |
| Pacemaker | 0 |
| ICD implantation | 0 |
| CRT implantation | 0 |
| Electrophysiological studies and catheter ablation | 0 |
| Atrial fibrillation ablation | 0 |
| Number of universities (Schools of Medicine) | 1 |
| Percentage of academic centres among all practicing EP centres | 100% |
| Percentage of academic centres among all practicing implanting devices centres | 100% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|-------------|
| | 2014 | 2015 |
| Implanting centres | 2 | 2 |
| Total Pacemaker units implanted | 298 | 308 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 257 | 263 |
| Replacements | 41 | 45 |
| Specialist performing implants | | |
| Cardiologists | Yes | 50% |
| Surgeons | Yes | 50% |



6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 1 | 1 |
| Total CRT units implanted | 26 | 21 |
| Thereof, CRT pacemaker | 16 | 13 |
| Thereof, CRT ICD | 10 | 8 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 1 | 1 |
| Total ICD units implanted | 59 | 59 |
| Thereof, Single chamber | 22 | 25 |
| Thereof, Dual chamber | 37 | 34 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 55 | 40 |
| Replacements | 4 | 19 |
| Specialist performing implants | | |
| Cardiologists | Yes | 50% |
| Surgeons | Yes | 50% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 1 | 2 |
| Total loop recorders implanted | 4 | 14 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 1 | 0 |
| Total lead extraction procedures | 1 | 0 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|----|---------------|
| National registry for | | |
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|------|------|
| | 2014 | 2015 |
| Number of ablation centres | 1 | 1 |
| Number of ablations performed | 76 | 78 |
| Mean number of ablations per centre | 76 | 78 |
| Number of AF ablations | 33 | 36 |
| Number of ablation centres (> 50 AF ablations) | 0 | 0 |
| Number of VT/VF ablations | 6 | 5 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 0 | 0 |
| Number of LAA closures | 0 | 0 |
| Number of centres (LAA closures) | 0 | 0 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 2 | 3 |
| Number of physicians under training to become independent electrophysiologists | 0 | 0 |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|-----------------------|
| National | No | | | | | |
| U.S. | No | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of referral | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of trained personnel | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Lack of operators | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| 1 = no obstacle, 5 = great obstacle | | | | | | 1 = top, 6 = lowest |

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|---------------------------------|
| Icelandic Society of Cardiology |
|---------------------------------|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

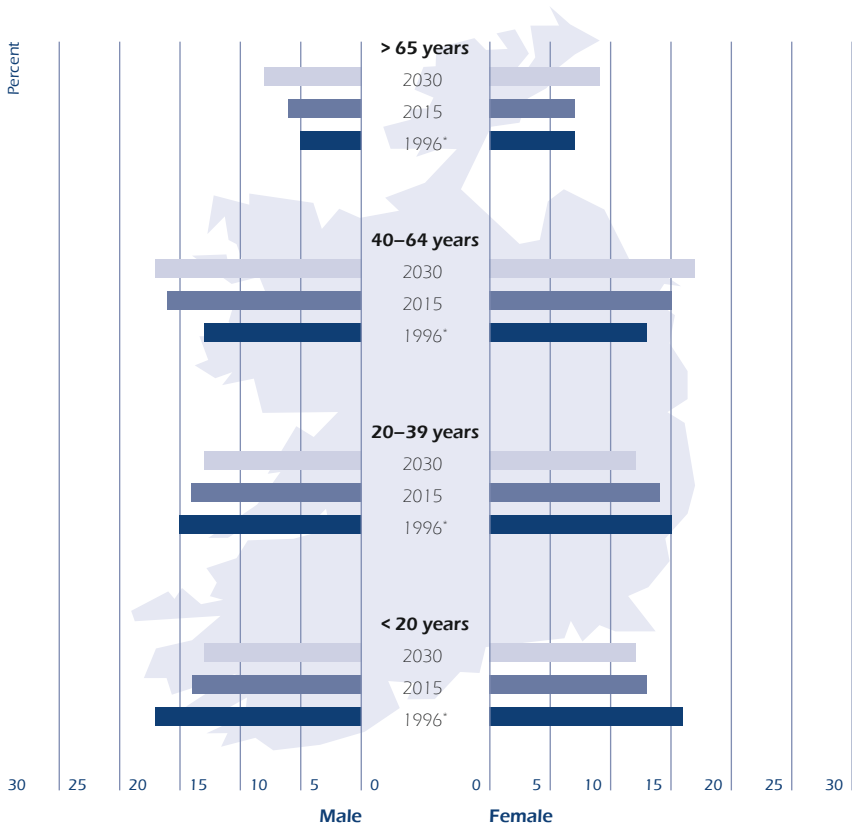
| |
|---------------------|
| Official statistics |
|---------------------|

IRELAND



1. Statistics

Age pyramid for Ireland



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 2,1 | 2012 |
| Beds (per 100.000 population) | 276,1 | 2013 |
| Density of physicians (per 1.000 population) | 2,8 | 2014 |
| Density of nurses (per 1.000 population) | 12,6 | 2011 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 4.892.305 | 2015 |
| Population annual growth rate (%) | 1,2 | 2015 |
| Life expectancy at birth (in years) | 81 | 2015 |
| Death rate (per 1.000 population) | 6,4 | 2012 |
| Live births (per 1.000 population) | 15,0 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 227,50 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 48.939,68 | 2015* |
| Total expenditure on health as% of GDP | 8,9 | 2013 |
| General government expenditure on health as% of total expenditure on health | 67,6 | 2012 |
| Private expenditure on health as% of total expenditure on health | 32,4 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|---------------|-------|
| | not available | 0,19% |

3. Healthcare System

Health Services Executive

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: Under the Health act 1970, everyone who is ordinary resident in Ireland qualifies for hospital care

| Percentage of insured and uninsured citizens | 2014 | 2015 |
|--|------|------|
|--|------|------|

| | | |
|--------------------|------|-------|
| Insured citizens | 48 % | 100 % |
| Uninsured citizens | 52 % | 0 % |

| Distribution of insurance modality | 2014 | 2015 |
|------------------------------------|------|------|
|------------------------------------|------|------|

| | | |
|---------------------------|------|-------|
| Public insurance company | 48 % | 100 % |
| Private insurance company | 52 % | 46 % |
| Private co-payment | 0 % | 46 % |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|--|
|--|--|

| | |
|-------------|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
|---|--|--|--|--|--|--|--|--|

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|--------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Comments: In the public health system all the above procedures are covered with no additional incentive or reimbursement for salaried physicians. In the private insurance system all the above are covered with physician reimbursement.



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input checked="" type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | Specialist |
|---------------------------|-----|-----------------------------|
| Catheter ablation | Yes | Cardiac electrophysiologist |
| ICD or pacemaker implants | Yes | Cardiac electrophysiologist |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|

| | |
|--|---------|
| Required period of training to perform implantations | Yes |
| | 6 years |

| | |
|---|---------|
| Suggested period of training to perform implantations | Yes |
| | 6 years |

| | |
|---|------------------|
| National quality control system availability | No |
| Willingness to install quality control system | No answer |
| Responsible person for quality control | |
| HIQA | |
| Training centres availability | |
| Pacemaker | 10 |
| ICD implantation | 10 |
| CRT implantation | 10 |
| Electrophysiological studies and catheter ablation | 6 |
| Atrial fibrillation ablation | 6 |
| Number of universities (Schools of Medicine) | 5 |
| Percentage of academic centres among all practicing EP centres | 50% |
| Percentage of academic centres among all practicing implanting devices centres | 63% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 17 | 17 |
| Total Pacemaker units implanted | not available | 2.277 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | not available | not available |
| Replacements | not available | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 17 | 17 |
| Total CRT units implanted | not available | 319 |
| Thereof, CRT pacemaker | not available | 88 |
| Thereof, CRT ICD | not available | 231 |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 17 | 17 |
| Total ICD units implanted | not available | not available |
| Thereof, Single chamber | not available | 403 |
| Thereof, Dual chamber | not available | 337 |
| Thereof, Subcutaneous ICD | not available | not available |
| First implants | not available | not available |
| Replacements | not available | not available |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 17 | 17 |
| Total loop recorders implanted | not available | 760 |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 2 | 2 |
| Total lead extraction procedures | not available | not available |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 50 % |
| Surgeons | Yes | 50 % |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|-----|--|
| National registry for | | |
| | | Official name |
| ICD | Yes | G-pace/Heart Rhythm Ireland but not 100% participation |
| Pacing | Yes | G-pace/Heart Rhythm Ireland but not 100% participation |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No answer |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | Yes |
| Official name: Irish Medicines Board | | |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 12 | 12 |
| Number of ablations performed | not available | not available |
| Mean number of ablations per centre | not available | not available |
| Number of AF ablations | not available | 650 |
| Number of ablation centres (> 50 AF ablations) | not available | not available |
| Number of VT/VF ablations | not available | 110 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | not available | not available |
| Number of LAA closures | not available | not available |
| Number of centres (LAA closures) | not available | not available |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | not available | not available |
| Number of physicians under training to become independent electrophysiologists | not available | not available |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------------------|
| National | No answer | | | | | |
| U.S. | Yes | | | | | |
| European | No answer | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of reimbursement, limited financial resources | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of referral | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of trained personnel | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Low awareness of guidelines | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of operators | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|--------------------------------------|
| EP Subgroup of Irish Cardiac Society |
|--------------------------------------|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

| |
|--|
| Central Statistics Office, Health Insurance Authority Report |
|--|

| |
|---|
| Department of Health, Department of Finance |
|---|

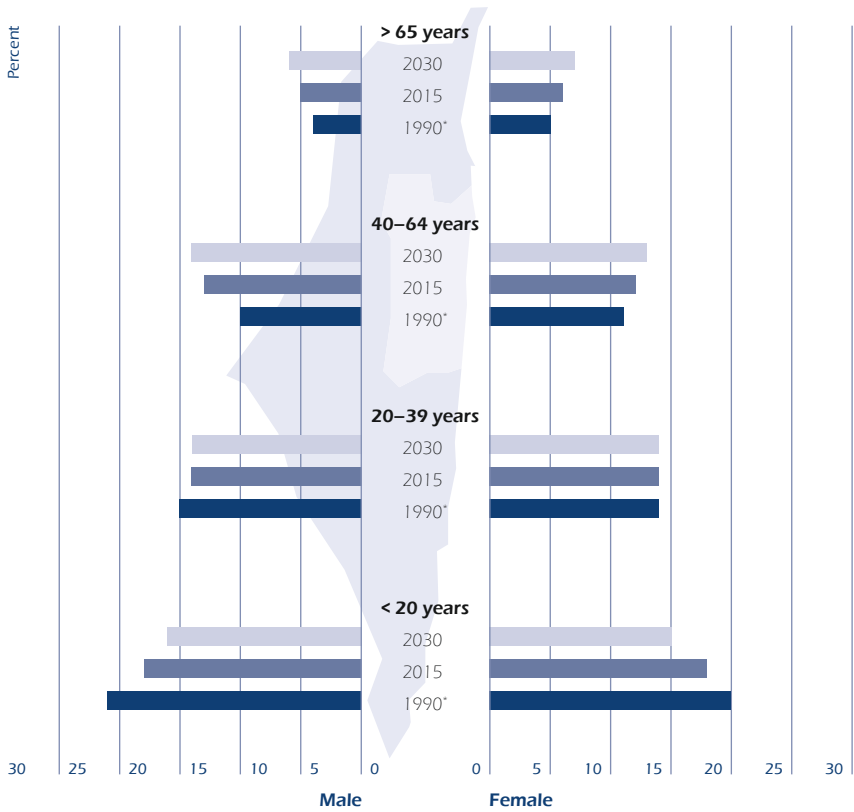
| |
|----------|
| Industry |
|----------|

ISRAEL



1. Statistics

Age pyramid for Israel



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 1,1 | 2013 |
| Beds (per 100.000 population) | 309,2 | 2013 |
| Density of physicians (per 1.000 population) | 3,3 | 2012 |
| Density of nurses (per 1.000 population) | 5,0 | 2012 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 8.049.314 | 2015 |
| Population annual growth rate (%) | 1,6 | 2015 |
| Life expectancy at birth (in years) | 82 | 2015 |
| Death rate (per 1.000 population) | 5,2 | 2013 |
| Live births (per 1.000 population) | 21,4 | 2014 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 298,87 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 35.702,07 | 2015* |
| Total expenditure on health as% of GDP | 7,2 | 2013 |
| General government expenditure on health as% of total expenditure on health | 59,8 | 2012 |
| Private expenditure on health as% of total expenditure on health | 40,2 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|---------------|------|
| | 2014 | 2015 |
| | not available | 17 % |

3. Healthcare System

National Health System (National Insurance) with private sector supplements

| Basic insurance availability | | | | | | | Yes | |
|--|---|--------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| Percentage of insured and uninsured citizens | | | | | | | | |
| | | | | | | | 2014 | 2015 |
| Insured citizens | | | | | | | 100% | 100% |
| Uninsured citizens | | | | | | | 0% | 0% |
| Distribution of insurance modality | | | | | | | | |
| | | | | | | | 2014 | 2015 |
| Public insurance company | | | | | | | 100% | 100% |
| Private insurance company | | | | | | | 0% | 0% |
| Private co-payment | | | | | | | 0% | 0% |
| Possibility to subscribing to private health insurance plans | | | | | | | Yes | |
| Co-payment necessary for the following therapy | | | | | | | | |
| ICD devices | | | | | | | No | |
| Pacemakers | | | | | | | No | |
| Ablation | | | | | | | No | |
| Reimbursement availability for physicians and hospitals | | | | | | | | |
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|-----|---------------------|
| | | Specialist |
| Catheter ablation | Yes | Electrophysiologist |
| ICD or pacemaker implants | Yes | Cardiologist |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|

| | |
|--|----|
| Required period of training to perform implantations | No |
|--|----|

| | |
|---|----|
| Suggested period of training to perform implantations | No |
|---|----|

| | |
|---|------------------|
| National quality control system availability | No answer |
| Willingness to install quality control system | No answer |
| Responsible person for quality control | |
| The ministry of Health | |
| Training centres availability | |
| Pacemaker | 1 |
| ICD implantation | 1 |
| CRT implantation | 1 |
| Electrophysiological studies and catheter ablation | 1 |
| Atrial fibrillation ablation | 1 |
| Number of universities (Schools of Medicine) | 6 |
| Percentage of academic centres among all practicing EP centres | 100% |
| Percentage of academic centres among all practicing implanting devices centres | 100% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 20 | 20 |
| Total Pacemaker units implanted | 4.200 | 4.250 |
| Thereof, Leadless Pacemaker | not available | 10 |
| First implants | not available | not available |
| Replacements | not available | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 98% |
| Surgeons | Yes | 2% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|-------|-------|
| | 2014 | 2015 |
| Implanting centres | 20 | 20 |
| Total CRT units implanted | 1.330 | 1.452 |
| Thereof, CRT pacemaker | 80 | 115 |
| Thereof, CRT ICD | 1.250 | 1.337 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 20 | 20 |
| Total ICD units implanted | 1.685 | 1.300 |
| Thereof, Single chamber | 708 | 700 |
| Thereof, Dual chamber | 977 | 600 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 1.265 | not available |
| Replacements | 420 | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 20 | 20 |
| Total loop recorders implanted | 225 | 310 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 5 | 5 |
| Total lead extraction procedures | 80 | 80 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 99% |
| Surgeons | Yes | 1% |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|-----|----------------------|
| National registry for | | |
| | | Official name |
| ICD | Yes | Israeli ICD Registry |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 16 | 16 |
| Number of ablations performed | not available | not available |
| Mean number of ablations per centre | not available | not available |
| Number of AF ablations | 550 | not available |
| Number of ablation centres (> 50 AF ablations) | 4 | 4 |
| Number of VT/VF ablations | not available | not available |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 4 | 4 |
| Number of LAA closures | 30 | not available |
| Number of centres (LAA closures) | 5 | 7 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 35 | 35 |
| Number of physicians under training to become independent electrophysiologists | 1 | 2 |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------------------|
| National | Yes | | | | | |
| U.S. | Yes | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of reimbursement, limited financial resources | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of referral | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of trained personnel | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Low awareness of guidelines | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of operators | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|--|
| The Israeli Working Group on Pacing and Electrophysiology, Israeli Heart Society |
|--|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

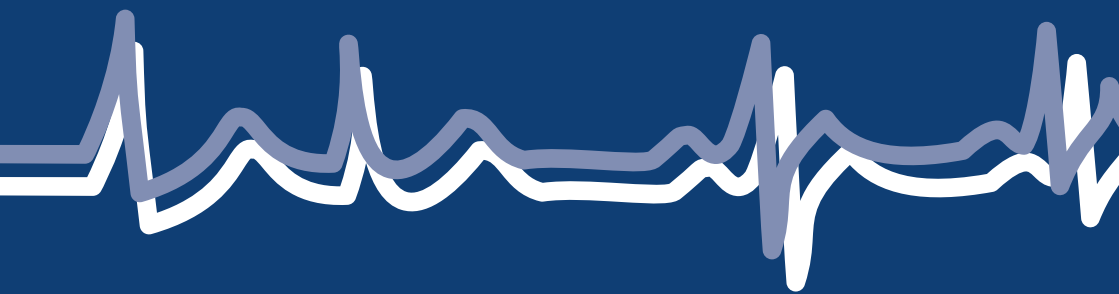
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|----------------------|
| EHRA White Book 2015 |
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|---------------------|
| Official statistics |
|---------------------|

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|------------|
| Sales data |
|------------|

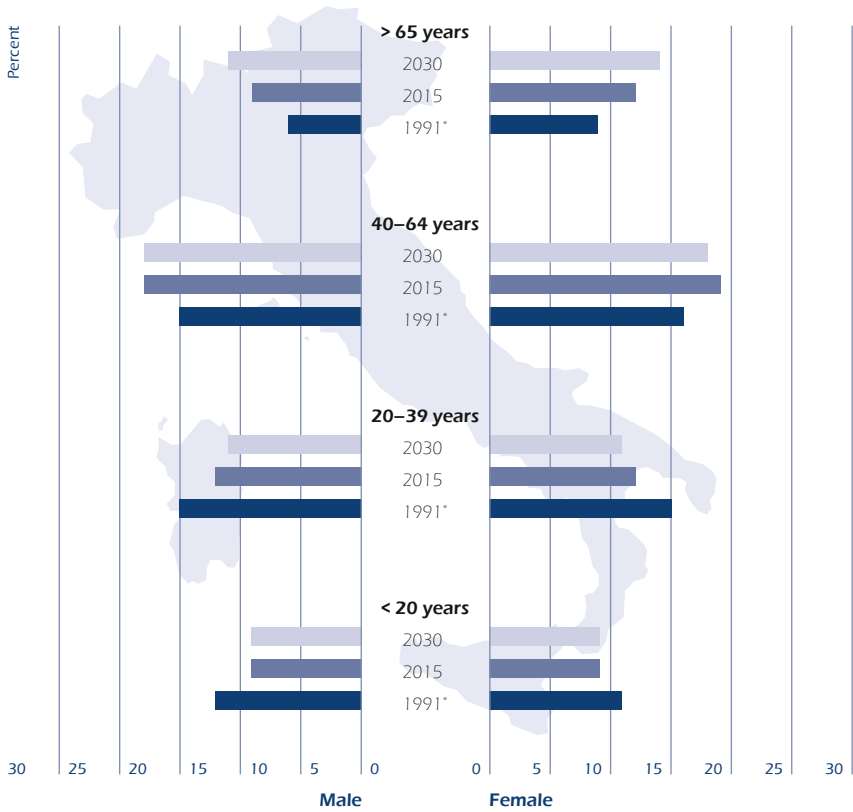
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|------------|
| Estimation |
|------------|

ITALY



1. Statistics

Age pyramid for Italy



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 1,9 | 2012 |
| Beds (per 100.000 population) | 342,2 | 2012 |
| Density of physicians (per 1.000 population) | 3,9 | 2013 |
| Density of nurses (per 1.000 population) | 6,3 | 2013 |

| Demographic information | | Year |
|-------------------------------------|------------|------|
| Population | 61.855.120 | 2015 |
| Population annual growth rate (%) | 0,3 | 2015 |
| Life expectancy at birth (in years) | 82 | 2015 |
| Death rate (per 1.000 population) | 10,3 | 2012 |
| Live births (per 1.000 population) | 8,4 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 1.819,05 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 29.847,38 | 2015* |
| Total expenditure on health as% of GDP | 9,1 | 2013 |
| General government expenditure on health as% of total expenditure on health | 77,3 | 2012 |
| Private expenditure on health as% of total expenditure on health | 22,7 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|---------------|---------------|
| | not available | not available |

3. Healthcare System

National health care system with the possibility of private insurance

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: to be Italian citizen

| Percentage of insured and uninsured citizens | | |
|--|--|--|
|--|--|--|

| | 2014 | 2015 |
|--------------------|------|------|
| Insured citizens | 100% | 100% |
| Uninsured citizens | 0% | 0% |

| Distribution of insurance modality | | |
|------------------------------------|--|--|
|------------------------------------|--|--|

| | 2014 | 2015 |
|---------------------------|------|------|
| Public insurance company | 100% | 100% |
| Private insurance company | 0% | 0% |
| Private co-payment | 0% | 0% |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|--|
|--|--|

| | |
|-------------|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
|---|--|--|--|--|--|--|--|--|

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|-------------------------------------|--|--------------------------|---|--------------------------|-------------------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Comments: We have no dedicated reimbursement for leadless pacing and S-ICD. The reimbursement for leadless pacing is the same for single chamber pacemaker replacement. The reimbursement for S-ICD is the same for single chamber ICD.

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | AIAC (italian heart rhythm association) certification for cardiac pacing |
| invasive electrophysiology | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | AIAC (italian heart rhythm association) certification for electrophysiology |
| allied professionals | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | EHRA certification for ap |
| training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input checked="" type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | |
|---------------------------|------------|
| | Specialist |
| Catheter ablation | No |
| ICD or pacemaker implants | No |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|

| | |
|---|---------------|
| Required period of training to perform implantations | No |
| Suggested period of training to perform implantations | No |
| National quality control system availability | No |
| Willingness to install quality control system | Yes |
| Responsible person for quality control | |
| Not applicable | |
| Training centres availability | |
| Pacemaker | not available |
| ICD implantation | not available |
| CRT implantation | not available |
| Electrophysiological studies and catheter ablation | not available |
| Atrial fibrillation ablation | not available |
| Number of universities (Schools of Medicine) | 35 |
| Percentage of academic centres among all practicing EP centres | 7% |
| Percentage of academic centres among all practicing implanting devices centres | 10% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 433 | 435 |
| Total Pacemaker units implanted | 63.442 | 65.234 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | 44.409 | not available |
| Replacements | 19.033 | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|--------|--------|
| | 2014 | 2015 |
| Implanting centres | 378 | 380 |
| Total CRT units implanted | 12.336 | 12.815 |
| Thereof, CRT pacemaker | 2.112 | 2.153 |
| Thereof, CRT ICD | 10.224 | 10.662 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 397 | 396 |
| Total ICD units implanted | 13.729 | 14.709 |
| Thereof, Single chamber | 6.128 | 6.584 |
| Thereof, Dual chamber | 7.601 | 7.574 |
| Thereof, Subcutaneous ICD | not available | 551 |
| First implants | 9.336 | not available |
| Replacements | 4.393 | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|-------|-------|
| | 2014 | 2015 |
| Implanting centres | 400 | 400 |
| Total loop recorders implanted | 3.900 | 4.000 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | not available | not available |
| Total lead extraction procedures | not available | not available |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 100 % |
| Surgeons | No | 0 % |

10. Device specific

| | | |
|---|-----|---------------|
| Availability of remote monitoring of devices | | Yes |
| National registry for | | |
| | | Official name |
| ICD | Yes | RIP & RID |
| Pacing | Yes | RIP & RID |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | Yes |
| Official name: AIAC | | |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | not available | not available |
| Number of ablations performed | not available | not available |
| Mean number of ablations per centre | not available | not available |
| Number of AF ablations | not available | not available |
| Number of ablation centres (> 50 AF ablations) | not available | not available |
| Number of VT/VF ablations | not available | not available |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | not available | not available |
| Number of LAA closures | not available | not available |
| Number of centres (LAA closures) | not available | not available |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | not available | not available |
| Number of physicians under training to become independent electrophysiologists | not available | not available |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------|
| National | Yes | | | | | |
| U.S. | No | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 1 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of operators | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|---|
| AIAC – Associazione Italiana Aritmologia E Cardiolazione (Italian Heart Rhythm Association) |
|---|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

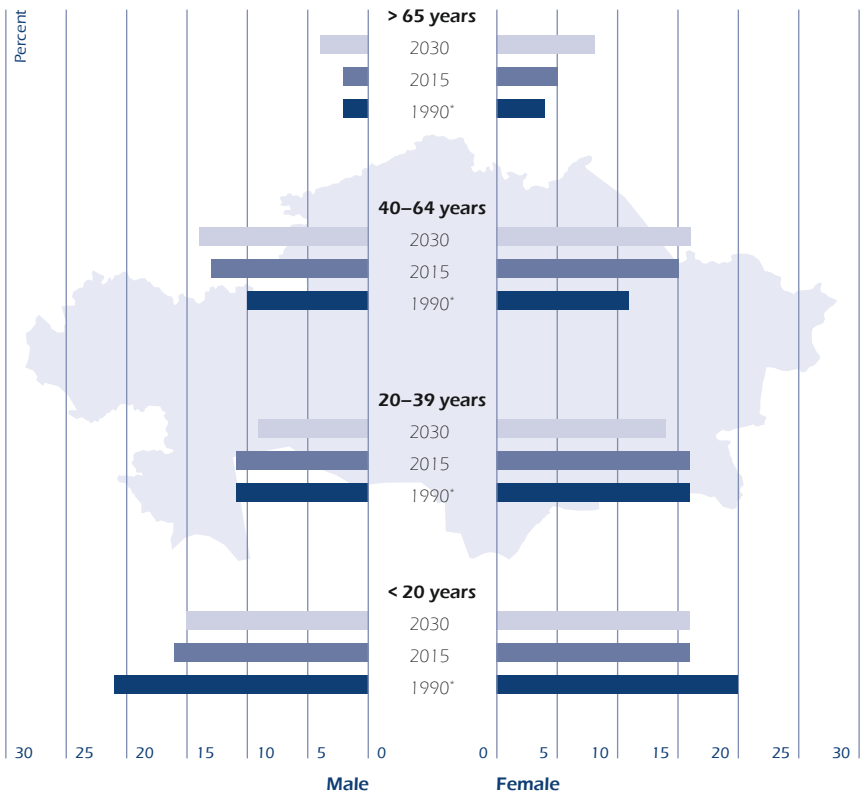
| |
|--------------------------------------|
| EHRA White Book 2015 |
| Survey from professional association |
| Sales data |
| Estimation |

KAZAKHSTAN



1. Statistics

Age pyramid for Kazakhstan



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 5,4 | 2013 |
| Beds (per 100.000 population) | 671,8 | 2013 |
| Density of physicians (per 1.000 population) | 3,5 | 2013 |
| Density of nurses (per 1.000 population) | 8,0 | 2013 |

| Demographic information | | Year |
|-------------------------------------|------------|------|
| Population | 18.157.122 | 2015 |
| Population annual growth rate (%) | 1,2 | 2015 |
| Life expectancy at birth (in years) | 71 | 2015 |
| Death rate (per 1.000 population) | 8,5 | 2012 |
| Live births (per 1.000 population) | 22,7 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 195,01 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 11.028,07 | 2015* |
| Total expenditure on health as% of GDP | 4,3 | 2013 |
| General government expenditure on health as% of total expenditure on health | 55,8 | 2012 |
| Private expenditure on health as% of total expenditure on health | 44,2 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|-------|------|
| | 2014 | 2015 |
| | 23,5% | 26% |

3. Healthcare System

National Health System

| Basic insurance availability | | | | No | | | | |
|--|---|-------------------------------------|--|--------------------------|---|-------------------------------------|--------------------------|-------------------------------------|
| Percentage of insured and uninsured citizens | | | | | | | | |
| | | | | 2014 | | 2015 | | |
| Insured citizens | | | | not available | | not available | | |
| Uninsured citizens | | | | not available | | not available | | |
| Distribution of insurance modality | | | | | | | | |
| | | | | 2014 | | 2015 | | |
| Public insurance company | | | | not available | | not available | | |
| Private insurance company | | | | not available | | not available | | |
| Private co-payment | | | | not available | | not available | | |
| Possibility to subscribing to private health insurance plans | | | | | | | | Yes |
| Co-payment necessary for the following therapy | | | | | | | | |
| ICD devices | | | | | | | | No |
| Pacemakers | | | | | | | | No |
| Ablation | | | | | | | | No |
| Reimbursement availability for physicians and hospitals | | | | | | | | |
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input checked="" type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|-----|--|
| | | Specialist |
| Catheter ablation | Yes | Interventional cardiologist |
| ICD or pacemaker implants | Yes | Interventional cardiologist or cardiac surgeon |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|

| | |
|--|----|
| Required period of training to perform implantations | No |
|--|----|

| | |
|---|--------|
| Suggested period of training to perform implantations | Yes |
| | 1 year |

| | |
|---|----------------------|
| National quality control system availability | Yes |
| Pacemaker | Yes |
| ICD implantation | Yes |
| CRT implantation | Yes |
| Cathether ablation | Yes |
| Responsible person for quality control | |
| Medical and Pharmaceutical activity Control Committee | |
| Training centres availability | |
| Pacemaker | 2 |
| ICD implantation | 2 |
| CRT implantation | 2 |
| Electrophysiological studies and catheter ablation | 2 |
| Atrial fibrillation ablation | 2 |
| Number of universities (Schools of Medicine) | 7 |
| Percentage of academic centres among all practicing EP centres | not available |
| Percentage of academic centres among all practicing implanting devices centres | not available |

5. Pacemakers

| | | |
|---|---------------|---------------|
| Pacemaker units implanted and number of implanting centres | | |
| | 2014 | 2015 |
| Implanting centres | 22 | 25 |
| Total Pacemaker units implanted | 2.355 | 1.801 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | not available | not available |
| Replacements | not available | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | not available |
| Surgeons | Yes | not available |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 13 | 18 |
| Total CRT units implanted | 262 | 314 |
| Thereof, CRT pacemaker | not available | 0 |
| Thereof, CRT ICD | not available | 314 |
| Specialist performing implants | | |
| Cardiologists | Yes | not available |
| Surgeons | Yes | not available |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 15 | 19 |
| Total ICD units implanted | 402 | 527 |
| Thereof, Single chamber | not available | 23 |
| Thereof, Dual chamber | not available | 504 |
| Thereof, Subcutaneous ICD | not available | not available |
| First implants | not available | not available |
| Replacements | not available | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | not available |
| Surgeons | No | not available |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 5 | 2 |
| Total loop recorders implanted | 27 | 19 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 0 | 1 |
| Total lead extraction procedures | 0 | 16 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 100% |
| Surgeons | Yes | 0% |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|----|---------------|
| National registry for | | |
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | Yes |
| Medical and Pharmaceutical Activity Control Committee | | |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 9 | 13 |
| Number of ablations performed | 2,018 | 2,461 |
| Mean number of ablations per centre | 224 | 189 |
| Number of AF ablations | 524 | 762 |
| Number of ablation centres (> 50 AF ablations) | 4 | 4 |
| Number of VT/VF ablations | 298 | not available |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 4 | not available |
| Number of LAA closures | not available | 81 |
| Number of centres (LAA closures) | 4 | 3 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | not available | not available |
| Number of physicians under training to become independent electrophysiologists | not available | not available |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|--------------------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|-----------------------|
| National | No answer | | | | | |
| U.S. | No | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 2 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 4 |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Low awareness of guidelines | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 1 |
| 1 = no obstacle, 5 = great obstacle | | | | | | 1 = top, 6 = lowest |

13. Sources

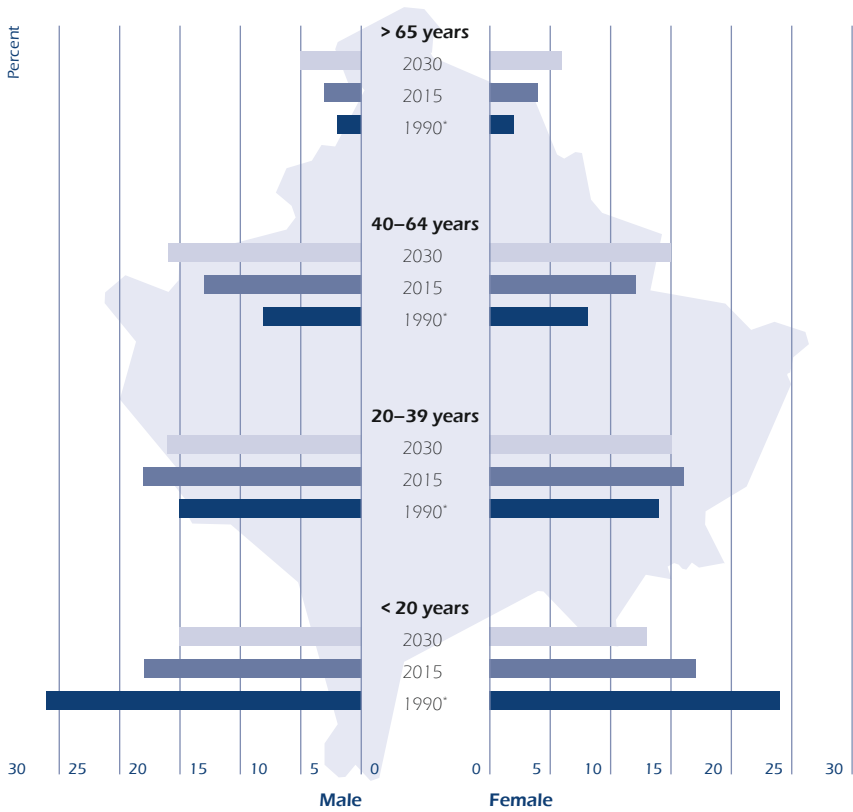
| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Association of cardiologists of Kazakhstan, Kazakh Association of arrhythmologists |
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
| EHRA White Book 2015 |
| Official statistics |
| Survey from professional association |

KOSOVO



1. Statistics

Age pyramid for Kosovo



* 1990 or last available

| Healthcare data | | Year |
|--|---------------|---------------|
| Hospitals (per 100.000 population) | not available | not available |
| Beds (per 100.000 population) | not available | not available |
| Density of physicians (per 1.000 population) | not available | not available |
| Density of nurses (per 1.000 population) | not available | not available |

| Demographic information | | Year |
|-------------------------------------|---------------|---------------|
| Population | 1.870.981 | 2015 |
| Population annual growth rate (%) | 0,6 | 2015 |
| Life expectancy at birth (in years) | 71 | 2015 |
| Death rate (per 1.000 population) | not available | not available |
| Live births (per 1.000 population) | not available | not available |

| Economic information | | Year |
|---|---------------|---------------|
| Gross domestic product (U.S dollar-billions) | 6,31 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | not available | not available |
| Total expenditure on health as% of GDP | not available | not available |
| General government expenditure on health as% of total expenditure on health | not available | not available |
| Private expenditure on health as% of total expenditure on health | not available | not available |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| | not available | not available |

3. Healthcare System

Health care system in Kosovo is organized in three sectors including: primary, secondary and tertiary health care. The highest health care authority in Kosovo is Ministry of Health of Kosovo.

| Basic insurance availability | | | | | | No | | | |
|--|--------------------------|---|--------------------------|--|-------------------------------------|---|--------------------------|--------------------------|--|
| Percentage of insured and uninsured citizens | | | | | | | | | |
| | | | | | | 2014 | 2015 | | |
| Insured citizens | | | | | | not available | not available | | |
| Uninsured citizens | | | | | | not available | not available | | |
| Distribution of insurance modality | | | | | | | | | |
| | | | | | | 2014 | 2015 | | |
| Public insurance company | | | | | | not available | not available | | |
| Private insurance company | | | | | | not available | not available | | |
| Private co-payment | | | | | | not available | not available | | |
| Possibility to subscribing to private health insurance plans | | | | | | No answer | | | |
| Co-payment necessary for the following therapy | | | | | | | | | |
| ICD devices | | | | | | No | | | |
| Pacemakers | | | | | | No | | | |
| Ablation | | | | | | No | | | |
| Reimbursement availability for physicians and hospitals | | | | | | | | | |
| | | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital | |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input checked="" type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input checked="" type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|-----------|--------------|
| | | Specialist |
| Catheter ablation | No answer | |
| ICD or pacemaker implants | Yes | Cardiologist |

| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|
|---|----|

| Required period of training to perform implantations | No answer |
|--|-----------|
|--|-----------|

| Suggested period of training to perform implantations | No answer |
|---|-----------|
|---|-----------|

| | |
|---|----------------------|
| National quality control system availability | No |
| Willingness to install quality control system | Yes |
| Responsible person for quality control | |
| University clinical center of Kosovo Clinic of Cardiology | |
| Training centres availability | |
| Pacemaker | 5 |
| ICD implantation | 3 |
| CRT implantation | not available |
| Electrophysiological studies and catheter ablation | not available |
| Atrial fibrillation ablation | not available |
| Number of universities (Schools of Medicine) | 1 |
| Percentage of academic centres among all practicing EP centres | not available |
| Percentage of academic centres among all practicing implanting devices centres | not available |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 2 | 3 |
| Total Pacemaker units implanted | 127 | 122 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | 120 | 116 |
| Replacements | 7 | 6 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | not available |
| Other | | not available |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|----------------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 0 | 1 |
| Total CRT units implanted | 0 | 4 |
| Thereof, CRT pacemaker | 0 | not available |
| Thereof, CRT ICD | 0 | 4 |
| Specialist performing implants | | |
| Cardiologists | Yes | 80% |
| Surgeons | No | not available |
| Other | Technical consultant | 20% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 1 | 1 |
| Total ICD units implanted | 3 | 12 |
| Thereof, Single chamber | 0 | 9 |
| Thereof, Dual chamber | 3 | 3 |
| Thereof, Subcutaneous ICD | not available | not available |
| First implants | not available | 12 |
| Replacements | not available | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | not available |
| Other | | not available |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|---------------|
| | 2014 | 2015 |
| Implanting centres | 0 | not available |
| Total loop recorders implanted | 0 | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 0 | not available |
| Total lead extraction procedures | 0 | not available |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | not available |
| Other | | not available |

10. Device specific

| Availability of remote monitoring of devices | | No |
|--|----|---------------|
| Reasons why remote monitoring is not available: We do not have such a device. | | |
| National registry for | | |
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 0 | not available |
| Number of ablations performed | 0 | not available |
| Mean number of ablations per centre | not available | not available |
| Number of AF ablations | 0 | not available |
| Number of ablation centres (> 50 AF ablations) | 0 | not available |
| Number of VT/VF ablations | 0 | not available |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 0 | not available |
| Number of LAA closures | 0 | not available |
| Number of centres (LAA closures) | 0 | not available |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 0 | not available |
| Number of physicians under training to become independent electrophysiologists | 0 | not available |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-------------------------------------|--------------------------|-------------------------------------|--------------------------|-------------------------------------|-----------------------|
| National | No | | | | | |
| U.S. | No | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 1 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 4 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 2 |
| Low awareness of guidelines | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 3 |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

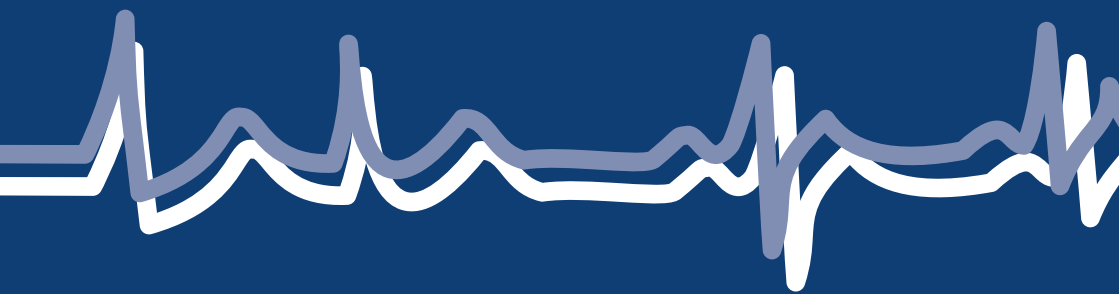
| |
|--|
| Name of National Cardiac Society, National Working Group or arrhythmia body |
|--|

| |
|------------------------------|
| Kosovo Society of Cardiology |
|------------------------------|

| |
|--|
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|--|

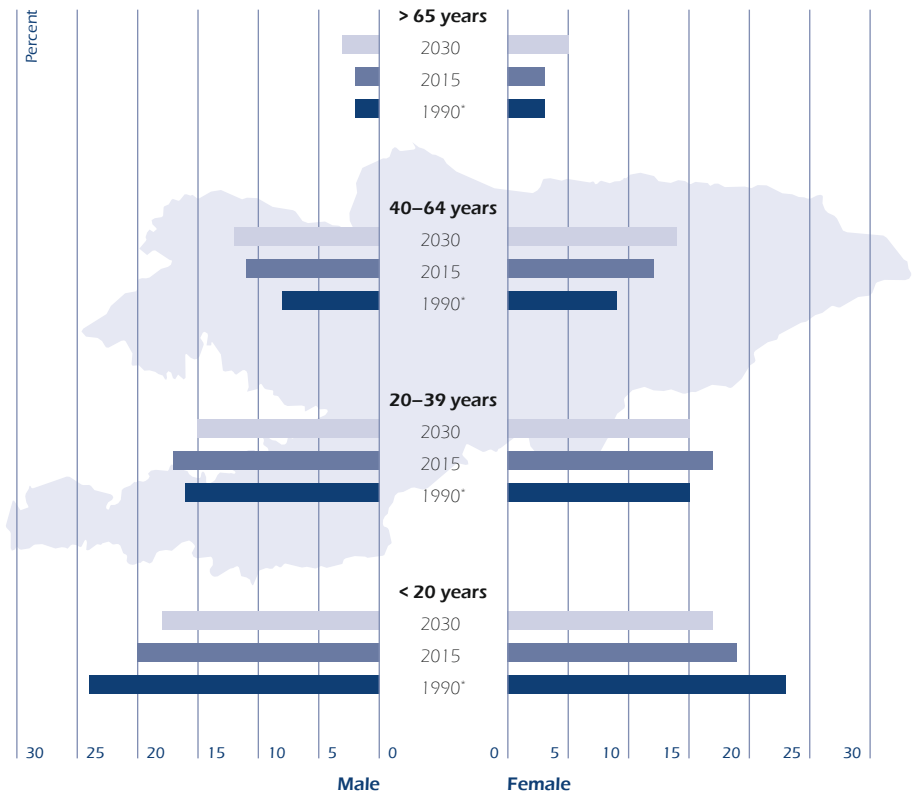
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|----------------------|
| EHRA White Book 2015 |
|----------------------|

KYRGYZSTAN



1. Statistics

Age pyramid for Kyrgyzstan



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 2,5 | 2013 |
| Beds (per 100.000 population) | 451,2 | 2013 |
| Density of physicians (per 1.000 population) | 1,9 | 2013 |
| Density of nurses (per 1.000 population) | 6,0 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 5.664.939 | 2015 |
| Population annual growth rate (%) | 1,1 | 2015 |
| Life expectancy at birth (in years) | 70 | 2015 |
| Death rate (per 1.000 population) | 6,1 | 2013 |
| Live births (per 1.000 population) | 27,2 | 2013 |

| Economic information | | Year |
|---|----------|-------|
| Gross domestic product (U.S dollar-billions) | 7,16 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 1.197,76 | 2015* |
| Total expenditure on health as% of GDP | 6,7 | 2013 |
| General government expenditure on health as% of total expenditure on health | 60,2 | 2012 |
| Private expenditure on health as% of total expenditure on health | 39,8 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|------|
| | 2014 | 2015 |
| | 50% | 50% |

3. Healthcare System

National Health System

Basic insurance availability Yes

Requirements for citizens to qualify for public insurance:

- pensioners at age 70 years and older
- labouring people
- children at age 5 years and less
- invalids at 2nd and 1st groups

Percentage of insured and uninsured citizens

| | 2014 | 2015 |
|--------------------|---------------|---------------|
| Insured citizens | not available | not available |
| Uninsured citizens | not available | not available |

Distribution of insurance modality

| | 2014 | 2015 |
|---------------------------|---------------|---------------|
| Public insurance company | not available | not available |
| Private insurance company | not available | not available |
| Private co-payment | not available | not available |

Possibility to subscribing to private health insurance plans Yes

Co-payment necessary for the following therapy

| | |
|-------------|-----|
| ICD devices | Yes |
| Pacemakers | Yes |
| Ablation | Yes |

Comments: Yes, not only in the private sector, at public hospitals too.

Reimbursement availability for physicians and hospitals

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|--------------------------|--|--------------------------|---|--------------------------|-------------------------------------|-------------------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input checked="" type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|--------------------------|-------------------------------------|---|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Allied professionals | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Certification commission of Healthcare Ministry |
| Training centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Certification commission of Healthcare Ministry |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input checked="" type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|-----|---------------|
| | | Specialist |
| Catheter ablation | Yes | Cardiosurgeon |
| ICD or pacemaker implants | Yes | Cardiosurgeon |

| Official national competency guidelines for electrophysiological studies or catheter ablation | No answer |
|---|-----------|
|---|-----------|

| | |
|---|------------------|
| Required period of training to perform implantations | No answer |
| Suggested period of training to perform implantations | No answer |
| National quality control system availability | No answer |
| Willingness to install quality control system | No answer |
| Responsible person for quality control | |
| Healthcare Ministry | |
| Training centres availability | |
| Pacemaker | 2 |
| ICD implantation | 2 |
| CRT implantation | 1 |
| Electrophysiological studies and catheter ablation | 0 |
| Atrial fibrillation ablation | 1 |
| Number of universities (Schools of Medicine) | 5 |
| Percentage of academic centres among all practicing EP centres | 0% |
| Percentage of academic centres among all practicing implanting devices centres | 0% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 2 | 2 |
| Total Pacemaker units implanted | 126 | not available |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | not available | 0 |
| Replacements | not available | not available |
| Specialist performing implants | | |
| Cardiologists | No | not available |
| Surgeons | Yes | not available |



6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|---------------|
| | 2014 | 2015 |
| Implanting centres | 0 | not available |
| Total CRT units implanted | 0 | not available |
| Thereof, CRT pacemaker | 0 | not available |
| Thereof, CRT ICD | 0 | not available |
| Specialist performing implants | | |
| Cardiologists | No | not available |
| Surgeons | Yes | not available |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 0 | 2 |
| Total ICD units implanted | 0 | not available |
| Thereof, Single chamber | 0 | not available |
| Thereof, Dual chamber | 0 | not available |
| Thereof, Subcutaneous ICD | not available | not available |
| First implants | 0 | not available |
| Replacements | 0 | not available |
| Specialist performing implants | | |
| Cardiologists | No | not available |
| Surgeons | Yes | not available |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | not available | not available |
| Total loop recorders implanted | not available | not available |

| Specialist performing implants | | |
|--------------------------------|-----|---------------|
| Cardiologists | No | not available |
| Surgeons | Yes | not available |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | not available | not available |
| Total lead extraction procedures | not available | not available |

| Specialist performing lead extractions | | |
|--|-----|---------------|
| Cardiologists | No | not available |
| Surgeons | Yes | not available |

10. Device specific

| Availability of remote monitoring of devices | | No answer |
|--|--|-----------|
|--|--|-----------|

| National registry for | | |
|-----------------------|-----------|---------------|
| | | Official name |
| ICD | No answer | |
| Pacing | No answer | |
| Electrophysiology | No | |

| Availability of a national quality insurance system or complication registry | | No answer |
|--|--|-----------|
|--|--|-----------|

| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No answer |
|--|--|-----------|
|--|--|-----------|



11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 2 | 2 |
| Number of ablations performed | 58 | 59 |
| Mean number of ablations per centre | 29 | 30 |
| Number of AF ablations | not available | not available |
| Number of ablation centres (> 50 AF ablations) | not available | not available |
| Number of VT/VF ablations | not available | not available |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | not available | not available |
| Number of LAA closures | not available | not available |
| Number of centres (LAA closures) | not available | not available |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | not available | not available |
| Number of physicians under training to become independent electrophysiologists | not available | not available |
| Availability of a national registry for interventional electrophysiology | | No answer |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------|
| National | No answer | | | | | |
| U.S. | No answer | | | | | |
| European | No answer | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Lack of referral | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|------------------------------|
| Kyrgyz Society of Cardiology |
|------------------------------|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

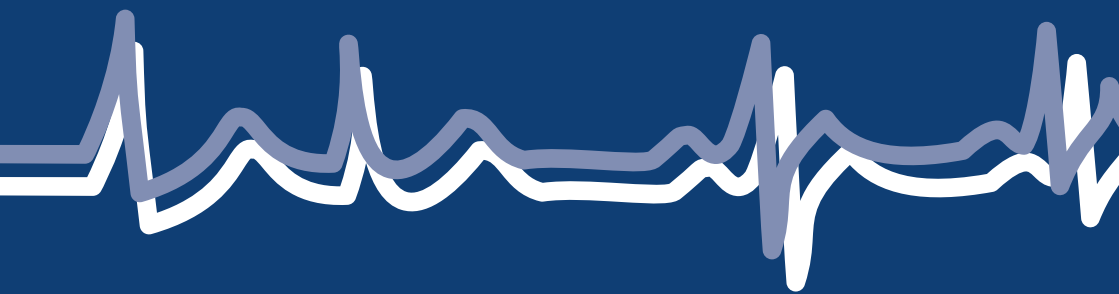
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| |
|---------------------|
| Official statistics |
|---------------------|

| |
|------------|
| Estimation |
|------------|

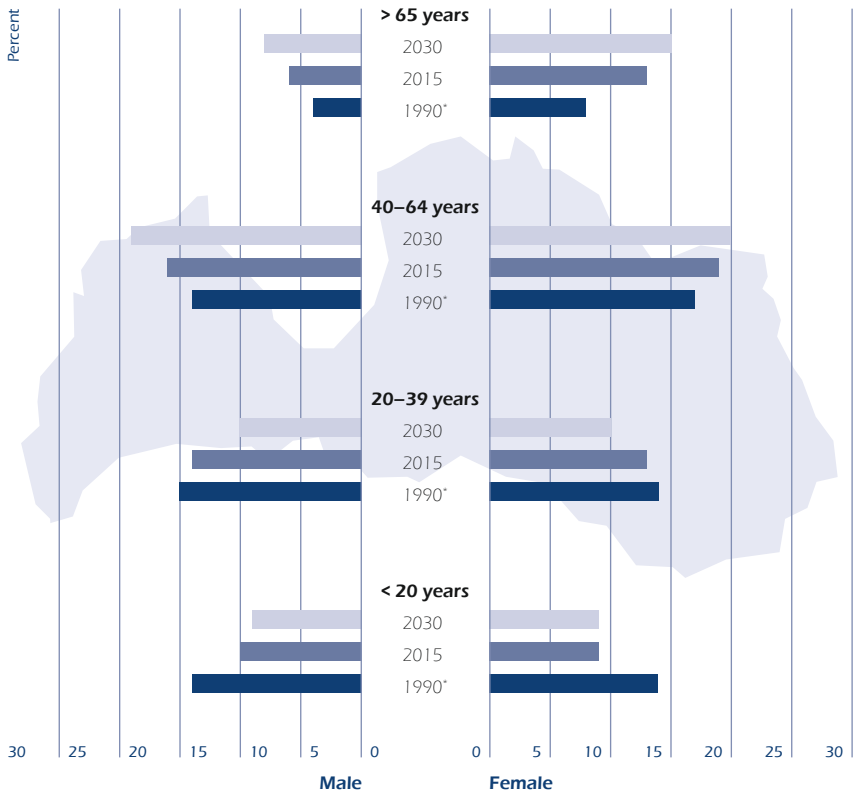
| |
|-------|
| Other |
|-------|

LATVIA



1. Statistics

Age pyramid for Latvia



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 3,2 | 2013 |
| Beds (per 100.000 population) | 580,0 | 2013 |
| Density of physicians (per 1.000 population) | 3,2 | 2013 |
| Density of nurses (per 1.000 population) | 5,1 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 1.986.705 | 2015 |
| Population annual growth rate (%) | -1,1 | 2015 |
| Life expectancy at birth (in years) | 74 | 2015 |
| Death rate (per 1.000 population) | 14,3 | 2012 |
| Live births (per 1.000 population) | 10,2 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 27,82 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 13.729,09 | 2015* |
| Total expenditure on health as% of GDP | 5,7 | 2013 |
| General government expenditure on health as% of total expenditure on health | 60,6 | 2012 |
| Private expenditure on health as% of total expenditure on health | 36,7 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|-------|-------|
| | 53,4% | 53,1% |

3. Healthcare System

National Health System

| Basic insurance availability | | Yes | | | | | | |
|--|---|-------------------------------------|--|--------------------------|---|--------------------------|--------------------------|--------------------------|
| | | | | | | | | |
| Percentage of insured and uninsured citizens | | | | | | | | |
| | 2014 | 2015 | | | | | | |
| Insured citizens | 100% | 100% | | | | | | |
| Uninsured citizens | 0% | 0% | | | | | | |
| | | | | | | | | |
| Distribution of insurance modality | | | | | | | | |
| | 2014 | 2015 | | | | | | |
| Public insurance company | 82% | 81% | | | | | | |
| Private insurance company | 18% | 19% | | | | | | |
| Private co-payment | 0% | not available | | | | | | |
| | | | | | | | | |
| Possibility to subscribing to private health insurance plans | | | Yes | | | | | |
| | | | | | | | | |
| Co-payment necessary for the following therapy | | | | | | | | |
| ICD devices | | | | Yes | | | | |
| Pacemakers | | | | Yes | | | | |
| Ablation | | | | No | | | | |
| | | | | | | | | |
| Reimbursement availability for physicians and hospitals | | | | | | | | |
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|--------------------------|--------------------------|--|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Latvian National Society of Cardiology |
| Invasive electrophysiology | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Latvian National Society of Cardiology |
| Allied professionals | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Latvian National Society of Cardiology |
| Training centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Latvian National Society of Cardiology |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | | Specialist |
|---------------------------|-----|--|-----------------------|
| Catheter ablation | Yes | | Cardiologist |
| ICD or pacemaker implants | Yes | | Cardiologist, surgeon |

| Official national competency guidelines for electrophysiological studies or catheter ablation | Yes |
|---|-----|
| Latvian National Society of Cardiology | |

| | |
|---|-------------|
| Required period of training to perform implantations | Yes |
| | 1 year |
| Suggested period of training to perform implantations | Yes |
| | 1 year |
| National quality control system availability | Yes |
| Pacemaker | Yes |
| ICD implantation | Yes |
| CRT implantation | Yes |
| Cathether ablation | Yes |
| Responsible person for quality control | |
| National Healthcare System | |
| Training centres availability | |
| Pacemaker | 1 |
| ICD implantation | 1 |
| CRT implantation | 1 |
| Electrophysiological studies and catheter ablation | 1 |
| Atrial fibrillation ablation | 1 |
| Number of universities (Schools of Medicine) | 2 |
| Percentage of academic centres among all practicing EP centres | 100% |
| Percentage of academic centres among all practicing implanting devices centres | 100% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|--|---------------|-------|
| | 2014 | 2015 |
| Implanting centres | 3 | 3 |
| Total Pacemaker units implanted | 1.236 | 1.400 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 1.023 | 1.160 |
| Replacements | 213 | 240 |
| Specialist performing implants | | |
| Cardiologists | Yes | 70% |
| Surgeons | Yes | 30% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 2 | 2 |
| Total CRT units implanted | 105 | 107 |
| Thereof, CRT pacemaker | 28 | 22 |
| Thereof, CRT ICD | 77 | 85 |
| Specialist performing implants | | |
| Cardiologists | Yes | 70% |
| Surgeons | Yes | 30% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 3 | 3 |
| Total ICD units implanted | 75 | 90 |
| Thereof, Single chamber | 24 | 25 |
| Thereof, Dual chamber | 51 | 62 |
| Thereof, Subcutaneous ICD | not available | 3 |
| First implants | 67 | 82 |
| Replacements | 8 | 8 |
| Specialist performing implants | | |
| Cardiologists | Yes | 70% |
| Surgeons | Yes | 30% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 2 | 2 |
| Total loop recorders implanted | 24 | 44 |
| Specialist performing implants | | |
| Cardiologists | Yes | 70% |
| Surgeons | Yes | 30% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 1 | 1 |
| Total lead extraction procedures | 10 | 19 |
| Specialist performing lead extractions | | |
| Cardiologists | No | 0% |
| Surgeons | Yes | 100% |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|---|---------------|--|
| National registry for | | |
| | Official name | |
| ICD | Yes | National register of Implantable Devices and EP procedures, National WG of Arrhythmology |
| Pacing | Yes | National register of Implantable Devices and EP procedures |
| Electrophysiology | Yes | National register of Implantable Devices and EP procedures |
| Availability of a national quality insurance system or complication registry | | |
| Official name: National Healthcare system in collaboration with National Society of Cardiology | | |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | |
| Official name: National Healthcare system in collaboration with National Society of Cardiology | | |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|---|------|------|
| | 2014 | 2015 |
| Number of ablation centres | 2 | 2 |
| Number of ablations performed | 638 | 726 |
| Mean number of ablations per centre | 319 | 363 |
| Number of AF ablations | 75 | 88 |
| Number of ablation centres (> 50 AF ablations) | 1 | 1 |
| Number of VT/VF ablations | 25 | 36 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 1 | 1 |
| Number of LAA closures | 18 | 28 |
| Number of centres (LAA closures) | 1 | 21 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 5 | 5 |
| Number of physicians under training to become independent electrophysiologists | 2 | 2 |
| Availability of a national registry for interventional electrophysiology | | |
| Official name: National Register of Implantable Devices and EP procedures | | |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----------|
| National | Yes |
| U.S. | No answer |
| European | Yes |

| Obstacles to guideline implementation | 1 | 2 | 3 | 4 | 5 | Ranking of importance |
|--|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|-----------------------|
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 1 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 |
| Low awareness of guidelines | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of operators | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Latvian National Society of Cardiology, National Working Group of Arrhythmology |

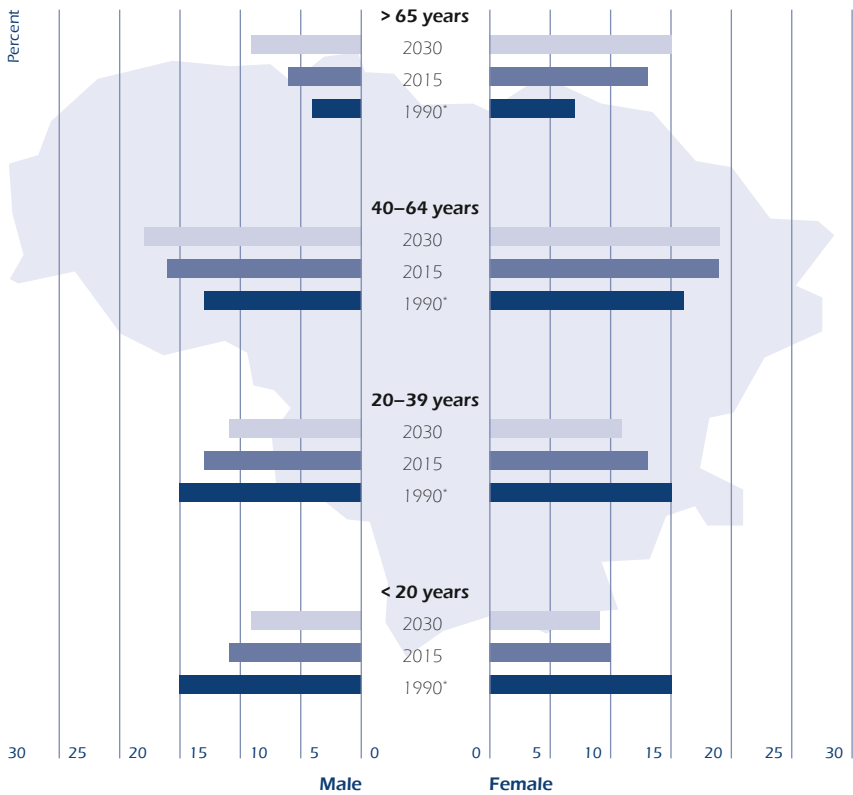
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
| EHRA White Book 2015 |
| National Healthcare System |
| Latvian National Society of Cardiology |
| National register of Implantable Devices and EP procedures |

LITHUANIA



1. Statistics

Age pyramid for Lithuania



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 3,4 | 2013 |
| Beds (per 100.000 population) | 728,2 | 2013 |
| Density of physicians (per 1.000 population) | 4,3 | 2013 |
| Density of nurses (per 1.000 population) | 7,9 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 2.884.433 | 2015 |
| Population annual growth rate (%) | -1,0 | 2015 |
| Life expectancy at birth (in years) | 75 | 2015 |
| Death rate (per 1.000 population) | 13,7 | 2012 |
| Live births (per 1.000 population) | 10,1 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 41,78 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 14.318,08 | 2015* |
| Total expenditure on health as% of GDP | 6,2 | 2013 |
| General government expenditure on health as% of total expenditure on health | 65,3 | 2012 |
| Private expenditure on health as% of total expenditure on health | 31,1 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| | not available | not available |

3. Healthcare System

Provision of health services is regulated by National Health Insurance Fund under the Ministry of Health.

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance:

Permanent residents and officially employed, non-permanent residents have basic insurance.

| Percentage of insured and uninsured citizens | 2014 | 2015 |
|--|------|------|
|--|------|------|

| | | |
|--------------------|---------------|------|
| Insured citizens | not available | 100% |
| Uninsured citizens | not available | 0% |

| Distribution of insurance modality | 2014 | 2015 |
|------------------------------------|------|------|
|------------------------------------|------|------|

| | | |
|---------------------------|---------------|-----|
| Public insurance company | not available | 98% |
| Private insurance company | not available | 2% |
| Private co-payment | not available | 0% |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|--|
|--|--|

| | |
|-------------|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|
|---|--|--|--|--|--|--|--|--|--|

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|--------------------------|--|--------------------------|---|-------------------------------------|--------------------------|-------------------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Comments: Leadless pacing and subcutaneous ICDs not reimbursed.



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|--------------------------|--------------------------|---------------------------------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | State Healthcare Accreditation Agency |
| Invasive electrophysiology | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | State Healthcare Accreditation Agency |
| Allied professionals | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | State Healthcare Accreditation Agency |
| Training centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | State Healthcare Accreditation Agency |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|------------|-------------------------------|
| | Specialist | |
| Catheter ablation | Yes | Cardiologist |
| ICD or pacemaker implants | Yes | Cardiologist, cardiac surgeon |

| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|
|---|----|

| | |
|---|------------|
| Required period of training to perform implantations | No |
| Suggested period of training to perform implantations | No |
| National quality control system availability | Yes |
| Pacemaker | Yes |
| ICD implantation | Yes |
| CRT implantation | Yes |
| Cathether ablation | Yes |
| Responsible person for quality control | |
| State Healthcare Accreditation Agency | |
| Training centres availability | |
| Pacemaker | 2 |
| ICD implantation | 2 |
| CRT implantation | 2 |
| Electrophysiological studies and catheter ablation | 2 |
| Atrial fibrillation ablation | 2 |
| Number of universities (Schools of Medicine) | 2 |
| Percentage of academic centres among all practicing EP centres | 67% |
| Percentage of academic centres among all practicing implanting devices centres | 40% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|-------------|
| | 2014 | 2015 |
| Implanting centres | 4 | 5 |
| Total Pacemaker units implanted | 2.767 | 2.583 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 2.447 | 2.350 |
| Replacements | 320 | 233 |
| Specialist performing implants | | |
| Cardiologists | Yes | 99% |
| Surgeons | Yes | 1% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 3 | 3 |
| Total CRT units implanted | 192 | 195 |
| Thereof, CRT pacemaker | 160 | 150 |
| Thereof, CRT ICD | 32 | 45 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 3 | 3 |
| Total ICD units implanted | 134 | 123 |
| Thereof, Single chamber | 45 | 26 |
| Thereof, Dual chamber | 89 | 97 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 97 | 84 |
| Replacements | 37 | 39 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 2 | 2 |
| Total loop recorders implanted | 9 | 7 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 2 | 2 |
| Total lead extraction procedures | 12 | 19 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 95% |
| Surgeons | Yes | 5% |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|----|---------------|
| National registry for | | |
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | Yes |
| Official name: State Healthcare Accreditation Agency | | |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | Yes |
| Official name: State Healthcare Accreditation Agency | | |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|---|------|-------|
| | 2014 | 2015 |
| Number of ablation centres | 3 | 3 |
| Number of ablations performed | 885 | 1,078 |
| Mean number of ablations per centre | 295 | 359 |
| Number of AF ablations | 74 | 81 |
| Number of ablation centres (> 50 AF ablations) | 0 | 1 |
| Number of VT/VF ablations | 6 | 8 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 0 | 0 |
| Number of LAA closures | 2 | 0 |
| Number of centres (LAA closures) | 2 | 0 |

| Number of electrophysiologists | | |
|--|----|----|
| Number of electrophysiologists performed catheter ablation independently | 14 | 15 |
| Number of physicians under training to become independent electrophysiologists | 1 | 1 |

| | |
|--|----|
| Availability of a national registry for interventional electrophysiology | No |
|--|----|

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | No |
| U.S. | No |
| European | Yes |

| Obstacles to guideline implementation | | | | | | Ranking of importance |
|---|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 1 |
| Lack of referral | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Low awareness of guidelines | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 2 |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

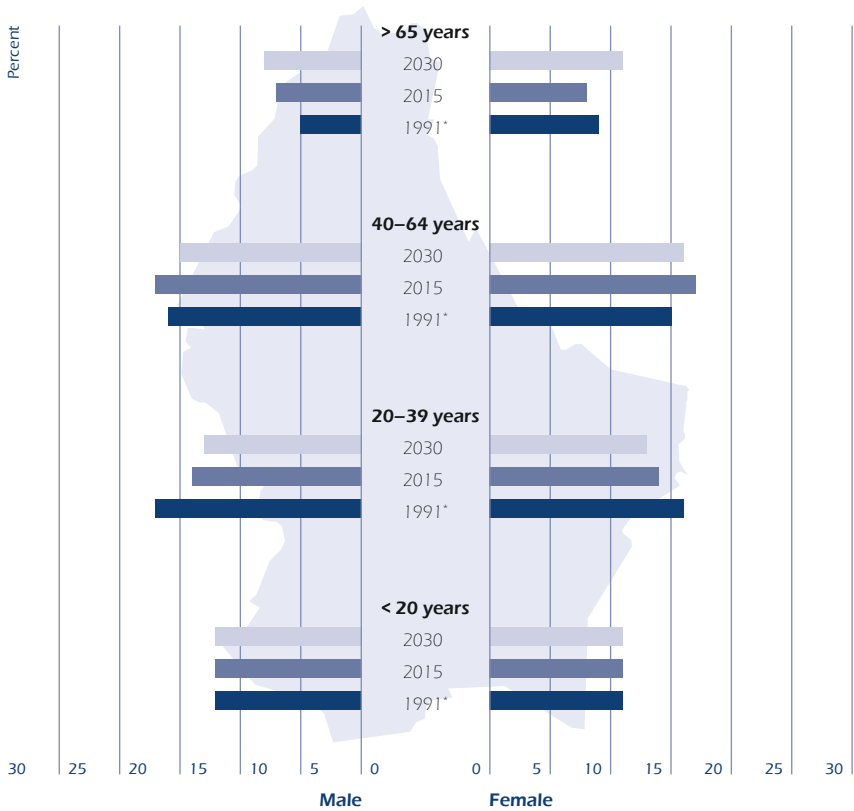
| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Lithuanian Society of Cardiology, Working Group on Pacing and Electrophysiology |
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
| EHRA White Book 2015 |
| Sample short survey |

LUXEMBOURG



1. Statistics

Age pyramid for Luxembourg



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 2,2 | 2014 |
| Beds (per 100.000 population) | 493,4 | 2014 |
| Density of physicians (per 1.000 population) | 2,9 | 2014 |
| Density of nurses (per 1.000 population) | 12,3 | 2014 |

| Demographic information | | Year |
|-------------------------------------|---------|------|
| Population | 570.252 | 2015 |
| Population annual growth rate (%) | 2,2 | 2015 |
| Life expectancy at birth (in years) | 82 | 2015 |
| Death rate (per 1.000 population) | 6,8 | 2013 |
| Live births (per 1.000 population) | 11,3 | 2013 |

| Economic information | | Year |
|---|------------|-------|
| Gross domestic product (U.S dollar-billions) | 57,93 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 103.186,99 | 2015* |
| Total expenditure on health as% of GDP | 7,1 | 2013 |
| General government expenditure on health as% of total expenditure on health | 83,5 | 2012 |
| Private expenditure on health as% of total expenditure on health | 16,5 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|---------------|---------------|
| | not available | not available |

3. Healthcare System

National Health System

| Basic insurance availability | | | Yes | | | | | |
|--|---|--------------------------|--|-------------------------------------|---|--------------------------|-------------------------------------|-------------------------------------|
| Requirements for citizens to qualify for public insurance: Paid half by yourself and half by your employer. | | | | | | | | |
| | | | | | | | | |
| Percentage of insured and uninsured citizens | | | | | | | | |
| | 2014 | 2015 | | | | | | |
| Insured citizens | 100 % | 100 % | | | | | | |
| Uninsured citizens | 0% | 0% | | | | | | |
| | | | | | | | | |
| Distribution of insurance modality | | | | | | | | |
| | 2014 | 2015 | | | | | | |
| Public insurance company | 100% | 100% | | | | | | |
| Private insurance company | not available | not available | | | | | | |
| Private co-payment | not available | not available | | | | | | |
| | | | | | | | | |
| Possibility to subscribing to private health insurance plans | | | Yes | | | | | |
| | | | | | | | | |
| Co-payment necessary for the following therapy | | | | | | | | |
| ICD devices | | | No | | | | | |
| Pacemakers | | | No | | | | | |
| Ablation | | | No | | | | | |
| | | | | | | | | |
| Reimbursement availability for physicians and hospitals | | | | | | | | |
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Subcutaneous ICD | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input checked="" type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | | Specialist |
|---------------------------|-----|--|----------------------|
| Catheter ablation | Yes | | Trained Cardiologist |
| ICD or pacemaker implants | Yes | | Trained Cardiologist |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|

| | |
|--|----|
| Required period of training to perform implantations | No |
|--|----|

| | |
|---|----|
| Suggested period of training to perform implantations | No |
|---|----|

| | |
|---|------------------|
| National quality control system availability | No |
| Willingness to install quality control system | No answer |
| Responsible person for quality control | |
| No official quality control | |
| Training centres availability | |
| Pacemaker | 0 |
| ICD implantation | 0 |
| CRT implantation | 0 |
| Electrophysiological studies and catheter ablation | 0 |
| Atrial fibrillation ablation | 0 |
| Number of universities (Schools of Medicine) | 0 |
| Percentage of academic centres among all practicing EP centres | 0% |
| Percentage of academic centres among all practicing implanting devices centres | 0% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 5 | 6 |
| Total Pacemaker units implanted | 349 | 393 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | 267 | 281 |
| Replacements | 82 | 112 |
| Specialist performing implants | | |
| Cardiologists | Yes | 85% |
| Surgeons | Yes | 15% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 1 | 1 |
| Total CRT units implanted | 34 | 34 |
| Thereof, CRT pacemaker | 10 | 8 |
| Thereof, CRT ICD | 24 | 26 |
| Specialist performing implants | | |
| Cardiologists | Yes | 90% |
| Surgeons | Yes | 10% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 1 | 1 |
| Total ICD units implanted | 62 | 65 |
| Thereof, Single chamber | 53 | 50 |
| Thereof, Dual chamber | 9 | 15 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 45 | 47 |
| Replacements | 17 | 18 |
| Specialist performing implants | | |
| Cardiologists | Yes | 98% |
| Surgeons | Yes | 2% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 2 | 2 |
| Total loop recorders implanted | 23 | 22 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 1 | 1 |
| Total lead extraction procedures | 7 | 6 |
| Specialist performing lead extractions | | |
| Cardiologists | No | 0% |
| Surgeons | Yes | 100% |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|-----|---|
| National registry for | | |
| | | Official name |
| ICD | Yes | INCCI (Institut National de Chirurgie Cardiaque et de Cardiologie Invasive) |
| Pacing | No | |
| Electrophysiology | Yes | INCCI (Institut National de Chirurgie Cardiaque et de Cardiologie Invasive) |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | Yes |
| Official name: Ministry of Health | | |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|------|------|
| | 2014 | 2015 |
| Number of ablation centres | 1 | 1 |
| Number of ablations performed | 158 | 145 |
| Mean number of ablations per centre | 158 | 145 |
| Number of AF ablations | 57 | 48 |
| Number of ablation centres (> 50 AF ablations) | 1 | 0 |
| Number of VT/VF ablations | 2 | 6 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 0 | 0 |
| Number of LAA closures | 0 | 2 |
| Number of centres (LAA closures) | 0 | 1 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 3 | 3 |
| Number of physicians under training to become independent electrophysiologists | 0 | 0 |
| Availability of a national registry for interventional electrophysiology | | Yes |
| Official name: INCCI (Institut National de Chirurgie Cardiaque et de Cardiologie Invasive) | | |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | No |
| U.S. | No |
| European | Yes |

| Obstacles to guideline implementation | 1 | 2 | 3 | 4 | 5 | Ranking of importance |
|--|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|-----------------------|
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of reimbursement, limited financial resources | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of referral | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of trained personnel | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Low awareness of guidelines | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of operators | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|--|
| Société Luxembourgeoise de Cardiologie |
|--|

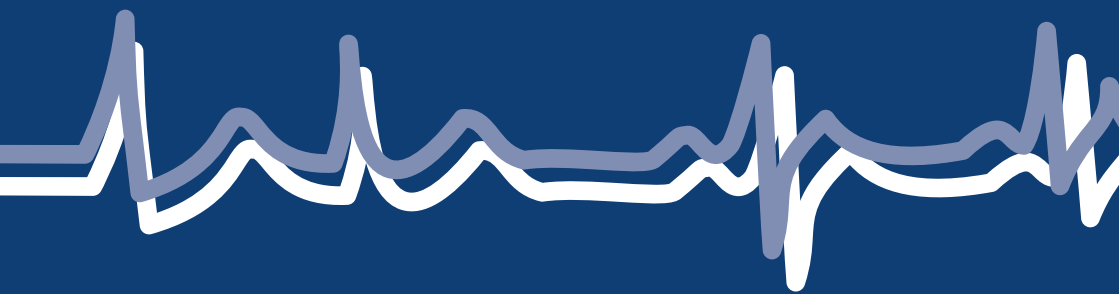
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

| |
|--|
| Official statistics - INCCI / Ministry of Health |
|--|

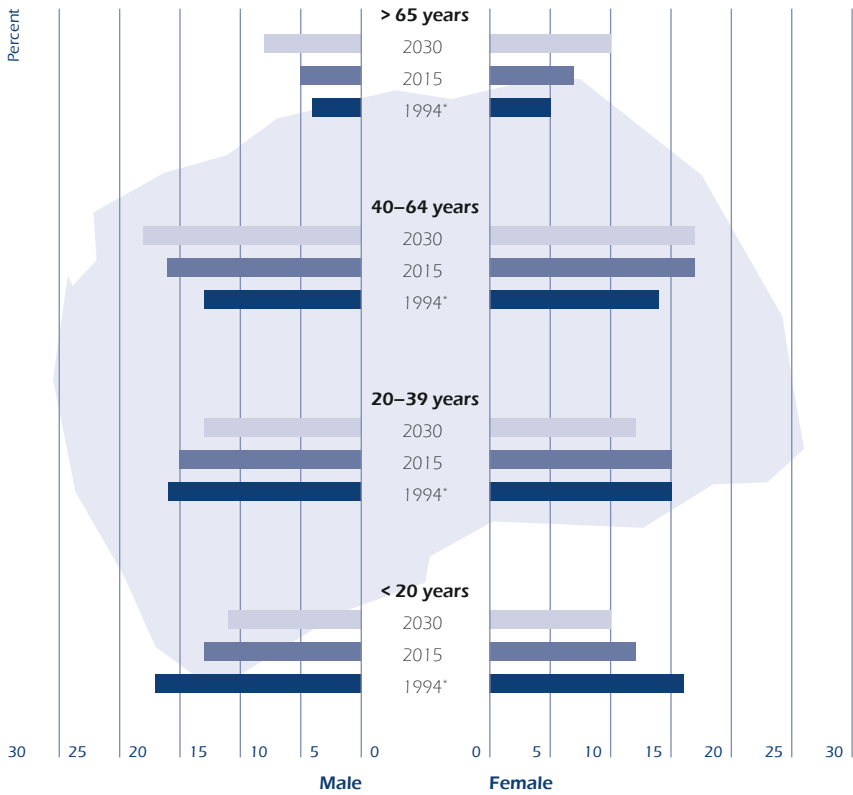
| |
|---|
| Survey from professional association - Société Luxembourgeoise de Cardiologie |
|---|

MACEDONIA FYR



1. Statistics

Age pyramid for Macedonia FYR



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 3,2 | 2013 |
| Beds (per 100.000 population) | 442,8 | 2013 |
| Density of physicians (per 1.000 population) | 2,8 | 2013 |
| Density of nurses (per 1.000 population) | 4,2 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 2.096.015 | 2015 |
| Population annual growth rate (%) | 0,2 | 2015 |
| Life expectancy at birth (in years) | 76 | 2015 |
| Death rate (per 1.000 population) | 9,3 | 2010 |
| Live births (per 1.000 population) | 11,4 | 2012 |

| Economic information | | Year |
|---|----------|-------|
| Gross domestic product (U.S dollar-billions) | 10,09 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 4.867,22 | 2015* |
| Total expenditure on health as% of GDP | 6,4 | 2013 |
| General government expenditure on health as% of total expenditure on health | 65,3 | 2012 |
| Private expenditure on health as% of total expenditure on health | 34,7 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|------|
| | 2014 | 2015 |
| | 52% | 58% |

3. Healthcare System

National Health System The health care system in the Republic of Macedonia is organized on three levels: primary, secondary and tertiary level. The health care is delivered at: health stations, health centers, general and specialized hospitals, clinical hospitals, university clinics and institutes, University Dental Clinical Centre, Maxillofacial Surgery Clinic, Institute of Transfusion Medicine, Institute of Public Health, and 10 centers for public health.

| | |
|-------------------------------------|-----------|
| Basic insurance availability | No |
|-------------------------------------|-----------|

| Percentage of insured and uninsured citizens | | |
|---|-------------|-------------|
| | 2014 | 2015 |
| Insured citizens | 90% | 90% |
| Uninsured citizens | 10% | 10% |

| Distribution of insurance modality | | |
|---|-------------|---------------|
| | 2014 | 2015 |
| Public insurance company | 80% | 90% |
| Private insurance company | 10% | 10% |
| Private co-payment | 10% | not available |

| | |
|---|------------|
| Possibility to subscribing to private health insurance plans | Yes |
|---|------------|

| Co-payment necessary for the following therapy | |
|---|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |
| Comments: Yes, only in private sector | |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|--|---|--------------------------|--|-------------------------------------|---|--------------------------|-------------------------------------|-------------------------------------|
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Univ St Kliment Ohridski Bitola (http://www.vmsb.uklo.edu.mk/) |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | | Specialist |
|---------------------------|-----|--|--------------|
| Catheter ablation | Yes | | Cardiologist |
| ICD or pacemaker implants | Yes | | Cardiologist |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|

| | |
|---|------------------|
| Required period of training to perform implantations | No |
| Suggested period of training to perform implantations | No |
| National quality control system availability | No |
| Willingness to install quality control system | No answer |
| Responsible person for quality control | |
| Institution where the procedures are performed | |
| Training centres availability | |
| Pacemaker | 1 |
| ICD implantation | 1 |
| CRT implantation | 1 |
| Electrophysiological studies and catheter ablation | 1 |
| Atrial fibrillation ablation | not available |
| Number of universities (Schools of Medicine) | 3 |
| Percentage of academic centres among all practicing EP centres | 33% |
| Percentage of academic centres among all practicing implanting devices centres | 33% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 3 | 3 |
| Total Pacemaker units implanted | 356 | 470 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | 296 | 387 |
| Replacements | 60 | 83 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 2 | 3 |
| Total CRT units implanted | 28 | 38 |
| Thereof, CRT pacemaker | 25 | 26 |
| Thereof, CRT ICD | 3 | 12 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 2 | 3 |
| Total ICD units implanted | 11 | 29 |
| Thereof, Single chamber | 7 | 14 |
| Thereof, Dual chamber | 4 | 15 |
| Thereof, Subcutaneous ICD | not available | not available |
| First implants | 9 | 20 |
| Replacements | 2 | 9 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|---------------|
| | 2014 | 2015 |
| Implanting centres | 2 | 3 |
| Total loop recorders implanted | 0 | not available |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 2 | 2 |
| Total lead extraction procedures | 0 | 1 |

| Specialist performing lead extractions | | |
|--|-----|-----|
| Cardiologists | Yes | 50% |
| Surgeons | Yes | 50% |

10. Device specific

| | |
|---|------------|
| Availability of remote monitoring of devices | Yes |
|---|------------|

| National registry for | | |
|-----------------------|----|---------------|
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |

| | |
|---|-----------|
| Availability of a national quality insurance system or complication registry | No |
|---|-----------|

| | |
|---|-----------|
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | No |
|---|-----------|

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 3 | 2 |
| Number of ablations performed | 105 | 166 |
| Mean number of ablations per centre | 35 | 83 |
| Number of AF ablations | 0 | not available |
| Number of ablation centres (> 50 AF ablations) | 0 | not available |
| Number of VT/VF ablations | 0 | not available |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 0 | not available |
| Number of LAA closures | 0 | not available |
| Number of centres (LAA closures) | 0 | not available |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 4 | 4 |
| Number of physicians under training to become independent electrophysiologists | 1 | 1 |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-----------------------|
| National | No answer | | | | | |
| U.S. | Yes | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Low awareness of guidelines | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|-----------------------------------|
| Macedonian Society for Cardiology |
|-----------------------------------|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

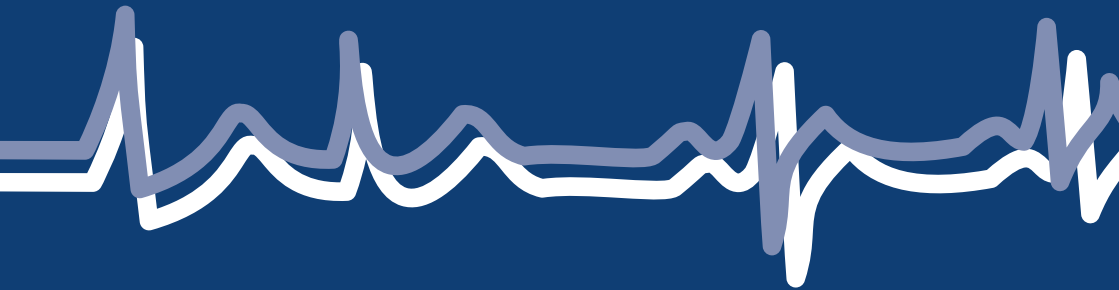
| |
|---------------------|
| Official statistics |
|---------------------|

| |
|--------------------------------------|
| Survey from professional association |
|--------------------------------------|

| |
|------------|
| Estimation |
|------------|

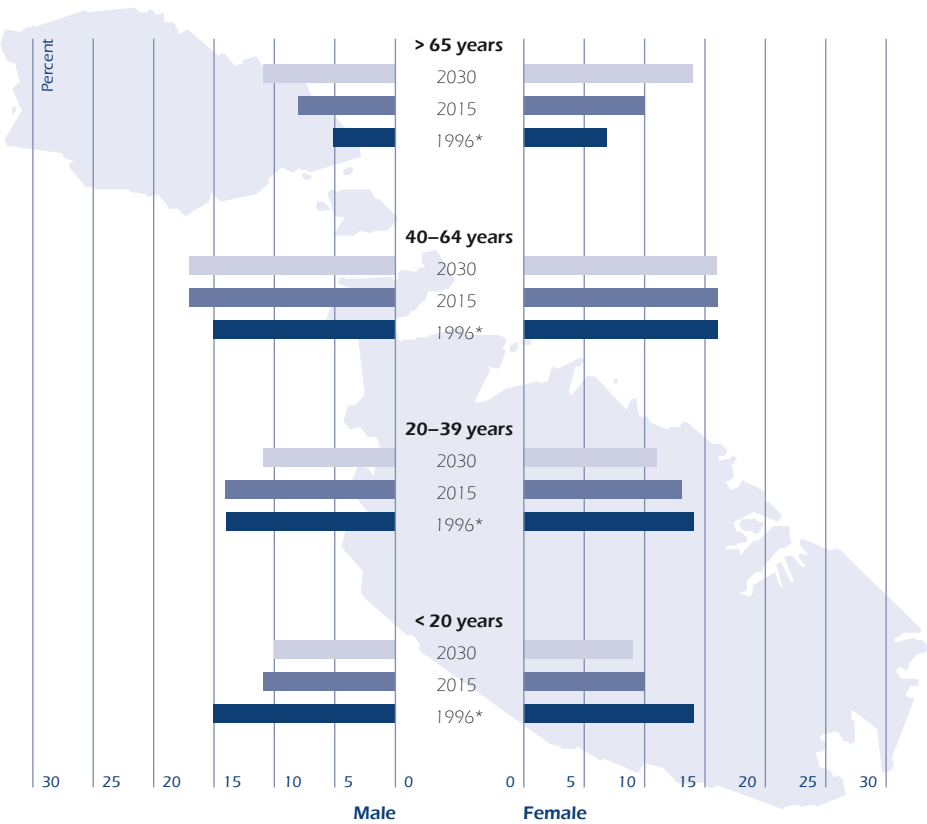
| |
|-------|
| Other |
|-------|

MALTA



1. Statistics

Age pyramid for Malta



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 2,1 | 2014 |
| Beds (per 100.000 population) | 466,5 | 2014 |
| Density of physicians (per 1.000 population) | 3,7 | 2014 |
| Density of nurses (per 1.000 population) | 8,4 | 2014 |

| Demographic information | | Year |
|-------------------------------------|---------|------|
| Population | 413.965 | 2015 |
| Population annual growth rate (%) | 0,3 | 2015 |
| Life expectancy at birth (in years) | 80 | 2015 |
| Death rate (per 1.000 population) | 7,7 | 2014 |
| Live births (per 1.000 population) | 9,8 | 2014 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 9,19 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 21.539,91 | 2015* |
| Total expenditure on health as% of GDP | 8,7 | 2013 |
| General government expenditure on health as% of total expenditure on health | 65,6 | 2012 |
| Private expenditure on health as% of total expenditure on health | 34,4 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|---------------|
| | 2014 | 2015 |
| | 40% | not available |

3. Healthcare System

It's a National Health System completely funded by a National Public Health Insurance

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: Being a Maltese citizen or taxpayer/wife and children of a taxpayer.

| Percentage of insured and uninsured citizens | | |
|--|--|--|
|--|--|--|

| | 2014 | 2015 |
|--------------------|------|------|
| Insured citizens | 100% | 100% |
| Uninsured citizens | 0% | 0% |

| Distribution of insurance modality | | |
|------------------------------------|--|--|
|------------------------------------|--|--|

| | 2014 | 2015 |
|---------------------------|------|---------------|
| Public insurance company | 90% | not available |
| Private insurance company | 0% | not available |
| Private co-payment | 10% | not available |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|--|
|--|--|

| | |
|-------------|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
|---|--|--|--|--|--|--|--|--|

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|--------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|--------------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | EHRA certification |
| Invasive electrophysiology | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | EHRA certification |
| Allied professionals | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | EHRA certification |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input checked="" type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | | Specialist |
|---------------------------|-----|--|---|
| Catheter ablation | Yes | | Cardiologist trained in electrophysiology |
| ICD or pacemaker implants | Yes | | Cardiologist |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|

| | |
|--|----|
| Required period of training to perform implantations | No |
|--|----|

| | |
|---|---------|
| Suggested period of training to perform implantations | Yes |
| | 2 years |

| | |
|---|-------------|
| National quality control system availability | No |
| Willingness to install quality control system | Yes |
| Responsible person for quality control | |
| Hospital administration and health department | |
| Training centres availability | |
| Pacemaker | 1 |
| ICD implantation | 1 |
| CRT implantation | 1 |
| Electrophysiological studies and catheter ablation | 1 |
| Atrial fibrillation ablation | 1 |
| Number of universities (Schools of Medicine) | 1 |
| Percentage of academic centres among all practicing EP centres | 100% |
| Percentage of academic centres among all practicing implanting devices centres | 100% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|-------------|
| | 2014 | 2015 |
| Implanting centres | 1 | 1 |
| Total Pacemaker units implanted | 366 | 400 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 240 | 266 |
| Replacements | 126 | 134 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 1 | 1 |
| Total CRT units implanted | 48 | 41 |
| Thereof, CRT pacemaker | 5 | 10 |
| Thereof, CRT ICD | 43 | 31 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 1 | 1 |
| Total ICD units implanted | 36 | 35 |
| Thereof, Single chamber | 3 | 1 |
| Thereof, Dual chamber | 33 | 34 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 26 | 26 |
| Replacements | 10 | 9 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 1 | 1 |
| Total loop recorders implanted | 13 | 13 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 1 | 1 |
| Total lead extraction procedures | 7 | 9 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|----|---------------|
| National registry for | | |
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|------|------|
| | 2014 | 2015 |
| Number of ablation centres | 1 | 1 |
| Number of ablations performed | 30 | 32 |
| Mean number of ablations per centre | 30 | 32 |
| Number of AF ablations | 0 | 0 |
| Number of ablation centres (> 50 AF ablations) | 0 | 0 |
| Number of VT/VF ablations | 0 | 0 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 0 | 0 |
| Number of LAA closures | 0 | 5 |
| Number of centres (LAA closures) | 0 | 1 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 2 | 2 |
| Number of physicians under training to become independent electrophysiologists | 1 | 1 |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

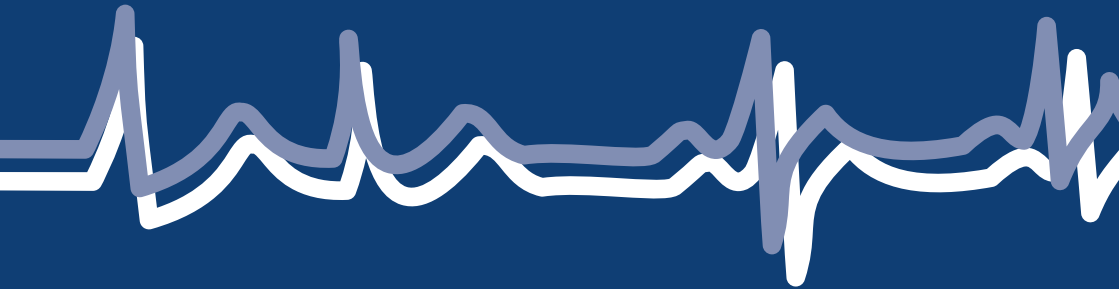
| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|-----------------------|
| National | No answer | | | | | |
| U.S. | No | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 3 |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| 1 = no obstacle, 5 = great obstacle | | | | | | 1 = top, 6 = lowest |

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Maltese Cardiac Society |

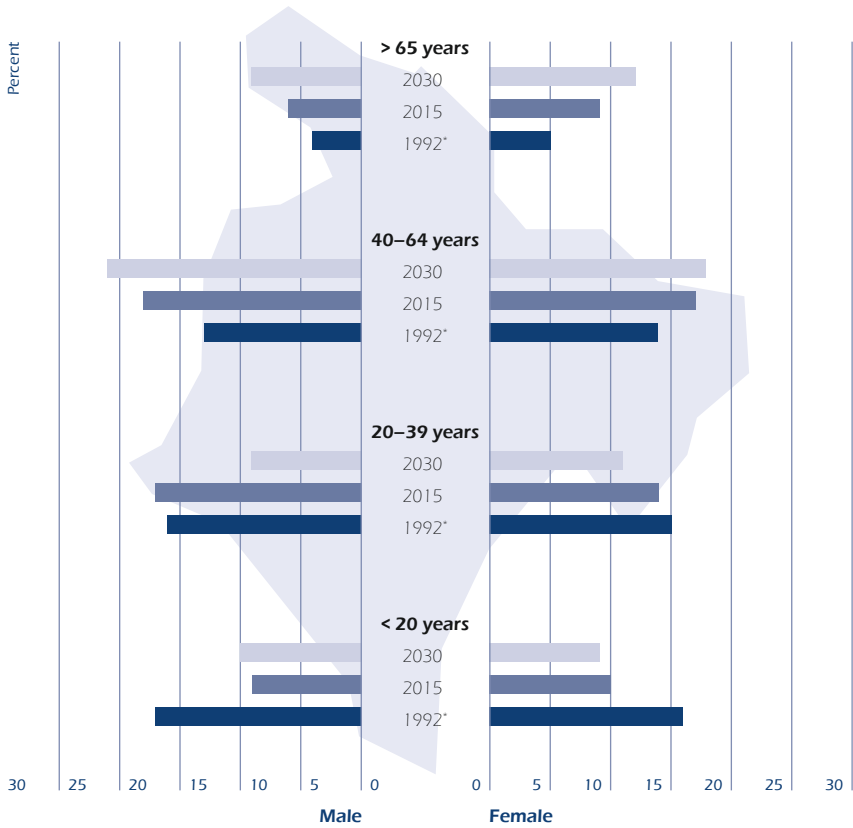
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
| EHRA White Book 2015 |
| Official statistics |
| Survey from professional association |

MONTENEGRO



1. Statistics

Age pyramid for Montenegro



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 1,8 | 2013 |
| Beds (per 100.000 population) | 396,5 | 2012 |
| Density of physicians (per 1.000 population) | 2,2 | 2013 |
| Density of nurses (per 1.000 population) | 5,5 | 2013 |

| Demographic information | | Year |
|-------------------------------------|---------|------|
| Population | 647.073 | 2015 |
| Population annual growth rate (%) | -0,5 | 2015 |
| Life expectancy at birth (in years) | 78 | 2015 |
| Death rate (per 1.000 population) | 9,3 | 2009 |
| Live births (per 1.000 population) | 12,0 | 2013 |

| Economic information | | Year |
|---|----------|-------|
| Gross domestic product (U.S dollar-billions) | 3,99 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 6.372,60 | 2015* |
| Total expenditure on health as% of GDP | 6,5 | 2013 |
| General government expenditure on health as% of total expenditure on health | 61,7 | 2012 |
| Private expenditure on health as% of total expenditure on health | 38,3 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|------|
| | 2014 | 2015 |
| | 54 % | 54 % |

3. Healthcare System

Healthcare system is organized through NHS Fund.

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: Every citizen who pay the public basic insurance have completely health protection

| Percentage of insured and uninsured citizens | 2014 | 2015 |
|--|------|------|
|--|------|------|

| | | |
|--------------------|------|-----|
| Insured citizens | 100% | 99% |
| Uninsured citizens | 0% | 1% |

| Distribution of insurance modality | 2014 | 2015 |
|------------------------------------|------|------|
|------------------------------------|------|------|

| | | |
|---------------------------|------|---------------|
| Public insurance company | 100% | not available |
| Private insurance company | 0% | not available |
| Private co-payment | 0% | not available |

| Possibility to subscribing to private health insurance plans | No |
|--|----|
|--|----|

| Co-payment necessary for the following therapy | |
|--|--|
|--|--|

| | |
|-------------|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
|---|--|--|--|--|--|--|--|--|

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|--------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input checked="" type="checkbox"/> |

| Specialist required for | | | Specialist |
|---------------------------|-----|--|--------------|
| Catheter ablation | Yes | | Cardiologist |
| ICD or pacemaker implants | Yes | | Cardiologist |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|

| | |
|--|----|
| Required period of training to perform implantations | No |
|--|----|

| | |
|---|----------|
| Suggested period of training to perform implantations | Yes |
| | 6 months |

| | |
|---|-------------|
| National quality control system availability | No |
| Willingness to install quality control system | Yes |
| Responsible person for quality control | |
| The professionals from different medical fields | |
| Training centres availability | |
| Pacemaker | 1 |
| ICD implantation | 1 |
| CRT implantation | 1 |
| Electrophysiological studies and catheter ablation | 1 |
| Atrial fibrillation ablation | 1 |
| Number of universities (Schools of Medicine) | 1 |
| Percentage of academic centres among all practicing EP centres | 100% |
| Percentage of academic centres among all practicing implanting devices centres | 100% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|-------------|
| | 2014 | 2015 |
| Implanting centres | 1 | 1 |
| Total Pacemaker units implanted | 182 | 247 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 150 | 197 |
| Replacements | 32 | 50 |
| Specialist performing implants | | |
| Cardiologists | Yes | 70% |
| Surgeons | Yes | 30% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 1 | 1 |
| Total CRT units implanted | 22 | 19 |
| Thereof, CRT pacemaker | 12 | 14 |
| Thereof, CRT ICD | 10 | 5 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 1 | 1 |
| Total ICD units implanted | 41 | 53 |
| Thereof, Single chamber | 27 | 1 |
| Thereof, Dual chamber | 14 | 1 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 35 | 46 |
| Replacements | 6 | 7 |
| Specialist performing implants | | |
| Cardiologists | Yes | 50% |
| Surgeons | Yes | 50% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 1 | 1 |
| Total loop recorders implanted | 0 | 0 |
| Specialist performing implants | | |
| Cardiologists | Yes | 50% |
| Surgeons | Yes | 50% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 0 | 0 |
| Total lead extraction procedures | 0 | 0 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 50% |
| Surgeons | Yes | 50% |

10. Device specific

| Availability of remote monitoring of devices | | No |
|--|----|---------------|
| Reasons why remote monitoring is not available: We do not have the technical possibility for remote monitoring of devices | | |
| National registry for | | |
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|------|------|
| | 2014 | 2015 |
| Number of ablation centres | 1 | 1 |
| Number of ablations performed | 66 | 83 |
| Mean number of ablations per centre | 66 | 83 |
| Number of AF ablations | 17 | 18 |
| Number of ablation centres (> 50 AF ablations) | 0 | 0 |
| Number of VT/VF ablations | 3 | 7 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 0 | 0 |
| Number of LAA closures | 0 | 0 |
| Number of centres (LAA closures) | 0 | 0 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 1 | 1 |
| Number of physicians under training to become independent electrophysiologists | 2 | 2 |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|--------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|-----------------------|
| National | No | | | | | |
| U.S. | No | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of referral | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Low awareness of guidelines | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of operators | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Others: Limited financial resources | | | | | | |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

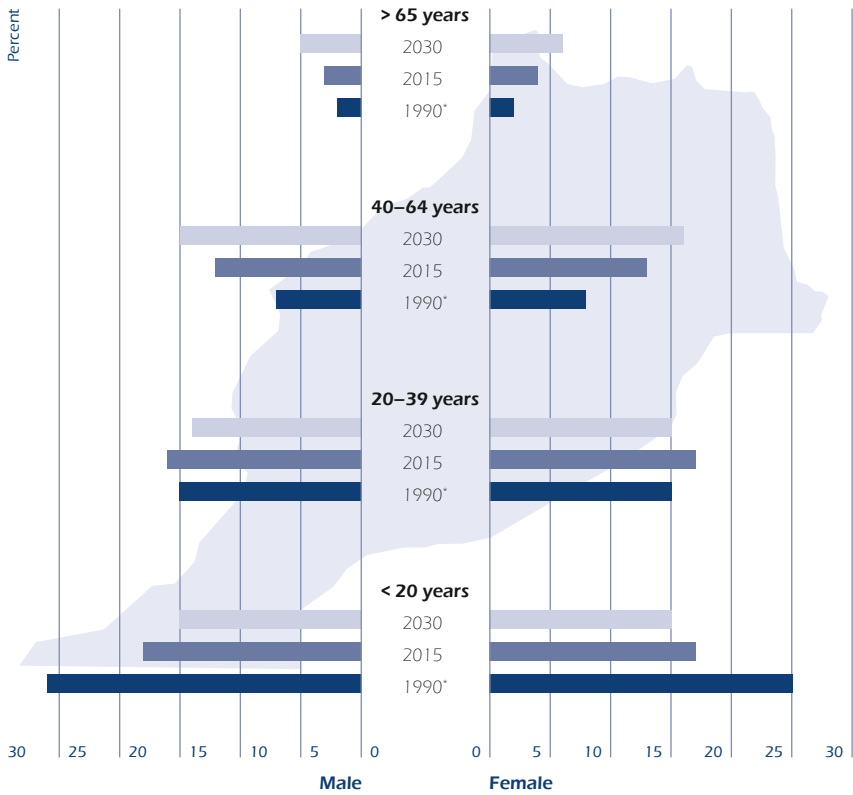
| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Center for pacemaker and electrophysiology |
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
| EHRA White Book 2015 |
| Sample short survey |

MOROCCO



1. Statistics

Age pyramid for Morocco



* 1990 or last available

| Healthcare data | | Year |
|--|---------------|---------------|
| Hospitals (per 100.000 population) | not available | not available |
| Beds (per 100.000 population) | not available | not available |
| Density of physicians (per 1.000 population) | not available | not available |
| Density of nurses (per 1.000 population) | not available | not available |

| Demographic information | | Year |
|-------------------------------------|------------|------|
| Population | 33.322.699 | 2015 |
| Population annual growth rate (%) | 1,0 | 2015 |
| Life expectancy at birth (in years) | 77 | 2015 |
| Death rate (per 1.000 population) | 6,34 | 2015 |
| Live births (per 1.000 population) | 23,41 | 2015 |

| Economic information | | Year |
|---|---------------|---------------|
| Gross domestic product (U.S dollar-billions) | 103,08 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 3.076,60 | 2015* |
| Total expenditure on health as% of GDP | not available | not available |
| General government expenditure on health as% of total expenditure on health | 35,5 | 2012 |
| Private expenditure on health as% of total expenditure on health | 64,5 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|-------|
| | 2014 | 2015 |
| | 40% | 37,6% |

3. Healthcare System

National Health System

| Basic insurance availability | No |
|------------------------------|----|
|------------------------------|----|

| Percentage of insured and uninsured citizens | | |
|--|------|------|
| | 2014 | 2015 |
| Insured citizens | 70% | 75% |
| Uninsured citizens | 30% | 25% |

| Distribution of insurance modality | | |
|------------------------------------|------|------|
| | 2014 | 2015 |
| Public insurance company | 80% | 80% |
| Private insurance company | 15% | 15% |
| Private co-payment | 5% | 5% |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|-----|
| ICD devices | Yes |
| Pacemakers | Yes |
| Ablation | Yes |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|---|-------------------------------------|--|--------------------------|---|--------------------------|-------------------------------------|-------------------------------------|
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| ICD primary prevention | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

Comments: Physicians: only on private practice



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |
| Comments: National health budget | |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|-------------------------------------|--------------------------|-----------------------------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | DEU for cardiac pacing |
| Invasive electrophysiology | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | DEU of invasive electrophysiology |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |
| Comments: European DEU | |

| Specialist required for | | Specialist |
|---------------------------|-----|----------------------------------|
| Catheter ablation | Yes | Cardiologist |
| ICD or pacemaker implants | Yes | Cardiologist and cardiac surgeon |

| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|
|---|----|

| | |
|---|------------------|
| Required period of training to perform implantations | Yes |
| | 1 year minimum |
| Suggested period of training to perform implantations | Yes |
| | 1 year minimum |
| National quality control system availability | No answer |
| Willingness to install quality control system | No answer |
| Responsible person for quality control | |
| Health Ministry | |
| Training centres availability | |
| Pacemaker | 11 |
| ICD implantation | 7 |
| CRT implantation | 7 |
| Electrophysiological studies and catheter ablation | 6 |
| Atrial fibrillation ablation | 2 |
| Number of universities (Schools of Medicine) | 5 |
| Percentage of academic centres among all practicing EP centres | 50% |
| Percentage of academic centres among all practicing implanting devices centres | 40% |

5. Pacemakers

| | | |
|---|---------------|-------------|
| Pacemaker units implanted and number of implanting centres | | |
| | 2014 | 2015 |
| Implanting centres | 11 | 11 |
| Total Pacemaker units implanted | 1.465 | 1.801 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | not available | 1.801 |
| Replacements | not available | 0 |
| Specialist performing implants | | |
| Cardiologists | Yes | 99% |
| Surgeons | Yes | 1% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 7 | 6 |
| Total CRT units implanted | 62 | 84 |
| Thereof, CRT pacemaker | 45 | 42 |
| Thereof, CRT ICD | 17 | 42 |
| Specialist performing implants | | |
| Cardiologists | Yes | 99 % |
| Surgeons | Yes | 1 % |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 7 | 6 |
| Total ICD units implanted | 27 | 57 |
| Thereof, Single chamber | 16 | 13 |
| Thereof, Dual chamber | 11 | 44 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | not available | not available |
| Replacements | not available | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | not available |
| Surgeons | Yes | not available |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|---------------|------|
| | 2014 | 2015 |
| Implanting centres | not available | 0 |
| Total loop recorders implanted | not available | 0 |

| Specialist performing implants | | |
|--------------------------------|----|----|
| Cardiologists | No | 0% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 2 | 3 |
| Total lead extraction procedures | 10 | 10 |

| Specialist performing lead extractions | | |
|--|-----|-----|
| Cardiologists | Yes | 99% |
| Surgeons | Yes | 1% |

10. Device specific

| Availability of remote monitoring of devices | | No |
|--|--|----|
| Reasons why remote monitoring is not available: infrastructure | | |

| National registry for | | |
|-----------------------|-----------|---------------|
| | | Official name |
| ICD | No answer | |
| Pacing | Yes | SMC |
| Electrophysiology | Yes | SMC |

| Availability of a national quality insurance system or complication registry | | No |
|--|--|----|
|--|--|----|

| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |
|--|--|----|
|--|--|----|



11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 5 | 5 |
| Number of ablations performed | 170 | 60 |
| Mean number of ablations per centre | 34 | 12 |
| Number of AF ablations | not available | not available |
| Number of ablation centres (> 50 AF ablations) | not available | not available |
| Number of VT/VF ablations | not available | not available |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | not available | not available |
| Number of LAA closures | not available | not available |
| Number of centres (LAA closures) | not available | not available |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 7 | 7 |
| Number of physicians under training to become independent electrophysiologists | not available | not available |
| Availability of a national registry for interventional electrophysiology | | Yes |
| Official name: SMC | | |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|-----------------------|
| National | | | | | | Yes |
| U.S. | | | | | | Yes |
| European | | | | | | Yes |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of referral | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 5 |
| 1 = no obstacle, 5 = great obstacle | | | | | | 1 = top, 6 = lowest |

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|-----|
| SMC |
|-----|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

| |
|---------------------|
| Official statistics |
|---------------------|

| |
|--------------------------------------|
| Survey from professional association |
|--------------------------------------|

| |
|------------|
| Sales data |
|------------|

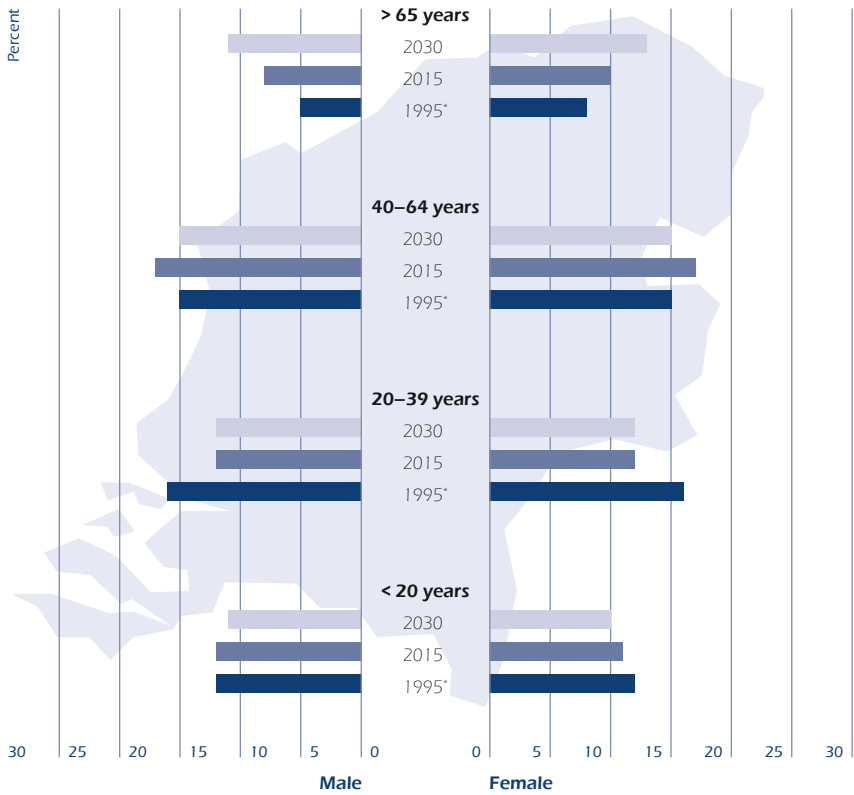
| |
|------------|
| Estimation |
|------------|

NETHERLANDS



1. Statistics

Age pyramid for Netherlands



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 1,6 | 2013 |
| Beds (per 100.000 population) | 465,7 | 2009 |
| Density of physicians (per 1.000 population) | 3,3 | 2013 |
| Density of nurses (per 1.000 population) | 8,6 | 2008 |

| Demographic information | | Year |
|-------------------------------------|------------|------|
| Population | 16.947.904 | 2015 |
| Population annual growth rate (%) | 0,4 | 2015 |
| Life expectancy at birth (in years) | 81 | 2015 |
| Death rate (per 1.000 population) | 8,4 | 2013 |
| Live births (per 1.000 population) | 10,2 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 750,78 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 44.333,15 | 2015* |
| Total expenditure on health as% of GDP | 12,9 | 2013 |
| General government expenditure on health as% of total expenditure on health | 79,6 | 2012 |
| Private expenditure on health as% of total expenditure on health | 13,2 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|------|
| | 2014 | 2015 |
| | 33% | 28% |

3. Healthcare System

There is a system of obligatory health Insurance, with private Insurance companies. These Insurance companies are obliged to provide a package with a defined set of insured treatments.

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: resident in the Netherlands

| Percentage of insured and uninsured citizens | | |
|--|------|------|
| | 2014 | 2015 |
| Insured citizens | 100% | 100% |
| Uninsured citizens | 0% | 0% |

| Distribution of insurance modality | | |
|------------------------------------|------|------|
| | 2014 | 2015 |
| Public insurance company | 0% | 0% |
| Private insurance company | 100% | 100% |
| Private co-payment | 0% | 0% |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|---|-------------------------------------|--|--------------------------|---|--------------------------|--------------------------|--------------------------|
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Comments: The hospital receives the total amount of reimbursement of the Insurance companies. Physicians receive from the hospital a honorarium for each procedure done.

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

Comments: In some rare cases the Dutch guidelines are somewhat different from the ESC guidelines.

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|--------------------------|--------------------------|--|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | EHRA or IHBRE certification |
| Invasive electrophysiology | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | EHRA certification; at this time the Dutch guidelines to become an electrophysiologist are rewritten |
| Allied professionals | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | EHRA certification; at this time the Dutch guidelines are rewritten |
| Training centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | NVVC practice guidelines and NHRA educational document for invasive electrophysiology; at this time these guidelines are rewritten |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input checked="" type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | | Specialist |
|---|-----|--|-----------------|
| Catheter ablation | Yes | Cardiologists named in the NHRA (Netherlands Heart Rhythm Association) documents | |
| ICD or pacemaker implants | Yes | Cardiologists named in the NHRA (Netherlands Heart Rhythm Association) documents | |
| Official national competency guidelines for electrophysiological studies or catheter ablation | | | Yes |
| NHRA (in name of the NVVC: Nederlands Vereniging voor Cardiologie) | | | |
| Required period of training to perform implantations | | | Yes |
| | | | at least 1 year |
| Suggested period of training to perform implantations | | | Yes |
| | | | 2 years |
| National quality control system availability | | | Yes |
| Pacemaker | | | Yes |
| ICD implantation | | | Yes |
| CRT implantation | | | Yes |
| Catheter ablation | | | Yes |
| Responsible person for quality control | | | |
| NCDR: National Cardiovascular Data Registry | | | |
| Training centres availability | | | |
| Pacemaker | | | 16 |
| ICD implantation | | | 16 |
| CRT implantation | | | 16 |
| Electrophysiological studies and catheter ablation | | | 16 |
| Atrial fibrillation ablation | | | 16 |
| Number of universities (Schools of Medicine) | | | 8 |
| Percentage of academic centres among all practicing EP centres | | | 47 % |
| Percentage of academic centres among all practicing implanting devices centres | | | 9 % |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|--|---------------|---------|
| | 2014 | 2015 |
| Implanting centres | 83 | 85 |
| Total Pacemaker units implanted | 10.132 | 10.000* |
| Thereof, Leadless Pacemaker | not available | 50 |
| First implants | 7.467 | 7.600* |
| Replacements | 2.665 | 2.350* |

* Leadless Pacemaker included

| Specialist performing implants | | |
|--------------------------------|----------------------|-----|
| Cardiologists | Yes | 95% |
| Surgeons | Yes | 2% |
| Other: | allied professionals | 3% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|-------|-------|
| | 2014 | 2015 |
| Implanting centres | 31 | 29 |
| Total CRT units implanted | 1.931 | 2.000 |
| Thereof, CRT pacemaker | 514 | 400 |
| Thereof, CRT ICD | 1.417 | 1.600 |

| Specialist performing implants | | |
|--------------------------------|-----|-----|
| Cardiologists | Yes | 97% |
| Surgeons | Yes | 3% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 28 | 29 |
| Total ICD units implanted | 3.577 | 3.500* |
| Thereof, Single chamber | not available | not available |
| Thereof, Dual chamber | not available | not available |
| Thereof, Subcutaneous ICD | not available | 150 |
| First implants | 2.373 | 2.300* |
| Replacements | 1.204 | 1.050* |

* Subcutaneous ICD included

| Specialist performing implants | | |
|--------------------------------|----------------------|-----|
| Cardiologists | Yes | 95% |
| Surgeons | Yes | 3% |
| Other: | allied professionals | 2% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|-------|------|
| | 2014 | 2015 |
| Implanting centres | 83 | 85 |
| Total loop recorders implanted | 1.500 | 300 |

| Specialist performing implants | | |
|--------------------------------|----------------------|-----|
| Cardiologists | Yes | 85% |
| Surgeons | Yes | 5% |
| Other: | allied professionals | 10% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 12 | 12 |
| Total lead extraction procedures | 500 | 120 |

| Specialist performing lead extractions | | |
|--|-----|-----|
| Cardiologists | Yes | 90% |
| Surgeons | Yes | 10% |

10. Device specific

| | |
|---|------------|
| Availability of remote monitoring of devices | Yes |
|---|------------|

| National registry for | | | Official name |
|------------------------------|-----|--|---|
| ICD | Yes | | NCDR (National Cardiovascular Data Registry, DIPR (Dutch ICD en Pacemaker Registry) |
| Pacing | Yes | | NCDR and DIPR |
| Electrophysiology | Yes | | NCDR and NHRA registry |

| | |
|---|------------|
| Availability of a national quality insurance system or complication registry | Yes |
| NCDR | |

| | |
|---|------------|
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | Yes |
| Official name: Device Committee from the NHRA | |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 16 | 16 |
| Number of ablations performed | 8.358 | 8.500 |
| Mean number of ablations per centre | 522 | 531 |
| Number of AF ablations | 3.413 | 3.600 |
| Number of ablation centres (> 50 AF ablations) | 15 | 16 |
| Number of VT/VF ablations | 850 | not available |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 16 | 16 |
| Number of LAA closures | not available | not available |
| Number of centres (LAA closures) | 4 | 5 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 48 | 52 |
| Number of physicians under training to become independent electrophysiologists | 12 | 10 |
| Availability of a national registry for interventional electrophysiology | No | |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | Yes |
| U.S. | No |
| European | Yes |

| Obstacles to guideline implementation | | | | | | Ranking of importance |
|--|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of referral | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Low awareness of guidelines | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Lack of operators | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |

1 = no obstacle, 5 = great obstacle

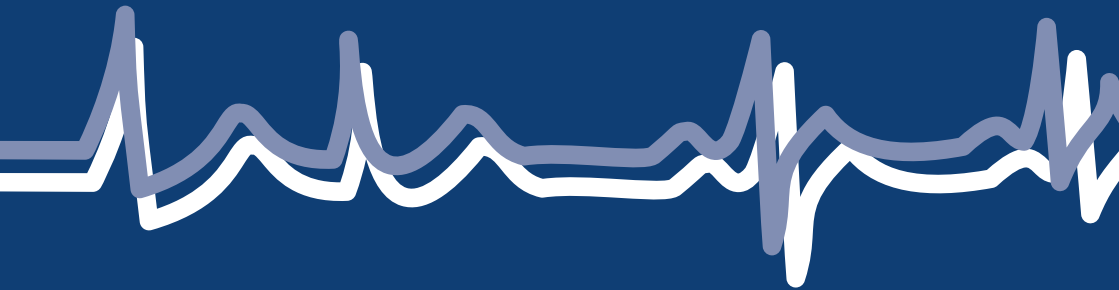
1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Netherlands Heart Rhythm Association |

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
| EHRA White Book 2015 |
| Official statistics |
| Survey from professional association |
| Estimation |
| Other |

NORWAY



1. Statistics

Age pyramid for Norway



* 1990 or last available

| Healthcare data | Year | |
|--|---------------|---------------|
| Hospitals (per 100.000 population) | not available | not available |
| Beds (per 100.000 population) | 385,8 | 2013 |
| Density of physicians (per 1.000 population) | 4,3 | 2013 |
| Density of nurses (per 1.000 population) | 17,2 | 2013 |

| Demographic information | Year | |
|-------------------------------------|-----------|------|
| Population | 5.207.689 | 2015 |
| Population annual growth rate (%) | 1,2 | 2015 |
| Life expectancy at birth (in years) | 82 | 2015 |
| Death rate (per 1.000 population) | 8,1 | 2013 |
| Live births (per 1.000 population) | 11,6 | 2013 |

| Economic information | Year | |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 397,59 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 76.266,46 | 2015* |
| Total expenditure on health as% of GDP | 9,6 | 2013 |
| General government expenditure on health as% of total expenditure on health | 85,0 | 2012 |
| Private expenditure on health as% of total expenditure on health | 15,0 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|---------------|---------------|
| | not available | not available |

3. Healthcare System

National Health Systems

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: Norwegian citizen

| Percentage of insured and uninsured citizens | 2014 | 2015 |
|--|------|------|
|--|------|------|

| | | |
|--------------------|------|------|
| Insured citizens | 100% | 100% |
| Uninsured citizens | 0% | 0% |

| Distribution of insurance modality | 2014 | 2015 |
|------------------------------------|------|------|
|------------------------------------|------|------|

| | | |
|---------------------------|-----|-----|
| Public insurance company | 98% | 99% |
| Private insurance company | 0% | 0% |
| Private co-payment | 2% | 1% |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|--|
|--|--|

| | |
|-------------|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
|---|--|--|--|--|--|--|--|--|

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|-------------------------------------|--|--------------------------|---|--------------------------|--------------------------|-------------------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | | Specialist |
|---------------------------|-----|--|--------------|
| Catheter ablation | Yes | | Cardiologist |
| ICD or pacemaker implants | Yes | | Cardiologist |

| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|
|---|----|

| | |
|---|------------|
| Required period of training to perform implantations | No |
| Suggested period of training to perform implantations | No |
| National quality control system availability | No |
| Willingness to install quality control system | Yes |
| Responsible person for quality control | |
| National Health register | |
| Training centres availability | |
| Pacemaker | 5 |
| ICD implantation | 5 |
| CRT implantation | 4 |
| Electrophysiological studies and catheter ablation | 3 |
| Atrial fibrillation ablation | 3 |
| Number of universities (Schools of Medicine) | 4 |
| Percentage of academic centres among all practicing EP centres | 80% |
| Percentage of academic centres among all practicing implanting devices centres | 60% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|-------------|
| | 2014 | 2015 |
| Implanting centres | 23 | 23 |
| Total Pacemaker units implanted | 3.887 | 4.121 |
| Thereof, Leadless Pacemaker | not available | 5 |
| First implants | 2.989 | 3.217 |
| Replacements | 898 | 904 |
| Specialist performing implants | | |
| Cardiologists | Yes | 99,7% |
| Surgeons | No | 0,3% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 10 | 9 |
| Total CRT units implanted | 514 | 562 |
| Thereof, CRT pacemaker | 197 | 214 |
| Thereof, CRT ICD | 317 | 348 |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|-------|
| | 2014 | 2015 |
| Implanting centres | 11 | 11 |
| Total ICD units implanted | 1.134 | 1.214 |
| Thereof, Single chamber | 298 | 222* |
| Thereof, Dual chamber | 836 | 696* |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 803 | 891 |
| Replacements | 331 | 323 |

*First implants only

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | not available | not available |
| Total loop recorders implanted | not available | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 3 | 3 |
| Total lead extraction procedures | 219 | 194 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|-----|---------------------------------------|
| National registry for | | |
| | | Official name |
| ICD | Yes | Norwegian Pacemaker- and ICD registry |
| Pacing | Yes | Norwegian Pacemaker- and ICD registry |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |



11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 5 | 5 |
| Number of ablations performed | 2.959 | 3.067 |
| Mean number of ablations per centre | 592 | 613 |
| Number of AF ablations | 1.432 | 1.460 |
| Number of ablation centres (> 50 AF ablations) | 5 | 5 |
| Number of VT/VF ablations | not available | not available |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 3 | 3 |
| Number of LAA closures | not available | not available |
| Number of centres (LAA closures) | not available | not available |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 15 | 15 |
| Number of physicians under training to become independent electrophysiologists | 2 | 2 |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|-----------------------|
| National | | | | | | |
| U.S. | | | | | | |
| European | | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of reimbursement, limited financial resources | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of operators | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| 1 = no obstacle, 5 = great obstacle | | | | | | 1 = top, 6 = lowest |

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

Norwegian Society of Cardiology, Working group of arrhythmias

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

EHRA White Book 2015

Official statistics

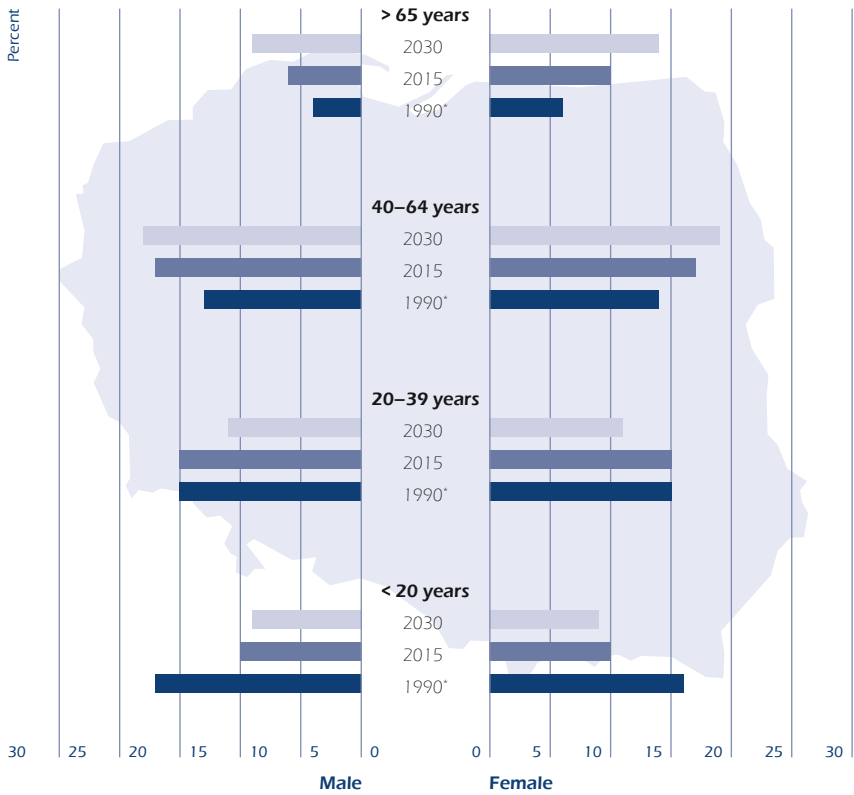
Survey from professional association

POLAND



1. Statistics

Age pyramid for Poland



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 2,8 | 2013 |
| Beds (per 100.000 population) | 650,0 | 2013 |
| Density of physicians (per 1.000 population) | 2,2 | 2013 |
| Density of nurses (per 1.000 population) | 5,8 | 2013 |

| Demographic information | | Year |
|-------------------------------------|------------|------|
| Population | 38.562.189 | 2015 |
| Population annual growth rate (%) | -0,1 | 2015 |
| Life expectancy at birth (in years) | 77 | 2015 |
| Death rate (per 1.000 population) | 10,1 | 2013 |
| Live births (per 1.000 population) | 9,6 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 481,24 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 12.662,21 | 2015* |
| Total expenditure on health as% of GDP | 6,7 | 2013 |
| General government expenditure on health as% of total expenditure on health | 69,2 | 2012 |
| Private expenditure on health as% of total expenditure on health | 30,3 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|------|
| | 2014 | 2015 |
| | 46% | 45% |

3. Healthcare System

National Health System

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: Monthly health care contribution

| Percentage of insured and uninsured citizens | 2014 | 2015 |
|--|------|------|
|--|------|------|

| | | |
|--------------------|-----|---------------|
| Insured citizens | 95% | not available |
| Uninsured citizens | 5% | not available |

| Distribution of insurance modality | 2014 | 2015 |
|------------------------------------|------|------|
|------------------------------------|------|------|

| | | |
|---------------------------|-----|-----|
| Public insurance company | 90% | 90% |
| Private insurance company | 5% | 0% |
| Private co-payment | 5% | 10% |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|--|
|--|--|

| | |
|-------------|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
|---|--|--|--|--|--|--|--|--|

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|-------------------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Comments: In the case of reimbursement for IRL and S-ICD implantation decision may be taken individually by the NHS at the request of the hospital. Reimbursement for leadless pacing is at the level of a standard pacemaker



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|-------------------------------------|-------------------------------------|---|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Certification of Heart Rhythm Section of Polish Cardiac Society |
| Invasive electrophysiology | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Certification of Heart Rhythm Section of Polish Cardiac Society |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | Specialist |
|---------------------------|-----|-------------------------------|
| Catheter ablation | Yes | Cardiologist |
| ICD or pacemaker implants | Yes | Cardiologist, cardiac surgeon |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|

| | |
|--|----|
| Required period of training to perform implantations | No |
|--|----|

| | |
|---|----------------------|
| Suggested period of training to perform implantations | No |
| National quality control system availability | No |
| Willingness to install quality control system | Yes |
| Responsible person for quality control | |
| Ministry of Health | |
| Training centres availability | |
| Pacemaker | 41 |
| ICD implantation | 26 |
| CRT implantation | 12 |
| Electrophysiological studies and catheter ablation | 10 |
| Atrial fibrillation ablation | 5 |
| Number of universities (Schools of Medicine) | 13 |
| Percentage of academic centres among all practicing EP centres | not available |
| Percentage of academic centres among all practicing implanting devices centres | not available |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 150 | 145 |
| Total Pacemaker units implanted | 28.470 | 30.494 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | 19.873 | 21.542 |
| Replacements | 8.597 | 8.952 |
| Specialist performing implants | | |
| Cardiologists | Yes | 99% |
| Surgeons | Yes | 1% |



6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|-------|---------------|
| | 2014 | 2015 |
| Implanting centres | 35 | not available |
| Total CRT units implanted | 3.718 | 3.964 |
| Thereof, CRT pacemaker | 717 | 645 |
| Thereof, CRT ICD | 3.001 | 3.319 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 120 | 122 |
| Total ICD units implanted | 8.401 | 8.344 |
| Thereof, Single chamber | not available | not available |
| Thereof, Dual chamber | not available | not available |
| Thereof, Subcutaneous ICD | not available | 15 |
| First implants | 6.687 | 6.529 |
| Replacements | 1.712 | 1.815 |
| Specialist performing implants | | |
| Cardiologists | Yes | 99% |
| Surgeons | No | 1% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|---------------|
| | 2014 | 2015 |
| Implanting centres | 20 | not available |
| Total loop recorders implanted | 250 | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|-------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 10 | 30 |
| Total lead extraction procedures | 600 | 1.050 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 99 % |
| Surgeons | No | 1 % |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|----|---------------|
| National registry for | | |
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 83 | 85 |
| Number of ablations performed | 10.922 | 10.795 |
| Mean number of ablations per centre | 132 | 127 |
| Number of AF ablations | 2.169 | 3.253 |
| Number of ablation centres (> 50 AF ablations) | 20 | 21 |
| Number of VT/VF ablations | not available | 693 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | not available | 19 |
| Number of LAA closures | 200 | not available |
| Number of centres (LAA closures) | 15 | not available |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 125 | not available |
| Number of physicians under training to become independent electrophysiologists | not available | not available |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-----------------------|
| National | Yes | | | | | |
| U.S. | No | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Lack of referral | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Low awareness of guidelines | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|--|
| Heart Rhythm Section of Polish Cardiac Society |
|--|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

| |
|---------------------|
| Official statistics |
|---------------------|

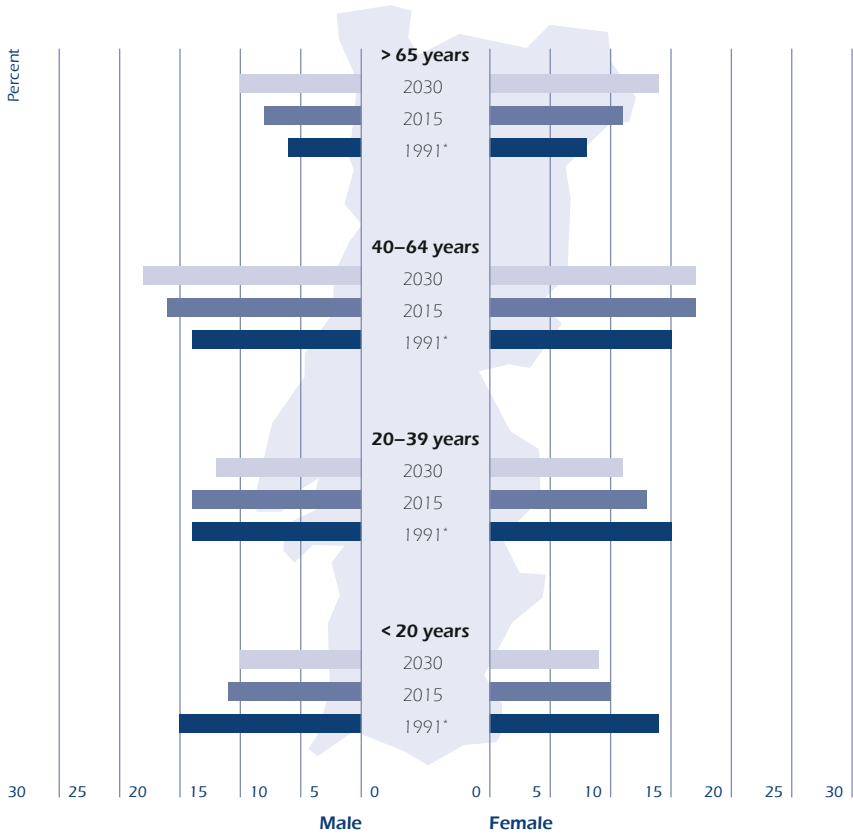
| |
|------------|
| Estimation |
|------------|

PORTUGAL



1. Statistics

Age pyramid for Portugal



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 2,2 | 2013 |
| Beds (per 100.000 population) | 339,5 | 2013 |
| Density of physicians (per 1.000 population) | 4,3 | 2013 |
| Density of nurses (per 1.000 population) | 6,3 | 2013 |

| Demographic information | | Year |
|-------------------------------------|------------|------|
| Population | 10.825.309 | 2015 |
| Population annual growth rate (%) | 0,1 | 2015 |
| Life expectancy at birth (in years) | 79 | 2015 |
| Death rate (per 1.000 population) | 10,2 | 2013 |
| Live births (per 1.000 population) | 8,0 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 197,51 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 18.983,78 | 2015* |
| Total expenditure on health as% of GDP | 9,7 | 2013 |
| General government expenditure on health as% of total expenditure on health | 64,0 | 2012 |
| Private expenditure on health as% of total expenditure on health | 36,0 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|---------------|--------|
| | not available | 30,6 % |

3. Healthcare System

In 2006, 81,1% of the resident population resorted mostly the National Health Service (NHS) to have access to health services. The second most mentioned subsystem corresponded to the Civil Servants Health Subsystem (ADSE), used by 10,1% of residents in 2006. In the same year private insurances supported 2,4% of the health expenditure and the private health subsystem supported 1,9% of the health expenditure.

(source Portuguese National Health Plan 2012–2016, Portuguese Directorate-General of Health, and Organization for Economic Co-operation and Development)

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

All residents in Portugal have access to health care provided by the National Health Service (NHS), financed mainly through taxation. CO-payments have been increasing over time, and the level of cost sharing is highest for pharmaceutical products. • Approximately one-fifth to a quarter of population enjoys a second (or more) layer of health insurance coverage through health subsystems and voluntary health insurance.

| Percentage of insured and uninsured citizens | | |
|--|------|------|
| | 2014 | 2015 |
| Insured citizens | 100% | 100% |
| Uninsured citizens | 0% | 0% |

| Distribution of insurance modality | | |
|------------------------------------|---------------|------|
| | 2014 | 2015 |
| Public insurance company | not available | 100% |
| Private insurance company | not available | 10% |
| Private co-payment | not available | 25% |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

Comments: co-payment necessary only in the private sector

Reimbursement availability for physicians and hospitals

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|--------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Comments: Physician reimbursement only if working in the private sector

Treatment availability

| | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

Comments: Hospital budgets are drawn up and allocated by the Ministry of Health. At present, public hospitals are allocated global budgets based on contracts (cotraros programa) signed with the Ministry of Health. As the year budget is reached, there may be restrictions on certain number of treatments.

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|-------------------------------------|--------------------------|--|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Portuguese Medical Association |
| Invasive electrophysiology | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Portuguese Medical Association (Ordem dos Médicos), College of Subspecialty in Electrophysiology |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Portuguese Medical Association (Ordem dos Médicos) |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input checked="" type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | Specialist |
|---------------------------|-----|-------------------------------|
| Catheter ablation | Yes | Cardiologist |
| ICD or pacemaker implants | Yes | Cardiologist, cardiac surgeon |

| Official national competency guidelines for electrophysiological studies or catheter ablation | Yes |
|--|-----|
| Portuguese Medical Association (Ordem dos Médicos), College of Subspecialty in Electrophysiology | |

| | |
|--|----|
| Required period of training to perform implantations | No |
|--|----|

| | |
|---|----|
| Suggested period of training to perform implantations | No |
|---|----|

| | |
|--|----|
| National quality control system availability | No |
|--|----|

| | |
|---|-----|
| Willingness to install quality control system | Yes |
|---|-----|

| | |
|--|-----------|
| Responsible person for quality control | no answer |
|--|-----------|

| Training centres availability | |
|---|----------------------|
| Pacemaker | not available |
| ICD implantation | not available |
| CRT implantation | not available |
| Electrophysiological studies and catheter ablation | 5 |
| Atrial fibrillation ablation | 3 |
| | |
| Number of universities (Schools of Medicine) | 7 |
| | |
| Percentage of academic centres among all practicing EP centres | 20% |
| | |
| Percentage of academic centres among all practicing implanting devices centres | not available |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|--|---------------|-------|
| | 2014 | 2015 |
| Implanting centres | 39 | 40 |
| Total Pacemaker units implanted | 8.830 | 8.769 |
| Thereof, Leadless Pacemaker | not available | 16 |
| First implants | 6.966 | 6.958 |
| Replacements | 1.864 | 1.795 |
| | | |
| Specialist performing implants | | |
| Cardiologists | Yes | 99% |
| Surgeons | Yes | 1% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 24 | 26 |
| Total CRT units implanted | 696 | 772 |
| Thereof, CRT pacemaker | 178 | 210 |
| Thereof, CRT ICD | 518 | 562 |
| | | |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|-------|
| | 2014 | 2015 |
| Implanting centres | 31 | 29 |
| Total ICD units implanted | not available | 1,224 |
| Thereof, Single chamber | not available | 975 |
| Thereof, Dual chamber | not available | 241 |
| Thereof, Subcutaneous ICD | not available | 8 |
| First implants | 819 | 1,001 |
| Replacements | not available | 223 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 13 | 40 |
| Total loop recorders implanted | 152 | 320 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and number of centers that performed lead extractions | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 5 | not available |
| Total lead extraction procedures | not available | not available |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | not available |
| Surgeons | Yes | not available |

10. Device specific

| | | |
|---|-----|---------------|
| Availability of remote monitoring of devices | | Yes |
| National registry for | | |
| | | Official name |
| ICD | Yes | |
| Pacing | Yes | |
| Electrophysiology | Yes | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | Yes |

11. Interventional electrophysiology

| | | |
|---|---------------|---------------|
| Number of ablations performed and number of centres | | |
| | 2014 | 2015 |
| Number of ablation centres | 24 | 25 |
| Number of ablations performed | 2.324 | 2.580 |
| Mean number of ablations per centre | 97 | 103 |
| Number of AF ablations | 684 | 743 |
| Number of ablation centres (> 50 AF ablations) | 5 | 6 |
| Number of VT/VF ablations | not available | not available |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | not available | not available |
| Number of LAA closures | not available | not available |
| Number of centres (LAA closures) | not available | not available |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | not available | 25 |
| Number of physicians under training to become independent electrophysiologists | not available | not available |
| Availability of a national registry for interventional electrophysiology | | Yes |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | Yes |
| U.S. | No |
| European | No |

| Obstacles to guideline implementation | Ranking of importance | | | | |
|--|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|
| | 1 | 2 | 3 | 4 | 5 |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lack of trained personnel | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lack of operators | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Portuguese Association of Arrhythmias, Pacing and Electrophysiology |

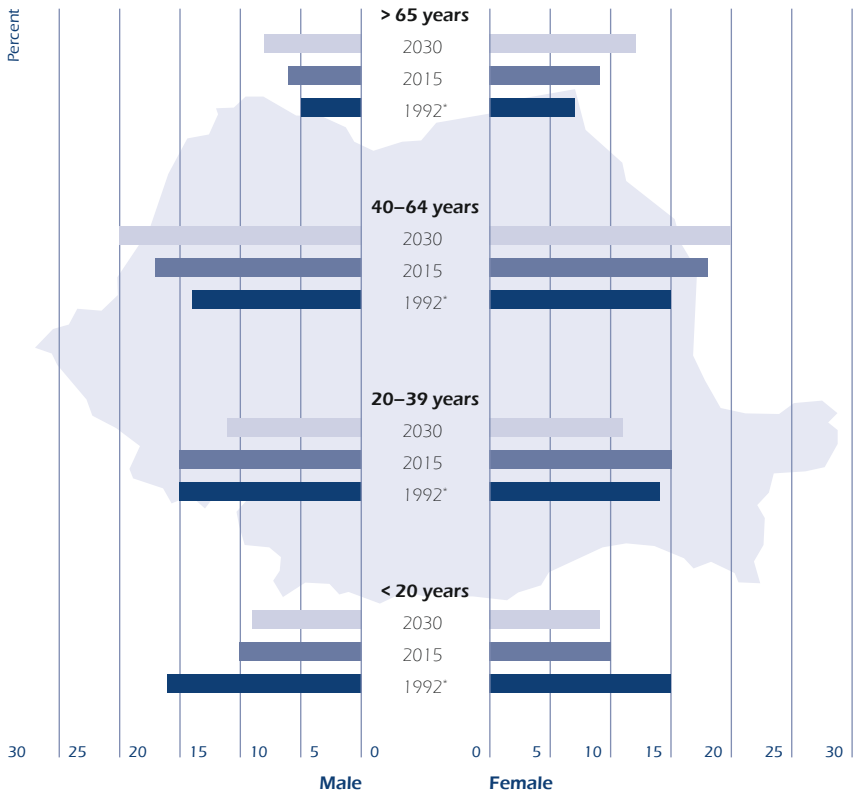
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
| EHRA White Book 2015 |
| Official statistics |
| Survey from professional association |
| Estimation |

ROMANIA



1. Statistics

Age pyramid for Romania



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 2,5 | 2013 |
| Beds (per 100.000 population) | 627,0 | 2013 |
| Density of physicians (per 1.000 population) | 2,5 | 2013 |
| Density of nurses (per 1.000 population) | 5,8 | 2013 |

| Demographic information | | Year |
|-------------------------------------|------------|------|
| Population | 21.666.350 | 2015 |
| Population annual growth rate (%) | -0,3 | 2015 |
| Life expectancy at birth (in years) | 75 | 2015 |
| Death rate (per 1.000 population) | 12,0 | 2012 |
| Live births (per 1.000 population) | 9,3 | 2013 |

| Economic information | | Year |
|---|----------|-------|
| Gross domestic product (U.S dollar-billions) | 174,92 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 8.807,33 | 2015* |
| Total expenditure on health as% of GDP | 5,3 | 2013 |
| General government expenditure on health as% of total expenditure on health | 80,3 | 2012 |
| Private expenditure on health as% of total expenditure on health | 19,7 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|------|---------------|
| | 60% | not available |

3. Healthcare System

National Health System, some private clinics and hospitals, some of them receiving partial funds from NHS
(The Ministry of Health is the coordinator of Health System)

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: to be employed, socially assisted or retired

| Percentage of insured and uninsured citizens | | |
|--|--|--|
|--|--|--|

| | 2014 | 2015 |
|--------------------|---------------|---------------|
| Insured citizens | not available | not available |
| Uninsured citizens | not available | not available |

| Distribution of insurance modality | | |
|------------------------------------|--|--|
|------------------------------------|--|--|

| | 2014 | 2015 |
|---------------------------|------|------|
| Public insurance company | 100% | 100% |
| Private insurance company | 0% | 0% |
| Private co-payment | 0% | 0% |

| Possibility to subscribing to private health insurance plans | No |
|--|----|
|--|----|

| Co-payment necessary for the following therapy | |
|--|--|
|--|--|

| | |
|-------------|-----|
| ICD devices | Yes |
| Pacemakers | Yes |
| Ablation | Yes |

Comments: Yes, only in private sector

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
|---|--|--|--|--|--|--|--|--|

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|-------------------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Comments: National Programs are available in selected centers, but limited by budget



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

Comments: National Programs are available in selected centers, but limited by fixed budget

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

Comments: We advanced the formalities for National Certification, and EHRA certification will be homologated as National Certification

| Specialist required for | | | Specialist |
|---------------------------|-----|--|--------------|
| Catheter ablation | Yes | | Cardiologist |
| ICD or pacemaker implants | Yes | | Cardiologist |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
| Required period of training to perform implantations | No |

| | |
|---|---------------|
| Suggested period of training to perform implantations | Yes |
| | 1 year |
| National quality control system availability | No |
| Willingness to install quality control system | Yes |
| Responsible person for quality control | |
| We do not have a quality control system | |
| Training centres availability | |
| Pacemaker | 9 |
| ICD implantation | 9 |
| CRT implantation | 9 |
| Electrophysiological studies and catheter ablation | 8 |
| Atrial fibrillation ablation | not available |
| Number of universities (Schools of Medicine) | 12 |
| Percentage of academic centres among all practicing EP centres | 80% |
| Percentage of academic centres among all practicing implanting devices centres | 85% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|-------------|
| | 2014 | 2015 |
| Implanting centres | 24 | 24 |
| Total Pacemaker units implanted | 4.258 | 3.918 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | not available | 3.538 |
| Replacements | not available | 380 |
| Specialist performing implants | | |
| Cardiologists | Yes | 99% |
| Surgeons | Yes | 1% |



6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 12 | 12 |
| Total CRT units implanted | 289 | 276 |
| Thereof, CRT pacemaker | 166 | 156 |
| Thereof, CRT ICD | 123 | 120 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 15 | 16 |
| Total ICD units implanted | 332 | 300 |
| Thereof, Single chamber | 307 | 210 |
| Thereof, Dual chamber | 25 | 89 |
| Thereof, Subcutaneous ICD | not available | 1 |
| First implants | not available | 257 |
| Replacements | not available | 43 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 1 | 2 |
| Total loop recorders implanted | 2 | 3 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 2 | 4 |
| Total lead extraction procedures | 10 | 15 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|----|---------------|
| National registry for | | |
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |



11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|---|-------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 12 | 12 |
| Number of ablations performed | 1.358 | 1.194 |
| Mean number of ablations per centre | 113 | 100 |
| Number of AF ablations | 88 | 132 |
| Number of ablation centres (> 50 AF ablations) | 0 | 1 |
| Number of VT/VF ablations | 23 | 50 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 1 | 2 |
| Number of LAA closures | 3 | not available |
| Number of centres (LAA closures) | 1 | not available |

| Number of electrophysiologists | | |
|--|----|----|
| Number of electrophysiologists performed catheter ablation independently | 15 | 18 |
| Number of physicians under training to become independent electrophysiologists | 3 | 3 |

| Availability of a national registry for interventional electrophysiology | No |
|--|----|
|--|----|

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-----------|--|--|--|--|--|
| National | No answer | | | | | |
| U.S. | No answer | | | | | |
| European | Yes | | | | | |

| Obstacles to guideline implementation | 1 | 2 | 3 | 4 | 5 | Ranking of importance |
|--|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------|
| Lack of centres | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 1 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Lack of operators | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

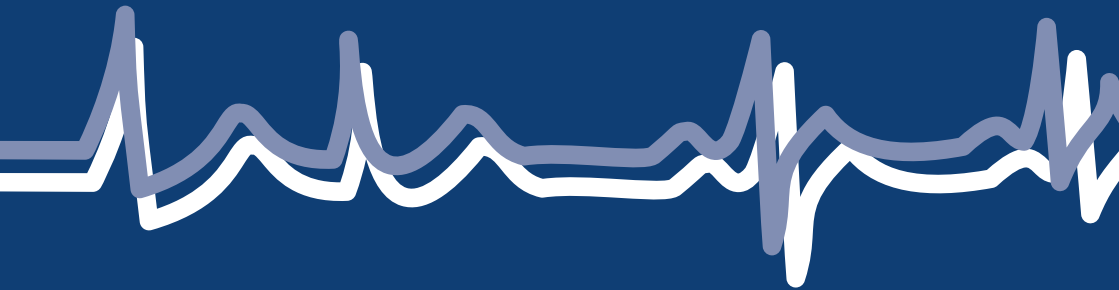
| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|---|
| Romanian Society of Cardiology, Working Group on Arrhythmias, Electrophysiology and Implantable Devices |
|---|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

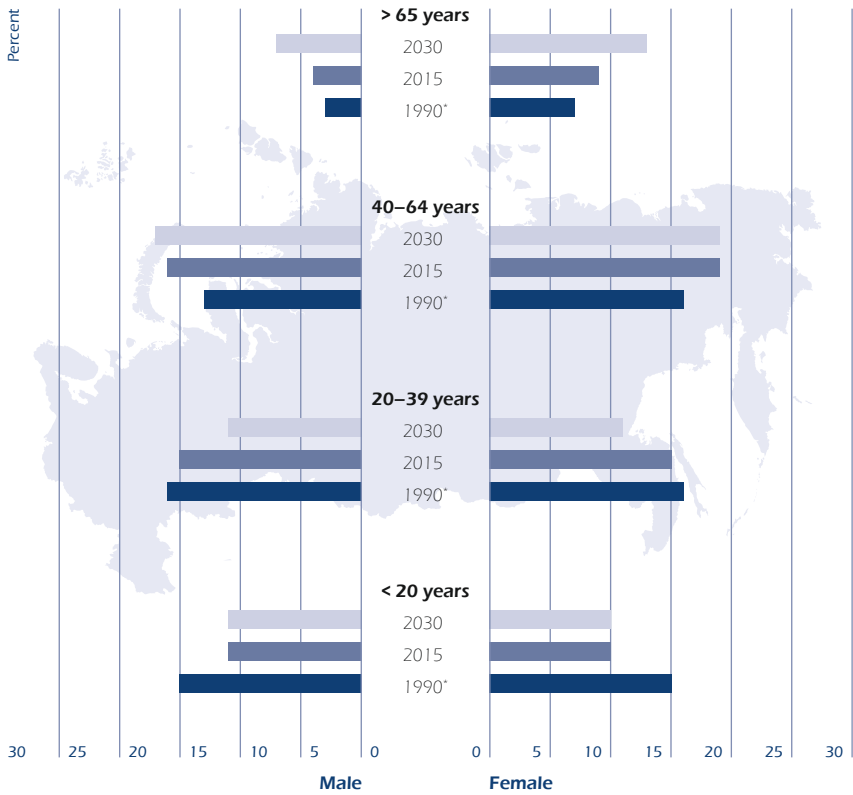
| |
|--------------------------------------|
| EHRA White Book 2015 |
| Survey from professional association |
| Estimation |

RUSSIAN FEDERATION



1. Statistics

Age pyramid for Russian Federation



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 3,5 | 2013 |
| Beds (per 100.000 population) | 817,5 | 2013 |
| Density of physicians (per 1.000 population) | 2,4 | 2013 |
| Density of nurses (per 1.000 population) | 4,3 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-------------|------|
| Population | 142.423.773 | 2015 |
| Population annual growth rate (%) | 0,0 | 2015 |
| Life expectancy at birth (in years) | 71 | 2015 |
| Death rate (per 1.000 population) | 13,5 | 2011 |
| Live births (per 1.000 population) | 12,6 | 2011 |

| Economic information | | Year |
|---|----------|-------|
| Gross domestic product (U.S dollar-billions) | 1.235,86 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 8.447,42 | 2015* |
| Total expenditure on health as% of GDP | 6,6 | 2013 |
| General government expenditure on health as% of total expenditure on health | 51,1 | 2012 |
| Private expenditure on health as% of total expenditure on health | 48,9 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|------|
| | 2014 | 2015 |
| | 53% | 53% |

3. Healthcare System

Mandatory health insurance

| Basic insurance availability | | | Yes | | | | | |
|---|---|--------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| Requirements for citizens to qualify for public insurance: All citizens | | | | | | | | |
| Percentage of insured and uninsured citizens | | | | | | | | |
| | 2014 | 2015 | | | | | | |
| Insured citizens | not available | not available | | | | | | |
| Uninsured citizens | not available | not available | | | | | | |
| Distribution of insurance modality | | | | | | | | |
| | 2014 | 2015 | | | | | | |
| Public insurance company | 85% | 90% | | | | | | |
| Private insurance company | 15% | 7% | | | | | | |
| Private co-payment | not available | 3% | | | | | | |
| Possibility to subscribing to private health insurance plans | | | | Yes | | | | |
| Co-payment necessary for the following therapy | | | | | | | | |
| ICD devices | | | | No | | | | |
| Pacemakers | | | | Yes | | | | |
| Ablation | | | | No | | | | |
| Reimbursement availability for physicians and hospitals | | | | | | | | |
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |
| Comments: NICE, Ministry of Health | |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | NSCA |
| Invasive electrophysiology | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | NSCA |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | NSCA |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|------------|-----------------------|
| | Specialist | |
| Catheter ablation | Yes | Cardiologist, surgeon |
| ICD or pacemaker implants | Yes | Cardiologist, surgeon |

| Official national competency guidelines for electrophysiological studies or catheter ablation | Yes |
|---|-----|
| National (Russian) Society of Cardiac Arrhythmias (NSCA) | |

| Required period of training to perform implantations | Yes |
|--|---------|
| | 3 years |

| Suggested period of training to perform implantations | Yes |
|---|---------|
| | 3 years |

| | |
|---|----------------------|
| National quality control system availability | Yes |
| Pacemaker | Yes |
| ICD implantation | Yes |
| CRT implantation | Yes |
| Cathether ablation | Yes |
| Responsible person for quality control | |
| NSCA | |
| Training centres availability | |
| Pacemaker | 10 |
| ICD implantation | 7 |
| CRT implantation | 7 |
| Electrophysiological studies and catheter ablation | 11 |
| Atrial fibrillation ablation | 6 |
| Number of universities (Schools of Medicine) | not available |
| Percentage of academic centres among all practicing EP centres | not available |
| Percentage of academic centres among all practicing implanting devices centres | not available |

5. Pacemakers

| | | |
|---|---------------|---------------|
| Pacemaker units implanted and number of implanting centres | | |
| | 2014 | 2015 |
| Implanting centres | 140 | 140 |
| Total Pacemaker units implanted | 37.832 | 34.492 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | 32.199 | 6.519 |
| Replacements | 5.633 | 0 |
| Specialist performing implants | | |
| Cardiologists | Yes | 80% |
| Surgeons | Yes | 18% |
| Other: | | 2% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|-------|
| | 2014 | 2015 |
| Implanting centres | 42 | 37 |
| Total CRT units implanted | 863 | 1.006 |
| Thereof, CRT pacemaker | 45 | 340 |
| Thereof, CRT ICD | 818 | 666 |
| Specialist performing implants | | |
| Cardiologists | Yes | 40% |
| Surgeons | Yes | 60% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 55 | 48 |
| Total ICD units implanted | 1.769 | 1.553 |
| Thereof, Single chamber | 645 | 563 |
| Thereof, Dual chamber | 1.124 | 990 |
| Thereof, Subcutaneous ICD | not available | not available |
| First implants | 1.516 | 1.271 |
| Replacements | 253 | 282 |
| Specialist performing implants | | |
| Cardiologists | Yes | 70% |
| Surgeons | Yes | 30% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | not available | not available |
| Total loop recorders implanted | not available | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | not available |
| Surgeons | Yes | not available |

9. Lead extractions

| Lead extractions procedures and number of centers that performed lead extractions | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | not available | not available |
| Total lead extraction procedures | not available | not available |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | not available |
| Surgeons | Yes | not available |

10. Device specific

| Availability of remote monitoring of devices | | No |
|--|---------------|------|
| Reasons why remote monitoring is not available: Biotronik Home Monitoring, Medtronic CareLink | | |
| National registry for | | |
| | Official name | |
| ICD | Yes | NSCA |
| Pacing | Yes | NSCA |
| Electrophysiology | Yes | NSCA |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | Yes |
| Federal center for interventional and surgical Arrhythmology | | |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 81 | 69 |
| Number of ablations performed | 23.874 | 21.482 |
| Mean number of ablations per centre | 295 | 311 |
| Number of AF ablations | 6.462 | 6.329 |
| Number of ablation centres (> 50 AF ablations) | 58 | 27 |
| Number of VT/VF ablations | 2.408 | 1.771 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 59 | 34 |
| Number of LAA closures | not available | not available |
| Number of centres (LAA closures) | not available | not available |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | not available | not available |
| Number of physicians under training to become independent electrophysiologists | 95 | 66 |
| Availability of a national registry for interventional electrophysiology | | Yes |
| Official name: NSCA | | |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----------|
| National | Yes |
| U.S. | No answer |
| European | Yes |

| Obstacles to guideline implementation | 1 | 2 | 3 | 4 | 5 | Ranking of importance |
|--|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-----------------------|
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Lack of referral | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Low awareness of guidelines | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of operators | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|--|
| National (Russian) Society of Cardiac Arrhythmias (NSCA) |
|--|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

| |
|--|
| Official statistics - Ministry of Health |
|--|

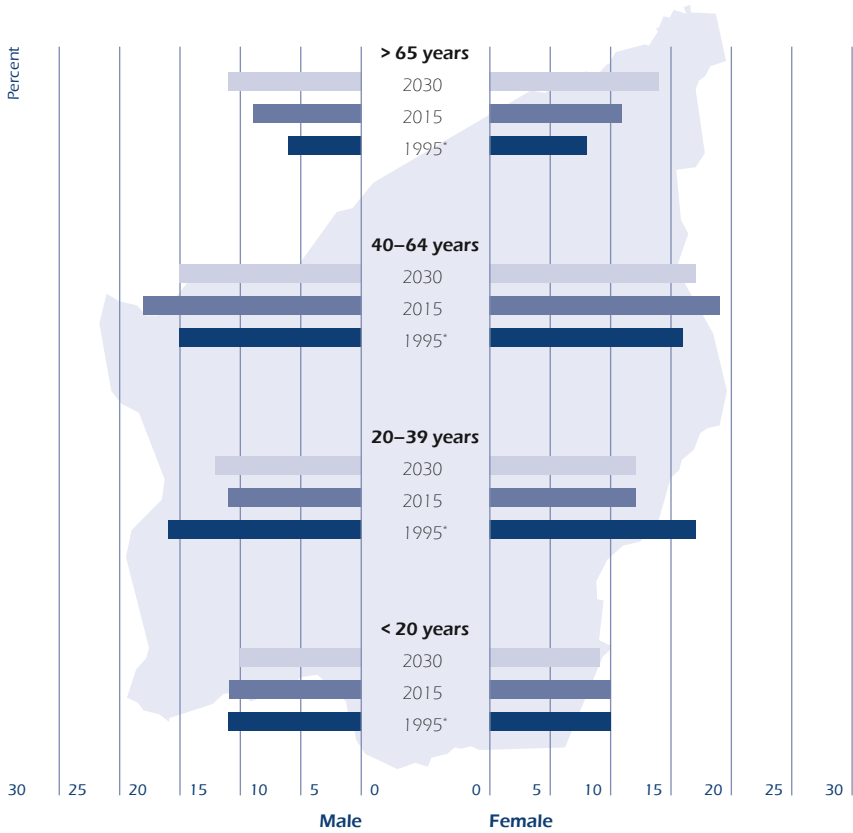
| |
|---|
| Survey from professional association - NSCA |
|---|

SAN MARINO



1. Statistics

Age pyramid for San Marino



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 3,1 | 2013 |
| Beds (per 100.000 population) | 348,7 | 2013 |
| Density of physicians (per 1.000 population) | 5,1 | 2013 |
| Density of nurses (per 1.000 population) | 8,8 | 2013 |

| Demographic information | | Year |
|-------------------------------------|--------|------|
| Population | 33.020 | 2015 |
| Population annual growth rate (%) | 0,9 | 2015 |
| Life expectancy at birth (in years) | 83 | 2015 |
| Death rate (per 1.000 population) | 7,3 | 2005 |
| Live births (per 1.000 population) | 9,9 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 1,54 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 49.139,01 | 2015* |
| Total expenditure on health as% of GDP | 6,5 | 2013 |
| General government expenditure on health as% of total expenditure on health | 87,2 | 2012 |
| Private expenditure on health as% of total expenditure on health | 12,2 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|---------------|--------|
| | 2014 | 2015 |
| | not available | 28,6 % |

3. Healthcare System

National health system provides for total health expenses coverage, for each citizen, from birth to death.

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: Citizenship and residency in San Marino.

| Percentage of insured and uninsured citizens | | |
|--|--|--|
|--|--|--|

| | 2014 | 2015 |
|--------------------|---------------|------|
| Insured citizens | not available | 100% |
| Uninsured citizens | not available | 0% |

| Distribution of insurance modality | | |
|------------------------------------|--|--|
|------------------------------------|--|--|

| | 2014 | 2015 |
|---------------------------|---------------|------|
| Public insurance company | not available | 100% |
| Private insurance company | not available | 0% |
| Private co-payment | not available | 0% |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|--|
|--|--|

| | |
|-------------|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
|---|--|--|--|--|--|--|--|--|

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|-------------------------------------|--|--------------------------|---|--------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|-----|---|
| | | Specialist |
| Catheter ablation | Yes | Cardiologist with experience and proficiency in catheter ablation |
| ICD or pacemaker implants | Yes | Cardiologist with experience and proficiency in PM/ICD implants |

| | |
|---|----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|

| | |
|--|----|
| Required period of training to perform implantations | No |
|--|----|

| | |
|---|----|
| Suggested period of training to perform implantations | No |
|---|----|

| | |
|---|------------|
| National quality control system availability | Yes |
| Pacemaker | Yes |
| ICD implantation | Yes |
| CRT implantation | Yes |
| Cathether ablation | Yes |
| Responsible person for quality control | |
| National Health Institute | |
| Training centres availability | |
| Pacemaker | 1 |
| ICD implantation | 1 |
| CRT implantation | 1 |
| Electrophysiological studies and catheter ablation | 0 |
| Atrial fibrillation ablation | 0 |
| Number of universities (Schools of Medicine) | 0 |
| Percentage of academic centres among all practicing EP centres | 0% |
| Percentage of academic centres among all practicing implanting devices centres | 0% |

5. Pacemakers

| | | |
|---|---------------|-------------|
| Pacemaker units implanted and number of implanting centres | | |
| | 2014 | 2015 |
| Implanting centres | not available | 1 |
| Total Pacemaker units implanted | not available | 11 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | not available | 7 |
| Replacements | not available | 4 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | not available | 1 |
| Total CRT units implanted | not available | 2 |
| Thereof, CRT pacemaker | not available | 0 |
| Thereof, CRT ICD | not available | 2 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | not available | 1 |
| Total ICD units implanted | not available | 8 |
| Thereof, Single chamber | not available | 4 |
| Thereof, Dual chamber | not available | 3 |
| Thereof, Subcutaneous ICD | not available | 1 |
| First implants | not available | 5 |
| Replacements | not available | 3 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|---------------|------|
| | 2014 | 2015 |
| Implanting centres | not available | 1 |
| Total loop recorders implanted | not available | 2 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|---------------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | not available | 0 |
| Total lead extraction procedures | not available | 0 |

| Specialist performing lead extractions | | |
|---|-----|----|
| Cardiologists | Yes | 0% |
| Surgeons | No | 0% |
| Comments: collaboration with foreign hospitals for lead extraction (where trained cardiologists perform the intervention) | | |

10. Device specific

| Availability of remote monitoring of devices | No |
|--|----|
| Reasons why remote monitoring is not available: Implementing is underway | |

| National registry for | | | Official name |
|-----------------------|-----|---|---------------|
| ICD | Yes | State Hospital Registry, belonging to National Health Institute | |
| Pacing | Yes | State Hospital Registry, belonging to National Health Institute | |
| Electrophysiology | No | | |

| Availability of a national quality insurance system or complication registry | Yes |
|--|-----|
| Official name: State Hospital Registry, belonging to National Health Institute | |

| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | No |
|--|----|
|--|----|

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Number of ablation centres | not available | 0 |
| Number of ablations performed | not available | 0 |
| Mean number of ablations per centre | not available | 0 |
| Number of AF ablations | not available | 0 |
| Number of ablation centres (> 50 AF ablations) | not available | 0 |
| Number of VT/VF ablations | not available | 0 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | not available | 0 |
| Number of LAA closures | not available | 0 |
| Number of centres (LAA closures) | not available | 0 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | not available | 0 |
| Number of physicians under training to become independent electrophysiologists | not available | 0 |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|---|
| National | No answer | | | | | |
| U.S. | No | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | | | | | Ranking of importance | |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Lack of referral | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 |
| Low awareness of guidelines | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 |
| 1 = no obstacle, 5 = great obstacle | | | | | 1 = top, 6 = lowest | |

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Società Sammarinese di Cardiologia |

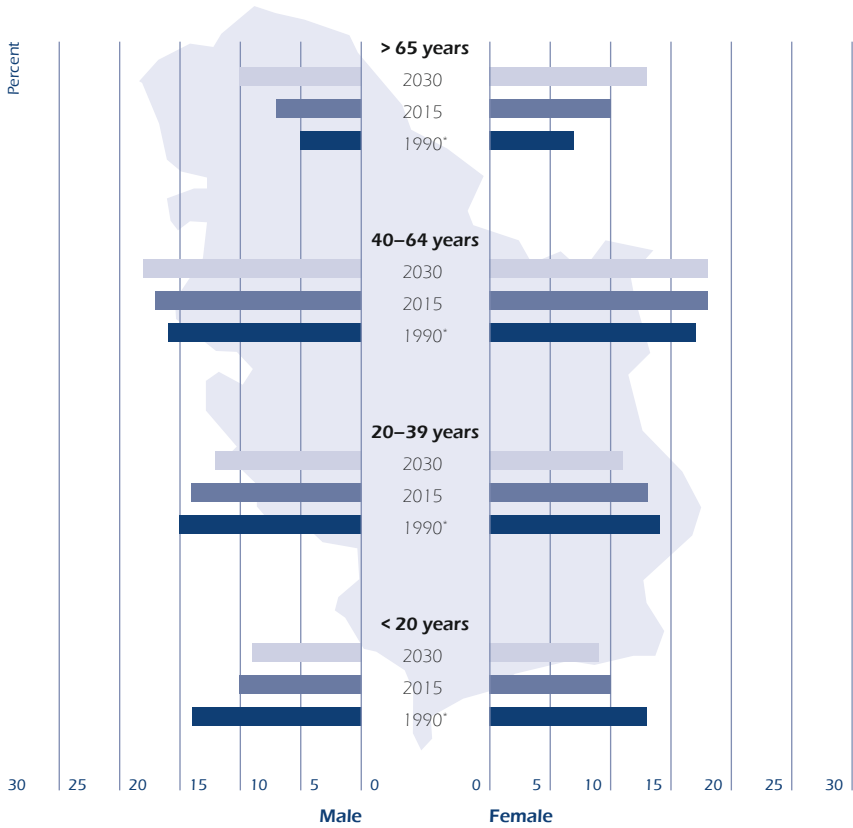
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
| EHRA White Book 2015 |
| Official statistics - National Health Institute |
| Survey from professional association |

SERBIA



1. Statistics

Age pyramid for Serbia



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 1,4 | 2012 |
| Beds (per 100.000 population) | 565,4 | 2012 |
| Density of physicians (per 1.000 population) | 3,1 | 2012 |
| Density of nurses (per 1.000 population) | 6,3 | 2012 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 7.176.794 | 2015 |
| Population annual growth rate (%) | -0,5 | 2015 |
| Life expectancy at birth (in years) | 75 | 2015 |
| Death rate (per 1.000 population) | 14,0 | 2013 |
| Live births (per 1.000 population) | 9,2 | 2013 |

| Economic information | | Year |
|---|----------|-------|
| Gross domestic product (U.S dollar-billions) | 36,56 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 5.102,45 | 2015* |
| Total expenditure on health as% of GDP | 10,6 | 2013 |
| General government expenditure on health as% of total expenditure on health | 61,2 | 2012 |
| Private expenditure on health as% of total expenditure on health | 38,8 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|------|
| | 2014 | 2015 |
| | 56 % | 56 % |

3. Healthcare System

National Health System with full insurance for all citizens

| | |
|-------------------------------------|------------|
| Basic insurance availability | Yes |
|-------------------------------------|------------|

| Percentage of insured and uninsured citizens | | |
|--|------|------|
| | 2014 | 2015 |
| Insured citizens | 100% | 100% |
| Uninsured citizens | 0% | 0% |

| Distribution of insurance modality | | |
|------------------------------------|------|------|
| | 2014 | 2015 |
| Public insurance company | 100% | 100% |
| Private insurance company | 0% | 0% |
| Private co-payment | 0% | 0% |

| | |
|---|------------|
| Possibility to subscribing to private health insurance plans | Yes |
|---|------------|

| Co-payment necessary for the following therapy | |
|--|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

Comments: Private health insurance is possible, but for now, there is no hospitals that are used for implantation, and electrophysiological procedure.

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|---|-------------------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Comments: By the decision of the Ministry of Health for all the materials that are permanently implanted in the human body is charged in the amount of 5% of its value, but with defined limited maximum price which the patient can pay.

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|-------------------------------------|--------------------------|---|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | National Reference Centre in consultation with the Ministry of Health |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Serbian Medical Chamber |
| Training centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | National Reference Centre in consultation with the Ministry of Health |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input checked="" type="checkbox"/> |

| Specialist required for | |
|---------------------------|---|
| | Specialist |
| Catheter ablation | Yes <input type="checkbox"/> Cardiologist |
| ICD or pacemaker implants | Yes <input type="checkbox"/> Cardiologist or cardiovascular surgeon |

| | |
|---|------------------------------------|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No answer <input type="checkbox"/> |
|---|------------------------------------|

| | |
|---|------------------|
| Required period of training to perform implantations | Yes |
| | 1 year |
| Suggested period of training to perform implantations | Yes |
| | 1 year |
| National quality control system availability | No answer |
| Willingness to install quality control system | No answer |
| Responsible person for quality control | |
| Ministry of Health | |
| Training centres availability | |
| Pacemaker | 4 |
| ICD implantation | 4 |
| CRT implantation | 4 |
| Electrophysiological studies and catheter ablation | 2 |
| Atrial fibrillation ablation | 2 |
| Number of universities (Schools of Medicine) | 5 |
| Percentage of academic centres among all practicing EP centres | 40% |
| Percentage of academic centres among all practicing implanting devices centres | 100% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|-------------|
| | 2014 | 2015 |
| Implanting centres | 17 | 17 |
| Total Pacemaker units implanted | 3.657 | 3.724 |
| Thereof, Leadless Pacemaker | not available | 7 |
| First implants | 3.135 | 3.289 |
| Replacements | 522 | 435 |
| Specialist performing implants | | |
| Cardiologists | Yes | 98% |
| Surgeons | Yes | 2% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 6 | 6 |
| Total CRT units implanted | 321 | 313 |
| Thereof, CRT pacemaker | 243 | 234 |
| Thereof, CRT ICD | 78 | 79 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 10 | 11 |
| Total ICD units implanted | 457 | 437 |
| Thereof, Single chamber | 360 | 357 |
| Thereof, Dual chamber | 97 | 80 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 394 | 396 |
| Replacements | 63 | 41 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 10 | 10 |
| Total loop recorders implanted | 34 | 25 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 5 | 3 |
| Total lead extraction procedures | 62 | 28 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|-----|-----------------------------------|
| National registry for | | |
| | | Official name |
| ICD | Yes | Implementation of the pilot phase |
| Pacing | Yes | Implementation of the pilot phase |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | Yes |
| Expert Group within the framework of the Health Insurance Fund | | |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|------|------|
| | 2014 | 2015 |
| Number of ablation centres | 2 | 3 |
| Number of ablations performed | 815 | 700 |
| Mean number of ablations per centre | 408 | 233 |
| Number of AF ablations | 236 | 150 |
| Number of ablation centres (> 50 AF ablations) | 2 | 2 |
| Number of VT/VF ablations | 50 | 75 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 2 | 2 |
| Number of LAA closures | 3 | 35 |
| Number of centres (LAA closures) | 1 | 20 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 7 | 11 |
| Number of physicians under training to become independent electrophysiologists | 5 | 1 |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|--------------------------|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|-----------------------|
| National | Yes | | | | | |
| U.S. | Yes | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of referral | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 2 |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 3 |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4 |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|---|
| Cardiology Society of Serbia, Working Group on Cardiac Pacing |
|---|

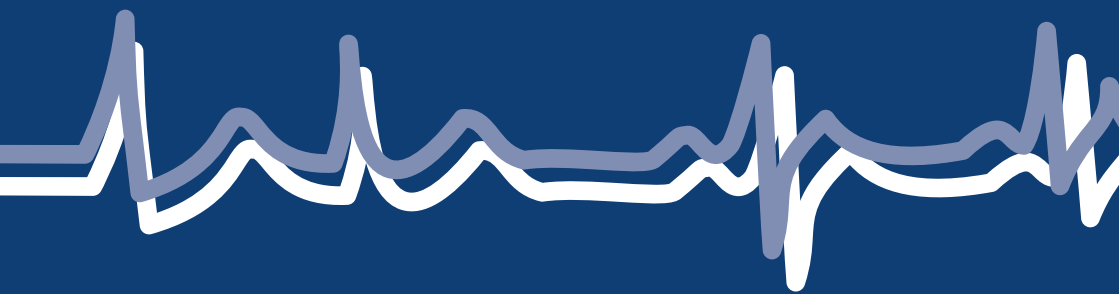
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
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| |
|----------------------|
| EHRA White Book 2015 |
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| |
|--|
| Survey from professional association - National Referreal Pacemaker Center |
|--|

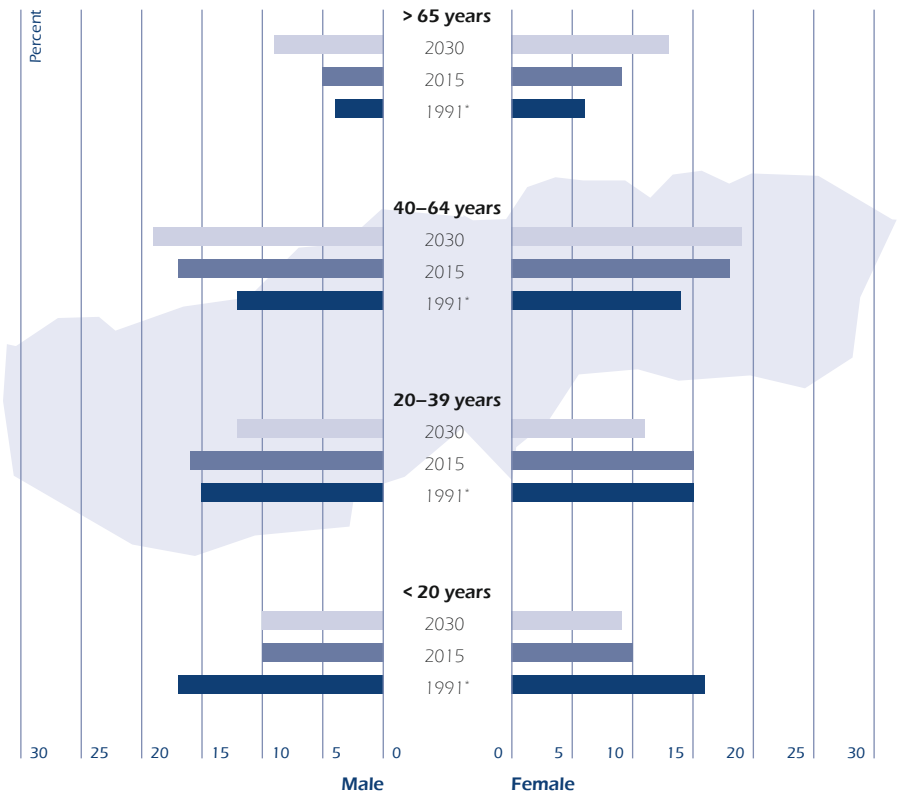
| |
|---|
| Official statistics - Insitute of Public Health of Serbia, Ministry of Health |
|---|

SLOVAKIA



1. Statistics

Age pyramid for Slovakia



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 2,5 | 2013 |
| Beds (per 100.000 population) | 580,3 | 2013 |
| Density of physicians (per 1.000 population) | 3,0 | 2007 |
| Density of nurses (per 1.000 population) | 6,1 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 5.415.949 | 2015 |
| Population annual growth rate (%) | 0,0 | 2015 |
| Life expectancy at birth (in years) | 77 | 2015 |
| Death rate (per 1.000 population) | 9,8 | 2010 |
| Live births (per 1.000 population) | 10,1 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 86,20 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 15.892,55 | 2015* |
| Total expenditure on health as% of GDP | 8,2 | 2013 |
| General government expenditure on health as% of total expenditure on health | 69,7 | 2012 |
| Private expenditure on health as% of total expenditure on health | 30,3 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|------|
| | 2014 | 2015 |
| | 47 % | 45 % |

National Health System

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| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|-----|--|
| | Yes | Specialist |
| Catheter ablation | Yes | Cardiologist (training in ablations) |
| ICD or pacemaker implants | Yes | Cardiologist (training in implantations), cardio surgeon (training in implantations), vascular surgeon (training in implantations) |

| | |
|---|-----|
| Official national competency guidelines for electrophysiological studies or catheter ablation | Yes |
|---|-----|

| | |
|---|------------------|
| Required period of training to perform implantations | No |
| Suggested period of training to perform implantations | No |
| National quality control system availability | No answer |
| Willingness to install quality control system | No answer |
| Responsible person for quality control | |
| State Institution for Drug Control | |
| Training centres availability | |
| Pacemaker | 3 |
| ICD implantation | 3 |
| CRT implantation | 3 |
| Electrophysiological studies and catheter ablation | 3 |
| Atrial fibrillation ablation | 3 |
| Number of universities (Schools of Medicine) | 4 |
| Percentage of academic centres among all practicing EP centres | 75% |
| Percentage of academic centres among all practicing implanting devices centres | 78% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|-------------|
| | 2014 | 2015 |
| Implanting centres | 13 | 14 |
| Total Pacemaker units implanted | 3.326 | 3.664 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 2.634 | 2.810 |
| Replacements | 692 | 854 |
| Specialist performing implants | | |
| Cardiologists | Yes | 98% |
| Surgeons | Yes | 2% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 6 | 4 |
| Total CRT units implanted | 529 | 588 |
| Thereof, CRT pacemaker | 136 | 209 |
| Thereof, CRT ICD | 393 | 379 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Implanting centres | 4 | 4 |
| Total ICD units implanted | 658 | 665 |
| Thereof, Single chamber | 483 | 513 |
| Thereof, Dual chamber | 175 | 151 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 539 | 514 |
| Replacements | 119 | 151 |
| Specialist performing implants | | |
| Cardiologists | Yes | 98% |
| Surgeons | Yes | 2% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 6 | 12 |
| Total loop recorders implanted | 250 | 120 |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 3 | 3 |
| Total lead extraction procedures | 136 | 119 |

| Specialist performing lead extractions | | |
|--|-----|-----|
| Cardiologists | Yes | 95% |
| Surgeons | Yes | 5% |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|--|--|-----|
|--|--|-----|

| National registry for | | |
|-----------------------|-----|--|
| | | Official name |
| ICD | Yes | |
| Pacing | Yes | SLOVIMPULZ - Registry of Slovak Heart Rhythm Ass. (SASA) |
| Electrophysiology | Yes | SLOVABLO - Registry of Slovak Heart Rhythm Ass. (SASA) |

| | |
|---|-----------|
| Availability of a national quality insurance system or complication registry | No |
|---|-----------|

| | |
|---|------------|
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | Yes |
|---|------------|

Official name: State Institute for Drug Control (SUKL)

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 4 | 4 |
| Number of ablations performed | 1.111 | 1.204 |
| Mean number of ablations per centre | 278 | 301 |
| Number of AF ablations | 129 | 224 |
| Number of ablation centres (> 50 AF ablations) | 2 | 3 |
| Number of VT/VF ablations | 37 | 106 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 3 | 3 |
| Number of LAA closures | 0 | not available |
| Number of centres (LAA closures) | 0 | not available |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 19 | 22 |
| Number of physicians under training to become independent electrophysiologists | not available | not available |
| Availability of a national registry for interventional electrophysiology | | |
| Official name: SLOVABLO - registry of Slovak Heart Rhythm Ass. | | |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | Yes |
| U.S. | No |
| European | Yes |

| Obstacles to guideline implementation | | | | | | Ranking of importance |
|---|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of referral | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Low awareness of guidelines | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |

1 = no obstacle, 5 = great obstacle

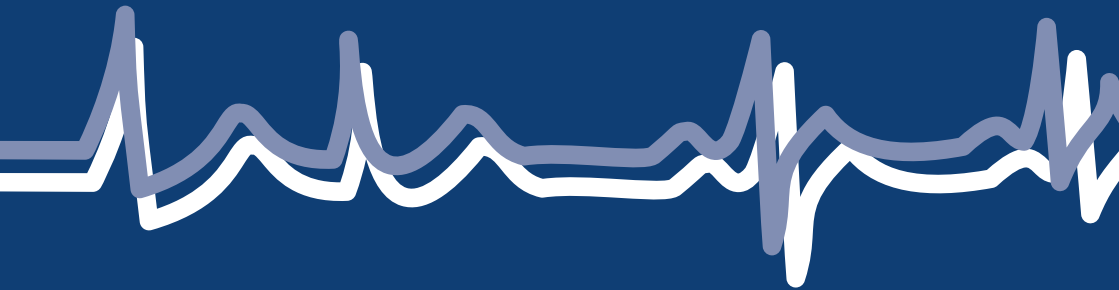
1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Slovak Heart Rhythm Ass. (SASA) |

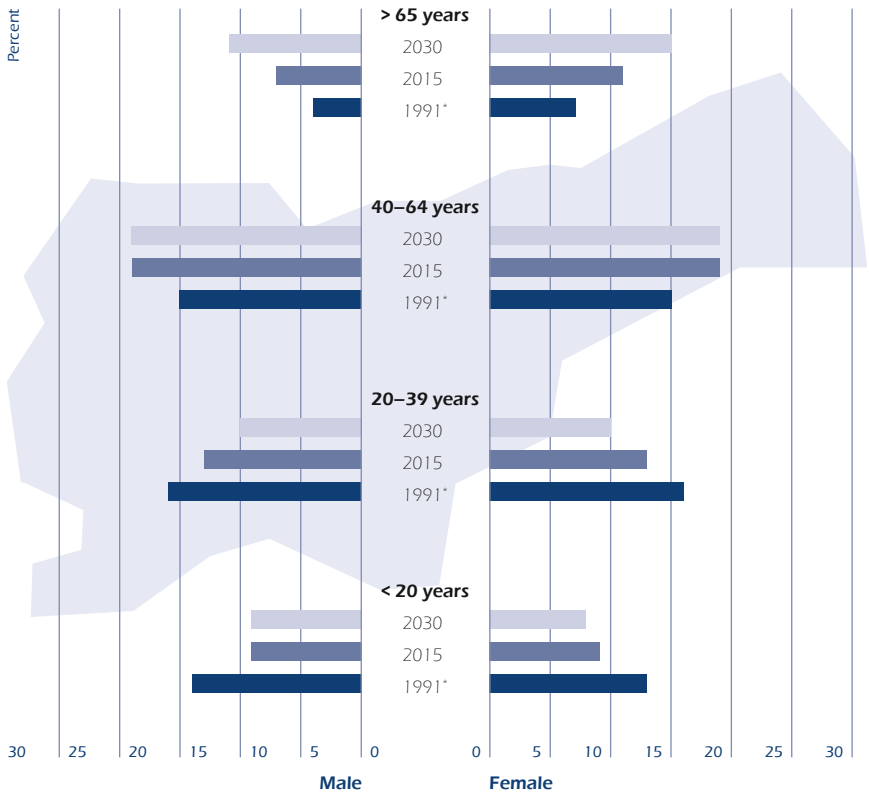
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
| EHRA White Book 2015 |
| Survey from professional association |
| Sales data |
| Estimation |
| Other |

SLOVENIA



1. Statistics

Age pyramid for Slovenia



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 1,4 | 2014 |
| Beds (per 100.000 population) | 455,4 | 2013 |
| Density of physicians (per 1.000 population) | 2,6 | 2013 |
| Density of nurses (per 1.000 population) | 8,3 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 1.983.412 | 2015 |
| Population annual growth rate (%) | -0,3 | 2015 |
| Life expectancy at birth (in years) | 78 | 2015 |
| Death rate (per 1.000 population) | 9,1 | 2010 |
| Live births (per 1.000 population) | 10,6 | 2012 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 42,74 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 20.712,01 | 2015* |
| Total expenditure on health as% of GDP | 9,2 | 2013 |
| General government expenditure on health as% of total expenditure on health | 71,5 | 2012 |
| Private expenditure on health as% of total expenditure on health | 28,5 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| | not available | not available |

3. Healthcare System

NHS Fund

| Basic insurance availability | | | Yes | | | | | |
|--|---|--------------------------|--|--------------------------|---|--------------------------|--------------------------|-------------------------------------|
| | | | | | | | | |
| Percentage of insured and uninsured citizens | | | | | | | | |
| | | | 2014 | 2015 | | | | |
| Insured citizens | | | 99% | 99% | | | | |
| Uninsured citizens | | | 1% | 1% | | | | |
| | | | | | | | | |
| Distribution of insurance modality | | | | | | | | |
| | | | 2014 | 2015 | | | | |
| Public insurance company | | | 4% | 4% | | | | |
| Private insurance company | | | 0% | 0% | | | | |
| Private co-payment | | | 96% | 96% | | | | |
| | | | | | | | | |
| Possibility to subscribing to private health insurance plans | | | No answer | | | | | |
| | | | | | | | | |
| Co-payment necessary for the following therapy | | | | | | | | |
| ICD devices | | | No | | | | | |
| Pacemakers | | | No | | | | | |
| Ablation | | | No | | | | | |
| | | | | | | | | |
| Reimbursement availability for physicians and hospitals | | | | | | | | |
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | |
|---------------------------|--------------------------------------|
| | Specialist |
| Catheter ablation | Yes Internist, cardiologist |
| ICD or pacemaker implants | Yes Internist, cardiologist, surgeon |

| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|
|---|----|

| | |
|---|-------------|
| Required period of training to perform implantations | No |
| Suggested period of training to perform implantations | No |
| National quality control system availability | Yes |
| Pacemaker | Yes |
| ICD implantation | Yes |
| CRT implantation | Yes |
| Cathether ablation | No |
| Responsible person for quality control | |
| Agency of the Republic of Slovenia for Medicines and Medical Devices | |
| Training centres availability | |
| Pacemaker | 2 |
| ICD implantation | 2 |
| CRT implantation | 2 |
| Electrophysiological studies and catheter ablation | 2 |
| Atrial fibrillation ablation | 2 |
| Number of universities (Schools of Medicine) | 2 |
| Percentage of academic centres among all practicing EP centres | 100% |
| Percentage of academic centres among all practicing implanting devices centres | 22% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|-------------|
| | 2014 | 2015 |
| Implanting centres | 7 | 9 |
| Total Pacemaker units implanted | 1.464 | 1.235 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 1.167 | 1.015 |
| Replacements | 297 | 220 |
| Specialist performing implants | | |
| Cardiologists | Yes | 20% |
| Surgeons | Yes | 80% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 2 | 2 |
| Total CRT units implanted | 150 | 164 |
| Thereof, CRT pacemaker | 57 | 47 |
| Thereof, CRT ICD | 93 | 117 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 2 | 3 |
| Total ICD units implanted | 174 | 228 |
| Thereof, Single chamber | 148 | 177 |
| Thereof, Dual chamber | 26 | 51 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 156 | 204 |
| Replacements | 18 | 24 |
| Specialist performing implants | | |
| Cardiologists | Yes | not available |
| Surgeons | Yes | not available |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 3 | 3 |
| Total loop recorders implanted | 19 | 40 |
| Specialist performing implants | | |
| Cardiologists | Yes | 50% |
| Surgeons | Yes | 50% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | not available | 1 |
| Total lead extraction procedures | not available | not available |
| Specialist performing lead extractions | | |
| Cardiologists | No | 0% |
| Surgeons | Yes | 100% |

10. Device specific

| Availability of remote monitoring of devices | | | Yes |
|--|-----|---|---------------|
| National registry for | | | |
| | | | Official name |
| ICD | Yes | Working Group on Arrhythmias, Slovenian Society of Cardiology | |
| Pacing | Yes | Working Group on Arrhythmias, Slovenian Society of Cardiology | |
| Electrophysiology | Yes | Working Group on Arrhythmias, Slovenian Society of Cardiology | |
| Availability of a national quality insurance system or complication registry | | | Yes |
| Official name: Agency of the Republic of Slovenia for Medicines and Medical Device | | | |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | | Yes |
| Official name: Agency of the Republic of Slovenia for Medicines and Medical Device | | | |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|------|
| | 2014 | 2015 |
| Number of ablation centres | 3 | 3 |
| Number of ablations performed | 437 | 712 |
| Mean number of ablations per centre | 146 | 237 |
| Number of AF ablations | 149 | 214 |
| Number of ablation centres (> 50 AF ablations) | 1 | 2 |
| Number of VT/VF ablations | 49 | 28 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 2 | 1 |
| Number of LAA closures | 4 | 17 |
| Number of centres (LAA closures) | not available | 1 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | not available | 7 |
| Number of physicians under training to become independent electrophysiologists | 3 | 1 |
| Availability of a national registry for interventional electrophysiology | | Yes |
| Official name: Working Group on Arrhythmias, Slovenian Society of Cardiology | | |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|-----------------------|
| National | No | | | | | |
| U.S. | No | | | | | |
| European | Yes | | | | | |
| Obstacles to guideline implementation | | | | | | Ranking of importance |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of referral | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Low awareness of guidelines | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of operators | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1 = no obstacle, 5 = great obstacle | | | | | | 1 = top, 6 = lowest |

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|---|
| Working Group on Arrhythmias, Slovenian Society of Cardiology |
|---|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

| |
|--------------------------------------|
| Survey from professional association |
|--------------------------------------|

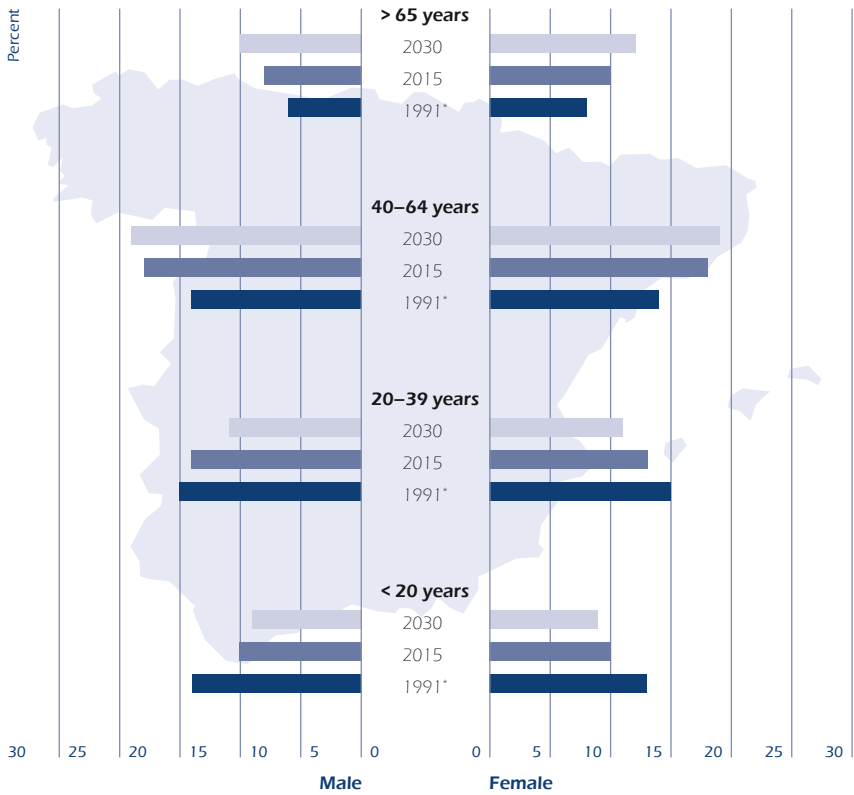
| |
|------------|
| Estimation |
|------------|

SPAIN



1. Statistics

Age pyramid for Spain



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 1,6 | 2013 |
| Beds (per 100.000 population) | 296,5 | 2013 |
| Density of physicians (per 1.000 population) | 3,8 | 2013 |
| Density of nurses (per 1.000 population) | 5,3 | 2013 |

| Demographic information | | Year |
|-------------------------------------|------------|------|
| Population | 48.146.134 | 2015 |
| Population annual growth rate (%) | 0,9 | 2015 |
| Life expectancy at birth (in years) | 82 | 2015 |
| Death rate (per 1.000 population) | 8,4 | 2013 |
| Live births (per 1.000 population) | 9,1 | 2013 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 1.221,39 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 26.326,87 | 2015* |
| Total expenditure on health as% of GDP | 8,9 | 2013 |
| General government expenditure on health as% of total expenditure on health | 71,7 | 2012 |
| Private expenditure on health as% of total expenditure on health | 28,3 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|------|--------|
| | 2014 | 2015 |
| | 33% | 30,09% |

3. Healthcare System

Spanish healthcare is based on a national health system that covers almost all population. Regional autonomous communities have their own budget and decide how to organize and deliver resources. Private insurance companies offer complementary healthcare coverage.

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Employed or self-employed persons affiliated (contributors) to the Social Security • Pensioners of the Social Security System • Unemployed persons receiving unemployment benefits • Unemployed persons who have exhausted unemployment benefits • Persons not previously covered, with incomes less than 100.000€ annually, which are in some of the following situations: • Spanish nationality residing in Spanish territory • Nationals of a Member State of the European Union, the European Economic Area or Switzerland registered in the Central Register of Foreigners. • Nationals of a country other than those mentioned in the preceding paragraphs, or stateless persons, and holders of an authorization to reside in Spanish territory, while it remains in force under the terms provided in their specific legislation. • A person has the status of beneficiary of an insured person when is one of the following situations: Being the spouse of the insured person or living with him/her with a relationship similar to marriage affectivity, forming a partnership. • Be former spouse, or be judicially separated. • Descendant, or person assimilated to it, the insured person or spouse, even if it is legally separated from his former dependent spouse or partner, in both cases by the insured and under 26 year-old or, should be over that age have a disability recognized in an equal or greater than 65% grade.

| Percentage of insured and uninsured citizens | | |
|--|------|------|
| | 2014 | 2015 |
| Insured citizens | 95% | 99% |
| Uninsured citizens | 5% | 1% |

| Distribution of insurance modality | | |
|------------------------------------|------|------|
| | 2014 | 2015 |
| Public insurance company | 83% | 79% |
| Private insurance company | 15% | 5% |
| Private co-payment | 2% | 16% |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

Comments: Yes, only in the private sector

Reimbursement availability for physicians and hospitals

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|--------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Comments: In the private sector, the physician/hospital receives per process reimbursement.

Treatment availability

| | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

National certification availability

| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
|----------------------------|---------------------------------|---|-------------------------------------|--------------------------|---|
| Device therapy | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Cardiac stimulation accreditation (Acreditación en estimulación cardiaca) |
| Invasive electrophysiology | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Acreditación de formación específica y excelencia para la práctica en Electrofisiología Cardíaca Intervencionista |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Acreditación de Centros para la formación en Electrofisiología |

| | | |
|--|-----|-------------------------------------|
| National Cardiac Society supporting EHRA certification system | | |
| Yes, the Society demands EHRA certification for practice | | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | | <input checked="" type="checkbox"/> |
| No | | <input type="checkbox"/> |
| No answer | | <input type="checkbox"/> |
| Specialist required for | | |
| | | Specialist |
| Catheter ablation | Yes | Cardiologist |
| ICD or pacemaker implants | Yes | Cardiologist, cardiac surgeon |
| Official national competency guidelines for electrophysiological studies or catheter ablation | | Yes |
| Spanish Society of Cardiology | | |
| Required period of training to perform implantations | | No |
| Suggested period of training to perform implantations | | Yes |
| 2 years | | |
| National quality control system availability | | No |
| Willingness to install quality control system | | Yes |
| Responsible person for quality control | | |
| Each Centre and Department | | |
| Training centres availability | | |
| Pacemaker | | not available |
| ICD implantation | | not available |
| CRT implantation | | not available |
| Electrophysiological studies and catheter ablation | | 26 |
| Atrial fibrillation ablation | | 26 |
| Number of universities (Schools of Medicine) | | 39 |
| Percentage of academic centres among all practicing EP centres | | 70 % |
| Percentage of academic centres among all practicing implanting devices centres | | 35 % |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|--|----------------------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 230 | 230 |
| Total Pacemaker units implanted | 36.322 | 33.373 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | 27.242 | 25.029 |
| Replacements | 9.080 | 8.344 |
| Specialist performing implants | | |
| Cardiologists | Yes | 72 % |
| Surgeons | Yes | 24 % |
| Other | Intensive Care specialists | 5 % |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|-------|-------|
| | 2014 | 2015 |
| Implanting centres | 130 | 130 |
| Total CRT units implanted | 2.974 | 2.728 |
| Thereof, CRT pacemaker | 949 | 910 |
| Thereof, CRT ICD | 2.025 | 1.818 |
| Specialist performing implants | | |
| Cardiologists | Yes | 98 % |
| Surgeons | Yes | 2 % |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 112 | 180 |
| Total ICD units implanted | 3.869 | 5.348 |
| Thereof, Single chamber | 2.903 | not available |
| Thereof, Dual chamber | 966 | not available |
| Thereof, Subcutaneous ICD | not available | not available |
| First implants | 2.813 | 3.840 |
| Replacements | 1.056 | 1.508 |

| Specialist performing implants | | |
|--------------------------------|-----|------|
| Cardiologists | Yes | 92 % |
| Surgeons | Yes | 8 % |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|-------|-------|
| | 2014 | 2015 |
| Implanting centres | 145 | 145 |
| Total loop recorders implanted | 2.500 | 3.008 |

| Specialist performing implants | | |
|--------------------------------|-----|-------|
| Cardiologists | Yes | 100 % |
| Surgeons | No | 0 % |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|---------------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 16 | 35 |
| Total lead extraction procedures | not available | 400 |

| Specialist performing lead extractions | | |
|--|-----|------|
| Cardiologists | Yes | 30 % |
| Surgeons | Yes | 70 % |

10. Device specific

| | |
|---|------------|
| Availability of remote monitoring of devices | Yes |
|---|------------|

National registry for

| | | Official name |
|-------------------|-----|--|
| ICD | Yes | Spanish Implantable Cardioverter-defibrillator Registry. Arrhythmia Working Group. Spanish Society of Cardiology |
| Pacing | Yes | Spanish Pacemaker Registry. Working Group on Cardiac Pacing. Spanish Society of Cardiology |
| Electrophysiology | Yes | Spanish Catheter Ablation Registry. Arrhythmia Working Group. Spanish Society of Cardiology |

| | |
|---|-----------|
| Availability of a national quality insurance system or complication registry | No |
|---|-----------|

| | |
|---|------------|
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | Yes |
|---|------------|

Official name: Ministry of Health in collaboration with Arrhythmia Working Group and Working Group on Cardiac Pacing, Spanish Society of Cardiology

11. Interventional electrophysiology

Number of ablations performed and number of centres

| | 2014 | 2015 |
|---|---------------|---------------|
| Number of ablation centres | 85 | 80 |
| Number of ablations performed | 12.871 | 12.353 |
| Mean number of ablations per centre | 151 | 154 |
| Number of AF ablations | 2.498 | 2.426 |
| Number of ablation centres (> 50 AF ablations) | 17 | 20 |
| Number of VT/VF ablations | 711 | 1.124 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 21 | 8 |
| Number of LAA closures | not available | not available |
| Number of centres (LAA closures) | not available | not available |

Number of electrophysiologists

| | | |
|--|---------------|-----|
| Number of electrophysiologists performed catheter ablation independently | 160 | 235 |
| Number of physicians under training to become independent electrophysiologists | not available | 50 |

| | |
|---|------------|
| Availability of a national registry for interventional electrophysiology | Yes |
|---|------------|

Official name: Spanish Catheter Ablation Registry. Arrhythmia Working Group. Spanish Society of Cardiology

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | Yes |
| U.S. | No |
| European | Yes |

| Obstacles to guideline implementation | 1 | 2 | 3 | 4 | 5 | Ranking of importance |
|--|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|-----------------------|
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of trained personnel | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Lack of operators | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

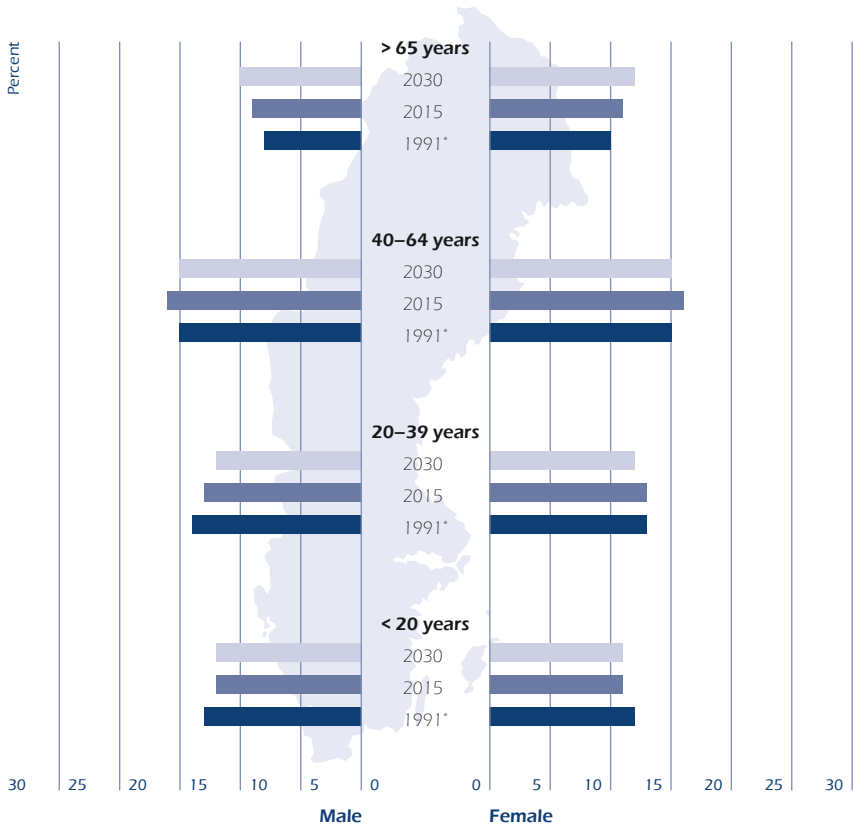
| Name of National Cardiac Society, National Working Group or arrhythmia body |
|--|
| Sección de Electrofisiología y Arritmias de la Sociedad Española de Cardiología (Arrhythmia Working Group of the Spanish Society of Cardiology) • Sección de Estimulación Cardíaca de la Sociedad Española de Cardiología (Working Group of Cardiac Pacing of the Spanish Society of Cardiology) |
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
| EHRA White Book 2015 |
| Official statistics - Ministry of Health and Ministry of Education |
| Survey from professional association - Spanish Society of Cardiology Working Groups |
| Sales data |
| Estimation |
| Other - IDIS Foundation |

SWEDEN



1. Statistics

Age pyramid for Sweden



* 1990 or last available

| Healthcare data | | Year |
|--|---------------|---------------|
| Hospitals (per 100.000 population) | 0,9 | 2003 |
| Beds (per 100.000 population) | 259,4 | 2013 |
| Density of physicians (per 1.000 population) | 4,0 | 2012 |
| Density of nurses (per 1.000 population) | not available | not available |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 9.801.616 | 2015 |
| Population annual growth rate (%) | 0,8 | 2015 |
| Life expectancy at birth (in years) | 82 | 2015 |
| Death rate (per 1.000 population) | 9,4 | 2013 |
| Live births (per 1.000 population) | 11,9 | 2014 |

| Economic information | | Year |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 483,72 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 48.965,95 | 2015* |
| Total expenditure on health as% of GDP | 9,7 | 2013 |
| General government expenditure on health as% of total expenditure on health | 81,3 | 2012 |
| Private expenditure on health as% of total expenditure on health | 18,7 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | | |
|--|---------------|------|
| | 2014 | 2015 |
| | not available | 37 % |

3. Healthcare System

| | | |
|-------------------------------------|------------------|--|
| Basic insurance availability | No answer | |
|-------------------------------------|------------------|--|

| Percentage of insured and uninsured citizens | | |
|--|------|---------------|
| | 2014 | 2015 |
| Insured citizens | 100% | not available |
| Uninsured citizens | 0% | not available |

| Distribution of insurance modality | | |
|------------------------------------|------|---------------|
| | 2014 | 2015 |
| Public insurance company | 90% | not available |
| Private insurance company | 0% | not available |
| Private co-payment | 10% | not available |

| | | |
|---|------------------|--|
| Possibility to subscribing to private health insurance plans | No answer | |
|---|------------------|--|

| Co-payment necessary for the following therapy | |
|--|-----------|
| ICD devices | No answer |
| Pacemakers | No answer |
| Ablation | No answer |

| Reimbursement availability for physicians and hospitals | | | | | | | | | |
|---|---|--------------------------|--|--------------------------|---|--------------------------|-------------------------------------|-------------------------------------|--|
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital | |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input checked="" type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|--------------------------|-------------------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input checked="" type="checkbox"/> |

| Specialist required for | |
|---------------------------|------------|
| | Specialist |
| Catheter ablation | No answer |
| ICD or pacemaker implants | No answer |

| | |
|---|-----------|
| Official national competency guidelines for electrophysiological studies or catheter ablation | No answer |
|---|-----------|

| | |
|--|-----------|
| Required period of training to perform implantations | No answer |
|--|-----------|

| | |
|---|-----------|
| Suggested period of training to perform implantations | No answer |
|---|-----------|

| | |
|---|------------------|
| National quality control system availability | No answer |
| Willingness to install quality control system | 0 |
| Responsible person for quality control | |
| No answer | |
| Training centres availability | |
| Pacemaker | not available |
| ICD implantation | not available |
| CRT implantation | not available |
| Electrophysiological studies and catheter ablation | 9 |
| Atrial fibrillation ablation | 9 |
| Number of universities (Schools of Medicine) | 8 |
| Percentage of academic centres among all practicing EP centres | 72% |
| Percentage of academic centres among all practicing implanting devices centres | 22% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|--------------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 45 | 44 |
| Total Pacemaker units implanted | 9.421 | not available |
| Thereof, Leadless Pacemaker | not available | 5 |
| First implants | 6.810 | 6.382 |
| Replacements | 2.611 | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 64% |
| Surgeons | Yes | 18% |
| Other: | Anaesthesiologists | 18% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|--------------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 15 | 25 |
| Total CRT units implanted | 854 | 1.034 |
| Thereof, CRT pacemaker | 308 | 440 |
| Thereof, CRT ICD | 546 | 594 |
| Specialist performing implants | | |
| Cardiologists | Yes | not available |
| Surgeons | Yes | not available |
| Other: | Anaesthesiologists | not available |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|--------------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 35 | 30 |
| Total ICD units implanted | 2.097 | not available |
| Thereof, Single chamber | not available | 346 |
| Thereof, Dual chamber | not available | 611 |
| Thereof, Subcutaneous ICD | not available | not available |
| First implants | 1.506 | 870 |
| Replacements | 591 | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 81 % |
| Surgeons | Yes | 14 % |
| | Anaesthesiologists | 5 % |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|--------------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 45 | not available |
| Total loop recorders implanted | 753 | 789 |
| Specialist performing implants | | |
| Cardiologists | Yes | not available |
| Surgeons | Yes | not available |
| | Anaesthesiologists | not available |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|-----------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 5 | not available |
| Total lead extraction procedures | 450 | not available |
| Specialist performing lead extractions | | |
| Cardiologists | No | not available |
| Surgeons | No | not available |
| Other: | no answer | not available |

10. Device specific

| Availability of remote monitoring of devices | | No answer |
|--|-----------|---------------|
| National registry for | | |
| | | Official name |
| ICD | No answer | |
| Pacing | No answer | |
| Electrophysiology | No answer | |
| Availability of a national quality insurance system or complication registry | | No answer |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No answer |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 10 | not available |
| Number of ablations performed | 4.803 | not available |
| Mean number of ablations per centre | 480 | not available |
| Number of AF ablations | 1.791 | not available |
| Number of ablation centres (> 50 AF ablations) | 9 | not available |
| Number of VT/VF ablations | not available | not available |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | not available | not available |
| Number of LAA closures | not available | 51 |
| Number of centres (LAA closures) | not available | 5 |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 36 | not available |
| Number of physicians under training to become independent electrophysiologists | 13 | not available |
| Availability of a national registry for interventional electrophysiology | | No answer |
| 0 | | |

12. Guidelines

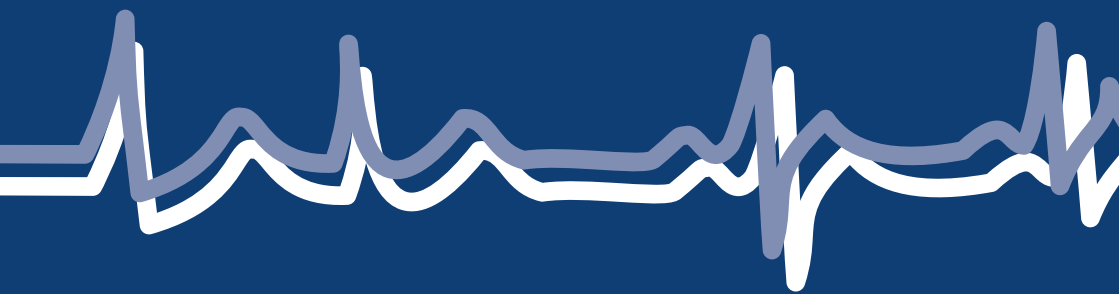
| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--|
| National | No answer | | | | | |
| U.S. | No answer | | | | | |
| European | No answer | | | | | |
| Obstacles to guideline implementation | | | | | Ranking of importance | |
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1 = no obstacle, 5 = great obstacle | | | | | 1 = top, 6 = lowest | |

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Heart Rhythm Group (HRG) |

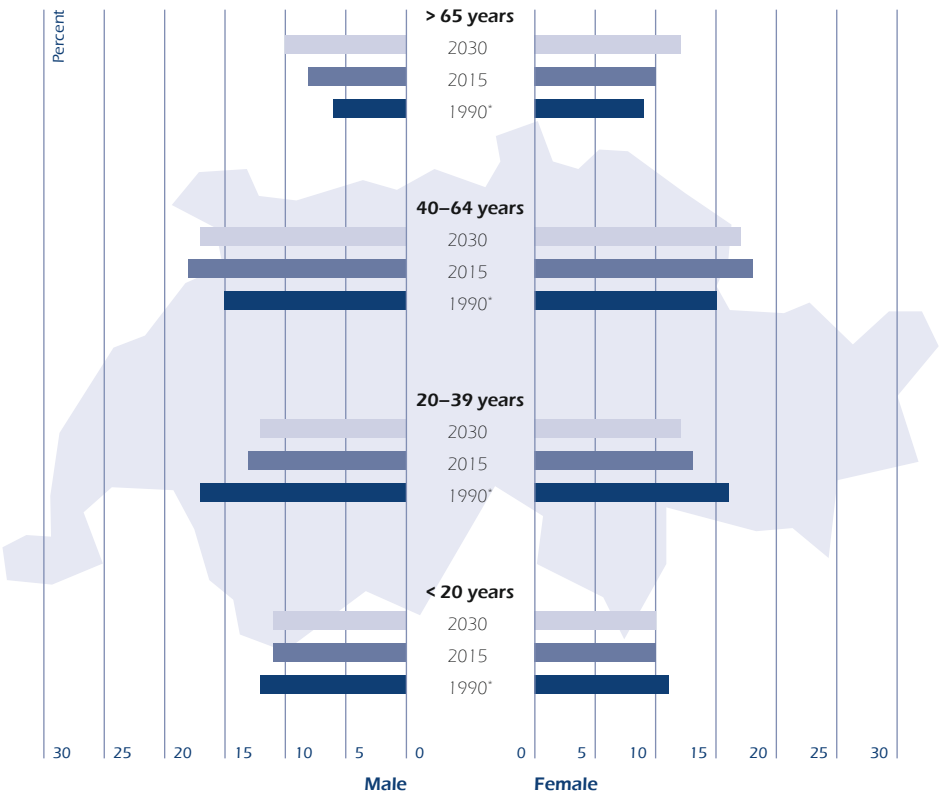
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
| EHRA White Book 2015 |
| Official statistics |
| Sales data |
| Other |

SWITZERLAND



1. Statistics

Age pyramid for Switzerland



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 3,6 | 2013 |
| Beds (per 100.000 population) | 467,7 | 2013 |
| Density of physicians (per 1.000 population) | 4,0 | 2013 |
| Density of nurses (per 1.000 population) | 17,7 | 2013 |

| Demographic information | | Year |
|-------------------------------------|-----------|------|
| Population | 8.121.830 | 2015 |
| Population annual growth rate (%) | 0,8 | 2015 |
| Life expectancy at birth (in years) | 83 | 2015 |
| Death rate (per 1.000 population) | 8,0 | 2013 |
| Live births (per 1.000 population) | 10,2 | 2013 |

| Economic information | | Year |
|--|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 676,98 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 82.177,60 | 2015* |
| Total expenditure on health as % of GDP | 11,5 | 2013 |
| General government expenditure on health as % of total expenditure on health | 65,8 | 2012 |
| Private expenditure on health as % of total expenditure on health | 34,2 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|------|---------------|
| | 35% | not available |

3. Healthcare System

National healthcare and private healthcare. Obligatory health insurance to be contracted by all inhabitants.

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: Inhabitant of the country (declared or not).
The insurance is however not free.

| Percentage of insured and uninsured citizens | 2014 | 2015 |
|--|------|------|
|--|------|------|

| | | |
|--------------------|------|---------------|
| Insured citizens | 100% | not available |
| Uninsured citizens | 0% | not available |

| Distribution of insurance modality | 2014 | 2015 |
|------------------------------------|------|------|
|------------------------------------|------|------|

| | | |
|---------------------------|-----|-----|
| Public insurance company | 71% | 70% |
| Private insurance company | 0% | 30% |
| Private co-payment | 29% | 0% |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|--|
|--|--|

| | |
|-------------|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
|---|--|--|--|--|--|--|--|--|

| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
|--------------------------|---|-------------------------------------|--|--------------------------|---|--------------------------|--------------------------|--------------------------|
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Comments: Needs to be a cardiologist or cardiovascular surgeon to have reimbursement

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|-------------------------------------|---|-------------------------------------|--------------------------|------------------------------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | EHRA certification |
| Invasive electrophysiology | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | According to 2015 Swiss guidelines |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|------------|-----------------------|
| | Specialist | |
| Catheter ablation | Yes | Cardiologist |
| ICD or pacemaker implants | Yes | Cardiologist, surgeon |

| Official national competency guidelines for electrophysiological studies or catheter ablation | Yes |
|---|-----|
| Swiss Working Group on Pacing and Electrophysiology | |

| Required period of training to perform implantations | Yes |
|--|--------|
| | 1 year |

| | |
|---|------------|
| Suggested period of training to perform implantations | No |
| National quality control system availability | Yes |
| Pacemaker | Yes |
| ICD implantation | Yes |
| CRT implantation | Yes |
| Cathether ablation | Yes |
| Responsible person for quality control | |
| Swiss Working Group on Pacing and Electrophysiology | |
| Training centres availability | |
| Pacemaker | 6 |
| ICD implantation | 6 |
| CRT implantation | 6 |
| Electrophysiological studies and catheter ablation | 5 |
| Atrial fibrillation ablation | 5 |
| Number of universities (Schools of Medicine) | 6 |
| Percentage of academic centres among all practicing EP centres | 20% |
| Percentage of academic centres among all practicing implanting devices centres | 7% |

5. Pacemakers

| | | |
|---|---------------|---------------|
| Pacemaker units implanted and number of implanting centres | | |
| | 2014 | 2015 |
| Implanting centres | 76 | 71 |
| Total Pacemaker units implanted | 6.543 | 6.401 |
| Thereof, Leadless Pacemaker | not available | not available |
| First implants | 4.983 | 4.947 |
| Replacements | 1.560 | 1.454 |
| Specialist performing implants | | |
| Cardiologists | Yes | 95% |
| Surgeons | Yes | 5% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|-------|
| | 2014 | 2015 |
| Implanting centres | 48 | 36 |
| Total CRT units implanted | 583 | 1.133 |
| Thereof, CRT pacemaker | 208 | 395 |
| Thereof, CRT ICD | 375 | 738 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | 52 | 49 |
| Total ICD units implanted | 1.341 | 1.830 |
| Thereof, Single chamber | not available | not available |
| Thereof, Dual chamber | not available | not available |
| Thereof, Subcutaneous ICD | not available | 21 |
| First implants | 742 | 819 |
| Replacements | 599 | 402 |
| Specialist performing implants | | |
| Cardiologists | Yes | 95% |
| Surgeons | Yes | 5% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | not available | not available |
| Total loop recorders implanted | not available | not available |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 5 | 6 |
| Total lead extraction procedures | 87 | not available |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 80 % |
| Surgeons | Yes | 20 % |

10. Device specific

| Availability of remote monitoring of devices | | Yes |
|---|-----|---------------|
| National registry for | | |
| | | Official name |
| ICD | Yes | CHPACEWEB |
| Pacing | Yes | CHPACEWEB |
| Electrophysiology | Yes | CHPACEWEB |
| Availability of a national quality insurance system or complication registry | | Yes |
| Official name: CHPACEWEB | | |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | Yes |
| Official name: CHPACEWEB | | |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 23 | 25 |
| Number of ablations performed | 5.135 | 5.709 |
| Mean number of ablations per centre | 223 | 228 |
| Number of AF ablations | 1.684 | 1.991 |
| Number of ablation centres (> 50 AF ablations) | 12 | 13 |
| Number of VT/VF ablations | 169 | 148 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 6 | 7 |
| Number of LAA closures | not available | not available |
| Number of centres (LAA closures) | not available | not available |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | 40 | not available |
| Number of physicians under training to become independent electrophysiologists | 15 | not available |
| Availability of a national registry for interventional electrophysiology | | Yes |
| Official name: CHPACEWEB | | |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----------|
| National | No answer |
| U.S. | No answer |
| European | Yes |

| Obstacles to guideline implementation | 1 | 2 | 3 | 4 | 5 | Ranking of importance |
|--|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|-----------------------|
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of reimbursement, limited financial resources | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Lack of referral | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of trained personnel | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Low awareness of guidelines | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of operators | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|--|
| Working Group of Pacing and Electrophysiology of the Swiss Society of Cardiology |
|--|

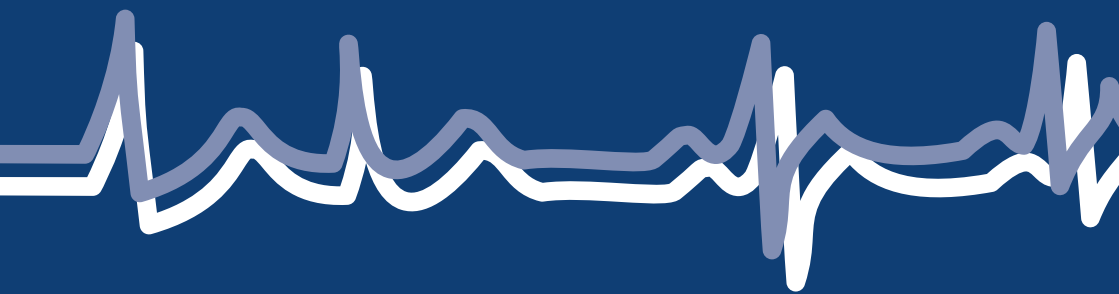
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

| |
|--------------------------------------|
| Survey from professional association |
|--------------------------------------|

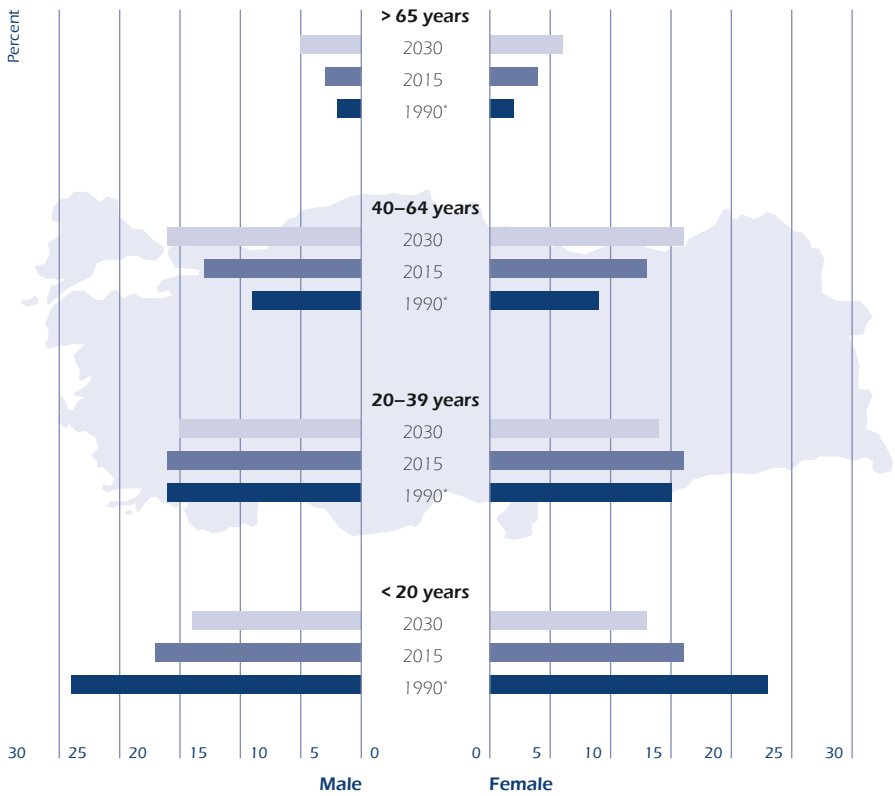
| |
|------------|
| Estimation |
|------------|

TURKEY



1. Statistics

Age pyramid for Turkey



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 2,0 | 2013 |
| Beds (per 100.000 population) | 265,6 | 2013 |
| Density of physicians (per 1.000 population) | 1,8 | 2013 |
| Density of nurses (per 1.000 population) | 2,5 | 2013 |

| Demographic information | | Year |
|-------------------------------------|------------|------|
| Population | 79.414.269 | 2015 |
| Population annual growth rate (%) | 1,3 | 2015 |
| Life expectancy at birth (in years) | 75 | 2015 |
| Death rate (per 1.000 population) | 4,7 | 2013 |
| Live births (per 1.000 population) | 16,9 | 2013 |

| Economic information | | Year |
|---|----------|-------|
| Gross domestic product (U.S dollar-billions) | 722,22 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 9.290,43 | 2015* |
| Total expenditure on health as% of GDP | 5,6 | 2013 |
| General government expenditure on health as% of total expenditure on health | 76,8 | 2012 |
| Private expenditure on health as% of total expenditure on health | 23,2 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|---------------|---------------|
| | not available | not available |

3. Healthcare System

National Health Care System (Social Security Institution -SSI) covers almost all population. Private insurance companies offer complementary health care.

| Basic insurance availability | Yes |
|------------------------------|-----|
|------------------------------|-----|

Requirements for citizens to qualify for public insurance: Working population that has acquired policy and their family, retired population.

| Percentage of insured and uninsured citizens | 2014 | 2015 |
|--|------|------|
| Insured citizens | 99 % | 99 % |
| Uninsured citizens | 1 % | 1 % |

| Distribution of insurance modality | 2014 | 2015 |
|------------------------------------|---------------|---------------|
| Public insurance company | 99 % | 99 % |
| Private insurance company | 1 % | 1 % |
| Private co-payment | not available | not available |

| Possibility to subscribing to private health insurance plans | Yes |
|--|-----|
|--|-----|

| Co-payment necessary for the following therapy | |
|--|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

Comments: Yes, only in the private sector

| Reimbursement availability for physicians and hospitals | | | | | | | | |
|---|---|-------------------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input checked="" type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

Body issuing the guidelines: Health Application Instructions

Comments: Social Security Institution publish a guideline called ,‘Health Application Instructions’ which reports the indications and the amount of reimbursement for each procedure. Indications follow ESC guidelines.

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---------------|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Invasive electrophysiology | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input checked="" type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|-----|--------------------------------------|
| | | Specialist |
| Catheter ablation | Yes | Cardiologist |
| ICD or pacemaker implants | Yes | Cardiologist, cardiovascular surgeon |

| Official national competency guidelines for electrophysiological studies or catheter ablation | No |
|---|----|
|---|----|

| | |
|---|---------------|
| Required period of training to perform implantations | No |
| Suggested period of training to perform implantations | No |
| National quality control system availability | No |
| Willingness to install quality control system | Yes |
| Responsible person for quality control | |
| None | |
| Training centres availability | |
| Pacemaker | not available |
| ICD implantation | not available |
| CRT implantation | not available |
| Electrophysiological studies and catheter ablation | not available |
| Atrial fibrillation ablation | not available |
| Number of universities (Schools of Medicine) | 74 |
| Percentage of academic centres among all practicing EP centres | 15% |
| Percentage of academic centres among all practicing implanting devices centres | 5% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | not available | not available |
| Total Pacemaker units implanted | 7.300 | 9.200 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 6.200 | 6.650 |
| Replacements | 1.100 | 2.250 |
| Specialist performing implants | | |
| Cardiologists | Yes | 95% |
| Surgeons | Yes | 5% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | not available | not available |
| Total CRT units implanted | 2.460 | 2.810 |
| Thereof, CRT pacemaker | 310 | 230 |
| Thereof, CRT ICD | 2.150 | 2.580 |
| Specialist performing implants | | |
| Cardiologists | Yes | 99 % |
| Surgeons | Yes | 1 % |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | not available | not available |
| Total ICD units implanted | 6.300 | 6.383 |
| Thereof, Single chamber | 2.600 | 3.340 |
| Thereof, Dual chamber | 3.700 | 1.975 |
| Thereof, Subcutaneous ICD | not available | 2 |
| First implants | 5.400 | 5.315 |
| Replacements | 900 | 1.066 |
| Specialist performing implants | | |
| Cardiologists | Yes | 97 % |
| Surgeons | Yes | 3 % |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Implanting centres | not available | not available |
| Total loop recorders implanted | 15 | 15 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100 % |
| Surgeons | No | 0 % |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | not available | not available |
| Total lead extraction procedures | 311 | 420 |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 75 % |
| Surgeons | Yes | 25 % |

10. Device specific

| Availability of remote monitoring of devices | | No |
|--|----|---------------|
| Reasons why remote monitoring is not available: Reimbursement problems | | |
| National registry for | | |
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |
| Availability of a national quality insurance system or complication registry | | No |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | No |



11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | not available | not available |
| Number of ablations performed | 11.218 | 13.000 |
| Mean number of ablations per centre | not available | not available |
| Number of AF ablations | 1.208 | 2.200 |
| Number of ablation centres (> 50 AF ablations) | not available | not available |
| Number of VT/VF ablations | 100 | 120 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | not available | not available |
| Number of LAA closures | 12 | 0 |
| Number of centres (LAA closures) | not available | 0 |

| Number of electrophysiologists | | |
|--|---------------|---------------|
| Number of electrophysiologists performed catheter ablation independently | not available | not available |
| Number of physicians under training to become independent electrophysiologists | not available | not available |

| Availability of a national registry for interventional electrophysiology | | No |
|--|--|----|
|--|--|----|

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|-----|--|--|--|--|--|
| National | Yes | | | | | |
| U.S. | Yes | | | | | |
| European | Yes | | | | | |

| Obstacles to guideline implementation | | | | | | Ranking of importance |
|--|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of reimbursement, limited financial resources | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Low awareness of guidelines | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| Lack of operators | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |

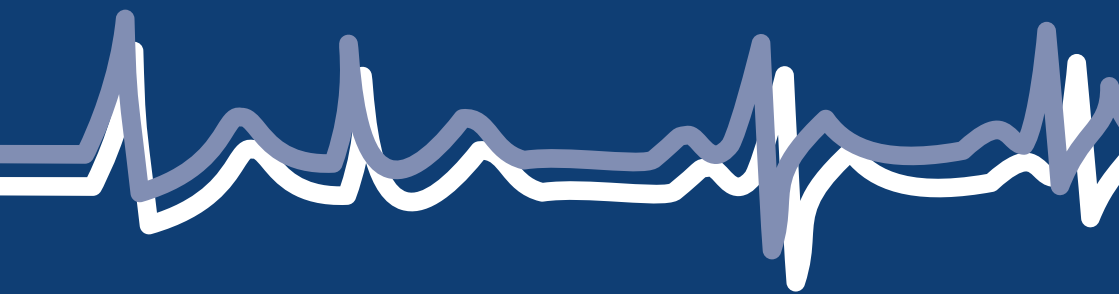
1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

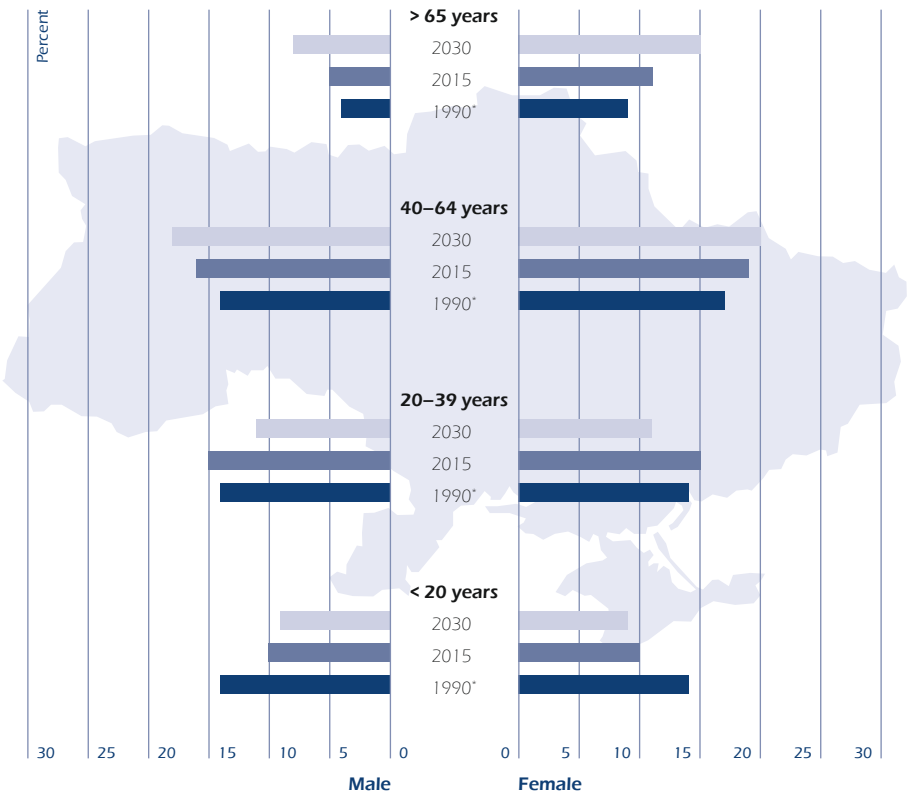
| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| Turkish Society of Cardiology, Working Group on Arrhythmias |
| |
| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
| EHRA White Book 2015 |
| Official statistics |
| Estimation |

UKRAINE



1. Statistics

Age pyramid for Ukraine



* 1990 or last available

| Healthcare data | | Year |
|--|-------|------|
| Hospitals (per 100.000 population) | 4,8 | 2013 |
| Beds (per 100.000 population) | 879,8 | 2013 |
| Density of physicians (per 1.000 population) | 3,5 | 2013 |
| Density of nurses (per 1.000 population) | 7,6 | 2013 |

| Demographic information | | Year |
|-------------------------------------|------------|------|
| Population | 44.429.471 | 2015 |
| Population annual growth rate (%) | -1,2 | 2015 |
| Life expectancy at birth (in years) | 72 | 2015 |
| Death rate (per 1.000 population) | 14,6 | 2012 |
| Live births (per 1.000 population) | 11,1 | 2013 |

| Economic information | | Year |
|--|----------|-------|
| Gross domestic product (U.S dollar-billions) | 90,14 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 2.108,91 | 2015* |
| Total expenditure on health as % of GDP | 7,8 | 2013 |
| General government expenditure on health as % of total expenditure on health | 55,4 | 2012 |
| Private expenditure on health as % of total expenditure on health | 44,6 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|-------|---------------|
| | 67,3% | not available |

3. Healthcare System

Ministry of Public Health of Ukraine, National Academy of Medical Sciences of Ukraine (National Scientific Centres – 36 in total), profile institutional hospitals (hospital of the Ministry of Internal Affairs, hospital of the Ministry of Defence so on), State sanitary and epidemiological service, State Administration of Ukraine on medical products, State service of Ukraine on HIV/AIDS and other socially dangerous diseases. National health system provides all citizens of Ukraine with the free medical and preventive help in accordance to acting legislation by: emergency, outpatient (ambulatory-polyclinic) help, stationary (general profile and specialized) help.

| | |
|-------------------------------------|-----------|
| Basic insurance availability | No |
|-------------------------------------|-----------|

| Percentage of insured and uninsured citizens | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Insured citizens | not available | not available |
| Uninsured citizens | not available | not available |

| Distribution of insurance modality | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Public insurance company | not available | not available |
| Private insurance company | not available | not available |
| Private co-payment | not available | not available |

| | |
|---|------------|
| Possibility to subscribing to private health insurance plans | Yes |
|---|------------|

| Co-payment necessary for the following therapy | |
|---|----|
| ICD devices | No |
| Pacemakers | No |
| Ablation | No |

| Reimbursement availability for physicians and hospitals | | | | | | | | | |
|--|---|--------------------------|--|--------------------------|---|-------------------------------------|--------------------------|--------------------------|--|
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital | |
| Internal loop recorders | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| ICD primary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| ICD secondary prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| CRT devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Ablation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Leadless Pacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Subcutaneous ICD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |



| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input checked="" type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|-------------------------------------|---|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Invasive and non invasive arrhythmology |
| Invasive electrophysiology | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Invasive and non invasive arrhythmology |
| Allied professionals | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input checked="" type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | | |
|---------------------------|------------|--|
| | Specialist | |
| Catheter ablation | Yes | Cardiovascular surgeon or cardiologist |
| ICD or pacemaker implants | Yes | Cardiovascular surgeon or cardiologist |

| Official national competency guidelines for electrophysiological studies or catheter ablation | Yes |
|---|-----|
| Рекомендації Асоціації Кардіологів України /Recommendations of Association of Cardiologists of Ukraine/ Рекомендації Асоціації Аритмологів України/ Recommendations of Association of Arrhythmologists of Ukraine | |

| | |
|---|------------------|
| Required period of training to perform implantations | No answer |
| Suggested period of training to perform implantations | No answer |
| National quality control system availability | Yes |
| Pacemaker | Yes |
| ICD implantation | Yes |
| CRT implantation | Yes |
| Catheter ablation | Yes |
| Responsible person for quality control | |
| Ministry of Health of Ukraine, National Academy of Medical Sciences of Ukraine | |
| Training centres availability | |
| Pacemaker | 4 |
| ICD implantation | 2 |
| CRT implantation | 2 |
| Electrophysiological studies and catheter ablation | 4 |
| Atrial fibrillation ablation | 4 |
| Number of universities (Schools of Medicine) | 19 |
| Percentage of academic centres among all practicing EP centres | 27,3% |
| Percentage of academic centres among all practicing implanting devices centres | 8,6% |

5. Pacemakers

| | | |
|---|---------------|-------------|
| Pacemaker units implanted and number of implanting centres | | |
| | 2014 | 2015 |
| Implanting centres | 36 | 38 |
| Total Pacemaker units implanted | 5.258 | 4.851 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 4,299 | 4.110 |
| Replacements | 959 | 741 |
| Specialist performing implants | | |
| Cardiologists | Yes | 10,3% |
| Surgeons | Yes | 89,7% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|------|------|
| | 2014 | 2015 |
| Implanting centres | 9 | 10 |
| Total CRT units implanted | 85 | 73 |
| Thereof, CRT pacemaker | 72 | 60 |
| Thereof, CRT ICD | 13 | 13 |
| Specialist performing implants | | |
| Cardiologists | Yes | 20% |
| Surgeons | Yes | 80% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|-------|
| | 2014 | 2015 |
| Implanting centres | 8 | 14 |
| Total ICD units implanted | 57 | 52 |
| Thereof, Single chamber | 33 | 44 |
| Thereof, Dual chamber | 24 | 8 |
| Thereof, Subcutaneous ICD | not available | 0 |
| First implants | 47 | 39 |
| Replacements | 10 | 13 |
| Specialist performing implants | | |
| Cardiologists | Yes | 14,3% |
| Surgeons | Yes | 85,7% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|------|------|
| | 2014 | 2015 |
| Implanting centres | 3 | 2 |
| Total loop recorders implanted | 6 | 2 |
| Specialist performing implants | | |
| Cardiologists | Yes | 50% |
| Surgeons | Yes | 50% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|------|------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | 7 | 6 |
| Total lead extraction procedures | 38 | 45 |

| Specialist performing lead extractions | | |
|--|-----|------|
| Cardiologists | No | 0% |
| Surgeons | Yes | 100% |

10. Device specific

| | |
|---|-----------|
| Availability of remote monitoring of devices | No |
|---|-----------|

| National registry for | | |
|-----------------------|----|---------------|
| | | Official name |
| ICD | No | |
| Pacing | No | |
| Electrophysiology | No | |

| | |
|---|-----------|
| Availability of a national quality insurance system or complication registry | No |
|---|-----------|

| | |
|---|-----------|
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | No |
|---|-----------|

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|--|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 8 | 11 |
| Number of ablations performed | 2,371 | 2,294 |
| Mean number of ablations per centre | 296 | 208,5 |
| Number of AF ablations | 622 | 634 |
| Number of ablation centres (> 50 AF ablations) | 4 | 5 |
| Number of VT/VF ablations | 74 | 29 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 2 | 1 |
| Number of LAA closures | not available | not available |
| Number of centres (LAA closures) | not available | not available |
| Number of electrophysiologists | | |
| Number of electrophysiologists performed catheter ablation independently | not available | not available |
| Number of physicians under training to become independent electrophysiologists | not available | not available |
| Availability of a national registry for interventional electrophysiology | | No |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | |
|---|-----|
| National | Yes |
| U.S. | Yes |
| European | Yes |

| Obstacles to guideline implementation | 1 | 2 | 3 | 4 | 5 | Ranking of importance |
|--|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------|
| Lack of centres | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 1 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 2 |
| Lack of trained personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 3 |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| Lack of operators | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4 |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
|---|

| |
|--|
| Association of Arrhythmologists of Ukraine |
|--|

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
|---|

| |
|----------------------|
| EHRA White Book 2015 |
|----------------------|

| |
|--|
| Association of Arrhythmologists of Ukraine |
|--|

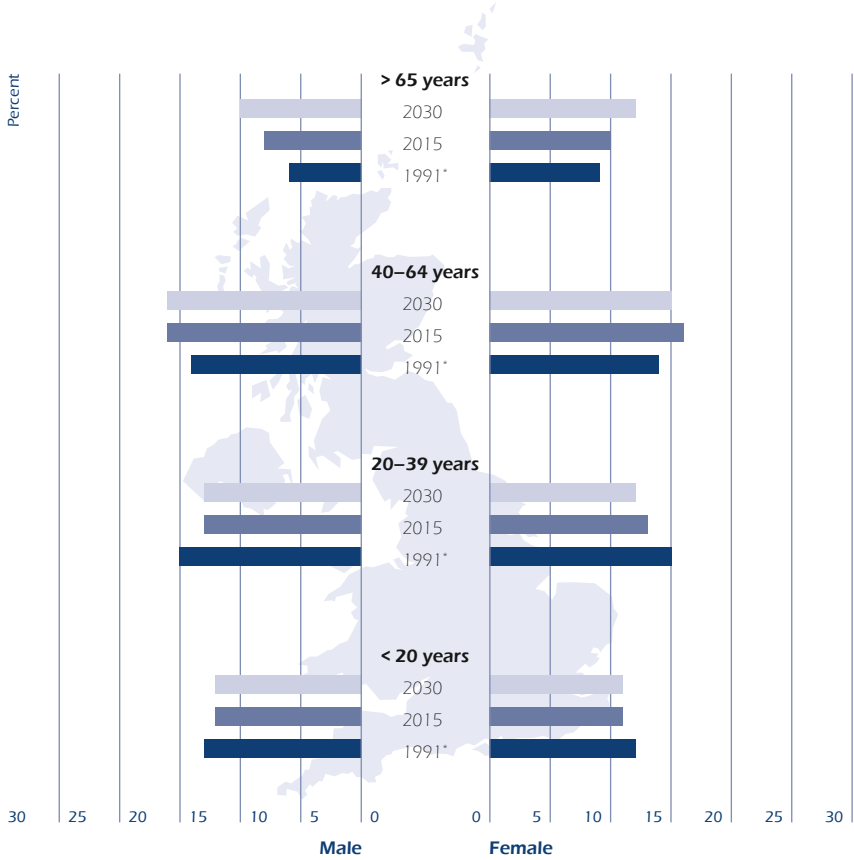
| |
|--|
| State Statistic Service of Ukraine, Ministry of Public Health of Ukraine |
|--|

UNITED KINGDOM



1. Statistics

Age pyramid for United Kingdom



* 1990 or last available

| Healthcare data | Year | |
|--|---------------|---------------|
| Hospitals (per 100.000 population) | not available | not available |
| Beds (per 100.000 population) | 275,8 | 2013 |
| Density of physicians (per 1.000 population) | 2,8 | 2014 |
| Density of nurses (per 1.000 population) | 8,7 | 2014 |

| Demographic information | Year | |
|-------------------------------------|------------|------|
| Population | 64.088.222 | 2015 |
| Population annual growth rate (%) | 0,5 | 2015 |
| Life expectancy at birth (in years) | 81 | 2015 |
| Death rate (per 1.000 population) | 9,0 | 2013 |
| Live births (per 1.000 population) | 12,2 | 2013 |

| Economic information | Year | |
|---|-----------|-------|
| Gross domestic product (U.S dollar-billions) | 2.864,90 | 2015* |
| Gross domestic product per capita (U.S dollar-units) | 44.117,80 | 2015* |
| Total expenditure on health as% of GDP | 9,1 | 2013 |
| General government expenditure on health as% of total expenditure on health | 84,0 | 2012 |
| Private expenditure on health as% of total expenditure on health | 16,0 | 2012 |

* IMF estimative

2. Country

| Proportion of deaths resulting from cardiovascular disease | 2014 | 2015 |
|--|------|------|
| | 22 % | 22 % |

3. Healthcare System

NHS for all citizens. Private healthcare optional.

| Basic insurance availability | | No | | | | | | |
|--|---|-------------------------------------|--|--------------------------|---|--------------------------|--------------------------|--------------------------|
| Percentage of insured and uninsured citizens | | | | | | | | |
| | 2014 | 2015 | | | | | | |
| Insured citizens | 100% | 5% | | | | | | |
| Uninsured citizens | 0% | 95% | | | | | | |
| Distribution of insurance modality | | | | | | | | |
| | 2014 | 2015 | | | | | | |
| Public insurance company | 89% | 95% | | | | | | |
| Private insurance company | 11% | 0% | | | | | | |
| Private co-payment | 0% | 5% | | | | | | |
| Possibility to subscribing to private health insurance plans | | Yes | | | | | | |
| Co-payment necessary for the following therapy | | | | | | | | |
| ICD devices | | No | | | | | | |
| Pacemakers | | No | | | | | | |
| Ablation | | No | | | | | | |
| Reimbursement availability for physicians and hospitals | | | | | | | | |
| | Physician/Hospital receives per process reimbursement | | Physician/Hospital does not receive reimbursement, but incentives (e.g. more salary on the following year) | | Physician/Hospital does not receive reimbursement neither incentive | | No answer | |
| | Physician | Hospital | Physician | Hospital | Physician | Hospital | Physician | Hospital |
| Internal loop recorders | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD primary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ICD secondary prevention | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT devices | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ablation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Leadless Pacing | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Subcutaneous ICD | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| Treatment availability | |
|---|-------------------------------------|
| No restrictions | <input checked="" type="checkbox"/> |
| No restrictions, but the indications have to follow the ESC guidelines | <input type="checkbox"/> |
| No restrictions, but the indications have to follow the National guidelines | <input type="checkbox"/> |
| Restricted to certain number of treatments/budget | <input type="checkbox"/> |
| Not funded | <input type="checkbox"/> |
| No answer | <input type="checkbox"/> |

4. Education and Quality Control

| National certification availability | | | | | |
|-------------------------------------|---------------------------------|---|-------------------------------------|--------------------------|---|
| | Yes, it's required for practice | Yes, but it's not required for practice | No | No answer | Official name |
| Device therapy | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | BHRS certification in CIEDs |
| Invasive electrophysiology | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | BHRS certification in cardiac electrophysiology |
| Allied professionals | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | BHRS certification in CIEDs and electrophysiology SCST certification |
| Training centres | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| National Cardiac Society supporting EHRA certification system | |
|--|-------------------------------------|
| Yes, the Society demands EHRA certification for practice | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification and homologates national certification | <input type="checkbox"/> |
| Yes, the Society advises EHRA certification, but it does not homologate national certification | <input type="checkbox"/> |
| No | <input checked="" type="checkbox"/> |
| No answer | <input type="checkbox"/> |

| Specialist required for | |
|---------------------------|--|
| | Specialist |
| Catheter ablation | Yes A cardiac electrophysiologist is required for catheter ablation. |
| ICD or pacemaker implants | Yes A trained cardiologist or cardiac surgeon may undertake device implants. |

| Official national competency guidelines for electrophysiological studies or catheter ablation | Yes |
|---|-----|
| BHRS standards documents in CIEDs and electrophysiology | |

| | |
|---|---------------|
| Required period of training to perform implantations | Yes |
| Cardiology trainees have a 5 year training programme. If they wish to specialise in device implantation, the final 2 years are focussed in this area. | |
| Suggested period of training to perform implantations | No |
| National quality control system availability | Yes |
| Pacemaker | Yes |
| ICD implantation | Yes |
| CRT implantation | Yes |
| Cathether ablation | Yes |
| Responsible person for quality control | |
| BHRS through national audit. | |
| Training centres availability | |
| Pacemaker | not available |
| ICD implantation | not available |
| CRT implantation | not available |
| Electrophysiological studies and catheter ablation | not available |
| Atrial fibrillation ablation | not available |
| Number of universities (Schools of Medicine) | 33 |
| Percentage of academic centres among all practicing EP centres | 50% |
| Percentage of academic centres among all practicing implanting devices centres | 14% |

5. Pacemakers

| Pacemaker units implanted and number of implanting centres | | |
|--|---------------|--------|
| | 2014 | 2015 |
| Implanting centres | 207 | 211 |
| Total Pacemaker units implanted | 45.131 | 46.110 |
| Thereof, Leadless Pacemaker | not available | 0 |
| First implants | 33.893 | 36.354 |
| Replacements | 11.238 | 9.756 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

6. Cardiac resynchronization therapy devices

| CRT units implanted and number of implanting centres | | |
|--|-------|--------|
| | 2014 | 2015 |
| Implanting centres | 129 | 126 |
| Total CRT units implanted | 9.516 | 10.198 |
| Thereof, CRT pacemaker | 4.144 | 4.160 |
| Thereof, CRT ICD | 5.372 | 6.038 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

7. Implantable Cardiac Defibrillator

| ICD units implanted and number of implanting centres | | |
|--|---------------|-------|
| | 2014 | 2015 |
| Implanting centres | 126 | 125 |
| Total ICD units implanted | 6.474 | 6.701 |
| Thereof, Single chamber | 2.395 | 4.021 |
| Thereof, Dual chamber | 4.079 | 2.484 |
| Thereof, Subcutaneous ICD | not available | 196 |
| First implants | 4.695 | 5.291 |
| Replacements | 1.779 | 1.410 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

8. Loop recorders

| Loop recorders implanted and number of implanting centres | | |
|---|-------|-------|
| | 2014 | 2015 |
| Implanting centres | 145 | 129 |
| Total loop recorders implanted | 5.792 | 5.804 |
| Specialist performing implants | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

9. Lead extractions

| Lead extractions procedures and and number of centers that performed lead extractions | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Hospitals performed lead extractions | not available | not available |
| Total lead extraction procedures | not available | not available |
| Specialist performing lead extractions | | |
| Cardiologists | Yes | 100% |
| Surgeons | No | 0% |

10. Device specific

| Availability of remote monitoring of devices | | No answer |
|--|-----|--|
| National registry for | | |
| | | Official name |
| ICD | Yes | National Cardiac Rhythm Management Audit (NICOR) |
| Pacing | Yes | National Cardiac Rhythm Management Audit (NICOR) |
| Electrophysiology | Yes | National Cardiac Rhythm Management Audit (NICOR) |
| Availability of a national quality insurance system or complication registry | | Yes |
| Official name: National Cardiac Rhythm Management Audit (NICOR) | | |
| Availability of a national institution coordinating and guiding device recalls and complications related to lead extractions | | Yes |
| Official name: Medicines and Healthcare Regulatory Authority (MHRA) | | |

11. Interventional electrophysiology

| Number of ablations performed and number of centres | | |
|---|---------------|---------------|
| | 2014 | 2015 |
| Number of ablation centres | 61 | 65 |
| Number of ablations performed | 17,578 | 17,622 |
| Mean number of ablations per centre | 288 | 271 |
| Number of AF ablations | 6,505 | 6,390 |
| Number of ablation centres (> 50 AF ablations) | 36 | 32 |
| Number of VT/VF ablations | 599 | 674 |
| Number of ablation centres (> 10 VT ablations on structural heart diseases) | 23 | 23 |
| Number of LAA closures | not available | not available |
| Number of centres (LAA closures) | not available | not available |

| Number of electrophysiologists | | |
|--|---------------|---------------|
| Number of electrophysiologists performed catheter ablation independently | not available | not available |
| Number of physicians under training to become independent electrophysiologists | not available | not available |

| Availability of a national registry for interventional electrophysiology | | Yes |
|--|--|-----|
| Official name: National cardiac rhythm management audit NICORJ | | |

12. Guidelines

| Guidelines adhered to ICD implants and pacemaker implants | | | | | | |
|---|--|--|--|--|--|-----|
| National | | | | | | Yes |
| U.S. | | | | | | No |
| European | | | | | | No |

| Obstacles to guideline implementation | | | | | | Ranking of importance |
|--|--------------------------|-------------------------------------|--------------------------|--------------------------|-------------------------------------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Lack of centres | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 |
| Lack of reimbursement, limited financial resources | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 |
| Lack of referral | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 4 |
| Lack of trained personnel | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Low awareness of guidelines | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 1 |
| Lack of operators | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 |

1 = no obstacle, 5 = great obstacle

1 = top, 6 = lowest

13. Sources

| Name of National Cardiac Society, National Working Group or arrhythmia body |
|---|
| British Heart Rhythm Society |

| All sources that were used to fill out the questionnaire for the EHRA White Book 2016 |
|---|
| EHRA White Book 2015 |
| Official statistics |
| Estimation |

5. Appendix



5. Appendix

EHRA Certification



The EHRA offers the first European certification of professional excellence, in three areas:

- Electrophysiology
- Cardiac Pacing & Device Therapy
- Allied Professionals

The EHRA is pleased to publish the list, starting from 2005, of professionals who are officially fully certified, as well as that of the candidates who have passed the written part of the certification process.

«Join us in congratulating them!»

Candidates successful to the exam need to have their logbook assessed by an EHRA grader to be fully certified. EHRA Certification is valid for 10 years.

Electrophysiology

EHRA EP Certified professionals

| | | | |
|-------------------|----------------|----------------|------|
| ACENA RAMOS | Marta | Spain | 2014 |
| ACOU | Willem-Jan | Belgium | 2015 |
| ADYAMAN | Ahmet | Netherlands | 2014 |
| ALCALDE RODRIGUEZ | Oscar | Spain | 2012 |
| ALI | Hussam | Italy | 2015 |
| ALZAND | B. | Netherlands | 2012 |
| ANDERSON | Mark H. | United Kingdom | 2010 |
| ANGUERA CAMOS | Ignacio | Spain | 2009 |
| ANNE | Wim | Belgium | 2013 |
| ARBELO | Elena | Spain | 2009 |
| ARCOCHA TORRES | Maria Fe | Spain | 2012 |
| ARIAS PALOMARES | Miguel Angel | Spain | 2013 |
| ARMENTA PASTOR | Juan Fernandez | Spain | 2012 |
| AVELLA | Andrea | Italy | 2009 |
| ÁVILA ALONSO | Pablo | Spain | 2013 |
| AYALA PAREDES | Felix | Canada | 2009 |
| BALTA | Osman | Germany | 2013 |
| BARDYSZEWSKI | Aleksander | Poland | 2015 |
| BARRERA CORDERO | Alberto | Spain | 2005 |
| BAYRAK | Duhan Fatih | Belgium | 2012 |
| BEAUPORT | Joelle | Germany | 2013 |
| BELOTTI | Giuseppina | Italy | 2008 |
| BENCSIK | Gabor | Hungary | 2009 |
| BERRUEZO SANCHEZ | Antonio | Spain | 2010 |
| BERTOMEU-GONZALEZ | Vicente | Spain | 2012 |
| BISBAL | Felipe | Belgium | 2015 |
| BLAAUW | Yuri | Netherlands | 2015 |
| BONANNO | Carlo | Italy | 2014 |
| BROUZET | Thomas | Spain | 2015 |
| BRUGADA | Josep | Spain | 2009 |
| BUERKLE | Gerd | Austria | 2011 |
| BUN | Sok-Sithikun | France | 2012 |

EHRA EP Certified professionals

| | | | |
|-------------------|-----------------|----------------|------|
| BURRI | Haran | Switzerland | 2008 |
| CALVO CUERVO | David | Spain | 2013 |
| CALVO GALIANO | Naiara | Spain | 2012 |
| CANO PEREZ | Oscar | Spain | 2011 |
| CASTRO URDA | Victor | Spain | 2012 |
| CATANCHIN | Andrei | Australia | 2012 |
| CHATTERJEE | Debjit | United Kingdom | 2013 |
| CHONG | Daniel | Singapore | 2013 |
| CIPOLLETTA | Laura | Italy | 2015 |
| CLEMENS | Marcell | Hungary | 2015 |
| CORTEZ-DIAS | Nuno | Portugal | 2015 |
| COZAR LEON | Rocio | Spain | 2012 |
| DATINO | Tomas | Spain | 2012 |
| DAVOODI | Gholamreza | Ireland | 2008 |
| DE DIEGO | Carlos | Spain | 2015 |
| DE FILIPPO | Paolo | Italy | 2012 |
| DE GROOT | Joris R. | Netherlands | 2012 |
| DE JONG | Jonas | Netherlands | 2013 |
| DE MEYER | Grim | Belgium | 2014 |
| DE RIVA SILVA | Marta | Spain | 2013 |
| DELGADO | Hugo Emilio | Argentina | 2014 |
| DEUTSCH | Alexandru | Romania | 2012 |
| DI CORI | Andrea | Italy | 2015 |
| DJAJADISASTRA | Achmad Iskandar | Germany | 2012 |
| DOMINGUEZ MAFE | Eloy | Spain | 2014 |
| DURAY | Gabor Zoltan | Germany | 2008 |
| DYRDA | Katia | Canada | 2012 |
| EISENBERGER | Martin | Czech Republic | 2012 |
| EL KADRI | Moutaz | United Kingdom | 2013 |
| ELDER | Douglas | United Kingdom | 2013 |
| EVERTZ | Reinder | Netherlands | 2015 |
| EWERTSEN | Niels Christian | Germany | 2014 |
| FERNANDEZ LOZANO | Ignacio | Spain | 2005 |
| FERNANDEZ PASTOR | Julia | Spain | 2015 |
| FONTENLA | Adolfo | Spain | 2012 |
| FORCLAZ | Andrei | Switzerland | 2012 |
| FOSCH | Javier | Spain | 2015 |
| FRANCK | Harald | Germany | 2011 |
| FRANZINI | Christine | Switzerland | 2015 |
| GALLARDO LOBO | Rodrigo | Spain | 2012 |
| GARCIA MORAN | Emilio | Spain | 2005 |
| GAROFALO FORTE | Daniel | Spain | 2014 |
| GAWRYSIK | Marcin | Poland | 2013 |
| GLOWNIAK | Andrzej | Poland | 2012 |
| GONZALEZ FERRER | Juan Jose | Spain | 2015 |
| GONZALEZ VASSEROT | Maria Del Mar | Spain | 2009 |
| GONZALEZ-ENRIQUEZ | Susana | Spain | 2012 |
| GOPALAMURUGAN | A. B. | United Kingdom | 2014 |
| GRECU | Mihaela | Romania | 2007 |
| GRUBB | Neil | United Kingdom | 2014 |

EHRA EP Certified professionals

| | | | |
|---------------------|-----------------|--------------------------|------|
| GUGUCHEV | Pavel | United States of America | 2010 |
| HEMELS | Martin | Netherlands | 2012 |
| HERCZKU | Csaba | Hungary | 2012 |
| HERREROS GUILARTE | Benito | Spain | 2005 |
| HLIVAK | Peter | Slovakia | 2012 |
| HUYBRECHTS | Wim | Belgium | 2009 |
| INFUSINO | Tommaso | Italy | 2013 |
| JANDA | Igor | Germany | 2012 |
| JANSEN | Ward | Netherlands | 2010 |
| JASTRZEBSKI | Marek | Poland | 2008 |
| JILEK | Clemens | Germany | 2012 |
| JIMENEZ JAIMEZ | Juan | Spain | 2015 |
| JIMENEZ-DIAZ | Javier | Spain | 2015 |
| JOHAR | Sofian | United Kingdom | 2012 |
| JONES | David Gareth | United Kingdom | 2012 |
| JOST | Colin | Germany | 2015 |
| KACZMAREK | Krzysztof | Poland | 2013 |
| KARDOS | Attila | Hungary | 2012 |
| KEMME | Michiel | The netherlands | 2009 |
| KILISZEK | Marek | Poland | 2010 |
| KONSTANTINIDOU | Melanie | Germany | 2013 |
| KOOPMAN | Pieter | Belgium | 2014 |
| KOSTOPOULOU | Anna | Greece | 2014 |
| KRISTENSEN | Jens | Denmark | 2014 |
| KUHNE | Michael | Switzerland | 2012 |
| LANG | Christopher | United Kingdom | 2014 |
| LAURENZI | Francesco | Italy | 2009 |
| LE POLAIN DE WAROUX | Jean-Benoit | Belgium | 2015 |
| LERCHER | Peter | Austria | 2012 |
| LETSAS | Konstantinos | Greece | 2009 |
| LOUW | Ruan | South Africa | 2014 |
| LUBINSKI | Andrzej | Poland | 2005 |
| LUEDORFF | Guido | Germany | 2012 |
| LUERMANS | Justin | Netherlands | 2014 |
| LUQUE | Antonio | Spain | 2015 |
| MADRID | Antonio | Spain | 2008 |
| MARINI | Massimiliano | Italy | 2011 |
| MARTINEK | Martin | Austria | 2010 |
| MARTINEZ ALDAY | Jesus Daniel | Spain | 2005 |
| MARTINEZ SANDE | Jose Luis | Spain | 2012 |
| MATIA FRANCES | Roberto | Spain | 2011 |
| MATIELLO | Maria | Spain | 2011 |
| MAZUR | Alexander | Israel | 2005 |
| MORENO REVIRIEGO | Sara | Spain | 2014 |
| MOYA I MITJANS | Angel | Spain | 2005 |
| MUELLER | Stephan Andreas | Switzerland | 2012 |
| MUNDEL | Markus | Germany | 2013 |
| NAGEH-ARMANIOS | Maged | United States of America | 2012 |
| NAVARRETE CASAS | Antonio Javier | United States of America | 2008 |
| NENTWICH | Karin | Germany | 2013 |

EHRA EP Certified professionals

| | | | |
|------------------------|--------------|----------------|------|
| NOVAK | Jan | United Kingdom | 2013 |
| ORMAETXE MERODIO | Jose Miguel | Spain | 2005 |
| OSCA ASENSI | Joaquin | Spain | 2010 |
| ÖZCAN | Emin Evren | Turkey | 2014 |
| PACHON | Marta | Spain | 2014 |
| PADFIELD | Gareth | United Kingdom | 2015 |
| PAPIASHVILI | Giorgi | Georgia | 2009 |
| PASTOR FUENTES | Agustin | Spain | 2005 |
| PAURIAH | Maheshwar | United Kingdom | 2015 |
| PAVLOVIC | Nikola | Croatia | 2014 |
| PEINADO | Rafael | Spain | 2005 |
| PELAEZ GONZALEZ | Antonio | Spain | 2015 |
| PEREZ ALVAREZ | Luisa | Spain | 2014 |
| PEREZ CASTELLANO | Nicasio | Spain | 2005 |
| PEREZ DIEZ | Diego | Spain | 2012 |
| PEREZ-VILLACASTIN | Julian | Spain | 2005 |
| PISON | Laurent | Netherlands | 2013 |
| POELSLEER | Robert | Germany | 2014 |
| POZZETTI | Daniela | Italy | 2007 |
| PRISECARU | Raluca | Belgium | 2015 |
| PUCHOL | Alberto | Hungary | 2012 |
| RACKAUSKAS | Gediminas | Lithuania | 2015 |
| REBELLATO | Luca | Italy | 2012 |
| RICCIARDI | Daniilo | Belgium | 2013 |
| RIVAS GANDARA | Nuria | Spain | 2013 |
| RIVERA | Santiago | Canada | 2013 |
| ROCA LUQUE | Ivo | Spain | 2014 |
| RODRIGUEZ MANERO | Moises | Belgium | 2013 |
| RORDORF | Roberto | Italy | 2012 |
| ROSSI | Luca | Italy | 2014 |
| ROSSI | Andrea | Italy | 2014 |
| ROTEN | Laurent | Switzerland | 2009 |
| ROUX | Antoine | France | 2013 |
| SABATE DE LA CRUZ | Xavier | Spain | 2005 |
| SALGADO ARANDA | Ricardo | Spain | 2014 |
| SALGUERO BODES | Rafael | Spain | 2009 |
| SAMO AYOU | Romeo | Sweden | 2011 |
| SANZO | Antonio | Italy | 2015 |
| SAUSE | Armin | Germany | 2009 |
| SCHIMPF | Rainer | Germany | 2012 |
| SCHOONDERWOERD | Bas | Netherlands | 2012 |
| SEBAG | Frederic | France | 2014 |
| SEGRETI | Luca | Italy | 2013 |
| SEGURA VILLALOBOS | Federico | Spain | 2012 |
| SEILER | Jens | Switzerland | 2013 |
| SEOW | Swee-Chong | Singapore | 2007 |
| SERVATIUS | Helge | Switzerland | 2014 |
| SGARITO | Giuseppe | Italy | 2014 |
| SIEIRA RODRIGUEZ-MORET | Juan Antonio | Spain | 2015 |
| SILISTE | Calin | Italy | 2013 |

EHRA EP Certified professionals

| | | | |
|-------------------|----------------------------|-----------------|------|
| SKENE | Christopher | United Kingdom | 2014 |
| SMIT | Jaap Jan | The Netherlands | 2009 |
| STANLEY | Anthony | South Africa | 2014 |
| STEFFEL | Jan | Switzerland | 2012 |
| STOECKEL | Holger | Switzerland | 2015 |
| STUEHLINGER | Markus | Austria | 2010 |
| SZABO | Albin Arpad | Hungary | 2012 |
| SZEPLAKI | Gabor | Hungary | 2012 |
| TEJEIRA FERNANDEZ | Elvis | United Kingdom | 2012 |
| TER BEKKE | Rachel M.A. | Netherlands | 2015 |
| TOMAN | Ondrej | Czech Republic | 2013 |
| TOQUERO RAMOS | Jorge | Spain | 2005 |
| TORCIVIA | Riccardo | Italy | 2015 |
| TRINES | Serge Alexander Ivo Petrus | Netherlands | 2008 |
| TRUCCO DE RINAUDO | María Emilce | Spain | 2015 |
| TUTDIBI | Osman | Germany | 2013 |
| TUTUIANU | Cristina Ioana | Romania | 2015 |
| TZEIS | Stylianios | Greece | 2010 |
| UCER | Ekrem | Germany | 2012 |
| VACCARI | Diego | Italy | 2013 |
| VALVERDE ANDRE | Irene | Spain | 2013 |
| VAN CASTEREN | Lieve | Belgium | 2012 |
| VAN DER HEIJDEN | Jeroen | Netherlands | 2015 |
| VAN HEUVERS WYN | Frederic | Belgium | 2015 |
| VAN OPSTAL | Jurren | Netherlands | 2014 |
| VATADESCU | Radu-Gabriel | Romania | 2009 |
| VENABLES | Paul | United Kingdom | 2013 |
| VILLUENDAS SABATE | Roger | Spain | 2013 |
| VITALE | Raffaele | Italy | 2012 |
| VOCKE | Wolfgang | Germany | 2013 |
| VOSS | Frederik | Germany | 2009 |
| VUKAJLOVIC | Dejan | Germany | 2010 |
| WETZEL | Renate Ulrike | Germany | 2015 |
| WIJCHERS | Sip | Belgium | 2015 |
| WINTER | Siegmond | Austria | 2012 |
| YEO | Wee Tiong | Singapore | 2013 |
| ZELJKO | Hrvjka Marija | Croatia | 2013 |
| ZELLERHOFF | Stephan | Germany | 2015 |
| ZOPPO | Franco | Italy | 2008 |
| ZUCCHELLI | Giulio | Italy | 2012 |

EP Certification candidates who have successfully completed the exam

| | | | |
|-----------------|------------|--------------------------|------|
| ABALEA | Jerome | France | 2014 |
| ABEDIN | Zainul | United States Of America | 2007 |
| ÁBRAHAM | Pál | Hungary | 2013 |
| ACENA RAMOS | Marta | Spain | 2011 |
| ACOSTA MARTINEZ | Juan | Spain | 2014 |
| ACOU | Willem-Jan | Belgium | 2013 |

EP Certification candidates who have successfully completed the exam

| | | | |
|---------------------|-------------------|----------------|------|
| ADIYAMAN | Ahmet | Netherlands | 2014 |
| AHMED TAHER MAHMOUD | Ahmed | Egypt | 2013 |
| AHUMADA | Miguel | Spain | 2013 |
| AKERSTROM | Finn | Sweden | 2015 |
| AL AMOURA | Alaa | France | 2015 |
| AL BUNNI | Muhamad | Italy | 2007 |
| ALCALDE RODRIGUEZ | Oscar | Spain | 2010 |
| ALGARRA CULLELL | Maria | Spain | 2013 |
| ALI | Hussam | Italy | 2014 |
| ALIYEV | Farid | Turkey | 2010 |
| ALZAND | B. | Netherlands | 2012 |
| AMET | Denis | France | 2011 |
| ANDERSON | Mark H | United Kingdom | 2010 |
| ANGUERA CAMOS | Ignacio | Spain | 2008 |
| ANIC | Ante | Croatia | 2013 |
| ANNE | Wim | Belgium | 2010 |
| ANTOLIC | Bor | Slovenia | 2015 |
| ARBELO | Elena | Spain | 2007 |
| ARCOCHA TORRES | Maria Fe | Spain | 2009 |
| ARGUEDAS-JIMENEZ | Hugo | Spain | 2014 |
| ARIAS PALOMARES | Miguel Angel | Spain | 2010 |
| ARISHA | Mohamed Mousa | France | 2015 |
| ARMENTA PASTOR | Juan Fernandez | Spain | 2011 |
| ARND | Christoph | Germany | 2014 |
| ATTA | Salah Eldin Sayed | Saudi Arabia | 2010 |
| AVELLA | Andrea | Italy | 2007 |
| ÁVILA ALONSO | Pablo | Spain | 2013 |
| AYALA PAREDES | Felix | Canada | 2007 |
| AZEM | Tareq | Germany | 2014 |
| BALT | Jippe | Netherlands | 2013 |
| BALTA | Osman | Germany | 2010 |
| BARDYSZEWSKI | Aleksander | Poland | 2014 |
| BARRERA CORDERO | Alberto | Spain | 2005 |
| BARRY | James | United Kingdom | 2012 |
| BASTANI | Hamid | Sweden | 2015 |
| BASTIAN | Dirk | Germany | 2014 |
| BAUERNEFIND | Tamas | Hungary | 2013 |
| BAYRAK | Duhan Fatih | Belgium | 2011 |
| BEAUPORT | Joelle | Germany | 2012 |
| BEDNAREK | Jacek | Poland | 2011 |
| BEHAR | Nathalie | France | 2014 |
| BELOTTI | Giuseppina | Italy | 2006 |
| BENCARDINO | Gianluigi | Italy | 2015 |
| BENCsik | Gabor | Hungary | 2009 |
| BENEZET MAZUECOS | Juan | Spain | 2014 |
| BENITO MARTIN | Eva Maria | Spain | 2015 |
| BERRUZO SANCHEZ | Antonio | Spain | 2006 |
| BERTAGNOLLI | Livio | Italy | 2013 |
| BERTERO | Giovanni | Italy | 2012 |
| BERTOMEU-GONZALEZ | Vicente | Spain | 2010 |

EP Certification candidates who have successfully completed the exam

| | | | |
|---------------------|----------------------|----------------|------|
| BIANCHI | Francesca | Italy | 2014 |
| BISBAL | Felipe | Belgium | 2014 |
| BLAAUW | Yuri | Netherlands | 2011 |
| BLANDINO | Alessandro | Italy | 2013 |
| BOGDAN | Stefan Nicolae | Romania | 2014 |
| BOHORA | Shomu | India | 2012 |
| BONANNO | Carlo | Italy | 2011 |
| BORDIGNON | Stefano | Italy | 2013 |
| BOROV | Stefan | Bulgaria | 2015 |
| BORREGO BERNABE | Luis | Spain | 2013 |
| BOTROS | Maichel Sobhy Naguib | Egypt | 2014 |
| BOULLIN | Julian Paul | United Kingdom | 2010 |
| BROCKMEIER | Johannes Paul | Germany | 2013 |
| BROUZET | Thomas | Spain | 2012 |
| BRUGADA | Josep | Spain | 2007 |
| BUCHHOLZ | Jochen | Germany | 2013 |
| BUERKLE | Gerd | Austria | 2008 |
| BUIATTI | Alessandra | Italy | 2015 |
| BUN | Sok-Sithikun | France | 2012 |
| BURKHARDT | Dietmar | Germany | 2014 |
| BURRI | Haran | Switzerland | 2007 |
| CABANAS GRANDIO | Pilar | Spain | 2014 |
| CABRERA GOMEZ | Sandra | Spain | 2014 |
| CALVANESE | Raimondo | Italy | 2014 |
| CALVO CUERVO | David | Spain | 2010 |
| CALVO GALIANO | Naiara | Spain | 2011 |
| CAMPOS GARCIA | Bieito | Spain | 2010 |
| CANADAS GODOY | Maria Victoria | Spain | 2013 |
| CANO PEREZ | Oscar | Spain | 2009 |
| CARBALLEIRA | Lidia | Spain | 2015 |
| CASADO ARROYO | Ruben | Spain | 2015 |
| CASTAGNO | Davide | Italy | 2015 |
| CASTILLO | Jesús | Spain | 2013 |
| CASTREJON CASTREJON | Sergio | Spain | 2012 |
| CASTRO FIGUEROA | Lena Del Pilar | Spain | 2015 |
| CASTRO URDA | Victor | Spain | 2009 |
| CATANCHIN | Andrei | Australia | 2008 |
| CHALDOUPI | Sevasti-Maria | Netherlands | 2015 |
| CHAPURNYKH | Alexander | Russia | 2015 |
| CHATTERJEE | Debjit | United Kingdom | 2010 |
| CHONG | Daniel | Singapore | 2011 |
| CIPOLLETTA | Laura | Italy | 2015 |
| CISMARU | Gabriel | Romania | 2015 |
| CLEMENS | Marcell | Hungary | 2012 |
| CLEMENTY | Nicolas | France | 2010 |
| CONTE | Giulio | Italy | 2015 |
| CONTI | Sergio | Italy | 2015 |
| CORTEZ-DIAS | Nuno | Portugal | 2013 |
| COSTA | Alessandro | Italy | 2015 |
| COZAR LEON | Rocio | Spain | 2011 |

EP Certification candidates who have successfully completed the exam

| | | | |
|---------------------|-----------------|----------------|------|
| DAR | Mehboob | Saudi Arabia | 2013 |
| DATINO | Tomas | Spain | 2011 |
| DAVOODI | Gholamreza | Ireland | 2007 |
| DE DIEGO | Carlos | Spain | 2012 |
| DE FILIPPO | Paolo | Italy | 2011 |
| DE GROOT | Joris R. | Netherlands | 2009 |
| DE JONG | Jonas | Netherlands | 2011 |
| DE LUCIA | Raffaele | Italy | 2015 |
| DE MEYER | Grim | Belgium | 2011 |
| DE RIVA SILVA | Marta | Spain | 2011 |
| DEL CASTILLO ARROJO | Sivia | Spain | 2006 |
| DELCOUR | Alexandre | Belgium | 2015 |
| DELGADO | Hugo Emilio | Argentina | 2013 |
| DEUTSCH | Alexandru | Romania | 2009 |
| DI CORI | Andrea | Italy | 2012 |
| DICHTL | Wolfgang | Austria | 2011 |
| DINOV | Borislav | Germany | 2012 |
| DJAJADISASTRA | Achmad Iskandar | Germany | 2011 |
| DOMINGUEZ MAFE | Eloy | Spain | 2012 |
| DURAY | Gabor Zoltan | Germany | 2008 |
| DUTHOIT | Guillaume | France | 2010 |
| DYRDA | Katia | Canada | 2010 |
| EJSBOUTS | Sabine | Netherlands | 2014 |
| EISENBERGER | Martin | Czech Republic | 2008 |
| EL KADRI | Moutaz | United Kingdom | 2012 |
| EL MAGHAWRY | Mohamed | Egypt | 2015 |
| ELDER | Douglas | United Kingdom | 2010 |
| ELICES TEJA | Juliana | Spain | 2015 |
| ESTRADA | Alejandro | Spain | 2013 |
| EVERTZ | Reinder | Netherlands | 2014 |
| EWERTSEN | Niels Christian | Germany | 2013 |
| EXPOSITO | Victor | Spain | 2015 |
| FERNANDEZ LOZANO | Ignacio | Spain | 2005 |
| FERNANDEZ PASTOR | Julia | Spain | 2012 |
| FICHTNER | Stephanie | Germany | 2014 |
| FIGUEROA | Jorge Alejandro | Argentina | 2014 |
| FILGUEIRAS RAMA | David | Spain | 2012 |
| FONTENLA | Adolfo | Spain | 2010 |
| FORCLAZ | Andrei | Switzerland | 2009 |
| FOSCH | Javier | Spain | 2013 |
| FRANCK | Harald | Germany | 2010 |
| FRANCO DIEZ | Eduardo | Spain | 2015 |
| FRANZINI | Christine | Switzerland | 2014 |
| FUKUNAGA | Masato | Czech Republic | 2015 |
| GALLARDO LOBO | Rodrigo | Spain | 2009 |
| GANDJBAKHCH | Estelle | France | 2013 |
| GARCIA MORAN | Emilio | Spain | 2005 |
| GAROFALO FORTE | Daniel | Spain | 2013 |
| GAWRYSIAK | Marcin | Poland | 2009 |
| GLOWNIAK | Andrzej | Poland | 2009 |

EP Certification candidates who have successfully completed the exam

| | | | |
|----------------------|------------------|--------------------------|------|
| GODA | Sherif | Egypt | 2014 |
| GOMEZ | Federico | Spain | 2014 |
| GONZALEZ FERRER | Juan Jose | Spain | 2012 |
| GONZALEZ VASSEROT | Maria Del Mar | Spain | 2007 |
| GONZALEZ-ENRIQUEZ | Susana | Spain | 2008 |
| GOPALAMURUGAN | A. B. | United Kingdom | 2011 |
| GOURRAUD | Jean Baptiste | France | 2014 |
| GRANIER | Mathieu | France | 2011 |
| GRECU | Mihaela | Romania | 2006 |
| GRIECO | Domenico | Italy | 2014 |
| GRUBB | Neil | United Kingdom | 2014 |
| GUENANCIA | Charles | France | 2015 |
| GUGUCHEV | Pavel | United States Of America | 2010 |
| GUY-MOYAT | Benoit | France | 2010 |
| HAGGUI | Abdeddayem | Tunisia | 2015 |
| HEMELS | Martin | Netherlands | 2011 |
| HENDRICKS | Neil | South Africa | 2012 |
| HENKENS | Ivo | Netherlands | 2015 |
| HERCZKU | Csaba | Hungary | 2009 |
| HERREROS GUILARTE | Benito | Spain | 2005 |
| HLIVAK | Peter | Slovakia | 2010 |
| HOBBS | William Julian | United Kingdom | 2007 |
| HOFFMANN | Andrzej | Poland | 2012 |
| HOGLUND | Niklas | Sweden | 2008 |
| HOOFT VAN HUYSDUYNEN | Bart | Netherlands | 2011 |
| HORDYNSKI | Grzegorz | Poland | 2012 |
| HUEMER | Martin | Germany | 2013 |
| HUYBRECHTS | Wim | Belgium | 2008 |
| IATROPOULOS | Dimitrios | Greece | 2015 |
| IMNADZE | Guram | Germany | 2015 |
| INFUSINO | Tommaso | Italy | 2011 |
| IORGULESCU | Corneliu-Nicolae | Romania | 2012 |
| JAN | Matevz | Slovenia | 2014 |
| JANDA | Igor | Germany | 2009 |
| JANSEN | Ward | Netherlands | 2009 |
| JARMAN | Julian | United Kingdom | 2012 |
| JASTRZEBSKI | Marek | Poland | 2007 |
| JAUREGUI ABULARACH | Miguel Eduardo | Spain | 2010 |
| JILEK | Clemens | Germany | 2011 |
| JIMENEZ JAIMEZ | Juan | Spain | 2013 |
| JIMENEZ LOPEZ | Jesús | Spain | 2015 |
| JIMENEZ-DIAZ | Javier | Spain | 2013 |
| JOHAR | Sofian | United Kingdom | 2009 |
| JONES | David Gareth | United Kingdom | 2009 |
| JOST | Colin | Germany | 2012 |
| JULIA CALVO | Justo | Spain | 2015 |
| KACZMAREK | Krzysztof | Poland | 2010 |
| KANDIL | Mehmet | Germany | 2011 |
| KARDOS | Attila | Hungary | 2010 |
| KEMME | Michiel | The Netherlands | 2008 |

EP Certification candidates who have successfully completed the exam

| | | | |
|---------------------|--------------------------|----------------|------|
| KILISZEK | Marek | Poland | 2009 |
| KIRUBAKARAN | Senthil | United Kingdom | 2012 |
| KOCH | Lydia | Germany | 2012 |
| KONRAD | Torsten | Germany | 2014 |
| KONSTANTINIDOU | Melanie | Germany | 2011 |
| KONTOGEORGIS | Andrianos | United Kingdom | 2015 |
| KOOPMAN | Pieter | Belgium | 2011 |
| KOSTOPOULOU | Anna | Greece | 2012 |
| KOX | Thomas | Germany | 2015 |
| KRISTENSEN | Jens | Denmark | 2013 |
| KRIVOLAPOV | Sergey | Russia | 2013 |
| KUHNE | Michael | Switzerland | 2011 |
| KUMAR | Narendra | Netherlands | 2015 |
| KUPICS | Kaspars | Latvia | 2015 |
| LALLEMAND | Benedicte | France | 2012 |
| LANG | Christopher | United Kingdom | 2012 |
| LANGBEIN | Anke | Germany | 2014 |
| LAURENZI | Francesco | Italy | 2008 |
| LE POLAIN DE WAROUX | Jean-Benoit | Belgium | 2012 |
| LERCHER | Peter | Austria | 2010 |
| LETSAS | Konstantinos | Greece | 2008 |
| LEVENTOPOULOS | Georgios | Greece | 2014 |
| LINDE | Antonio | Spain | 2013 |
| LOUW | Ruan | South Africa | 2014 |
| LUBINSKI | Andrzej | Poland | 2005 |
| LUEDORFF | Guido | Germany | 2012 |
| LUERMANS | Justin | Netherlands | 2013 |
| LUQUE | Antonio | Spain | 2014 |
| MADRAZO DELGADO | Ines | Spain | 2012 |
| MADRID | Antonio | Spain | 2008 |
| MAKOWSKI | Karol | Portugal | 2010 |
| MANTZIARI | Aglaia-Angeliki (Lilian) | United Kingdom | 2013 |
| MANUSAMA | Randy | Netherlands | 2015 |
| MARINI | Massimiliano | Italy | 2010 |
| MARTINEK | Martin | Austria | 2008 |
| MARTINEZ ALDAY | Jesus Daniel | Spain | 2005 |
| MARTINEZ SANDE | Jose Luis | Spain | 2009 |
| MASSIN | Francois | France | 2009 |
| MATIA FRANCES | Roberto | Spain | 2009 |
| MATIELLO | Maria | Spain | 2007 |
| MAZUR | Alexander | Israel | 2005 |
| MCCREADY | James | United Kingdom | 2010 |
| MEJIA | Elena | Spain | 2014 |
| MELLOR | Greg | United Kingdom | 2013 |
| MEYER | Christian | Germany | 2011 |
| MOISEI | Radu Eugen | Romania | 2015 |
| MOLATTA | Stephan | Germany | 2015 |
| MORENO | Jose | Spain | 2013 |
| MORENO REVIRIEGO | Sara | Spain | 2011 |
| MOYA I MITJANS | Angel | Spain | 2005 |

EP Certification candidates who have successfully completed the exam

| | | | |
|-------------------|-----------------|--------------------------|------|
| MUELLER | Dirk | Germany | 2008 |
| MUELLER | Stephan Andreas | Switzerland | 2011 |
| MUNDEL | Markus | Germany | 2011 |
| MUNOZ ESPARZA | Carmen | Spain | 2015 |
| MUNTEAN | Bogdan | Germany | 2013 |
| NAGEH-ARMANIOS | Maged | United States Of America | 2010 |
| NAVARRETE CASAS | Antonio Javier | United States Of America | 2007 |
| NAVARRO | Javier | Spain | 2012 |
| NENTWICH | Karin | Germany | 2012 |
| NG | Fu Siong | United Kingdom | 2014 |
| NOTI | Fabian | Switzerland | 2013 |
| NOVAK | Jan | United Kingdom | 2013 |
| OLORIZ SANJUAN | Teresa | Spain | 2013 |
| ORMAETXE MERODIO | Jose Miguel | Spain | 2005 |
| OSCA ASENSI | Joaquin | Spain | 2006 |
| ÖZCAN | Emin Evren | Turkey | 2013 |
| PACHON | Marta | Spain | 2011 |
| PADFIELD | Gareth | United Kingdom | 2013 |
| PAISEY | John | United Kingdom | 2008 |
| PANCHETTI | Luca | Italy | 2014 |
| PAPIASHVILI | Giorgi | Georgia | 2007 |
| PARK | Chan-Il | Switzerland | 2014 |
| PASTOR FUENTES | Agustin | Spain | 2005 |
| PAURIAH | Maheshwar | United Kingdom | 2012 |
| PAVACI | Heribert | Germany | 2015 |
| PAVLOVIC | Nikola | Croatia | 2014 |
| PAWLK | Tomasz | Poland | 2013 |
| PEINADO | Rafael | Spain | 2005 |
| PELAEZ GONZALEZ | Antonio | Spain | 2012 |
| PENELA | Diego | Spain | 2014 |
| PEREZ | Armando | Spain | 2010 |
| PEREZ ALVAREZ | Luisa | Spain | 2011 |
| PEREZ CASTELLANO | Nicasio | Spain | 2005 |
| PEREZ DIEZ | Diego | Spain | 2010 |
| PEREZ-VILLACASTIN | Julian | Spain | 2005 |
| PERROTTA | Laura | Italy | 2014 |
| PEZAWAS | Thomas | Austria | 2015 |
| PIQUERAS | Eric | France | 2015 |
| PISON | Laurent | Netherlands | 2010 |
| POELSLEER | Robert | Germany | 2014 |
| POOSAPADDI RAJA | Bhima Shankar | India | 2012 |
| POZZETTI | Daniela | Italy | 2007 |
| PRISECARU | Raluca | Belgium | 2015 |
| PUCHOL | Alberto | Hungary | 2009 |
| QURESHI | Norman | United Kingdom | 2013 |
| RACKAUSKAS | Gediminas | Lithuania | 2015 |
| RAJU | Hariharan | United Kingdom | 2015 |
| RAMANNA | Hemanth | The Netherlands | 2008 |
| REBELLATO | Luca | Italy | 2009 |
| RENZULLO | Elvira | Italy | 2015 |

EP Certification candidates who have successfully completed the exam

| | | | |
|------------------------|--------------|-----------------|------|
| RIAH | Leila | Tunisia | 2013 |
| RICCIARDI | Danilo | Belgium | 2012 |
| RICCIARDI | Giuseppe | Italy | 2015 |
| RISTIC | Velibor | Serbia | 2015 |
| RIVAS GANDARA | Nuria | Spain | 2010 |
| RIVERA | Santiago | Canada | 2013 |
| ROCA LUQUE | Ivo | Spain | 2011 |
| ROCHA COSTA | Sergia | Portugal | 2015 |
| RODRIGUEZ MANERO | Moises | Belgium | 2012 |
| RORDORF | Roberto | Italy | 2009 |
| ROSER | Mattias | Germany | 2012 |
| ROSSI | Andrea | Italy | 2011 |
| ROSSI | Luca | Italy | 2012 |
| ROTEN | Laurent | Switzerland | 2008 |
| ROUX | Antoine | France | 2010 |
| RUBIO | Jose Manuel | Spain | 2015 |
| SABATE DE LA CRUZ | Xavier | Spain | 2005 |
| SALGADO ARANDA | Ricardo | Spain | 2013 |
| SALGUERO BODES | Rafael | Spain | 2007 |
| SALMAS | Jozef | Germany | 2015 |
| SAMMUT | Mark Adrian | Malta | 2012 |
| SAMO AYOU | Romeo | Sweden | 2010 |
| SANCHEZ BORQUE | Pepa | Spain | 2015 |
| SANCHEZ GOMEZ | Juan Miguel | Spain | 2013 |
| SANDILANDS | A. | United Kingdom | 2010 |
| SANZO | Antonio | Italy | 2014 |
| SARRIAS | Axel | Spain | 2013 |
| SAUSE | Armin | Germany | 2008 |
| SAYGI | Serkan | Turkey | 2015 |
| SCHERR | Daniel | Austria | 2013 |
| SCHIMPF | Rainer | Germany | 2012 |
| SCHOENBAUER | Robert | Austria | 2011 |
| SCHOONDERWOERD | Bas | Netherlands | 2008 |
| SEBAG | Frederic | France | 2014 |
| SEGRETI | Luca | Italy | 2010 |
| SEGURA VILLALOBOS | Federico | Spain | 2011 |
| SEILER | Jens | Switzerland | 2010 |
| SEOW | Swee-Chong | Singapore | 2007 |
| SERVATIUS | Helge | Switzerland | 2014 |
| SGARITO | Giuseppe | Italy | 2012 |
| SIEIRA RODRIGUEZ-MORET | Juan Antonio | Spain | 2014 |
| SIELSKI | Slawomir | Poland | 2007 |
| SILBERBAUER | John | United Kingdom | 2013 |
| SILISTE | Calin | Italy | 2011 |
| SKENE | Christopher | United Kingdom | 2013 |
| SKODA | Jan | Czech Republic | 2008 |
| SMIT | Jaap Jan | The Netherlands | 2008 |
| SOHAL | Manav | United Kingdom | 2015 |
| SONNE | Kai | Germany | 2015 |
| SORREL | Jeremie | France | 2015 |

EP Certification candidates who have successfully completed the exam

| | | | |
|--------------------|----------------------------|----------------|------|
| SPADACINI | Gianmario | Italy | 2006 |
| STANLEY | Anthony | South Africa | 2012 |
| STEC | Sebastian | Poland | 2014 |
| STEFFEL | Jan | Switzerland | 2012 |
| STOECKEL | Holger | Switzerland | 2012 |
| STUEHLINGER | Markus | Austria | 2010 |
| SUMAN HORDUNA | Irina | United Kingdom | 2008 |
| SZABO | Albin Arpad | Hungary | 2010 |
| SZEPLAKI | Gabor | Hungary | 2011 |
| SZTANISZLAV | Aron | Hungary | 2015 |
| TAHAPARY | Giovanni | Netherlands | 2013 |
| TAHIN | Tamas | Hungary | 2015 |
| TEJEIRA FERNANDEZ | Elvis | United Kingdom | 2012 |
| TEMPLE | Ian | United Kingdom | 2013 |
| TER BEKKE | Rachel M.A. | Netherlands | 2013 |
| TOMAN | Ondrej | Czech Republic | 2012 |
| TOMLINSON | D. | United Kingdom | 2008 |
| TONIOLO | Mauro | Italy | 2014 |
| TOQUERO RAMOS | Jorge | Spain | 2005 |
| TORCIVA | Riccardo | Italy | 2012 |
| TRAN | Van Nam | Switzerland | 2014 |
| TRAYKOV | Vassil B. | Hungary | 2010 |
| TREGUER | Frederic | France | 2009 |
| TRINES | Serge Alexander Ivo Petrus | Netherlands | 2006 |
| TRUCCO DE RINAUDO | María Emilce | Spain | 2013 |
| TSCHOLL | Verena | Germany | 2015 |
| TUOHY | Stephen | Ireland | 2015 |
| TURRENI | Federico | Italy | 2014 |
| TUTDIBI | Osman | Germany | 2012 |
| TUTUIANU | Cristina Ioana | Romania | 2014 |
| TZEIS | Stylianios | Greece | 2009 |
| UCER | Ekrem | Germany | 2011 |
| URBAN | Lubos | Slovakia | 2009 |
| VACCARI | Diego | Italy | 2012 |
| VALVERDE ANDRE | Irene | Spain | 2010 |
| VAN ALEM | Anouk | Netherlands | 2012 |
| VAN CASTEREN | Lieve | Belgium | 2010 |
| VAN DER HEJDEN | Jeroen | Netherlands | 2013 |
| VAN DIJK | Vincent | Netherlands | 2015 |
| VAN HEUVERSWEYN | Frederic | Belgium | 2012 |
| VAN MALDEREN | Sophie | Netherlands | 2015 |
| VAN OOSTROM | Antonie | Netherlands | 2012 |
| VAN OPSTAL | Jurren | Netherlands | 2013 |
| VANDUYNHOFEN | Philippe | Belgium | 2015 |
| VATASESCU | Radu-Gabriel | Romania | 2007 |
| VEASEY | Rick | United Kingdom | 2014 |
| VEGA OLVERA | Mercedes | Spain | 2012 |
| VENABLES | Paul | United Kingdom | 2010 |
| VERNOOY | Kevin | Netherlands | 2014 |
| VILLANUEVA SANCHEZ | José Ginés | Spain | 2013 |

EP Certification candidates who have successfully completed the exam

| | | | |
|-------------------|---------------|--------------------|------|
| VILLUENDAS SABATE | Roger | Spain | 2010 |
| VITALE | Raffaele | Italy | 2009 |
| VITALI SERDOZ | Laura | Italy | 2013 |
| VOCKE | Wolfgang | Germany | 2010 |
| VOSS | Frederik | Germany | 2008 |
| VUKAJLOVIC | Dejan | Germany | 2009 |
| WATANABE | Masaya | Netherlands | 2014 |
| WEBERNDORFER | Vanessa | Switzerland | 2015 |
| WESTRA | Sjoerd | Netherlands | 2012 |
| WETZEL | Renate Ulrike | Germany | 2013 |
| WUCHERS | Sip | Belgium | 2012 |
| WINTER | Siegmund | Austria | 2010 |
| WO | Hung-Ta | Taiwan | 2015 |
| WOLF | Michael | Belgium | 2015 |
| WYNN | Gareth | United Kingdom | 2014 |
| YAMASE | Miki | Italy | 2015 |
| YEO | Wee Tiong | Singapore | 2013 |
| ZELJKO | Hrvjka Marija | Croatia | 2012 |
| ZELLERHOFF | Stephan | Germany | 2011 |
| ZHELYAKOV | Eugeniy | Russian Federation | 2012 |
| ZOPPO | Franco | Italy | 2006 |
| ZUBERI | Zia | United Kingdom | 2013 |
| ZUCCHELLI | Giulio | Italy | 2008 |

Cardiac Pacing & Device Therapy

EHRA CP Certified professionals

| | | | |
|-------------------|-----------------|-------------|------|
| AARDEMA | Margriet W. | Netherlands | 2014 |
| ACENA RAMOS | Marta | Spain | 2012 |
| ACOU | Willem-Jan | Belgium | 2014 |
| ADİYAMAN | Ahmet | Netherlands | 2014 |
| AL BUNNI | Muhamad | Italy | 2007 |
| ALCALDE RODRIGUEZ | Oscar | Spain | 2012 |
| AL-HASHIMI | Hisham | Netherlands | 2015 |
| ALZAND | Bakr | Netherlands | 2012 |
| ANNE | Wim | Belgium | 2011 |
| APOSTOLOPOULOS | Theodoros | Greece | 2007 |
| ARBELO | Elena | Spain | 2013 |
| ARIAS PALOMARES | Miguel Angel | Spain | 2013 |
| AVELLA | Andrea | Italy | 2005 |
| AYALA PAREDES | Felix Alejandro | Canada | 2009 |
| AZEM | Tareq | Germany | 2015 |
| BACCHIONI | Giuseppe | Italy | 2012 |
| BAHGAT | Amr Kamal | Egypt | 2012 |
| BALT | Jippe | Netherlands | 2014 |
| BALTA | Osman | Germany | 2013 |
| BAYRAK | Duhan Fatih | Belgium | 2012 |
| BELOTTI | Giuseppina | Italy | 2005 |
| BENCSEK | Gabor | Hungary | 2009 |

EHRA CP Certified professionals

| | | | |
|---------------------|------------------|----------------------------|------|
| BERTOMEU-GONZALEZ | Vicente | Spain | 2012 |
| BUSTERVELD | Nick | Netherlands | 2012 |
| BISSINGER | Andrzej | Poland | 2007 |
| BLAAUW | Yuri | Netherlands | 2012 |
| BLICHARZ | Jaroslav | Poland | 2015 |
| BOHM | Adam | Hungary | 2009 |
| BONANNO | Carlo | Italy | 2014 |
| BOOS | Christopher | United Kingdom | 2009 |
| BORGER VAN DER BURG | Alida Elisabeth | Netherlands | 2009 |
| BORRELLI | Alessio | Italy | 2012 |
| BORRELLO | Francesco | Italy | 2013 |
| BOUWELS | Leon H.R. | Netherlands | 2009 |
| BREULS | Nico | The netherlands | 2010 |
| BROERS | Bernard | The netherlands | 2010 |
| BUERKLE | Gerd | Austria | 2012 |
| BUN | Sok-Sithikun | France | 2013 |
| BURRI | Haran | Switzerland | 2005 |
| CALVO CUERVO | David | Spain | 2013 |
| CALZOLARI | Vittorio | Italy | 2007 |
| CANADAS | Victoria | Spain | 2013 |
| CARAVATI | Fabrizio | Italy | 2012 |
| CASSIDY | Christopher John | United Kingdom | 2015 |
| CHATTERJEE | Debjit | United Kingdom | 2013 |
| CHONG | Daniel | Singapore | 2013 |
| CHONG YU | Eric | Singapore | 2013 |
| CHRISTOPHE | Arnd | Germany | 2014 |
| CHRISTOU | Apostolos | Greece | 2015 |
| CIPOLLETTA | Laura | Italy | 2014 |
| CLEMENS | Marcell | Hungary | 2015 |
| CROSATO | Martino | Italy | 2009 |
| CURNIS | Antonio | Italy | 2007 |
| DAVID | Laura-Alice | Romania | 2015 |
| DAVOODI | Gholamreza | Iran (Islamic Republic of) | 2005 |
| DE DOELDER | Marieke | Netherlands | 2012 |
| DE GROOT | Joris R. | Netherlands | 2011 |
| DE JONG | Jonas | Netherlands | 2012 |
| DE LA FUENTE | Sam | The netherlands | 2010 |
| DE MEYER | Grim | Belgium | 2013 |
| DE SENSI | Francesco | Italy | 2015 |
| DI CORI | Andrea | Italy | 2015 |
| DICHTL | Wolfgang | Austria | 2012 |
| DIJKMAN | Barbara | Netherlands | 2015 |
| DILAVERIS | Polychronis | Greece | 2007 |
| DINH | Trang | Netherlands | 2013 |
| DOMENICHINI | Giulia | Spain | 2014 |
| DORMAN | Reinhart | Netherlands | 2013 |
| DULBECCO | Massimo | Italy | 2013 |
| DURAY | Gabor Zoltan | Germany | 2008 |
| DYRDA | Katia | Canada | 2012 |
| EHRlich | Joachim | Germany | 2012 |

EHRA CP Certified professionals

| | | | |
|--------------------------|----------------|-----------------|------|
| EIJSBOUTS | Sabine | Netherlands | 2015 |
| EISENBERGER | Martin | Czech republic | 2011 |
| EIVINDSON | Gunvald | Norway | 2009 |
| EL KADRI | Moutaz | United Kingdom | 2013 |
| ENGBERS | Jos G. | The netherlands | 2011 |
| ESCHEN | Ole | Denmark | 2012 |
| EVERTZ | Reinder | Spain | 2012 |
| FACCHIN | Domenico | Italy | 2013 |
| FERNANDEZ PASTOR | Julia | Spain | 2012 |
| FERNANDEZ-ARMENTA PASTOR | Juan | Spain | 2015 |
| FIROUZI | Mehran | Netherlands | 2015 |
| FOLDESI | Csaba Laszlo | Hungary | 2012 |
| FOLEY | Paul | United Kingdom | 2012 |
| FOLKERINGA | Richard | Netherlands | 2009 |
| FONTENLA | Adolfo | Spain | 2012 |
| FRANCK | Harald | Germany | 2011 |
| FRANCOIS | Bart | Belgium | 2012 |
| FRANZINI | Christine | Switzerland | 2015 |
| FURNISS | Guy | United Kingdom | 2015 |
| GALLARDO LOBO | Rodrigo | Spain | 2012 |
| GARCIA BOLAO | Jose Ignacio | Spain | 2005 |
| GARWEG | Christophe | Belgium | 2014 |
| GERRITSEN | Jean Georges | Netherlands | 2013 |
| GHANI | Abdul | Netherlands | 2012 |
| GIANNOLA | Gabriele | Italy | 2012 |
| GIL | Ricardo | Portugal | 2013 |
| GIL ORTEGA | Ignacio | Spain | 2013 |
| GJESTVANG | Finn Tore | Norway | 2009 |
| GONZALEZ-ENRIQUEZ | Susana | Spain | 2013 |
| GRADAUS | Rainer | Germany | 2007 |
| GRECU | Mihaela | Romania | 2009 |
| GRIECO | Domenico | Italy | 2014 |
| HAMEL | John John | Switzerland | 2011 |
| HARTOG | Jasper | Netherlands | 2015 |
| HASSINK | Rutger | Netherlands | 2015 |
| HAUER | Herbert | Netherlands | 2012 |
| HAUER | Arnaud | Netherlands | 2015 |
| HAYES | Chris | United Kingdom | 2012 |
| HAZELEGER | Ronald | Netherlands | 2012 |
| HEIB | Klausdieter | Germany | 2010 |
| HEMELS | Martin | Netherlands | 2012 |
| HERCZKU | Csaba | Hungary | 2012 |
| HERREROS GUILARTE | Benito | Spain | 2005 |
| HJORTSHOJ | Soren | Denmark | 2010 |
| HOBBS | William Julian | United Kingdom | 2013 |
| HORDYNSKI | Grzegorz | Poland | 2011 |
| HORNSTEN | Jonas | Sweden | 2007 |
| HURLIMANN | David | Switzerland | 2012 |
| HUYBRECHTS | Wim | Belgium | 2010 |
| IONNIDIS | Panagiotis | Greece | 2007 |

EHRA CP Certified professionals

| | | | |
|--------------------|----------------|-----------------|------|
| IORGULESCU | Corneliu | Romania | 2012 |
| JACON | Peggy | France | 2012 |
| JAMALYAN | Smbat | Armenia | 2011 |
| JANSEN | Ward | Netherlands | 2010 |
| JANSEN | Annemieke | The netherlands | 2011 |
| JASTRZEBSKI | Marek | Poland | 2007 |
| JILEK | Clemens | Germany | 2012 |
| JOHAR | Sofian | United Kingdom | 2015 |
| JONES | David Gareth | United Kingdom | 2012 |
| KACZMAREK | Krzysztof | Poland | 2013 |
| KARABINOS | Ilias K. | Greece | 2009 |
| KEMME | Michiel | Netherlands | 2009 |
| KETELS | Stefan | Belgium | 2009 |
| KLAUSZ | Gergely | Hungary | 2015 |
| KLEIN | Gunnar | Germany | 2007 |
| KLEIN | Norbert | Germany | 2013 |
| KOEPFLI | Pascal | Switzerland | 2010 |
| KOEPP | Ulf | Norway | 2009 |
| KOOPMAN | Pieter | Belgium | 2014 |
| KORANTZOPOULOS | Panagiotis | Greece | 2011 |
| KOSTOPOULOU | Anna | Greece | 2012 |
| KOULOURIS | Spyridon | Greece | 2010 |
| KOUROUKLIS | Spyridon | Greece | 2012 |
| KRAVCHUK | Borys | Ukraine | 2012 |
| KRISTENSEN | Jens | Denmark | 2013 |
| KRUPA | Wojciech | Poland | 2010 |
| LANGERAK | Susan | Netherlands | 2013 |
| LERCHER | Peter | Austria | 2013 |
| LEWANDOWSKI | Michael | Poland | 2015 |
| LEWANDOWSKI | Michael | Poland | 2015 |
| LINDE | Antonio | Spain | 2015 |
| LIPCHENCA | Igor Ariel | Israel | 2009 |
| LIPTON | Jonathan | Netherlands | 2015 |
| LITTERFELDT | Ingrid | Sweden | 2011 |
| LOUW | Ruan | Belgium | 2014 |
| LUBBERTVERBERKMOES | Addy | Netherlands | 2013 |
| LUEDORFF | Guido | Germany | 2009 |
| LUERMANS | Justin | Netherlands | 2014 |
| LUTHJE | Lars | Germany | 2013 |
| MAC GILLAVRY | Melvin | The netherlands | 2011 |
| MACIAG | Aleksander | Poland | 2009 |
| MADEIRA | Joao | Portugal | 2012 |
| MARGULESCU | Andrei Dumitru | Romania | 2014 |
| MARINI | Massimiliano | Italy | 2008 |
| MARTINEK | Martin | Austria | 2010 |
| MARTINEZ SANDE | Jose Luis | Spain | 2012 |
| MASCIOLI | Giosue | Italy | 2007 |
| MASSA | Thomas | Germany | 2011 |
| MAXIM | George Razvan | Romania | 2015 |
| MEINE | Mathias | Netherlands | 2010 |

EHRA CP Certified professionals

| | | | |
|-------------------|-----------------|--------------------------|------|
| MERKELY | Bela | Hungary | 2007 |
| MICHAELSEN | Jochen | Germany | 2011 |
| MITKOWSKI | Przemyslaw | Poland | 2005 |
| MOLLNAU | Hanke | Germany | 2014 |
| MONNINK | Stefan | Netherlands | 2012 |
| MORENO | Jose | Spain | 2015 |
| MORENO PLANAS | Javier | Spain | 2005 |
| MORTSELL | David | Sweden | 2013 |
| MUELLER | Stephan Andreas | Switzerland | 2014 |
| MUNDEL | Markus | Germany | 2011 |
| MUNTINGA | Harm-Jans | Netherlands | 2012 |
| NAGEH-ARMANIOS | Maged | United States of America | 2015 |
| NENTWICH | Karin | Germany | 2013 |
| NEVEN | Kars | Netherlands | 2008 |
| NOVAK | Jan | Switzerland | 2013 |
| NOVIKOV | Dmitry | Russian Federation | 2013 |
| OMAR | Salama | Egypt | 2012 |
| OOMEN | Ad | Netherlands | 2015 |
| OREZIAK | Artur | Poland | 2015 |
| ORSIDA | Daniela | Italy | 2014 |
| OSMAN | Faizel | United Kingdom | 2007 |
| OSZTHEIMER | István | Hungary | 2015 |
| OUSS | Alexandre | Netherlands | 2014 |
| PADFIELD | Gareth | United Kingdom | 2015 |
| PATWALA | Ashish | United Kingdom | 2012 |
| PAULUSSEN | Guido | Netherlands | 2007 |
| PENA HERNANDEZ | Jose Luis | Spain | 2011 |
| PEREZ ALVAREZ | Luisa | Spain | 2013 |
| PEREZ CASTELLANO | Nicasio | Spain | 2005 |
| PEREZ DIEZ | Diego | Spain | 2012 |
| PERNA | Francesco | Italy | 2015 |
| PETRACCI | Barbara | Italy | 2012 |
| PETTIT | Stephen | United Kingdom | 2013 |
| PINDADO RODRIGUEZ | Javier | Spain | 2010 |
| PLUTA | Slawomir | Poland | 2012 |
| POELSLEER | Robert | Germany | 2013 |
| PORRO | Rosa | Spain | 2010 |
| POZZETTI | Daniela | Italy | 2007 |
| PREDOVSKI | Milen | Bulgaria | 2013 |
| PRISECARU | Raluca | Belgium | 2015 |
| PROIETTI | Riccardo | Italy | 2014 |
| PRUSKI | Maciej | Poland | 2013 |
| PRZYBYLSKI | Andrzej | Poland | 2008 |
| PUCHOL | Alberto | Spain | 2012 |
| PUGH | Peter | United Kingdom | 2009 |
| PYATT | Jason | United Kingdom | 2012 |
| RAO | Archana | United Kingdom | 2009 |
| RASSIAS | Ioannis | Greece | 2014 |
| REBELLATO | Luca | Italy | 2012 |
| RESTLE | Christian | Germany | 2013 |

EHRA CP Certified professionals

| | | | |
|-------------------|----------------|-----------------|------|
| RICCIARDI | Danilo | Belgium | 2013 |
| RIENSTRA | Michiel | Netherlands | 2014 |
| RIVAS GANDARA | Nuria | Spain | 2013 |
| ROBERT | Jens | Switzerland | 2014 |
| ROBLES DE MEDINA | Ramon Mariano | Netherlands | 2015 |
| ROCA LUQUE | Ivo | Spain | 2015 |
| RODRIGUEZ MANERO | Moises | Belgium | 2013 |
| RORDORF | Roberto | Italy | 2014 |
| ROSA | Antonio | Switzerland | 2013 |
| ROSSI | Andrea | Italy | 2014 |
| ROTEN | Laurent | Switzerland | 2009 |
| ROUKAS | Kriton-Ioannis | Greece | 2012 |
| ROUX | Antoine | France | 2013 |
| RUZICKA | Petr | United Kingdom | 2013 |
| SAFAK | Erdal | Germany | 2014 |
| SALGADO ARANDA | Ricardo | Spain | 2014 |
| SCHÄR | Beat Andreas | Switzerland | 2013 |
| SCHAUMANN | Anselm | Germany | 2012 |
| SCHIEFFER | Michael G. | The netherlands | 2011 |
| SCHOONDERWOERD | Bas | Netherlands | 2012 |
| SCHREVE-STEENSMA | Ariadne Midori | Netherlands | 2014 |
| SEDLACEK | Kamil | Czech Republic | 2013 |
| SEGRETI | Luca | Italy | 2013 |
| SEGURA VILLALOBOS | Federico | Spain | 2012 |
| SEILER | Jens | Switzerland | 2013 |
| SEMICHON | Marc | France | 2014 |
| SEOW | Swee-Chong | Singapore | 2008 |
| SEPSI | Milan | Czech Republic | 2014 |
| SGARITO | Giuseppe | Italy | 2007 |
| SIMEONIDOU | Eftihia | Greece | 2007 |
| SJOBLOM | Johanna | Sweden | 2009 |
| SKENE | Chris | United Kingdom | 2014 |
| SKIADAS | Ioannis | Greece | 2012 |
| SMILDE | Tom | Netherlands | 2012 |
| SONESSON | Linus | Sweden | 2014 |
| SPIERENBURG | Han | The netherlands | 2009 |
| STATESCU | Cristian | Romania | 2012 |
| STEEN | Torkel | Norway | 2013 |
| STEFAN | Liliana | Czech Republic | 2012 |
| STEFAN NICOLEA | Bogdan | Romania | 2012 |
| STEFFEL | Jan | Switzerland | 2012 |
| STERLINSKI | Marciej | Poland | 2009 |
| STOCKBURGER | Martin | Germany | 2012 |
| STOECKEL | Holger | Switzerland | 2015 |
| STRANDERS | Ischa | Netherlands | 2015 |
| STUEHLINGER | Markus | Austria | 2012 |
| SZAMLEWSKI | Piotr | Sweden | 2011 |
| TAHAPARY | Giovanni | The netherlands | 2013 |
| TEJEIRA FERNANDEZ | Elvis | Spain | 2014 |
| TER BEKKE | Rachel | The netherlands | 2013 |

EHRA CP Certified professionals

| | | | |
|----------------------|----------------|-----------------|------|
| TIELEMAN | Robert | Netherlands | 2012 |
| TIMMERS | Liesbeth | Belgium | 2015 |
| TIMMERS | Liesbeth | Belgium | 2015 |
| TORCIVIA | Riccardo | Italy | 2012 |
| TORN | Marieke | The Netherlands | 2012 |
| TRAYKOV | Vassil B. | Bulgaria | 2011 |
| TRUCCO | Maria Emilce | Spain | 2015 |
| TUINENBURG | Anton | Netherlands | 2013 |
| TUININGA | Ype | The Netherlands | 2011 |
| TUREL | Baybars | Turkey | 2012 |
| TURK | Ugur Onsel | Turkey | 2015 |
| TUTUIANU | Cristina Ioana | Romania | 2015 |
| UCER | Ekrem | Germany | 2012 |
| VACCARI | Diego | Italy | 2007 |
| VALK | Suzanne | Netherlands | 2011 |
| VALZANIA | Cinzia | Italy | 2010 |
| VAMOS | Mate | Hungary | 2014 |
| VAN ALEM | Anouk | Netherlands | 2013 |
| VAN CASTEREN | Lieve | Belgium | 2011 |
| VAN DEN AKKER-BERMAN | Lily | Netherlands | 2015 |
| VAN DEN BOS | Ewoutjan | The Netherlands | 2011 |
| VAN DEN BRINK | Olivier Wv | Netherlands | 2014 |
| VAN DER HEUDEN | Robert | Netherlands | 2011 |
| VAN DER HEUDEN | Dirk | Netherlands | 2011 |
| VAN DER HEUDEN | Jeroen | Netherlands | 2013 |
| VAN DIJK | Vincent | Netherlands | 2015 |
| VAN DOORN | Dirk Jan | Netherlands | 2015 |
| VAN HEUVERSWIJN | Frederic | Belgium | 2015 |
| VAN KRAAIJ | Dave | The Netherlands | 2010 |
| VAN MALDEREN | Sophie C.H. | Belgium | 2015 |
| VAN OOSTROM | Antonie | Netherlands | 2012 |
| VAN OPSTAL | Jurren | Netherlands | 2009 |
| VAN REIJ | Frank | Netherlands | 2012 |
| VAN ROOSMALEN | Radboud | Netherlands | 2015 |
| VAN SCHAARDENBURGH | Pepijn | The Netherlands | 2012 |
| VAN VLIES | Bob | Netherlands | 2013 |
| VAN WOERKENS | Leon | Netherlands | 2012 |
| VASILOPOULOS | Charalambos | Greece | 2007 |
| VATASESCU | Radu- Gabriel | Romania | 2007 |
| VENABLES | Paul | United Kingdom | 2013 |
| VERGARA | Pasquale | Italy | 2010 |
| VERNOOY | Kevin | Netherlands | 2013 |
| VET | Thijs | The Netherlands | 2011 |
| VIERGEVER | Eric Paul | Netherlands | 2012 |
| VILLUENDAS SABATE | Roger | Spain | 2013 |
| VOLKOV | Dmytro | Ukraine | 2015 |
| VOSS | Frederik | Germany | 2009 |
| VRAZIC | Hrvoje | Croatia | 2014 |
| WESTENDORP | Iris | Netherlands | 2009 |
| WESTRA | Sjoerd | Netherlands | 2012 |

EHRA CP Certified professionals

| | | | |
|-------------|----------------|----------------------|------|
| WETZEL | Ulrike Renate | Germany | 2015 |
| WIJCHERS | Sip | Belgium | 2012 |
| WILLEMS | Albert Richard | Netherlands | 2012 |
| WOLF | Michael | Belgium | 2015 |
| WOLLMANN | Christian | Austria | 2012 |
| YAP | Sing-Chien | Netherlands | 2014 |
| YEO | Wee Tiong | Singapore | 2014 |
| ZAKY | Hosam | United Arab Emirates | 2007 |
| ZALEVSKY | Valery P. | Ukraine | 2011 |
| ZELJKO | Hrvojka Marija | Croatia | 2015 |
| ZERVOPOULOS | George | Greece | 2007 |
| ZIMA | Endre | Hungary | 2012 |
| ZOPPO | Franco | Italy | 2007 |
| ZUCCHELLI | Giulio | Italy | 2012 |

CP Certification candidates who have successfully completed the exam

| | | | |
|-------------------|--------------------|-----------------|------|
| AARDEMA | Margriet W. | Netherlands | 2006 |
| ABRAHAM | Pal | Hungary | 2011 |
| ACENA RAMOS | Marta | Spain | 2010 |
| ACOU | Willem-Jan | Belgium | 2011 |
| ADDONISIO | Luigi | Italy | 2012 |
| ADYAMAN | Ahmet | Netherlands | 2014 |
| AERTS | Arnaud | The Netherlands | 2009 |
| AKERSTROM | Finn | Sweden | 2015 |
| AL AMOURA | Alaa | France | 2015 |
| AL ANANY | Alaa Allah Mohamed | Egypt | 2013 |
| AL BUNNI | Muhamad | Italy | 2006 |
| ALBERTSEN | Andi Eie | Denmark | 2010 |
| ALCALDE RODRIGUEZ | Oscar | Spain | 2010 |
| ALDERGARD | Niklas | Sweden | 2007 |
| ALDHOON | Bashar | Czech Republic | 2011 |
| ALGALARRONDO | Vincent | France | 2009 |
| AL-HASHIMI | Hisham | Netherlands | 2011 |
| ALIYEV | Farid | Turkey | 2010 |
| ALIZADEH DEHNAVI | Reza | Netherlands | 2013 |
| ALMEIDA | Sofia | Portugal | 2014 |
| ALZAND | Bakr | Netherlands | 2011 |
| AMET | Denis | France | 2011 |
| AMMON | Michael | Switzerland | 2014 |
| ANDERSON | Mark H | United Kingdom | 2012 |
| ANGHEBEN | Carlo | Italy | 2015 |
| ANNE | Wim | Belgium | 2008 |
| ANSABERGA | Leva | Latvia | 2015 |
| APOSTOLOPOULOS | Theodoros | Greece | 2006 |
| ARBELO | Elena | Spain | 2012 |
| ARGUEDAS-JIMENEZ | Hugo | Spain | 2015 |
| ARIAS PALOMARES | Miguel Angel | Spain | 2010 |
| ARNOLD | Alfred E. R. | Netherlands | 2012 |

CP Certification candidates who have successfully completed the exam

| | | | |
|---------------------|------------------|----------------|------|
| ARO | Aapo | Finland | 2013 |
| ARVANITIS | Panagiotis | Sweden | 2015 |
| ASSAAD | Hany | Egypt | 2015 |
| ASSELMAN | Maarten | Netherlands | 2012 |
| AVELLA | Andrea | Italy | 2005 |
| AYALA PAREDES | Felix Alejandro | Canada | 2006 |
| AYDIN | Alper | Turkey | 2014 |
| AZEM | Tareq | Germany | 2013 |
| BACCHIONI | Giuseppe | Italy | 2008 |
| BADRAN | Haitham | Egypt | 2013 |
| BAHGAT | Amr Kamal | Egypt | 2009 |
| BALMER | Christian | Switzerland | 2013 |
| BALT | Jippe | Netherlands | 2011 |
| BALTA | Osman | Germany | 2010 |
| BARBRAUD | Cynthia | Belgium | 2015 |
| BARKER | Diane | United Kingdom | 2011 |
| BAROUDI | Rabah | France | 2014 |
| BARSAMIAN | Sergei | Armenia | 2013 |
| BARTHEZ | Olivier | France | 2009 |
| BAYRAK | Duhan Fatih | Belgium | 2011 |
| BEAUPORT | Joelle | Germany | 2012 |
| BEDNAREK | Jacek | Poland | 2013 |
| BELOTTI | Giuseppina | Italy | 2005 |
| BELVITO | Chiara | Italy | 2013 |
| BENCSIK | Gabor | Hungary | 2008 |
| BENEZET MAZUECOS | Juan | Spain | 2014 |
| BENNIK | Jasper | Netherlands | 2015 |
| BERENJKOUB | Ehssan | Germany | 2015 |
| BERGNER | Michael | Switzerland | 2015 |
| BERLI | Reto | Switzerland | 2015 |
| BERTE | Benjamin | Belgium | 2012 |
| BERTOMEU-GONZALEZ | Vicente | Spain | 2010 |
| BEUKEMA | Rypko | Netherlands | 2015 |
| BHELEEL | Osama | Libya | 2013 |
| BIANCHI | Francesca | Italy | 2015 |
| BIANCO | Daniele | Italy | 2015 |
| BUJSTERVELD | Nick | Netherlands | 2009 |
| BISH | Laurence | Switzerland | 2015 |
| BISSINGER | Andrzej | Poland | 2006 |
| BLAAUW | Yuri | Netherlands | 2009 |
| BLANDINO | Alessandro | Italy | 2015 |
| BLICHARZ | Jaroslav | Poland | 2011 |
| BLOMGREN | Jan | Sweden | 2012 |
| BOHM | Adam | Hungary | 2008 |
| BOLOGNESI | Maria Giulia | Italy | 2015 |
| BON | Laurens Bastiaan | Netherlands | 2015 |
| BONANNO | Carlo | Italy | 2012 |
| BONCOMPAGNI | Andrea | Italy | 2014 |
| BOOS | Christopher | United Kingdom | 2008 |
| BORGER VAN DER BURG | Alida Elisabeth | Netherlands | 2007 |

CP Certification candidates who have successfully completed the exam

| | | | |
|---------------------|------------------|-----------------|------|
| BORGHOUTS | Virginie | Netherlands | 2014 |
| BORGQUIST | Rasmus | Sweden | 2013 |
| BORLEFFS | Jan Willem | Netherlands | 2015 |
| BORREGO BERNABE | Luis | Spain | 2013 |
| BORRELLI | Alessio | Italy | 2009 |
| BORRELLO | Francesco | Italy | 2013 |
| BOS | Hans | Netherlands | 2012 |
| BOSKER | Hans | Netherlands | 2012 |
| BOULE | Stéphane | France | 2015 |
| BOUWELS | Leon H.R. | Netherlands | 2007 |
| BRAAM | Richard | Netherlands | 2010 |
| BREULS | Nico | The Netherlands | 2009 |
| BROERS | Bernard | The Netherlands | 2009 |
| BRONIS | Konstantinos | United Kingdom | 2015 |
| BUERKLE | Gerd | Austria | 2008 |
| BUGA | Laszlo | United Kingdom | 2012 |
| BULUT | Suat | Netherlands | 2010 |
| BUN | Sok-Sithikun | France | 2012 |
| BURKART-KUETTNER | Dagmar | Austria | 2015 |
| BURRI | Haran | Switzerland | 2005 |
| BUSER | Marc | Switzerland | 2015 |
| CABANAS GRANDIO | Pilar | Spain | 2014 |
| CACKO | Andrzej | Poland | 2015 |
| CALVO CUERVO | David | Spain | 2010 |
| CALZOLARI | Vittorio | Italy | 2006 |
| CAMPOS GARCIA | Bieito | Spain | 2010 |
| CANADAS | Victoria | Spain | 2010 |
| CANDEIAS | Rui | Portugal | 2008 |
| CARAVATI | Fabrizio | Italy | 2010 |
| CARBALLEIRA POL | Lidia | Spain | 2015 |
| CARROZ | Patrice | Switzerland | 2015 |
| CASSIDY | Christopher John | United Kingdom | 2014 |
| CASTREJON CASTREJON | Sergio | Spain | 2013 |
| CHAMBERS | John | United Kingdom | 2013 |
| CHATEL | Marie Pierre | France | 2015 |
| CHATTERJEE | Debjit | United Kingdom | 2010 |
| CHENEVARD | Remy | Switzerland | 2012 |
| CHONG | Daniel | Singapore | 2011 |
| CHONG YU | Eric | Singapore | 2013 |
| CHRISTOPHE | Arnd | Germany | 2011 |
| CHRISTOU | Apostolos | Greece | 2014 |
| CIPOLLETTA | Laura | Italy | 2014 |
| CLAPPERS | Nick | Netherlands | 2014 |
| CLEMENS | Marcell | Hungary | 2012 |
| CORTEVILLE | Ben | Belgium | 2015 |
| COSER | Alessio | Italy | 2011 |
| CROSATO | Martino | Italy | 2008 |
| CSONTOS | Pal | Hungary | 2009 |
| CURNIS | Antonio | Italy | 2006 |
| DAVID | Laura-Alice | Romania | 2012 |

CP Certification candidates who have successfully completed the exam

| | | | |
|----------------|------------------|----------------------------|------|
| DAVIDSEN | Ulla | Denmark | 2015 |
| DAVIES | Edward | United Kingdom | 2015 |
| DAVOODI | Gholamreza | Iran (Islamic Republic Of) | 2005 |
| DE CLERCO | An | Netherlands | 2013 |
| DE DIEGO RUS | Carlos | Spain | 2013 |
| DE DOELDER | Marieke | Netherlands | 2010 |
| DE GROOT | Joris R. | Netherlands | 2009 |
| DE GROOT | Cornelis Andreas | Netherlands | 2012 |
| DE JONG | Jeroen | Netherlands | 2006 |
| DE JONG | Richard M. | Netherlands | 2007 |
| DE JONG | Jonas | Netherlands | 2009 |
| DE LA FUENTE | Sam | The Netherlands | 2009 |
| DE LEEUW | Martin | The Netherlands | 2008 |
| DE LUCIA | Raffaele | Italy | 2014 |
| DE MARIA | Elia | Italy | 2012 |
| DE MEYER | Grim | Belgium | 2010 |
| DE POOTER | Jan | Belgium | 2015 |
| DE POTTER | Tom | Belgium | 2008 |
| DE RIVA SILVA | Marta | Spain | 2011 |
| DE SENSI | Francesco | Italy | 2013 |
| DE TOMMASI | Francesco | Italy | 2015 |
| DE WAARD | Daan | Netherlands | 2007 |
| DE WEERD | Gerjan | The Netherlands | 2009 |
| DEß | Michael | Germany | 2015 |
| DEMONIERE | Fabrice | Martinique | 2011 |
| DERNDORFER | Michael | Austria | 2013 |
| DI CORI | Andrea | Italy | 2012 |
| DI STOLFO | Giuseppe | Italy | 2015 |
| DIAB | Ihab Gomaa | United Kingdom | 2009 |
| DIAZ BUSCHMANN | Isabel | Spain | 2011 |
| DICHTL | Wolfgang | Austria | 2010 |
| DIDENKO | Maxim | Roumania | 2010 |
| DUKMAN | Barbara | Netherlands | 2012 |
| DILAVERIS | Polychronis | Greece | 2006 |
| DILLIER | Roger | Switzerland | 2015 |
| DINH | Trang | Netherlands | 2012 |
| DOMENICHINI | Giulia | Spain | 2011 |
| DORMAN | Reinhart | Netherlands | 2012 |
| DULBECCO | Massimo | Italy | 2010 |
| DUNCKER | David | Germany | 2013 |
| DURAY | Gabor Zoltan | Germany | 2008 |
| DUSCEAC | Dinu | Sweden | 2014 |
| DUTHOIT | Guillaume | France | 2010 |
| DYRDA | Katia | Canada | 2010 |
| EHL | Niklas Florestan | Switzerland | 2014 |
| EHRLICH | Joachim | Germany | 2011 |
| EJSBOUITS | Sabine | Netherlands | 2011 |
| EISENBERGER | Martin | Czech Republic | 2008 |
| EIVINDSON | Gunvald | Norway | 2008 |
| EL KADIKI | Abdelhadi | Lebanon | 2014 |

CP Certification candidates who have successfully completed the exam

| | | | |
|--------------------------|-----------------|--------------------------|------|
| EL KADRI | Moutaz | United Kingdom | 2012 |
| ELDER | Douglas | United Kingdom | 2010 |
| ELICES TEJA | Juliana | Spain | 2013 |
| ENGBERS | Jos G. | The Netherlands | 2009 |
| ERCKERT | Martin | Italy | 2006 |
| ERIKSEN | Ulrik Hedegaard | Denmark | 2011 |
| ERNTELL | Hans | Sweden | 2011 |
| ESCHEN | Ole | Denmark | 2009 |
| ESMAIL | Shani | United Kingdom | 2011 |
| EURLINGS | Luc | Netherlands | 2014 |
| EVERTZ | Reinder | Spain | 2012 |
| EXPOSITO | Victor | Spain | 2013 |
| FACCHIN | Domenico | Italy | 2010 |
| FEDORCO | Marian | Czech Republic | 2011 |
| FERNANDEZ LOZANO | Juan Antonio | Spain | 2013 |
| FERNANDEZ PASTOR | Julia | Spain | 2011 |
| FERNANDEZ-ARMENTA PASTOR | Juan | Spain | 2014 |
| FIROUZI | Mehran | Netherlands | 2011 |
| FLEVARI | Panayota | Greece | 2008 |
| FOLDESI | Csaba Laszlo | Hungary | 2009 |
| FOLEY | Paul | United Kingdom | 2009 |
| FOLKERINGA | Richard | Netherlands | 2007 |
| FONTENLA | Adolfo | Spain | 2010 |
| FRANCA PEREIRA | Roberto | United States Of America | 2007 |
| FRANCK | Harald | Germany | 2010 |
| FRANCOIS | Bart | Belgium | 2011 |
| FRANZINI | Christine | Switzerland | 2014 |
| FREUND | Niclas | Germany | 2013 |
| FROMMEYER | Gerrit | Germany | 2014 |
| FRYKMANN | Viveka | Sweden | 2007 |
| FUNK | Sabine | Switzerland | 2010 |
| FURNISS | Guy | United Kingdom | 2014 |
| GABRIEL | Mario | Netherlands | 2011 |
| GALLARDO LOBO | Rodrigo | Spain | 2009 |
| GANDJBAKHCH | Estelle | France | 2013 |
| GANIERE | Vincent | Switzerland | 2010 |
| GARCIA | Rodrique | France | 2014 |
| GARCIA ALMAGRO | Francisco Jose | Spain | 2013 |
| GARCIA BOLAO | Jose Ignacio | Spain | 2005 |
| GARNIER | Fabien | France | 2013 |
| GARWEG | Christophe | Belgium | 2011 |
| GEBETSBERGER | Franz | Austria | 2008 |
| GERMANS | Tjeerd | Morocco | 2013 |
| GERRITSEN | Jean Georges | Netherlands | 2011 |
| GHANI | Abdul | Netherlands | 2012 |
| GIANNOLA | Gabriele | Italy | 2008 |
| GIL | Ricardo | Portugal | 2010 |
| GIL ORTEGA | Ignacio | Spain | 2011 |
| GIOMI | Andrea | Italy | 2015 |
| GIORGI | Davide | Italy | 2014 |

CP Certification candidates who have successfully completed the exam

| | | | |
|-------------------|-------------------|--------------------------|------|
| GJESTVANG | Finn Tore | Norway | 2008 |
| GOANTA | Emilia-Violeta | Romania | 2015 |
| GONZALEZ FERRER | Juan Jose | Spain | 2012 |
| GONZALEZ-ENRIQUEZ | Susana | Spain | 2008 |
| GORLO | Adam | Poland | 2012 |
| GRABOWSKI | Marcin | Poland | 2014 |
| GRADAUS | Rainer | Germany | 2006 |
| GRAUSS | Robert Willem | Netherlands | 2012 |
| GRECU | Mihaela | Romania | 2006 |
| GREYLING | Adele | South Africa | 2015 |
| GRIECO | Domenico | Italy | 2012 |
| GROSFELD | Marcel | Netherlands | 2013 |
| GRUBB | Neil | United Kingdom | 2015 |
| GRUBER | Norbert | Germany | 2013 |
| GUGUCHEV | Pavel | United States Of America | 2010 |
| GUSTEU | Nicolae-Gabriel | Romania | 2015 |
| GUTLEBEN | Klaus Juergen | Germany | 2011 |
| HAEMERS | Peter | Belgium | 2013 |
| HAGGUI | Abdeddayem | Tunisia | 2014 |
| HAJKO | Erik | Hungary | 2013 |
| HAMEL | John John | Switzerland | 2010 |
| HAMRAOUI | Karim | Netherlands | 2010 |
| HARTOG | Johannes | Netherlands | 2011 |
| HARTOG | Jasper | Netherlands | 2014 |
| HASSAN | Ahmed Abdulwadoud | Netherlands | 2012 |
| HASSINK | Rutger | Netherlands | 2014 |
| HAUER | Herbert | Netherlands | 2009 |
| HAUER | Arnaud | Netherlands | 2013 |
| HAUGAN | Ketil | Denmark | 2014 |
| HAWKINS | Nathaniel Mark | United Kingdom | 2012 |
| HAYAT | Sajad | United Kingdom | 2012 |
| HAYDOCK | Paul | United Kingdom | 2015 |
| HAYES | Chris | United Kingdom | 2009 |
| HAZELEGER | Ronald | Netherlands | 2010 |
| HEGARD | Terje | Norway | 2015 |
| HEGGELUND | Geir | Norway | 2013 |
| HEIB | Klausdieter | Germany | 2009 |
| HELLIGE | Gerrit | Switzerland | 2014 |
| HEMELS | Martin | Netherlands | 2009 |
| HENKENS | Ivo | Netherlands | 2013 |
| HERCZKU | Csaba | Hungary | 2009 |
| HERREROS GUILARTE | Benito | Spain | 2005 |
| HERRING | Neil | United Kingdom | 2013 |
| HERSBACH | Ferry | Netherlands | 2014 |
| HERZOG | Bernhard | Switzerland | 2015 |
| HJORTSHOJ | Soren | Denmark | 2008 |
| HLIVAK | Peter | Slovak Republic | 2013 |
| HOBBS | William Julian | United Kingdom | 2010 |
| HOEKSTRA | Eduard Henk | Netherlands | 2011 |
| HOFFMANN | Mario | Switzerland | 2014 |

CP Certification candidates who have successfully completed the exam

| | | | |
|----------------------|----------------|----------------------|------|
| HOLM | Katja Fiedler | Denmark | 2014 |
| HOOFD VAN HUYSDUYNEN | Bart | Netherlands | 2010 |
| HORDYNSKI | Grzegorz | Poland | 2011 |
| HORNSTEN | Jonas | Sweden | 2007 |
| HOTTKOWITZ | Christoph | Switzerland | 2015 |
| HUANG | Sung-Hao | China | 2014 |
| HUEMER | Martin | Germany | 2015 |
| HUIJSKES | Raymond | Netherlands | 2012 |
| HURLIMANN | David | Switzerland | 2009 |
| HUYBRECHTS | Wim | Belgium | 2008 |
| IONNIDIS | Panagiotis | Greece | 2006 |
| IORGULESCU | Corneliu | Romania | 2008 |
| ISAKSEN | Tor Olav | Norway | 2014 |
| JACOBSEN | Alexander | United Arab Emirates | 2015 |
| JACON | Peggy | France | 2010 |
| JAMALYAN | Smbat | Armenia | 2010 |
| JANSEN | Annemieke | The Netherlands | 2008 |
| JANSEN | Ward | Netherlands | 2010 |
| JANSSSENS | Cornelis | Netherlands | 2006 |
| JARMAN | Julian | United Kingdom | 2012 |
| JASTRZEBSKI | Marek | Poland | 2006 |
| JAUREGUI ABULARACH | Miguel Eduardo | Spain | 2010 |
| JELANI | Anwar D. | Canada | 2010 |
| JILEK | Clemens | Germany | 2012 |
| JOHANSEN | Mette | Norway | 2014 |
| JOHANSSON | Peter | Sweden | 2008 |
| JOHAR | Sofian | United Kingdom | 2011 |
| JONES | David Gareth | United Kingdom | 2009 |
| JONSSON | Jon Erik | Sweden | 2010 |
| JUAREZ PRERA | Ruben Alfonso | Spain | 2015 |
| KACZMAREK | Krzysztof | Poland | 2010 |
| KAHN | Matthew | United Kingdom | 2015 |
| KALLIANOS | Christos | Greece | 2011 |
| KAMAL | Ziaullah | Norway | 2015 |
| KARABINOS | Ilias K. | Greece | 2007 |
| KARLSEN | Finn Michael | Denmark | 2015 |
| KATARIA | Vikas | India | 2014 |
| KATSIKAS | Christos | Greece | 2012 |
| KEILEGAVLEN | Håvard | Norway | 2015 |
| KEMME | Michiel | Netherlands | 2007 |
| KETELS | Stefan | Belgium | 2007 |
| KIENCKE | Stephanie | Switzerland | 2015 |
| KJELLMAN | Bjorn | Sweden | 2007 |
| KLAUSZ | Gergely | Hungary | 2013 |
| KLEIN | Gunnar | Germany | 2007 |
| KLEIN | Norbert | Germany | 2011 |
| KLEIN | Lucas | Netherlands | 2013 |
| KNOLL | Mathias | Germany | 2015 |
| KNOPS | Reinoud | The Netherlands | 2008 |
| KOEPFLI | Pascal | Switzerland | 2007 |

CP Certification candidates who have successfully completed the exam

| | | | |
|--------------------|---------------|-----------------|------|
| KOEPP | Ulf | Norway | 2008 |
| KOL | Amir | Italy | 2013 |
| KOLB | Christophe | Germany | 2010 |
| KOLLIAS | Georgios | Greece | 2013 |
| KOMANOVA | Erika | Slovak Republic | 2011 |
| KOOMEN | Egbert M. | Netherlands | 2010 |
| KOOPMAN | Pieter | Belgium | 2011 |
| KORANTZOPOULOS | Panagiotis | Greece | 2009 |
| KORTZ | Mikael | Netherlands | 2010 |
| KOSTOPOULOU | Anna | Greece | 2011 |
| KOULOURIS | Spyridon | Greece | 2007 |
| KOURGIANNIDIS | Georgios | Greece | 2007 |
| KOUROUKLIS | Spyridon | Greece | 2011 |
| KOUTSOGEORGIS | Ilias | Greece | 2014 |
| KOVACS | Andras | Hungary | 2012 |
| KRAAIER | Karin | Netherlands | 2015 |
| KRAVCHUK | Borys | Ukraine | 2007 |
| KRIJNE | Rudolf | Netherlands | 2012 |
| KRISTENSEN | Jens | Denmark | 2012 |
| KRONBORG | Mads Brix | Denmark | 2011 |
| KRUPA | Wojciech | Poland | 2006 |
| KRYZE | Lukas | Czech Republic | 2013 |
| KRZYZANOWSKI | Krystian | Poland | 2014 |
| KUUPER | Aaf | Netherlands | 2011 |
| KUJAWSKI | Tomasz | Switzerland | 2013 |
| KUMMER | Marco | Switzerland | 2015 |
| KUPICS | Kaspars | Latvia | 2015 |
| KWASNIEWSKI | Wojciech | Poland | 2013 |
| LAN | Rongfang | China | 2014 |
| LANGERAK | Susan | Netherlands | 2012 |
| LARGAESPADA PEREZ | Gabriel | Spain | 2015 |
| LEBEDEVA | Viktoriia | Russia | 2013 |
| LEDEBVRE | Kristof | Netherlands | 2015 |
| LENNERZ | Carsten | Germany | 2015 |
| LERCHER | Peter | Austria | 2010 |
| LERNER | Martin Robert | Sweden | 2010 |
| LEVENTOPOULOS | Georgios | Greece | 2014 |
| LEWANDOWSKI | Michael | Poland | 2012 |
| LIEUW-A-FA | Mariska | The Netherlands | 2009 |
| LINDE | Antonio | Spain | 2012 |
| LINDELL | Peter | Sweden | 2007 |
| LINDGREEN | Ulf | Denmark | 2008 |
| LIPCHENCA | Igor Ariel | Israel | 2008 |
| LIPOLDOVA | Jolana | Czech Republic | 2009 |
| LIPTON | Jonathan | Netherlands | 2012 |
| LITTERFELDT | Ingrid | Sweden | 2008 |
| LOEPRICH | Bruno | Germany | 2015 |
| LOUW | Ruan | Belgium | 2013 |
| LUBBERTVERBERKMOES | Addy | Netherlands | 2010 |
| LUEDORFF | Guido | Germany | 2008 |

CP Certification candidates who have successfully completed the exam

| | | | |
|----------------|------------------|-----------------|------|
| LUERMANS | Justin | Netherlands | 2012 |
| LUNDE | Torbjorn | Norway | 2015 |
| LUQUE | Antonio | Spain | 2014 |
| LUTHJE | Lars | Germany | 2011 |
| LUZI | Mario | Italy | 2008 |
| MAASS | Alexander | Netherlands | 2007 |
| MAC GILLAVRY | Melvin | The Netherlands | 2008 |
| MACIAG | Aleksander | Poland | 2007 |
| MADEIRA | Joao | Portugal | 2011 |
| MAGNUSSON | Peter | Sweden | 2007 |
| MAHFOUD | Mohanad | France | 2010 |
| MANENTI | Vladimir | France | 2015 |
| MANOLA | Sime | Croatia | 2015 |
| MANTZIARI | Lilian | United Kingdom | 2015 |
| MANUSAMA | Randy | Netherlands | 2011 |
| MARGATO | Renato | Portugal | 2013 |
| MARGULESCU | Andrei Dumitru | Romania | 2013 |
| MARICONTI | Barbara | Italy | 2008 |
| MARINI | Massimiliano | Italy | 2007 |
| MARTENS | Eimo | Germany | 2013 |
| MARTIN | Alix | France | 2013 |
| MARTINEK | Martin | Austria | 2008 |
| MARTINEZ SANDE | Jose Luis | Spain | 2009 |
| MASCIOLI | Giosue | Italy | 2006 |
| MASSA | Thomas | Germany | 2008 |
| MATHIEU | Frederic | Belgium | 2015 |
| MATTLE | Daniel | Switzerland | 2015 |
| MAXIM | George Razvan | Romania | 2014 |
| MAZZUCCO | Raffaele | Italy | 2009 |
| MEDINA PALOMO | Maria Del Carmen | Spain | 2013 |
| MEILTZ | Alexandre | Switzerland | 2009 |
| MEINARDI | Martin | Netherlands | 2015 |
| MEINDERSMA | Esther | Netherlands | 2013 |
| MEINE | Mathias | Netherlands | 2007 |
| MELANDER | Kjell | Sweden | 2008 |
| MELMAN | Paul G. | Netherlands | 2011 |
| MENNE | Jochen | Germany | 2014 |
| MERKELY | Bela | Hungary | 2007 |
| MICHAELSEN | Jochen | Germany | 2010 |
| MICHALAK | Marcin | Poland | 2015 |
| MIHALCZ | Attila | Austria | 2011 |
| MIRANDA | Rita | Portugal | 2014 |
| MISOVOULOS | Platon | Switzerland | 2015 |
| MITKOWSKI | Przemyslaw | Poland | 2005 |
| MJOLSTAD | Ole Christian | Norway | 2015 |
| MLCOCHOVA | Hanka | Czech Republic | 2009 |
| MOISEI | Radu Eugen | Romania | 2015 |
| MOLHOEK | Sander G. | The Netherlands | 2008 |
| MOLLNAU | Hanke | Germany | 2013 |
| MONDESERT | Blandine | Canada | 2014 |

CP Certification candidates who have successfully completed the exam

| | | | |
|-----------------|-----------------|--------------------------|------|
| MONNARD | Simon | Switzerland | 2011 |
| MONNINK | Stefan | Netherlands | 2011 |
| MOORE | Philip R. | United Kingdom | 2014 |
| MORENO | Jose | Spain | 2012 |
| MORENO PLANAS | Javier | Spain | 2005 |
| MOROSATO | Martina | Italy | 2015 |
| MORTSELL | David | Sweden | 2012 |
| MORTTADA | Ayman | Egypt | 2012 |
| MUELLER | Dirk | Germany | 2008 |
| MUELLER | Stephan Andreas | Switzerland | 2011 |
| MUELLER | Iris Irmgard | Germany | 2014 |
| MUNDEL | Markus | Germany | 2008 |
| MUNTEAN | Bogdan | Germany | 2011 |
| MUNTINGA | Harm-Jans | Netherlands | 2009 |
| MUTSCHELKNAUSS | Marcus | Switzerland | 2013 |
| MUTTER | Michael | Switzerland | 2013 |
| NAGARAJAN | Darbhamaulla | United Kingdom | 2007 |
| NAGEH-ARMANIOS | Maged | United States Of America | 2011 |
| NENTWICH | Karin | Germany | 2012 |
| NERI | Gianfilippo | Italy | 2007 |
| NEVEN | Kars | Netherlands | 2007 |
| NG | Sunanto | Netherlands | 2011 |
| NG KAM CHUEN | Marie Jennyfer | United Kingdom | 2013 |
| NICASTIA | Deborah | The Netherlands | 2009 |
| NICOLAIDES | Eleftherios | United Kingdom | 2007 |
| NIIRANEN | Jussi | Finland | 2015 |
| NOTI | Fabian | Switzerland | 2012 |
| NOVAK | Jan | Switzerland | 2011 |
| NOVIKOV | Dmitry | Russian Federation | 2012 |
| NÜSSLI | Dominique | Switzerland | 2013 |
| ODLAND | Hans Henrik | Norway | 2009 |
| OIKARINEN | Lasse | Finland | 2008 |
| OLORIZ | Teresa | Spain | 2015 |
| OMAR | Salama | Egypt | 2010 |
| OOMEN | Ad | Netherlands | 2011 |
| OREZIAK | Artur | Poland | 2011 |
| ORSIDA | Daniela | Italy | 2013 |
| OSMAN | Faizel | United Kingdom | 2006 |
| OSTROWSKA | Bozena | Sweden | 2007 |
| OSZTHEIMER | István | Hungary | 2013 |
| OUSS | Alexandre | Netherlands | 2012 |
| PACHON IGLESIAS | Marta | Spain | 2012 |
| PADFIELD | Gareth | United Kingdom | 2013 |
| PAISEY | John | United Kingdom | 2008 |
| PAOLTI PERINI | Alessandro | Italy | 2015 |
| PAPACHRISTIDIS | Alexandros | United Kingdom | 2014 |
| PARAVOLIDAKIS | Konstantinos | Greece | 2008 |
| PASCALE | Patrizio | Switzerland | 2009 |
| PATWALA | Ashish | United Kingdom | 2010 |
| PAULUSSEN | Guido | Netherlands | 2006 |

CP Certification candidates who have successfully completed the exam

| | | | |
|-------------------|----------------|-----------------|------|
| PAVACI | Herribert | Albania | 2014 |
| PAWLJK | Tomasz | Poland | 2012 |
| PENA HERNANDEZ | Jose Luis | Spain | 2008 |
| PENTEADO | Jose Otavio P. | Brazil | 2012 |
| PEREZ ALVAREZ | Luisa | Spain | 2010 |
| PEREZ CASTELLANO | Nicasio | Spain | 2005 |
| PEREZ DIEZ | Diego | Spain | 2009 |
| PERIK | Patrick | Netherlands | 2010 |
| PERMENTIER | Lianne | Netherlands | 2015 |
| PERNA | Francesco | Italy | 2014 |
| PERROTTA | Laura | Italy | 2012 |
| PETERS | René | Netherlands | 2015 |
| PETKAR | Sanjiv | United Kingdom | 2008 |
| PETRACCI | Barbara | Italy | 2009 |
| PETRU | Jan | Czech Republic | 2009 |
| PETTIT | Stephen | United Kingdom | 2011 |
| PHILBERT / JENSEN | Berit Thornvig | Denmark | 2010 |
| PHILIPS | Thomas | Belgium | 2014 |
| PINDADO RODRIGUEZ | Javier | Spain | 2009 |
| PIQUERAS | Eric | France | 2015 |
| PLASEK | Jiri | Czech Republic | 2014 |
| PLUTA | Slawomir | Poland | 2010 |
| POELSLEER | Robert | Germany | 2013 |
| POGGI | Alessio | Italy | 2014 |
| POLGAR | Balazs | Hungary | 2015 |
| PORRO | Rosa | Spain | 2009 |
| POS | Lambertus | Netherlands | 2013 |
| POSTEMA | Pieter | Netherlands | 2015 |
| POZZETTI | Daniela | Italy | 2006 |
| PRASAD | Rachana | United Kingdom | 2013 |
| PREDOVSKI | Milen | Bulgaria | 2011 |
| PRENNER | Guenther | Austria | 2015 |
| PRISECARU | Raluca | Belgium | 2014 |
| PROIETTI | Riccardo | Italy | 2013 |
| PRONK | Arjen | Netherlands | 2010 |
| PRUSKI | Maciej | Poland | 2010 |
| PRZYBYLSKI | Andrzej | Poland | 2007 |
| PSYCHARI | Stavroula | Greece | 2011 |
| PUCHOL | Alberto | Spain | 2009 |
| PUDULIS | Janis | Latvia | 2014 |
| PUETZ | Vanessa | Germany | 2013 |
| PUGH | Peter | United Kingdom | 2008 |
| PYATT | Jason | United Kingdom | 2011 |
| RAHEL | Braim M. | Netherlands | 2011 |
| RAMANNA | Hemanth | The Netherlands | 2008 |
| RAMAZZINA | Carola | Switzerland | 2015 |
| RAMCHURN | Hemant | Belgium | 2011 |
| RAO | Archana | United Kingdom | 2007 |
| RASSIAS | Ioannis | Greece | 2013 |
| REBELLATO | Luca | Italy | 2009 |

CP Certification candidates who have successfully completed the exam

| | | | |
|------------------|--|-----------------|------|
| REGOLI | François | Switzerland | 2015 |
| REICHLIN | Tobias | Switzerland | 2015 |
| REIF | Sebastian | Germany | 2015 |
| RESTLE | Christian | Germany | 2009 |
| REVERDIN | Stephane | Switzerland | 2013 |
| RIAHI | Leila | Tunisia | 2014 |
| RICCIARDI | Danilo | Belgium | 2012 |
| RICCIARDI | Giuseppe Gilberto | Italy | 2013 |
| RIENSTRA | Michiel | Netherlands | 2013 |
| RIVAS GANDARA | Nuria | Spain | 2010 |
| ROBERT | Jens | Switzerland | 2012 |
| ROBERTSON | Alan James | United Kingdom | 2014 |
| ROBLES DE MEDINA | Ramon Mariano | Netherlands | 2011 |
| ROCA LUQUE | Ivo | Spain | 2011 |
| ROCHA | Sérgia | Portugal | 2013 |
| RODE | Susanne | Germany | 2013 |
| RODRIGUEZ MANERO | Moises | Belgium | 2012 |
| ROHNER | Andreas | Switzerland | 2014 |
| RORDORF | Roberto | Italy | 2013 |
| ROSA | Antonio | Switzerland | 2011 |
| ROSSI | Andrea | Italy | 2011 |
| ROSSI | Luca | Italy | 2012 |
| ROTEN | Laurent | Switzerland | 2008 |
| ROUKAS | Kriton-Ioannis | Greece | 2011 |
| ROUX | Antoine | France | 2010 |
| RUSSI | Ian | Switzerland | 2015 |
| RUSSO | Giovanni | Italy | 2009 |
| RUZICKA | Petr | United Kingdom | 2011 |
| SAFAK | Erdal | Germany | 2011 |
| SALAHSHOURI | Pegah | United Kingdom | 2011 |
| SALGADO ARANDA | Ricardo | Spain | 2013 |
| SALIM | Belgin | Romania | 2014 |
| SALMAS | Jozef | Germany | 2015 |
| SANCHEZ GARCIA | Manuel | Spain | 2015 |
| SANDIN-FUENTES | Maria De Gracia | Spain | 2013 |
| SANTOS | Nuno | Portugal | 2013 |
| SANTOS CALLE | Francisco José | Spain | 2013 |
| SARRIAS | Axel | Spain | 2013 |
| SAURER | Georg | Austria | 2013 |
| SCHÄR | Beat Andreas | Switzerland | 2013 |
| SCHAUMANN | Anselm | Germany | 2009 |
| SCHEFFER | Michael G. | The Netherlands | 2008 |
| SCELLINGS | Dirk | Netherlands | 2015 |
| SCHGOER | Wilfried | Austria | 2015 |
| SCHLIEPHAKE | Florian | Switzerland | 2015 |
| SCHMUTZ | Mathieu Thomas André Hermann Ghislain | Switzerland | 2013 |
| SCHOENBAUER | Robert | Austria | 2015 |
| SCHOLZ | Brit | Germany | 2011 |
| SCHOONDERWOERD | Bas | Netherlands | 2008 |

CP Certification candidates who have successfully completed the exam

| | | | |
|-------------------|----------------|-----------------|------|
| SCHRAGO | Gregoire | Switzerland | 2010 |
| SCHREVE-STEENSMA | Ariadne Midori | Netherlands | 2012 |
| SCHUKRO | Christoph | Austria | 2011 |
| SCHURMANS | Joris | Belgium | 2013 |
| SCHWAGTEN | Bruno | Belgium | 2008 |
| SCHWERG | Marius | Germany | 2014 |
| SCIARAFFIA | Elena | Sweden | 2011 |
| SEDLACEK | Kamil | Czech Republic | 2010 |
| SEGRETI | Luca | Italy | 2010 |
| SEGURA VILLALOBOS | Federico | Spain | 2011 |
| SEIFERT | Martin | Germany | 2013 |
| SEILER | Jens | Switzerland | 2011 |
| SEMICHON | Marc | France | 2013 |
| SENOUF | David | Switzerland | 2009 |
| SEOW | Swee-Chong | Singapore | 2007 |
| SEPSI | Milan | Czech Republic | 2011 |
| SERVATIUS | Helge | Switzerland | 2014 |
| SGARITO | Giuseppe | Italy | 2006 |
| SHCIPPER | Jurjan | Netherlands | 2015 |
| SIELSKI | Slawomir | Poland | 2005 |
| SILBERBAUER | John | United Kingdom | 2013 |
| SIMEONIDOU | Eftihia | Greece | 2006 |
| SJOBLOM | Johanna | Sweden | 2008 |
| SKENE | Chris | United Kingdom | 2013 |
| SKIADAS | Ioannis | Greece | 2011 |
| SKRETTEBERG | Per Torgjer | Norway | 2013 |
| SLOOTWEG | Andries | Netherlands | 2014 |
| SLOTTE | Fredrik | Finland | 2014 |
| SMEELE | Frank | Netherlands | 2011 |
| SMEETS | Frans | Netherlands | 2011 |
| SMILDE | Tom | Netherlands | 2011 |
| SMITS | Jeroen | Netherlands | 2012 |
| SOM | Zoltan | Hungary | 2014 |
| SONESSON | Linus | Sweden | 2013 |
| SORREL | Jeremie | France | 2015 |
| SPIERENBURG | Han | The Netherlands | 2008 |
| STARTARI | Umberto | Italy | 2014 |
| STATESCU | Cristian | Romania | 2009 |
| STEEN | Torkel | Norway | 2007 |
| STEFAN | Liliana | Czech Republic | 2010 |
| STEFAN NICOLEA | Bogdan | Romania | 2009 |
| STEFFEL | Jan | Switzerland | 2012 |
| STERLINSKI | Marciej | Poland | 2006 |
| STEVENHAGEN | Jeroen | The Netherlands | 2008 |
| STOCKBURGER | Martin | Germany | 2011 |
| STOECKEL | Holger | Switzerland | 2012 |
| STRANDERS | Ischa | Netherlands | 2011 |
| STRIKWERDA | Sipke | The Netherlands | 2009 |
| STUEHLINGER | Markus | Austria | 2011 |
| SUN | Qi | China | 2014 |

CP Certification candidates who have successfully completed the exam

| | | | |
|----------------------|----------------|-----------------|------|
| SUPRYN | Rafal | Poland | 2014 |
| SUTER | Yves Martin | Switzerland | 2013 |
| SWART | Hp | The Netherlands | 2009 |
| SYSKA | Pawel | Poland | 2015 |
| SZAMLEWSKI | Piotr | Sweden | 2010 |
| SZILAGYI | Szabolcs | Hungary | 2013 |
| SZTANISZLAV | Áron | Hungary | 2013 |
| TAHAPARY | Giovanni | The Netherlands | 2009 |
| TAKENS | Lambertus H. | Netherlands | 2014 |
| TAN | Vern Hsen | Singapore | 2015 |
| TASIC | Jernej | Slovenia | 2015 |
| TEJEIRA FERNANDEZ | Elvis | Spain | 2013 |
| TER BEKKE | Rachel | The Netherlands | 2010 |
| TEUBL | Alexander | Austria | 2009 |
| THEIß | Söhnke | Germany | 2013 |
| TIBITANZL | Jan | United Kingdom | 2015 |
| TIELEMAN | Robert | Netherlands | 2009 |
| TIMMERS | Liesbeth | Belgium | 2011 |
| TOMASI | Luca | Italy | 2012 |
| TOMLINSON | D. | United Kingdom | 2009 |
| TORCIVIA | Riccardo | Italy | 2010 |
| TORN | Marieke | The Netherlands | 2009 |
| TOSSEBRO | Morten Shoren | Norway | 2009 |
| TRAN | Van Nam | Switzerland | 2015 |
| TRAYKOV | Vassil B. | Bulgaria | 2010 |
| TREGUER | Frederic | France | 2009 |
| TRINES | Serge | The Netherlands | 2008 |
| TROFIN | Monica | Germany | 2015 |
| TRUCCO | Maria Emilce | Spain | 2012 |
| TSCHOLL | Verena | Germany | 2015 |
| TUINENBURG | Anton | Netherlands | 2011 |
| TUINGA | Ype | The Netherlands | 2009 |
| TUREL | Baybars | Turkey | 2009 |
| TURK | Ugur Onsel | Turkey | 2011 |
| TUTUIANU | Cristina Ioana | Romania | 2013 |
| UCER | Ekrem | Germany | 2011 |
| UDO | Erik | Netherlands | 2015 |
| URBAN | Lubos | Slovakia | 2009 |
| VACCARI | Diego | Italy | 2006 |
| VALENTE | Bruno | Portugal | 2015 |
| VALK | Suzanne | Netherlands | 2010 |
| VALZANIA | Cinzia | Italy | 2007 |
| VAMOS | Mate | Hungary | 2014 |
| VAN ALEM | Anouk | Netherlands | 2010 |
| VAN ASSELDONK | Jan | Netherlands | 2015 |
| VAN BEMMEL | Marnix | Netherlands | 2014 |
| VAN CASTEREN | Lieve | Belgium | 2010 |
| VAN DE POLL | Sweder | Netherlands | 2013 |
| VAN DEN AKKER-BERMAN | Lily | Netherlands | 2011 |
| VAN DEN BERGH | Paulus | Netherlands | 2013 |

CP Certification candidates who have successfully completed the exam

| | | | |
|--------------------------|--------------------|-----------------|------|
| VAN DEN BOS | Ewoutjan | The Netherlands | 2009 |
| VAN DEN BRINK | Olivier Wv | Netherlands | 2013 |
| VAN DER GALIEN | Albert | Netherlands | 2012 |
| VAN DER HEUDEN | Robert | Netherlands | 2010 |
| VAN DER HEUDEN | Dirk | Netherlands | 2010 |
| VAN DER HEUDEN | Jeroen | Netherlands | 2011 |
| VAN DER KLEY | Tim | Netherlands | 2011 |
| VAN DER MEER | Peter | Netherlands | 2013 |
| VAN DER VEEN | Maurits | Netherlands | 2012 |
| VAN DER WAL | Henriette | Netherlands | 2010 |
| VAN DER WEERDT | Arno Peter | Netherlands | 2007 |
| VAN DEURSEN | Caroline | Netherlands | 2012 |
| VAN DIJK | Vincent | Netherlands | 2013 |
| VAN DOORN | Dirk Jan | Netherlands | 2011 |
| VAN EMPEL | Vanessa | Netherlands | 2010 |
| VAN ES | Robert | Netherlands | 2011 |
| VAN GASTEL | Henk Christiaan | Netherlands | 2010 |
| VAN GENT | Marco | Netherlands | 2012 |
| VAN HAELST | Paul | Netherlands | 2012 |
| VAN HERENDAEL | Hugo | Belgium | 2009 |
| VAN HEUVERSWIJN | Frederic | Belgium | 2011 |
| VAN HORSEN | Elisabeth Veronica | Netherlands | 2013 |
| VAN KRAAIJ | Dave | The Netherlands | 2009 |
| VAN MALDEREN | Sophie C.H. | Belgium | 2013 |
| VAN NOORD | Trudeke | Netherlands | 2007 |
| VAN OFWEGEN-HANEKAMP | Clara Emilia Emese | Netherlands | 2013 |
| VAN OOSTROM | Antonie | Netherlands | 2009 |
| VAN OPSTAL | Jurren | Netherlands | 2007 |
| VAN PETEGHEM | Sylvie | Belgium | 2014 |
| VAN POPELE | Nicole | Netherlands | 2013 |
| VAN REIJ | Frank | Netherlands | 2010 |
| VAN ROOSMALEN | Radboud | Netherlands | 2011 |
| VAN SCHAARDENBURGH | Pepijn | The Netherlands | 2009 |
| VAN SCHAIKVAN DER WIELEN | Marielouise | The Netherlands | 2009 |
| VAN VLIES | Bob | Netherlands | 2010 |
| VAN WIJK | Leendert M. | Netherlands | 2013 |
| VAN WOERKENS | Leon | Netherlands | 2011 |
| VANDER | Marianna | Russia | 2015 |
| VANDUYNHOFEN | Philippe | Belgium | 2014 |
| VASILOPOULOS | Charalambos | Greece | 2006 |
| VATAESCU | Radu- Gabriel | Romania | 2006 |
| VELTMANN | Christian | Germany | 2014 |
| VENABLES | Paul | United Kingdom | 2010 |
| VERBUNT | Robert | Netherlands | 2011 |
| VERGARA | Pasquale | Italy | 2009 |
| VERNOOY | Kevin | Netherlands | 2010 |
| VET | Thijs | The Netherlands | 2008 |
| VICENTINI | Alessandro | Italy | 2009 |
| VIERGEVER | Eric Paul | Netherlands | 2010 |
| VIJN | Arie Gerhard | Netherlands | 2010 |

CP Certification candidates who have successfully completed the exam

| | | | |
|-------------------|--------------------|----------------------|------|
| VILLUENDAS SABATE | Roger | Spain | 2010 |
| VISMAN | Roeland | Netherlands | 2015 |
| VITALE | Raffaele | Italy | 2013 |
| VITALI SERDOZ | Laura | Germany | 2015 |
| VOLKOV | Dmytro | Ukraine | 2013 |
| VON BARY | Christian | Germany | 2011 |
| VOSS | Frederik | Germany | 2008 |
| VRAZIC | Hrvoje | Croatia | 2011 |
| VRIEND | Joris | Netherlands | 2011 |
| WALHOUT | Ronald | Netherlands | 2011 |
| WALKER | Alexander Josef | Switzerland | 2014 |
| WEBERNDÖRFER | Christina Vanessa | Switzerland | 2013 |
| WERETKA | Slawomir | Germany | 2011 |
| WESTENBRINK | B. Daan | Netherlands | 2015 |
| WESTENDORP | Iris | Netherlands | 2006 |
| WESTPHALEN | Alexander | Switzerland | 2015 |
| WESTRA | Sjoerd | Netherlands | 2009 |
| WETZEL | Ulrike Renate | Germany | 2013 |
| WHINNETT | Zachary | United Kingdom | 2011 |
| WIDDERSHOVEN | Josef Jos | The Netherlands | 2009 |
| WUCHERS | Sip | Belgium | 2009 |
| WUFFELS DE GROOT | Sofia | Netherlands | 2015 |
| WIJNMALEN | Adrianus | Netherlands | 2015 |
| WILLEMS | Albert Richard | Netherlands | 2009 |
| WINTER | Siegmund | Austria | 2010 |
| WITT | Christoffer Tobias | Denmark | 2015 |
| WO | Hung-Ta | Taiwan | 2015 |
| WOLF | Michael | Belgium | 2014 |
| WOLLMANN | Christian | Austria | 2011 |
| WONG | Ka Lam | China | 2013 |
| YAP | Sing-Chien | Netherlands | 2012 |
| YEO | Wee Tiong | Singapore | 2013 |
| YUNG | Arthur | China | 2015 |
| ZACA' | Valerio | Italy | 2015 |
| ZAGKLI | Fani | Greece | 2013 |
| ZAJAC | Dariusz | Poland | 2012 |
| ZAKY | Hosam | United Arab Emirates | 2007 |
| ZALEVSKY | Valery P. | Ukraine | 2007 |
| ZELJKO | Hrvjka Marija | Croatia | 2013 |
| ZEMAN | Kamil | Czech Republic | 2013 |
| ZERVOPOULOS | George | Greece | 2006 |
| ZIMA | Endre | Hungary | 2009 |
| ZIZEK | David | Slovenia | 2015 |
| ZOPPO | Franco | Italy | 2006 |
| ZUCHELLI | Giulio | Italy | 2008 |
| ZYCINSKI | Pawel | Poland | 2014 |

Allied Professionals

Certified Allied Professionals

| | | | |
|--------------------------|-----------------------|----------------|------|
| AMAZINE | Natja | Netherlands | 2015 |
| AMIRANDA | Giuseppe | Italy | 2015 |
| ANSELM | Vittorio | Italy | 2015 |
| ANTENBRINK | Johannes Fredericus | Netherlands | 2011 |
| ARNDDELL | Dianne | Netherlands | 2015 |
| ARTS | Germaine | Netherlands | 2011 |
| ARUMUGAM | Paul Ayyappan | United Kingdom | 2014 |
| BAKKER | Emiel | Netherlands | 2015 |
| BATSIKAS | Kimón | Greece | 2013 |
| BENEDUCE | Roberta | Italy | 2015 |
| BERGERVOET | Jan | Netherlands | 2015 |
| BERNARDES | Ana | Portugal | 2015 |
| BERTOLI | Fabrizio | Switzerland | 2013 |
| BESTEN DEN | Truus | Netherlands | 2013 |
| BETTEN | Jort | Netherlands | 2015 |
| BIJL | Jeroen | Netherlands | 2015 |
| BIJVOET | Eleonora | Netherlands | 2011 |
| BOWEN | Daniel | United Kingdom | 2015 |
| BRAAM | Nort | Netherlands | 2014 |
| BRANTS | Ruud | Netherlands | 2014 |
| BROENINK | Ingrid | Netherlands | 2014 |
| BRUEGGEMANN | Thomas | Germany | 2013 |
| BURGOS | Jesús | Spain | 2013 |
| BURKHARDT | Dr.Dietmar | Germany | 2015 |
| BUSKES | Marjo | Netherlands | 2014 |
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| DEMOZZI | Marilena | Italy | 2015 |
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| DIJKERS-SICCAMA | Maria Martina | Netherlands | 2015 |
| EBES | F.J. | Netherlands | 2015 |
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| ENGELAER | Paulus Johannes Maria | Germany | 2013 |
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