

**DPIR**



**DANISH  
PACEMAKER  
AND ICD  
REGISTER**

**Annual Report  
2022**

## Preface

The Danish Pacemaker Register was founded in 1982 by physicians from all Danish hospitals where pacemakers were implanted. When the first implantable cardioverter defibrillator (ICD) was implanted in 1989, these devices were also included in the register as well as cardiac resynchronization therapy pacemakers and ICDs (CRT-P and CRT-D). The register have since the very start in 1982 recorded details on implant and explant including hardware and survival status of the patients and an annual report have been published. The register holds data on 135,061 pacemaker- and 33,169 ICD implants as of 31. December 2022.

Data collection and reporting have since 2007 been based on online reporting from all the implanting hospitals. The last printed annual report was issued in 2012, but despite that all data are accessible online, there is still a need for a commented report, which this collection of data represents.

In order to present the key quality indicators, among others surgical site infection related to the implant, concordant with the implant and demographic data behind the most up to date quality indicators. The current report therefore presents the full collection of data from implant year 2022 with quality indicators along with related implant data, except from long term infection rate, that requires 365 days of follow-up. Hence, the current report presents long term infection rate based on 2021 implant data.

Since last annual report, updated data the quality indicators have now also been made available on-line to stakeholders in the healthcare system through the Danish Clinical Registries (RKKP).

Challenges for the future are to present data for the emerging conduction system pacing (His bundle and left bundle branch area pacing) and to have the register recognized and incorporated as an integral part of the patient healthcare record.

Odense, May, 2023

On behalf of the steering committee

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## 1 Introduction

### 1.1 Organisation

The register has previously been a private research database, but is now an official clinical quality database and part of the Danish Clinical Registries (RKKP). The steering committee consists of a physician from all implanting hospitals and is rooted in the Danish Society of Cardiology working group for cardiac arrhythmias and device treatment. The daily management of the register is located at Department of Cardiology, Odense University Hospital, by physician Ole Dan Jørgensen (management and development of database), nurse-technician Lisbeth Skov Nielsen (data entry and support), and physician Jens Brock Johansen (chairman).

The steering committee consists of (as of May 2022):

- Søren Højberg, Bispebjerg Hospital, Copenhagen
- Ulrik Hintze, South-West Jutland Hospital, Esbjerg
- Charlotte Larroudé, Gentofte Hospital, Copenhagen
- Jerzy Malczinsky, Regional Hospital West Jutland, Herning
- Tommi Bo Lindhardt, Nordsjællands Hospital, Hillerød
- Jens Brock Johansen, Odense University Hospital, Odense
- Berit Philbert, Rigshospitalet, Copenhagen
- Ketil Haugland, Roskilde Hospital, Roskilde
- Thomas Fischer, Hospital Little Belt, Vejle
- Andi Albertsen, Regional Hospital of Viborg, Viborg
- Lene Svendstrup, South Jutland Hospital, Aabenraa
- Sam Riahi, Aalborg University Hospital, Ålborg
- Jens Kristensen, Aarhus University Hospital, Aarhus.

All device manufacturers on the Danish market funds the activities of the register by a fee for each sold device and lead, and they have access to aggregated anonymous data in the register.

Data are entered online by the treating physician at implant and explant. Survival status is checked in the civil registration system and users have access to all data in a web based format at the URL address [www.icddata.dk](http://www.icddata.dk). Data is also provided for research purposes after approval of the steering committee and The Danish Clinical Registries (RKKP).

## 1.2 Comments on implant activity in Denmark 2022

Pacemaker and ICD implantation in Denmark is done in 13 public hospitals and one private hospital (Mølholm).

Institution	Pacemaker	CRT-P	ICD (VVI/DDD)	CRT-D	Lead extraction	Pediatrics GUCH
Bispebjerg	X					
Esbjerg	X					
Gentofte	X	X	X	X		
Herning	X					
Hillerød	X					
Odense	X	X	X	X	X	
Rigshospitalet	X	X	X	X	X	X
Roskilde	X		X			
Mølholm	X					
Vejle	X					
Viborg	X					
Aabenraa	X					
Ålborg	X	X	X	X	X	
Aarhus	X	X	X	X	X	

Table 1.1 Pacemaker and ICD implantation in Danish hospitals 2022

The vast majority of institutions were high volume centers except Mølholm. The intention is to aim for at least 50 device implants per year per operator.

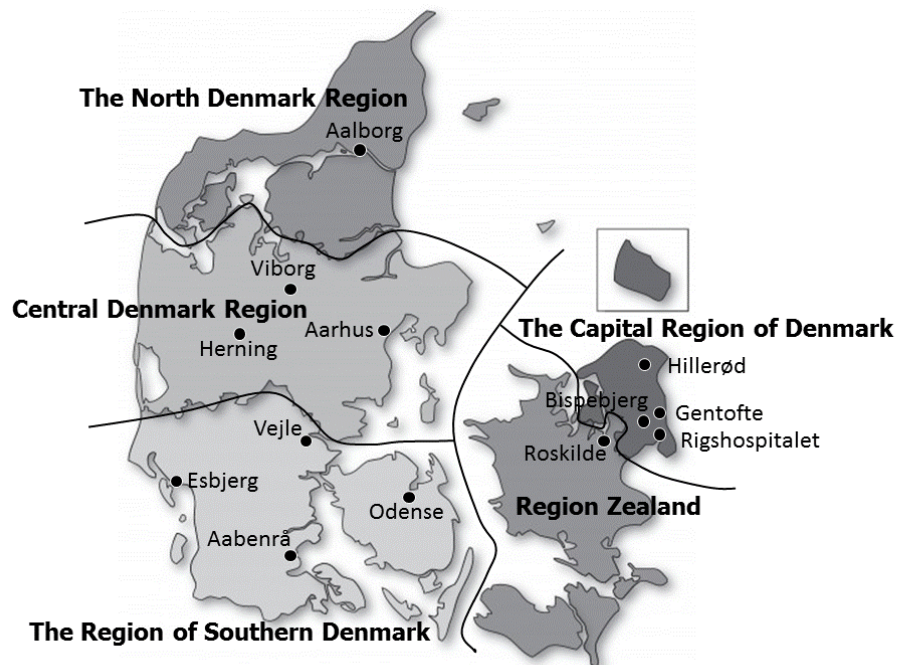


Figure 1.1 Device Implanting hospitals in Denmark

### 1.2.1 Pacemaker

The majority of first pacemaker implants was dual chamber (n=3263, 66.5%) and about one quarter was transvenous single chamber right ventricle pacemakers (n=1289, 26.3%). Biventricular pacemakers were implanted in a smaller percentage (n=249, 5.1%) and an even smaller number (n=7, 0.1%) were single chamber atrial pacemakers (See table 2.1). Intracardiac leadless pacemakers (VVI and VDD mode) were implanted n=101 (2.1%) patients.

The pacemaker replacements and system up-/downgrades took up a minor part (22.2%) of the total number of implants in 2022 (See table 2.2 and table 2.3).

### 1.2.2 ICD

The predominant pacing mode in first ICD implants was VVI (n=789, 64.1%) while DDD (n=145, 11.8%) and CRT-D (n=286, 23.2%) were only used in smaller numbers. Total subcutaneous ICD was implanted in 9 cases (See table 2.4).

The ICD replacements and system up-/downgrades took up 39.1% of the total number of ICD implants in 2022 (See table 2.5 and table 2.6), which is the same as previous years, but still far higher than pacemakers.

The indication for first ICD implant was primary prophylactic in 46.0% in all first implants (See Table 2.12 and Figure 2.5), and the predominant etiology for ICD implant was ischemic heart disease (52.5%) (See table 2.14 and figure 2.6). Until 2017 routine primary prophylactic ICD for non-ischemic heart failure was not been recommended by the Danish Society of Cardiology.

### 1.2.3 Leads

All low voltage leads for atrial and right ventricle were bipolar active fixation leads. Of n=728 low voltage leads for left ventricular pacing, n=700 (97%) were quadripolar and n=24 (3%) bipolar (See table 2.9)

Similarly all high voltage leads (except for a small number of leads used for subcutaneous defibrillation) were active fixation leads. Of n=1420 right ventricular defibrillation leads 95.3% were single coil leads and 4.7% were dual coil leads (See table 2.10). The decreased use of dual coil defibrillation leads is further pronounced compared to previous years.

## 1.3 Comments on pacemaker and ICD patients

The largest group of patients for first pacemaker implant was between 75-79 years of age for VVI and DDD pacemakers as well as for biventricular pacemakers (see table 3.1 and figure 3.1).

Female patients consisted of 37.2% of all first pacemaker patients (See Table 3.2).

For ICD patients, the largest group was 65-69 years of age, which is an increase compared to previous years, but with only a limited number above 80 years of age at time of implant (n=57, 4.6%) (See table 3.3 and figure 3.3).

Male patients were dominating in first ICD implants (n=972, 79.0%) (See #Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 3.4 and Figure 3.4).

At the end of 2022 36,333 pacemaker- and 13,071 ICD patients were in treatment and alive (See table 3.5 and table 3.6).

## 1.4 Comments on trends in implant activity 2002-2022

### 1.4.1 Number of implants

The number of first pacemaker implants has increased from 484 per million citizens in 2003 to 827 per million citizens in 2022 (See Table 4.1 and Figure 4.1). First ICD implants increased dramatically from 61 per million citizens in 2003 to 219 per million citizens in 2012, and have now plateaued to 207 per million

citizens in 2022 (See Table 4.2 and Figure 4.2). Primary prophylactic indication for ICD in ischemic heart disease was endorsed in Denmark in 2006 and only recently (in 2017) in dilated cardiomyopathy.

Unfortunately, there are still apparent regional differences in number of implants with The Capital Region and Region Zealand implanting 177.6 per million citizens compared to The Region of Southern Denmark 275.6 per million citizens (See Table 4.3). These figures are not corrected for regional differences in cardiovascular morbidity.

#### 1.4.2 Pacing modes

In first pacemaker implants DDD pacing mode was used in 63.4% in 2002 and have remained relatively constant to 66.8% in 2022. Single lead atrial pacing (AAI) has almost disappeared, whereas VVI pacing has remained constant (See Table 4.4 and Figure 4.3). Intracardiac leadless pacing still only occupies 2.1% of all implants after the introduction in 2015, and biventricular pacing 4.8%.

In first ICD implants VVI pacing mode was used in 60.8% in 2002 and is almost unchanged to 64.6% in 2022. CRT-D and DDD-ICD were more often implanted previously (highest in 2011), but after a decrease they now constitute 23.2% (CRT-D) 11.8% (DDD-ICD) of all first implants (See Table 4.5 and Figure 4.4). Subcutaneous based ICD systems have only played a very limited role since the introduction in 2011.

### 1.5 Comments on Quality in device treatment

Quality indicators have been selected through the recent recommendations from the European Society of Cardiology Working Group for Cardiac Pacing Quality Indicators and European Heart Rhythm Association (Aktaa et al, Europace 2021). It is no surprise that the quality indicators that DPIR have had for years are in line with the recent recommendation as members of the steering group have taken part in the preparation of these recommendations.

As stated in the preface, the quality indicators are now reported along with the corresponding data on implants. However, with 365 days follow-up needed for the most important quality indicator, implant related surgical site infection leading to removal of the implanted system, the follow-up on the presented data thus concluded 31 December 2022, and the data on surgical site infection within 365 days are therefore based on data from implants in 2021.

Complications related to all device implantations within 120 days after implant were categorized according to a previous work from the register (Kirkfeldt et al, European Heart Journal, 2013) and divided in major and minor complications, where "major" either have major clinical impact or results in re-operation. Only major complications are reported. The predefined goal was a frequency of less than 5% of both surgical related complications as well as generator/lead related complications leading to re-operation.

Across all institutions, there seems to be an equal distribution of complications, and all institutions now fulfil these criteria (See #Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 5.1). It is important to recognize that these numbers don't take late infections into account, as surgical site infection in implant surgery is defined as infection within 365 days after implant operation. This issue is covered in Table 5.5, where it is shown that infection rate does not exceed 2% at any institutions. However, two institutions (Vejle and Aarhus) have a higher rate of infection, and at both institutions the rate seems to be increasing. Both institutions are urged to resolve this issue through investigations on the underlying matter. Overall, infection rate has been stable since 2015, and close to 1% (see Table 5.6 and Figure 5.3). Hospitals implanting CRT systems seems to have a somewhat higher rate of infection, which is well explained in the current literature, that identify patients for CRT implants, either first- or upgrade implants, as in higher risk of infection.

The trends in surgical and generator/lead related complications are shown in Table 5.3 and Table 5.4. There has been a consistent overall decrease in both types of complications since 2015 (see Figure 5.1 and Figure



5.2), which demonstrates the value of continued focus on quality assurance both nationally and on an institutional level. The registry offers opportunity for on-line access for users to monitor each institutions own quality indicators.

Lead access via puncture of the subclavian vein is related to pneumothorax, and it is thus recommended to use the cephalic cut-down technique. This is well taken at all institutions but with some variations between hospitals (See Table 5.7 and Figure 5.3).

The Danish Board of Health has suggested an annual minimum number of cases for maintaining operator experience ([https://www.sst.dk/da/nyheder/2014/~/\\_/media/0232471983BF4C23A241080E82243512.ashx](https://www.sst.dk/da/nyheder/2014/~/_/media/0232471983BF4C23A241080E82243512.ashx)). The majority of institutions comply with these recommendations (see Table 5.8), but some institutions don't adhere to the recommendations. In some teaching hospitals, operators in training may not achieve the suggested minimum number of procedures during their first year in training.

## 1.6 Dansk resume

### 1.6.1 Organisation

Der implanteres pacemakere på 14 danske offentlige hospitaler og på 6 institutioner også implanterbar cardioverter defibrillator (ICD) og endelig re-synkroniserings (CRT) enheder på 5 af disse 6 institutioner.

Siden 1982 er aktiviteten rapporteret til Dansk Pacemaker og ICD Register, som siden starten også har fungeret som register for implanteret materiale. Registeret er nu en klinisk kvalitetsdatabase under regionernes kliniske kvalitetsudviklingsprogram (RKKP).

Ud fra indrapporterede data dannes i samarbejde med RKKP nøgle kvalitetsindikatorer for behandlingen med pacemaker og ICD, der on-line kan tilgås for regionernes administrationer.

Styregruppen (se afsnit 1.1) mødes flere gange årligt i forbindelse med møder i Dansk Cardiologisk Selskab hvor dataindsamling og resultater diskuteres.

### 1.6.2 Implantationer

Der blev i 2022 implanteret pacemaker første gang hos 4909 patienter og ICD første gang hos 1231 patienter. Størstedelen (6.5%) af enhederne var dobbeltkammer pacemakere mens 64.9% af ICDer var enkeltkammer. Af alle implanterede pacemakere var 22.2% skift og opgraderinger mens 39.1% af ICD var skift og opgraderinger.

For førstegangs pacemakerpatienter var medianalderen 75-79 år. Den største gruppe af ICD patienter var 65-99 år. Ca halvdelen (46.0%) af ICD patienter havde ikke oplevet alvorlig hjerterytmeforstyrrelse på implantations tidspunktet, mens den resterende andel havde.

Ved slutningen af 2022 var der 36,333 pacemaker patienter 13,071 ICD patienter i behandling.

### 1.6.3 Kvalitetsindikatorer for pacemaker- og ICD behandling

De valgte kvalitetsindikatorer er i overensstemmelse med europæiske rekommandationer på området.

Den væsentligste kvalitetsindikator, infektion som fører til fjernelse af systemet, har en opfølgningstid på 12 måneder. Derfor rapporteres denne med implantationsdata for 2021 for at kunne omfatte 12 måneders opfølgning specielt af hensyn til infektionsraten, mens øvrige kvalitetsindikatorer baseres på implantationsdata fra 2022.

Infektionsraten indenfor 12 måneder efter implantation (tabel 5.5) overstiger ikke den fastlagte standard på 2% fraset to institutioner (Vejle og Århus). Overordnet har infektionsraten været stabil siden 2015 og er tæt på 1%.

Komplikationer relateret til implantation indenfor 120 dage efter indgrebet er vist i tabel 5.1. Standarden er maksimalt 5% og alle institutioner lever op til dette. Specielt bemærkes positivt at institutioner, som tidligere har haft væsentligt højere komplikationsfrekvens, har nedbragt dette gennem systematisk uddannelse og kvalitetsudvikling (figur 5.1 og figur 5.2). På institutioner med lavt antal implantationer vil relativt få komplikationer dog betyde store udsving fra år til år.

Adgang til venesystemet for pacemaker/ICD elektroderne foregår mest sikkert med kirurgisk venefremlægning af vena cephalica i modsætning til punktur af vena subclavia eller axillaris. Dette monitoreres også, og man ser at det primært er for ICD elektrode implantation på større centre, at denne teknik anvendes. Ingen institutioner anvender vena cephalica adgang i mindre end 50%, som er den fastsatte standard.

Sundhedsstyrelsen har fastsat minimumsantal operationer per operatør, og som det fremgår af tabel 5.8 lever de fleste institutioner op til disse krav fraset de større centre, hvor der pågår oplæring af læger i uddannelse.

## 2 Implant activity in Denmark 2022

### 2.1 Pacemaker

#### 2.1.1 First pacemaker implantation: (Institution | pacing mode)

Operation   First implant						
Actual device						
Institution	PM-AAI	PM-VVI	PM leadless	PM-DDD	CRT-P	First Implant Total
Bispebjerg	#	62		256		319
Esbjerg	#	28		164		193
Gentofte		249	3	350	16	618
Herning		109		242		351
Hillerød	#	84	7	119		212
Odense		67	65	377	57	566
Rigshospitalet		20	18	114	53	205
Roskilde	#	281		434		717
Vejle		50		146		196
Viborg		83		127		210
Aabenraa		31		155		186
Ålborg		96		410	45	551
Aarhus	#	129	8	369	78	585
Grand Total	7	1289	101	3263	249	4909

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 2.1 First pacemaker implantations in Denmark 2022 for each institution and pacing mode

#### 2.1.2 Pacemaker replacement: (Institution | pacing mode)

Operation   Replacement							
Actual Device							
Institution	PM-AAI	PM-VVI	PM-leadless	PM-VDD	PM-DDD	CRT-P	Replacement Total
Bispebjerg	#	22			59	0	83
Esbjerg	#	12			33	0	46
Gentofte	7	42			52	23	124
Herning	#	6			74	0	82
Hillerød	5	9			50	0	64
Odense	#	8			79	46	134
Rigshospitalet	#	4			29	59	94
Roskilde	#	18			167	0	187
Vejle	3	10			58	0	71
Viborg	#	11			105	0	117
Aabenraa	#	3			33	0	38
Ålborg	#	6			79	15	101
Aarhus	3	3			43	47	96
Grand Total	32	154			861	190	1237

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 2.2 Pacemaker replacements in Denmark 2022 for each institution and pacing mode

### 2.1.3 Pacemaker Up-/downgrade: (Institution|pacing mode)

Operation   Up-/downgrade						
Actual Device						
Institution	PM-AAI	PM-VVI	PM-leadless	PM-DDD	CRT-P	Up/downgrd. Total
Bispebjerg				#		#
Esbjerg		9				9
Gentofte		#		#	4	7
Herning						0
Hillerød				#		#
Odense			14	3	20	37
Rigshospitalet			3	6	26	35
Roskilde		3		#		4
Vejle	#	17				18
Viborg		#				#
Aabenraa		8				8
Ålborg				#	8	9
Aarhus		#	#	4	21	28
Grand Total	#	43	17	20	79	161

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 2.3 Pacemaker up-/downgrades in Denmark 2022 for each institution and pacing mode

## 2.2 ICD

### 2.2.1 First ICD implantation (Institution | pacing mode)

Institution	Operation   First implant			
	Actual device			
	VVI-ICD*	DDD-ICD	CRT-D	First Implant Total
Gentofte	78	21	15	114
Odense	235	13	93	341
Rigshospitalet	143	17	70	231
Roskilde	115	27		142
Ålborg	51	29	41	121
Aarhus	176	39	67	282
Grand Total	789	145	286	1231

Table 2.4 First ICD implantations in Denmark 2022 for each institution and pacing mode

\*Of 738 VVI-ICD 9 (1.1%) were subcutaneous ICD; 5 implanted at Odense, 3 at Rigshospitalet and 1 at Gentofte.

### 2.2.2 ICD replacement: (Institution | pacing mode)

Institution	Operation   Replacement			
	Actual device			
	VVI-ICD*	DDD-ICD	CRT-D	Replacement Total
Gentofte	53	15	27	95
Odense	57	17	61	135
Rigshospitalet	67	22	77	166
Roskilde	32	13		45
Ålborg	19	13	25	57
Aarhus	41	31	63	135
Grand Total	269	111	253	633

Table 2.5 ICD replacements in Denmark 2022 for each institution and pacing mode.

\*Of 265 VVI-ICD 8 were subcutaneous ICD, 5 replaced at Odense, 1 at Rigshospitalet and 1 at Gentofte.

### 2.2.3 ICD Up-/downgrade: (Institution | pacing mode)

Institution	Operation   Up-/downgrade			
	Actual device			
	VVI-ICD*	DDD-ICD	CRT-D	Up/downgrad. Total
Gentofte	#	3	8	13
Odense	3	5	24	32
Rigshospitalet	3	4	44	51
Roskilde		#		#
Ålborg		3	10	13
Aarhus	3	5	37	45
Grand Total	11	22	123	156

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 2.6 ICD up-/downgrade in Denmark 2022 for each institution and pacing mode.

\*Of 11 VVI-ICD 1 was subcutaneous ICD downgraded at Odense and 1 at Rigshospitalet.

## 2.3 Manufacturer

### 2.3.1 Pacemaker (manufacturer|pacing mode)

Manufacturer	Actual device					Grand Total	Percent [%]
	PM-AAI	PM-VVI	PM-leadless	PM-DDD	CRT-P		
Biotronik	15	440		1302	47	1804	28.6
Boston Scientific	5	249		656	103	1013	16.1
Medtronic	#	112	118	208	23	463	7.3
Microport		5		23		28	0.4
Sorin	#	5		8		15	0.2
St. Jude Medical	14	575		1743	345	2677	42.5
Vitatron	#	100		204		306	4.9
Grand Total	40	1486	118	4144	518	6306	100.0

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 2.7 Manufacturer of pacemakers implanted in Denmark 2022 for each pacing mode

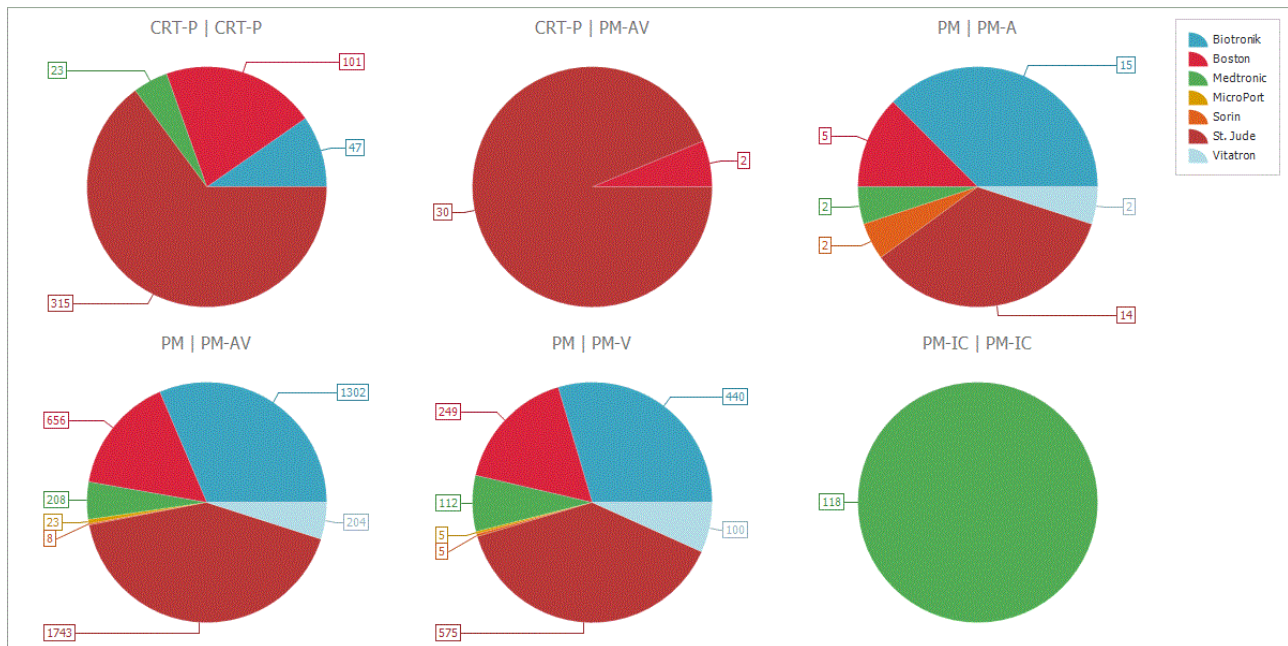


Figure 2.1 Manufacturer of pacemakers implanted in Denmark 2022 for each pacing mode

2.3.2 ICD (manufacturer|pacing mode)

Manufacturer	Actual device			Grand Total	Percent [%]
	VVI/DDD-ICD	SC-ICD	CRT-D		
Abbott	184		70	254	12.6
Biotronik	351		120	471	23.3
Boston Scientific	191	17	98	306	15.2
Medtronic	232		84	316	15.7
St. Jude Medical	382		290	672	33.3
Grand Total	1340		662	2019	100.0

Table 2.8 Manufacturer of ICD's implanted in Denmark 2022 for each pacing mode

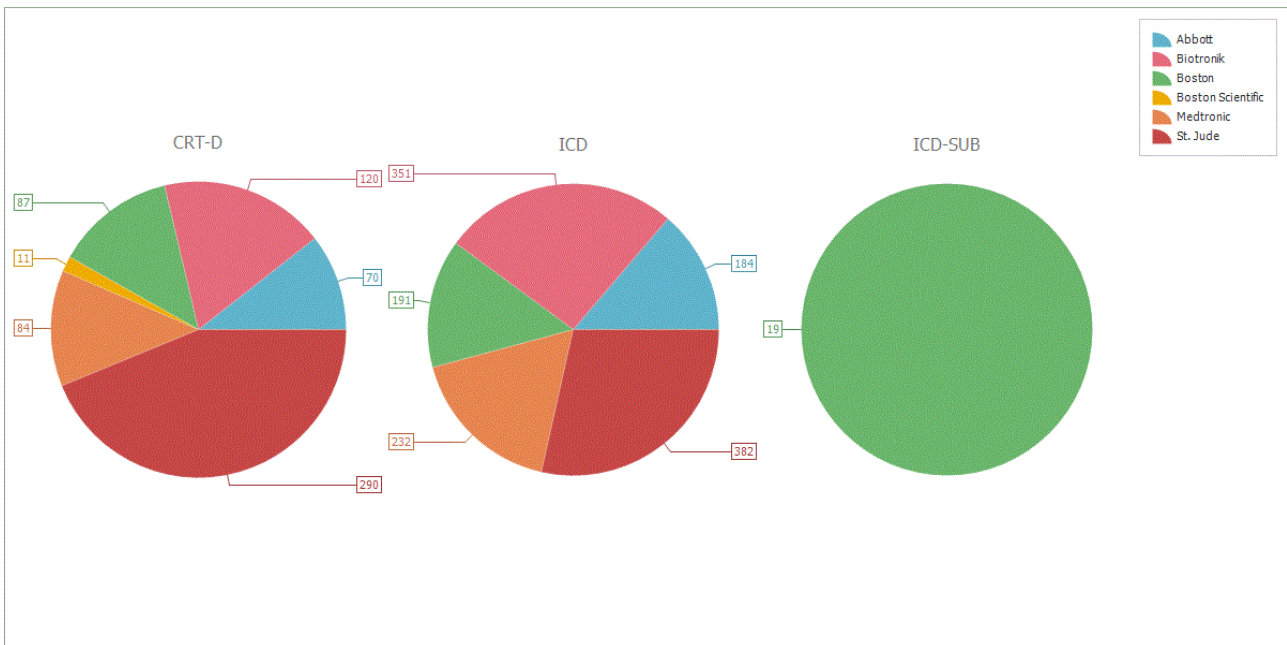


Figure 2.2 Manufacturer of ICD's implanted in Denmark 2022 for each pacing mode

## 2.4 Leads

### 2.4.1 Low voltage leads (atrial, left ventricular, suppl. right ventricular pace/sense | manufacturer)

	Atrial	Left ventricular*	Right ventricular#	Grand Total	Percent [%]
Biotronik	164	34	481	679	6.8
Boston Scientific	15	#	33	49	0.5
Medtronic	79	8	156	243	2.4
St. Jude Medical	3878	682	4444	9004	90.3
Grand Total	4136	725	5114	9975	100.0

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 2.9 Manufacturer of low voltage leads implanted in Denmark 2022

\*Of 724 low voltage leads for left ventricular pacing, 700 (97%) were quadripolar and 24 (3%) bipolar

# Of 5114 leads for right ventricular 59 were placed in the His bundle for conduction pacing.

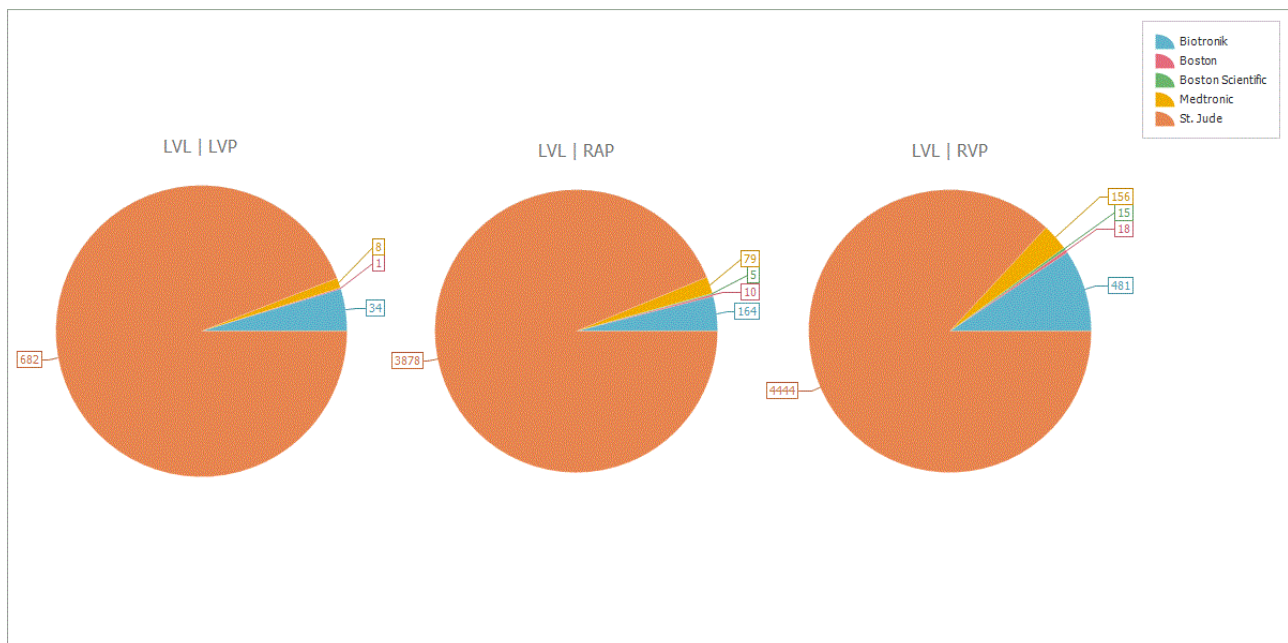


Figure 2.3 Manufacturer of low voltage leads implanted in Denmark 2022



2.4.2 High voltage leads (Right ventricular defibrillation | manufacturer)

	Right ventricular defibrillation	Percent [%]
Biotronik	379	26.7
Boston Scientific	209	14.7
Medtronic	237	16.7
St. Jude Medical	595	41.9
Grand Total	1420	100.0

Table 2.10 Manufacturer of high voltage leads implanted in Denmark 2022

\*Of 1418 right ventricular leads 95.3% were single coil leads and 4.7% were dual coil leads.

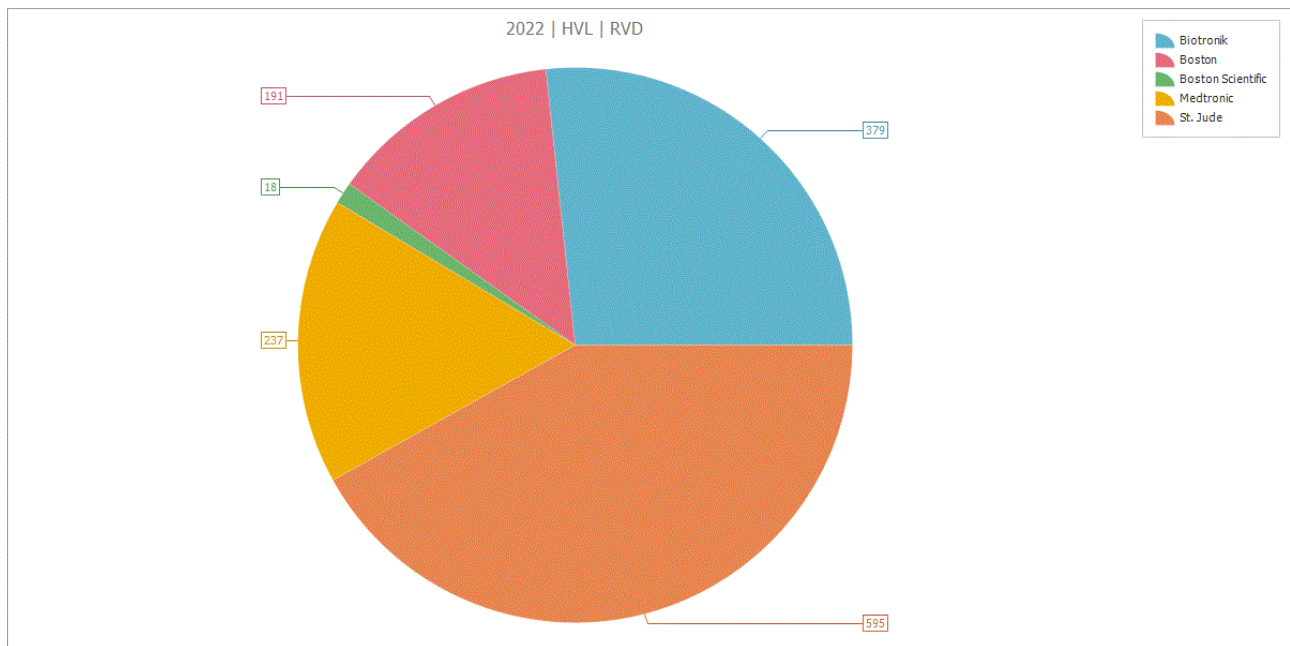


Figure 2.4 Manufacturer of high voltage leads implanted in Denmark 2022

## 2.5 Indication

### 2.5.1 Pacemaker (First implant|ECG indication)

Indication	Operation   First Implant	Percent [%]
Arrhythmia not documented	#	0.0
Atrial arrhythmias without sinus dysfunction	18	0.4
AV block - 1°	28	0.6
AV block - 2:1	175	3.6
AV block - 2° , advanced type	201	4.1
AV block - 2° type I	68	1.4
AV block - 2° type II	286	5.8
AV block - 3°	1683	34.3
AV conduction impaired - status unknown	32	0.7
Bradycardia - Tachycardia syndrome	586	11.9
Bundle branch block, unspecified	101	2.1
Chronic atrial fibrillation & AV block - 3°	201	4.1
Chronic atrial fibrillation & bradycardia	216	4.4
Left bundle branch block	188	3.8
Other	47	1.0
Polymorphic VT /Torsades des pointes	4	0.1
Right bundle branch block	101	2.1
Sinus node dysfunction unspec. + imp. AV conductio	25	0.5
Sinus node dysfunction unspecified	39	0.8
Sinus node dysfunction with pause	697	14.2
Sinus node dysfunction without pause	141	2.9
Unknown	70	1.4
Grand Total	4909	100.0

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 2.11 ECG indication, first pacemaker implantation Denmark 2022

2.5.2 ICD (First implant| ECG indication)

Indication	Operation   First Implant	Percent [%]
Other	15	1.2
Prophylactic (none documented / induced)	566	46.0
Syncope with inducible VT or VF	7	0.6
Unknown	34	2.8
Ventricular Fibrillation	364	29.6
VT - monomorphic Non-sustained	56	4.5
VT - monomorphic Sustained	170	13.8
VT - Polymorphic w. long QT (Torsades des pointes)	10	0.8
VT - polymorphic (with normal QT interval)	7	0.6
Wide complex tachycardia unspecified	#	0.2
Grand Total	1231	100.0

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 2.12 ECG indication, first ICD implantation Denmark 2022

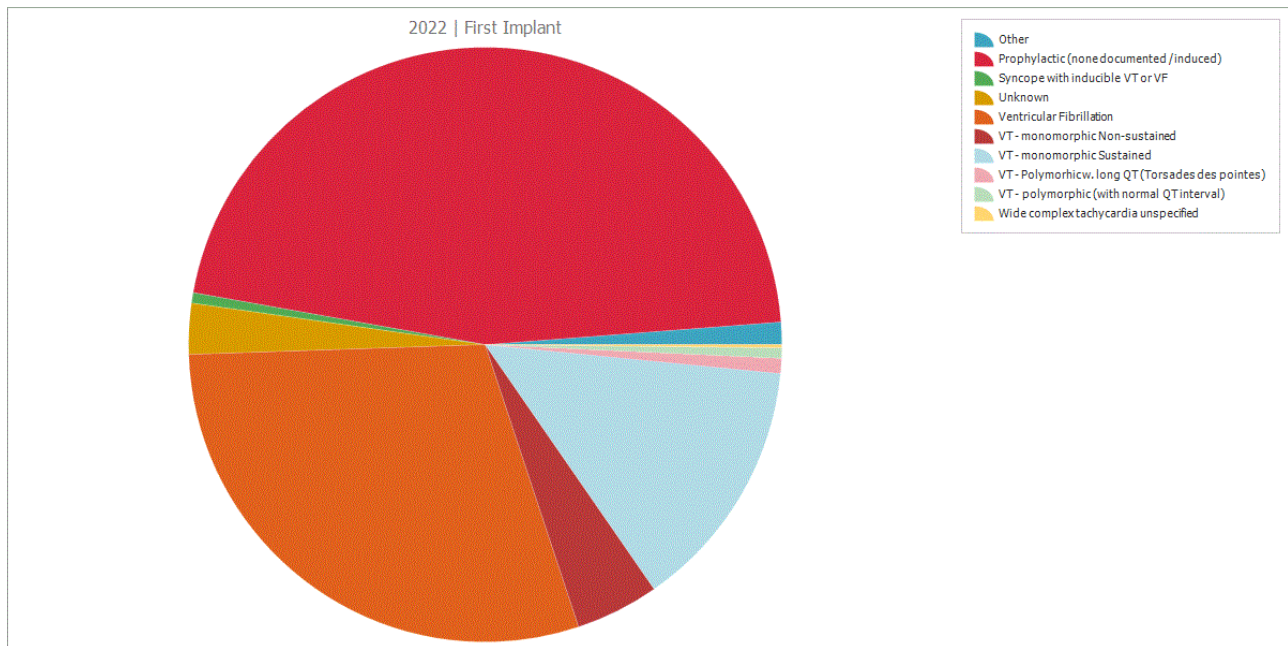


Figure 2.5 ECG indication, first ICD implantation Denmark 2022

## 2.6 Etiology

### 2.6.1 Pacemaker (First implant| Etiology)

Diagnosis	Operation   First Implant	Percent [%]
Autonomic dysfunction, other	#	0.04
AV node ablation, therapeutic	19	0.39
Cardiomyopathy - dilated	68	1.39
Cardiomyopathy - hypertrophic	7	0.14
Cardiomyopathy - other	42	0.86
Carotid sinus syndrome	44	0.90
Conduction tissue disease	3679	74.94
Congenital AV block	6	0.12
Congenital heart disease	5	0.10
Drug induced	3	0.06
Endocarditis	4	0.08
Heart transplant	#	0.02
Ischaemic heart disease	133	2.71
Myocarditis	#	0.02
Other	84	1.71
Primary electrical disease - other	3	0.06
Surgical complication	114	2.32
Surgical therapeutic	#	0.04
Unknown	622	12.67
Valvular heart disease	52	1.06
Vasovagal syncope	18	0.37
Grand Total	4909	100.00

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 2.13 Etiology, first pacemaker implantation Denmark 2022

2.6.2 ICD (First implant| Etiology)

Diagnosis	Operation   First Implant	Percent [%]
Arrhythmogenic right ventricle	10	0.8
Brugada syndrome	#	0.2
Cardiomyopathy - dilated	251	20.4
Cardiomyopathy - hypertrophic	33	2.7
Cardiomyopathy - other	71	5.8
Congenital heart disease	4	0.3
Congenital long QT	13	1.1
Idiopathic ventricular fibrillation	54	4.4
Ischaemic heart disease	646	52.5
Other	35	2.8
Primary electrical disease - other	34	2.8
Unknown	67	5.4
Valvular heart disease	11	0.9
Grand Total	1231	100.0

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 2.14 Etiology, first ICD implantation, Denmark 2022

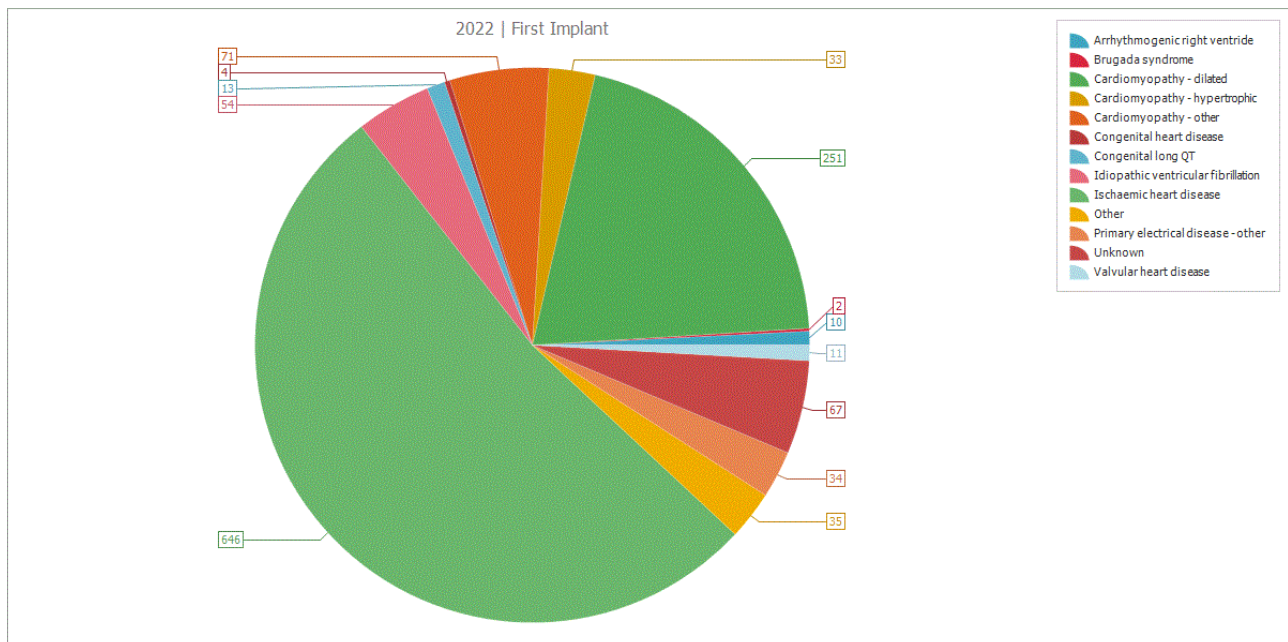


Figure 2.6 Etiology, first ICD implantation, Denmark 2022

### 3 Patients

#### 3.1 Age and sex

##### 3.1.1 First pacemaker implant (Age group|pacing mode)

Actual Device	Age at first implant																				Grand Total	
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99		100-104
PM-leadless		#			#				#		3	9	13	9	20	22	14	8				101
PM	5	#	3	4	9	14	15	17	31	55	109	197	348	627	1104	971	705	280	56	8	5	4559
CRT-P			#		#				#	3	#	4	16	50	70	71	29					249
Grand Total	5	#	4	4	10	15	15	17	34	58	114	210	377	686	1194	1064	748	288	56	8	5	4909

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 3.1 Age group in first pacemaker implantation, Denmark 2022

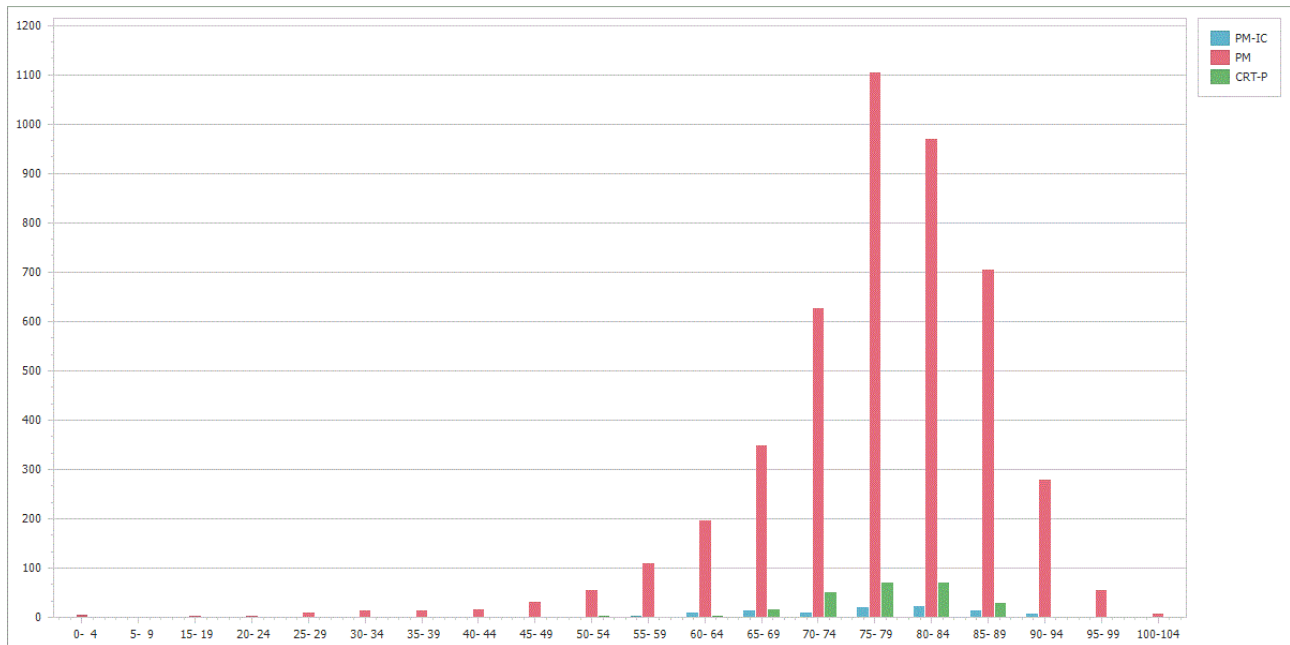


Figure 3.1 Age group in first pacemaker implantation, Denmark 2022

### 3.1.2 First pacemaker implant (Sex|pacing mode)

Actual device	Sex		Grand Total
	Female	Male	
PM-leadless	25 (24.8%)	76 (75.2%)	101
PM-AAI/VVI/DDD	1718 (37.7%)	2841 (62.3%)	4559
CRT-P	83 (37.2%)	166 (66.7%)	249
Grand Total	1826 (37.2%)	3083 (62.8%)	4909

Table 3.2 Sex in first pacemaker implantation in each pacing mode, Denmark 2022

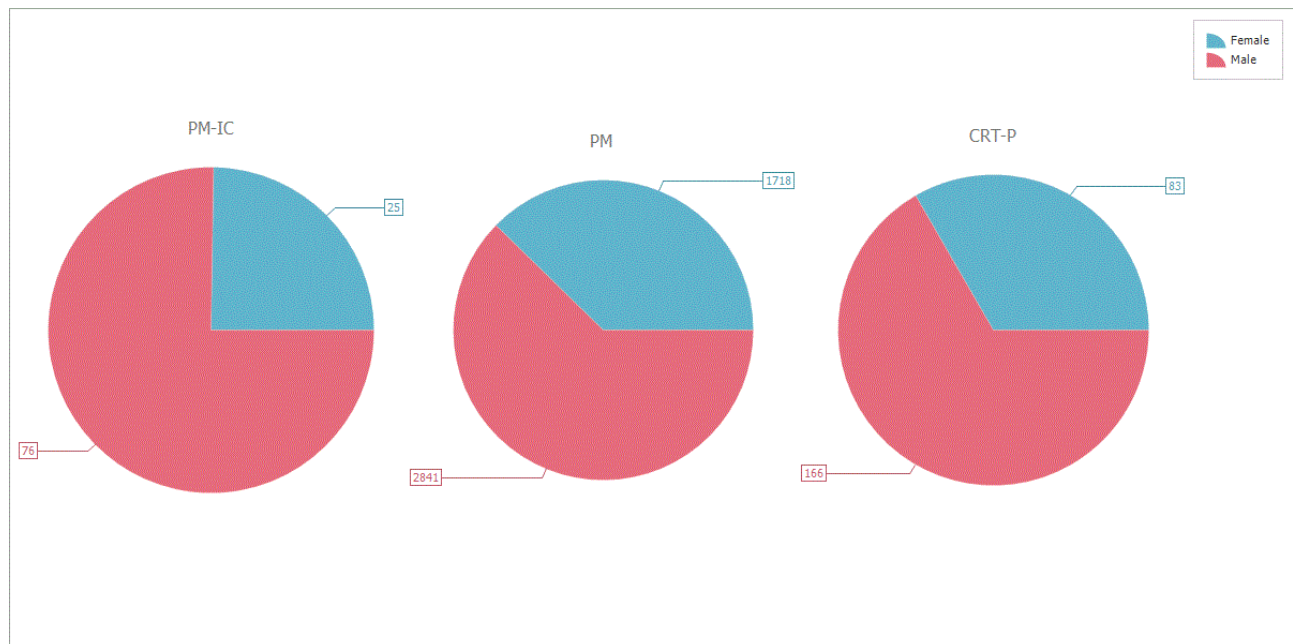


Figure 3.2 Sex in first pacemaker implantation in each pacing mode, Denmark 2022

### 3.1.3 First ICD implant (Age group | pacing mode)

Actual Device	Age at first implant																		Grand Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	
ICD-subcutane					#		#				3		#			#			9
ICD VVI/DDD	#	#		8	8	7	15	24	34	41	95	125	139	156	118	114	41	8	936
CRT-D						#	#	4	5	8	25	41	56	51	47	39	7	#	286
Grand Total	#	#		8	10	8	18	28	39	49	123	166	196	207	165	154	48	9	1231

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 3.3 Age group in first ICD implantation, Denmark 2022

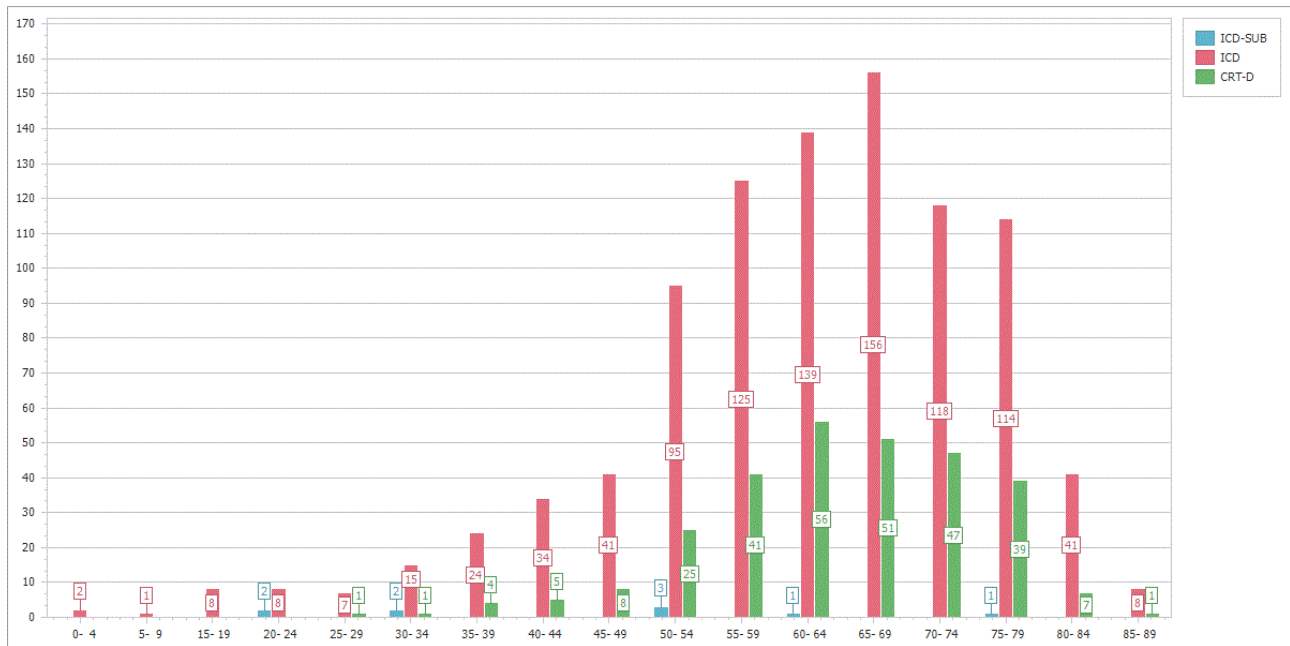


Figure 3.3 Age group in first ICD implantation, Denmark 2022



### 3.1.4 First ICD implant (Sex|pacing mode)

Actual device	Sex		Grand Total
	Female	Male	
ICD-subcutane	#	7 (77.8%)	9
ICD-VVI/DDD	185 (19.8%)	751 (80.2%)	936
CRT-D	72 (25.2%)	214 (74.8%)	286
Grand Total	259 (21.0%)	972 (79.0%)	1231

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 3.4 Sex in first ICD implantation in each pacing mode, Denmark 2022

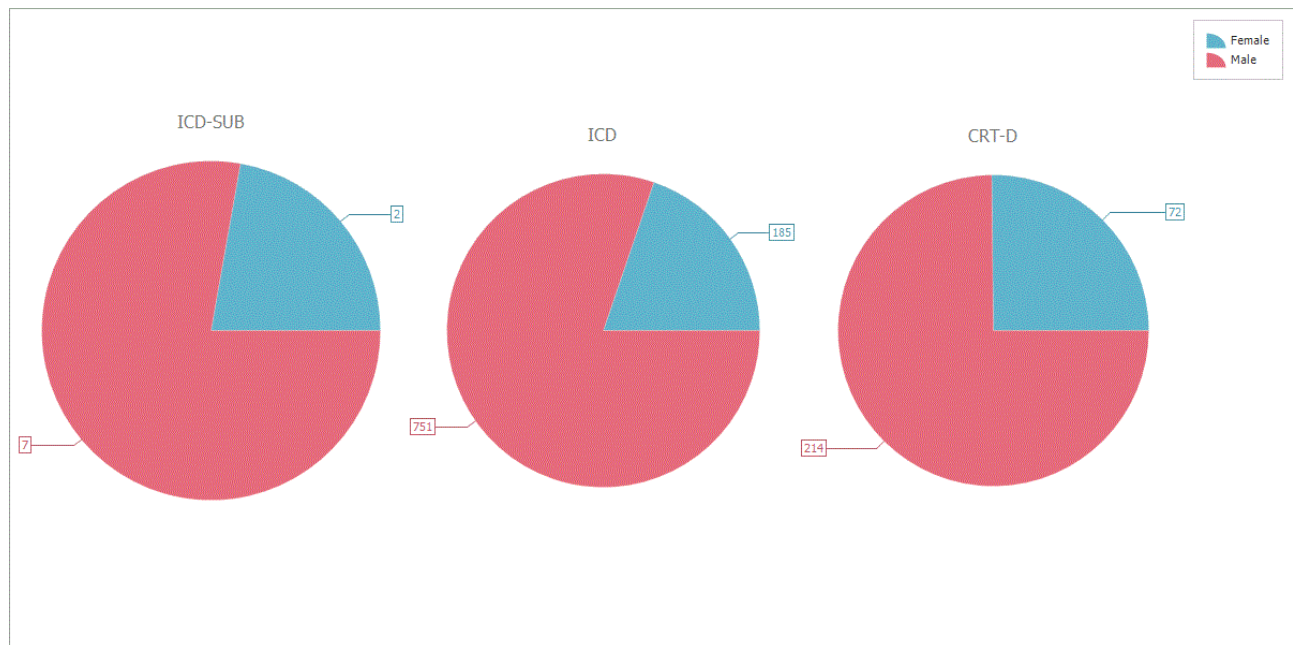


Figure 3.4 Sex in first ICD implantation in each pacing mode, Denmark 2022

## 3.2 Patients in treatment

### 3.2.1 All pacemaker patients in treatment | 31. December 2022 | last implant institution

Period	Last Institution	Actual Device					Grand Total
		PM-AAI	PM-VVI	PM-Intracard.	PM-DDD	CRT-P	
End 2022	Bispebjerg	31	403				2479
	Esbjerg	10	200			6	1458
	Gentofte	64	1071	33	33	267	4309
	Herning	38	479				2240
	Hillerød	46	297	101	101		1805
	Odense	36	386	270	270	644	4231
	Rigshospitalet	38	237	62	62	542	2268
	Roskilde	63	1006				4609
	Vejle	55	399				1996
	Viborg	9	307			10	1694
	Aabenraa	26	211				1320
	Ålborg	40	372			252	3706
	Aarhus	25	509	49	49	555	4218
End 2022 Total		489	5877	515	27184	2276	36333

Table 3.5 All danish pacemaker patients in treatment and alive 31. December 2022 according to last implant institution.

### 3.2.2 All ICD patients in treatment | 31. December 2022 | last implant institution

Period	Last Institution	Actual Device				Grand Total
		ICD-VVI	ICD-DDD	CRT-D	ICD-subcutane	
End 2022	Gentofte	905	227	334	6	1472
	Odense	2007	248	860	68	3183
	Rigshospitalet	1792	469	884	27	3172
	Roskilde	711	240			951
	Ålborg	580	361	335	#	1278
	Aarhus	1646	537	830	#	3015
End 2022 Total		7641	2082	3243	105	13071

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 3.6 All danish ICD patients in treatment and alive 31. December 2022 according to last implant institution.

## 4 Trends in implant activity 2003 - 2022

### 4.1 Total number of first implants | number of devices per million citizens

#### 4.1.1 First pacemaker implants 2003 - 2022

	Operation   First Implant																			
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Implants Total	2605	2652	2883	2932	2780	3006	3080	3328	3386	3664	3733	3861	4042	4176	4181	4326	4498	4713	4580	4909
Implants per mill. citizens*	484	491	533	540	510	549	559	601	609	657	666	686	714	732	727	745	772	807	780	827

Table 4.1 Number of first pacemaker implants in Denmark 2003 - 2022 and number of pacemakers per million citizens

\*Data on population based on data from Statistics Denmark

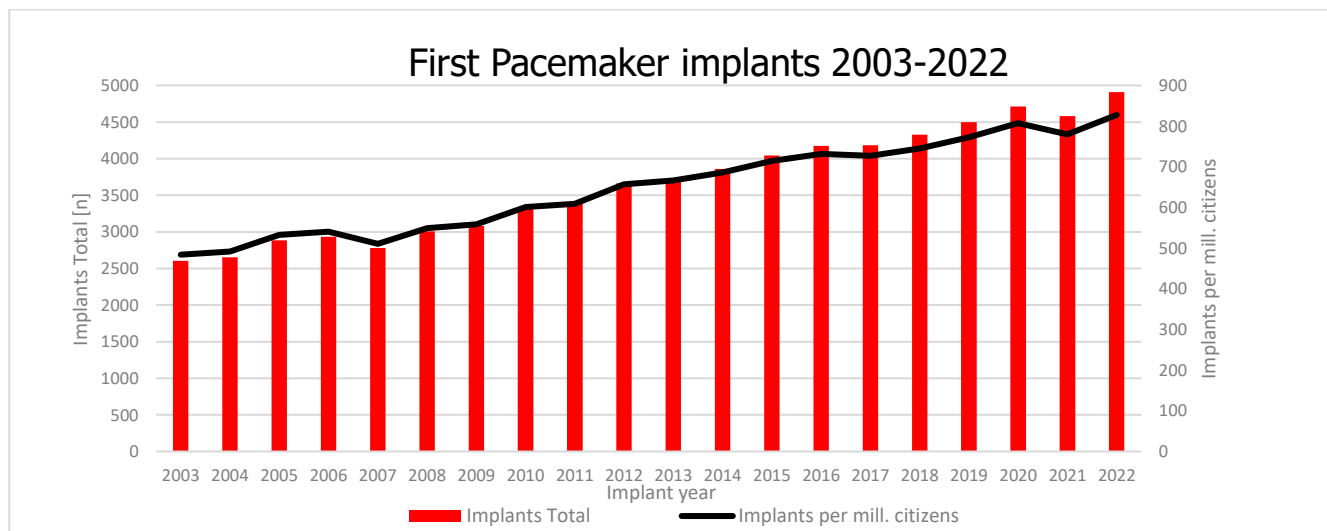


Figure 4.1 Number of first pacemaker implants in Denmark 2003 - 2022 and number of pacemakers per million citizens

4.1.2 First ICD implants 2003 – 2022

		Operation   First Implant																			
		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Implants Total		331	397	510	574	725	918	1013	1090	1160	1224	1180	1117	1088	1147	1309	1141	1184	1125	1196	1231
Implants per mill. citizens*		61	74	94	10	133	168	184	197	209	219	211	198	192	201	228	197	203	193	204	207

Table 4.2 Number of first ICDs implants in Denmark 2003 - 2022 and number of ICDs per million citizens

\*Data on population based on data from Statistics Denmark

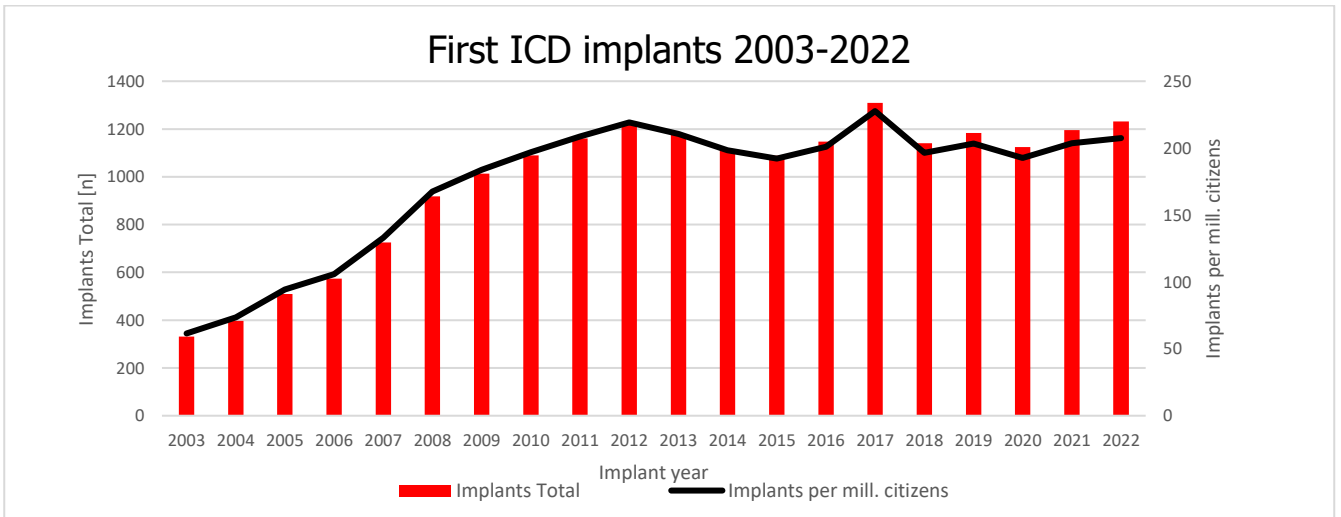


Figure 4.2 Number of first ICDs implants in Denmark 2003 - 2022 and number of ICDs per million citizens

### 4.1.3 First ICD implants 2022 | million citizens | Region

Institution	Operation   First Implant			First Implant Total	Region	Citizens 1. January 2023	First ICD implants per mill. citizens
	Actual Device						
	ICD-VVI	ICD-DDD	CRT-D				
Gentofte	78	21	15	114	The Capital Region of Denmark and Region Zealand	2,741,728	<b>177.6</b>
Roskilde	115	27		142			
Rigshospitalet	143	17	70	231			
Odense	235	13	93	341	The Region of Southern Denmark	1,237,413	<b>275.6</b>
Ålborg	51	29	41	121	The North Denmark Region	596,634	<b>203.5</b>
Aarhus	176	39	67	282	Central Denmark Region	1,358,879	<b>207.5</b>
<b>Grand Total</b>	789	145	286	1231		5,932,654	<b>207.5</b>

Table 4.3 Number of first ICDs implants in 2022 and number of ICDs per million citizens i different regions in Denmark

### 4.1.4 Trends in first ICD implants | million citizens | Region

#### First ICD implants per million citizens per Region. 2015 - 2022

Frequency per Region

	The Capital Region of Denmark and Region Zealand			The Region of Southern Denmark	The North Denmark Region	Central Denmark Region	Denmark
Institution	Gentofte	Roskilde	Rigshosp	Odense	Ålborg	Aarhus	Total
2015	189.6			212.1	167.4	183.3	<b>190.6</b>
2016	184.5			223.5	202.6	199.3	<b>198.0</b>
2017	202.8			266.2	227.4	261.9	<b>232.1</b>
2018	173.5			227.7	241.0	197.9	<b>197.4</b>
2019	175.9			255.9	217.0	202.1	<b>202.8</b>
2020	178.9			247.6	206.6	203.4	<b>201.7</b>
2021	172.2			279.2	170.7	213.1	<b>203.8</b>
2022	177.6			275.6	203.5	207.5	<b>207.5</b>

## 4.2 Pacing mode | first implants

### 4.2.1 Pacemakers 2002-2022

Actual Device	Operation   First Implant																				
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM-AAI	230	274	287	286	239	168	130	99	55	18	5	7	15	10	11	4	11	12	15	10	9
PM-VVI/VDD	605	691	713	803	849	775	858	780	732	717	844	855	898	946	866	906	960	1097	1215	1190	1289
PM-Intracardiac														26	64	126	111	109	125	120	101
PM-DDD	1572	1550	1531	1642	1715	1742	1942	2124	2440	2501	2681	2699	2738	2828	3031	2918	3079	3148	3263	3186	3281
CRT-P	71	87	119	176	145	117	115	136	142	188	199	228	249	256	268	228	215	194	203	215	232
Grand Total	2478	2602	2650	2907	2948	2802	3045	3139	3369	3424	3729	3789	3900	4066	4240	4182	4376	4560	4821	4721	4912

Table 4.4 Number of first pacemaker implants and pacing modes in Denmark 2002-2022

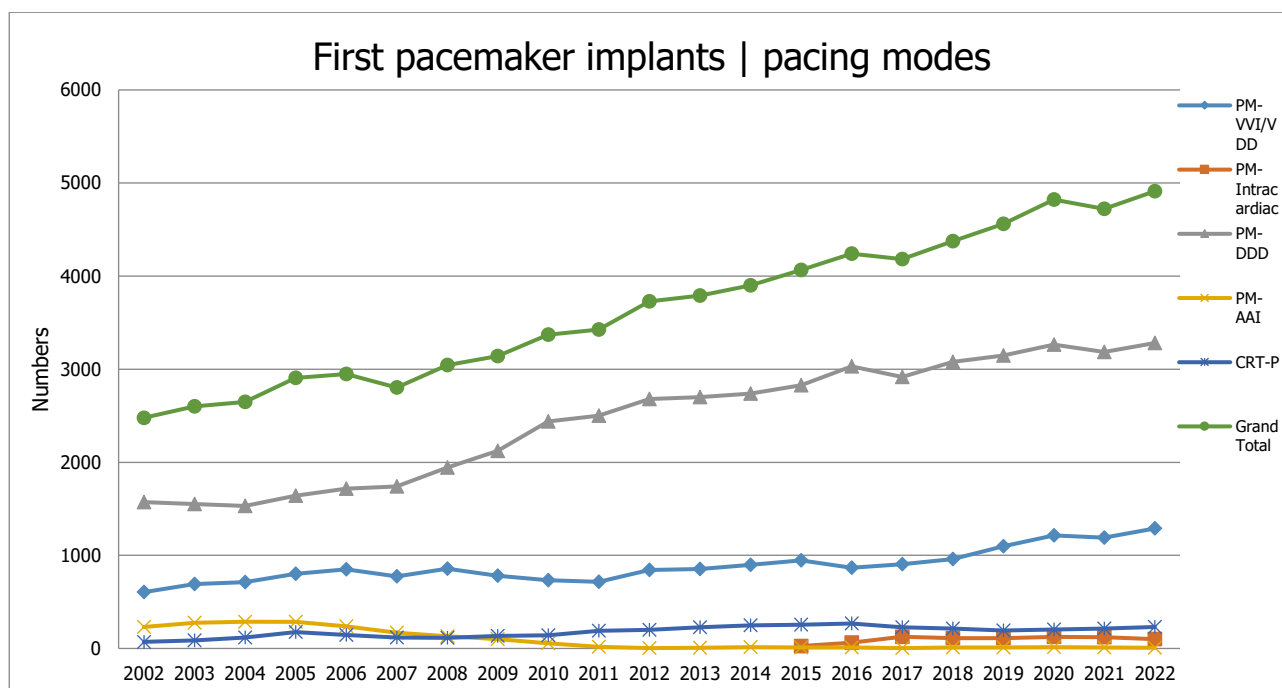


Figure 4.3 Number of first pacemaker implants and pacing modes in Denmark 2002-2022.

4.2.2 ICDs 2002 – 2022

	Operation   First Implant																				
Actual Device	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
ICD-VVI	183	233	274	308	331	478	582	553	544	545	667	702	710	701	718	850	758	800	746	794	789
ICD-subcutane										6	18	18	7	13	10	9	15	14	16	13	9
ICD-DDD	101	73	90	118	144	135	198	256	306	305	266	220	192	192	163	178	154	167	135	167	167
CRT-D	25	29	42	95	108	129	164	238	275	344	347	300	257	242	289	326	250	243	279	259	263
Grand Total	2478	2602	2650	2907	2948	2802	3045	3139	3369	3424	3729	3789	3900	4066	4240	4182	4376	4560	4821	4721	4912

Table 4.5 Number of first ICD implants and pacing modes in Denmark 2002-2022.

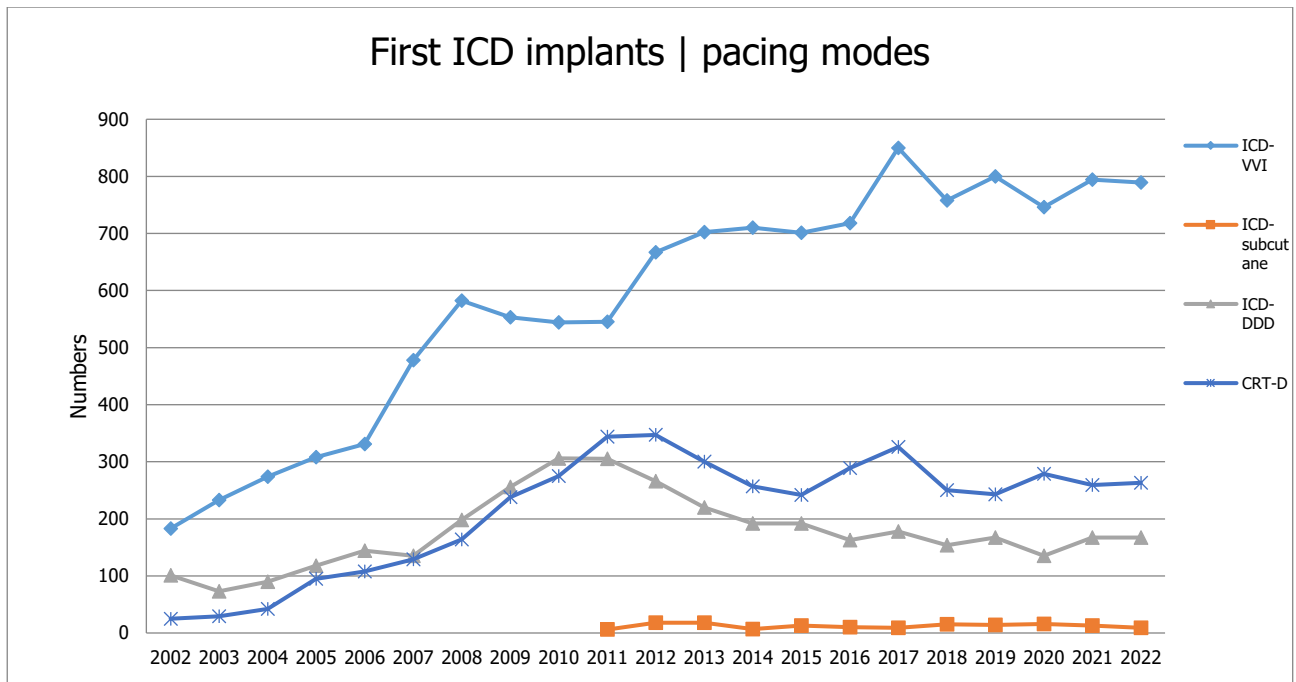


Figure 4.4 Number of first ICD implants and pacing modes in Denmark 2002-2022.

## 5 Quality in device treatment 2022

### 5.1 Complications after all operations in 2022

#### 5.1.1 Major complications per institution up to 120 days after implant

##### Complications with major clinical impact or resulting in reoperation within 120 days after implant operation in 2022

Complication type	Institution													Total
	Bispebjerg	Esbjerg	Gentofte	Herning	Hillerød	Odense	Rigshosp	Roskilde	Vejle	Viborg	Aabenrå	Ålborg	Aarhus	
<b>Surgical related</b>														
Cardiac perforation not req. pericardiocentesis			#	#		3	#	#		#		#	#	14
Cardiac perforation req. pericardiocentesis		#		#	#	#		#		#		3	#	10
Deep venous thrombosis			#			#	#	#	#		#	#		10
Haemothorax req. drainage							#	#						#
Local pocket infection / Skin erosion req. explant		#				#		#	#	#	#	#	3	14
Pneumothorax not req. drainage						#		#						3
Pneumothorax req. drainage						#		9	#		#			14
Systemic infection / endocarditis	#	#	#	#		#	#		#			#	5	15
Total number of surgical related complications	#	4	4	4	#	11	5	18	4	4	6	10	10	82
Total number of operations	406	258	973	437	279	1258	800	1108	285	330	233	869	1210	<b>8446</b>
<b>Frequency pr. institution</b>	<b>0.25</b>	<b>1.55</b>	<b>0.41</b>	<b>0.92</b>	<b>0.36</b>	<b>0.87</b>	<b>0.63</b>	<b>1.62</b>	<b>1.40</b>	<b>1.21</b>	<b>2.58</b>	<b>1.15</b>	<b>0.83</b>	<b>0.97</b>

Generator/lead related complications leading to re-operation	Institution													Total
	Bispebjerg	Esbjerg	Gentofte	Herning	Hillerød	Odense	Rigshosp	Roskilde	Vejle	Viborg	Aabenrå	Ålborg	Aarhus	
Connector failure					#									#
Displacement	#	6	7	4	#	15	13	13	#	#	#	15	14	93
Extracardiac stimulation						#		#					#	4
High defibrillation threshold								#					#	#
High impedance									#					#
High pacing threshold	#	4	#		#	#	#	7			#	#	4	24
Insulation failure							#							#
Oversensing							#							#
Sensing / pacing failure	#		#			#	#	#						5
Twiddler's syndrome														0
Undersensing	#		#					6	#				#	10
Total number of lead/generator complications leading to re-operation	5	10	10	4	4	19	17	30	3	0	3	16	21	142
Total number of operations	406	258	973	437	279	1258	800	1108	285	330	233	869	1210	<b>8446</b>
<b>Frequency pr. institution</b>	<b>1.23</b>	<b>3.88</b>	<b>1.03</b>	<b>0.92</b>	<b>1.43</b>	<b>1.51</b>	<b>2.13</b>	<b>2.71</b>	<b>1.05</b>	<b>0.00</b>	<b>1.29</b>	<b>1.84</b>	<b>1.74</b>	<b>1.68</b>

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 5.1 Major surgical- and generator/lead related complications within 120 days after all operations in 2022.



## 5.1.2 Major complications per operation type up to 120 days after implant

### Complications with major clinical impact or resulting in reoperation within 120 days after implant operation in 2022

Complication type	Operation type		
	First implant	Replacement	Up-Downgrade
<b>Surgical related</b>			
Cardiac perforation not req. pericardiocentesis	13		#
Cardiac perforation req. pericardiocentesis	10		#
Deep venous thrombosis	10		
Haemothorax not req. drainage		#	#
Local pocket infection / Skin erosion req. explant	7	7	#
Pneumothorax not req. drainage	3		
Pneumothorax req. drainage	11	3	
Systemic infection / endocarditis	12		3
Total number of surgical related complications	66	11	7
Total number of operations	6140	1987	319
Frequency of surgical related complications pr. operation type	<b>1.08</b>	<b>0.55</b>	<b>2.19</b>

### Generator/lead related complications leading to re-operation

	First implant	Replacement	Up-Downgrade
Connector failure	#		
Conductor break	#	#	
Displacement	82	0	11
Extracardiac stimulation	4		
Generator-lead interface problem			
Failure to defibrillate	#		
High pacing threshold	23		#
Insulation failure		#	
Sensing / pacing failure	3	#	
Twiddler's syndrome			
Undersensing	9	#	
Generator failure, other			
Total number of complications	124	5	12
Total number of operations	6140	1987	319
Frequency of generator/lead related complications pr. operation type	<b>2.02</b>	<b>0.25</b>	<b>3.76</b>

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 5.2 Major surgical related complications within 120 days according to type of operations in 2022.

### 5.1.3 Trends in major complications (either major clinical impact or resulting in re-operation) per operation type up to 120 days after implant

#### Surgical related complications\* within 120 days after implant operation 2015 - 2022

Frequency pr. Institution

	Bispebjerg	Esbjerg	Gentofte	Herring	Hillerød	Odense	Rigshosp	Roskilde	Vejle	Viborg	Aabenrå	Ålborg	Aarhus	Total
2015	0.93	1.19	1.43	0.68	1.86	1.09	2.16	2.11	0.75	0.53	1.74	3.94	2.08	<b>1.80</b>
2016	0.51	2.38	0.37	1.43	1.38	0.93	1.02	1.93	1.82	0.44	3.24	1.55	1.67	<b>1.31</b>
2017	0.60	0.45	0.87	1.47	1.89	0.71	1.82	3.50	0.99	0.43	2.23	1.87	1.04	<b>1.44</b>
2018	1.05	1.16	0.78	2.29	0.99	0.99	0.63	1.18	0.97	2.10	1.50	1.39	1.67	<b>1.20</b>
2019	1.29	1.6	0.57	0.58	1.37	1.41	0.87	1.49	1.27	0.45	2.38	0.90	1.63	<b>1.19</b>
2020	0.52	1.26	0.83	0.55	0.6	1.39	0.51	1.61	1.92	0.94	1.5	1.2	1.52	<b>1.15</b>
2021	0.50	1.67	1.56	2.01	1.60	1.38	0.36	1.53	2.00	0.31	1.20	0.85	2.20	<b>1.35</b>
2022	0.25	1.55	0.41	0.92	0.36	0.87	0.63	1.62	1.40	1.21	2.58	1.15	0.83	<b>0.97</b>

Table 5.3 Major surgical complications within 120 days after implant operations in 2015-2022 (\*See Table 5.1 for definition of Surgical related complications)

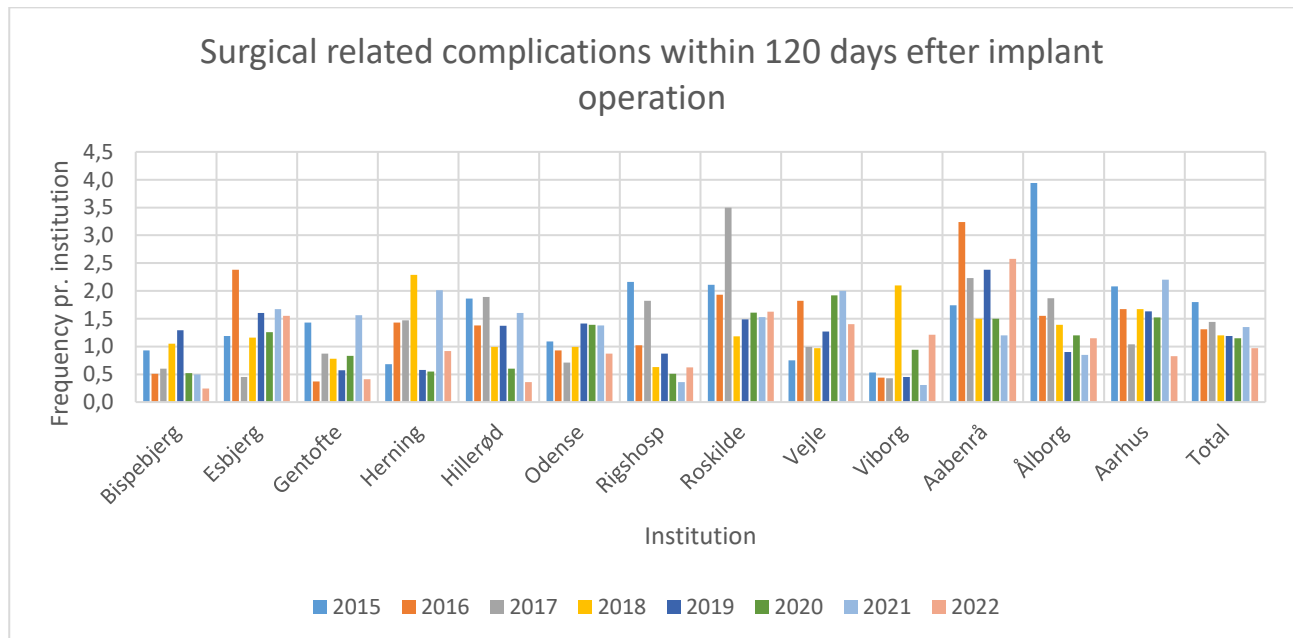


Figure 5.1 Major surgical complications within 120 days after implant operations in 2015-2022.

**Generator/lead related complications\* within 120 days after implant operation 2015 - 2022**

Frequency pr. institution

	Bispebjerg	Esbjerg	Gentofte	Herring	Hillerød	Odense	Rigshosp	Roskilde	Vejle	Viborg	Aabenrå	Ålborg	Aarhus	Total
2015	1.63	3.56	1.19	3.07	2.60	1.64	3.05	2.86	0.75	2.12	1.16	2.33	1.09	<b>2.00</b>
2016	0.51	7.54	1.46	1.08	2.07	1.39	2.30	2.54	0.36	1.32	0.00	0.56	1.75	<b>1.71</b>
2017	0.60	5.43	0.99	0.37	2.21	1.51	1.46	1.87	1.99	1.73	1.68	1.20	1.47	<b>1.54</b>
2018	1.57	3.09	0.78	1.96	1.32	1.07	1.88	2.13	4.22	0.84	1.00	0.83	1.39	<b>1.52</b>
2019	2.32	4.80	0.80	1.46	1.02	1.49	1.49	2.24	2.87	0.45	1.19	1.03	2.06	<b>1.69</b>
2020	0.26	2.52	1.03	1.93	1.21	1.31	1.78	0.60	0.32	0.63	0.50	1.44	1.52	<b>1.20</b>
2021	1.25	0.84	1.14	1.25	2.88	0.49	1.44	2.61	2.33	1.25	3.21	1.21	2.11	<b>1.58</b>
2022	1.23	3.88	1.03	0.92	1.43	1.51	2.13	2.71	1.05	0.00	1.29	1.84	1.74	<b>1.68</b>

Table 5.4 Generator/lead related complications within 120 days after implant operations in 2015-2022 (\*See Table 5.1 for definition of generator/lead related complications)

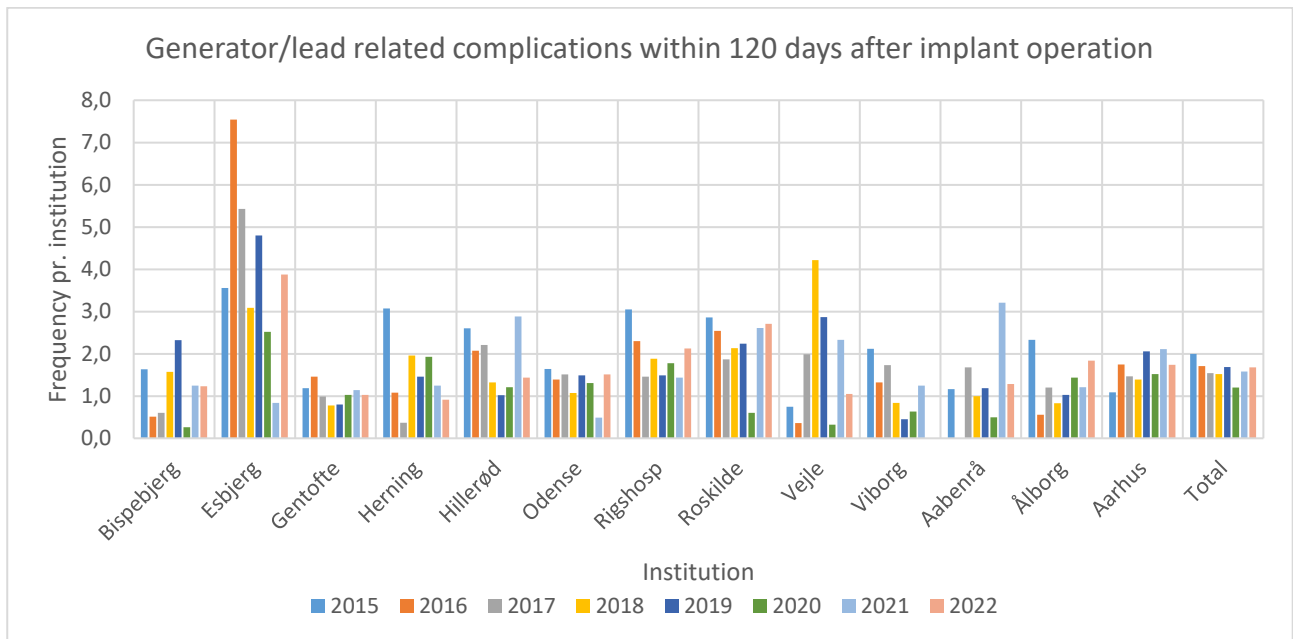


Figure 5.2 Generator/lead related complications within 120 days after implant operations in 2015-2022.

## 5.2 CIED infection

### 5.2.1 Removal of system due to infection up to 365 days after implant

#### Infection leading to removal of the CIED system within 365 days after implant operation in 2021

Infection type	Institution													Total
	Bispebjerg	Esbjerg	Gentofte	Herning	Hillerød	Odense	Rigshosp	Roskilde	Vejle	Viborg	Aabenrå	Ålborg	Aarhus	
Local pocket infection / Skin erosion		3	#	4	3	3	#	3	4		#	4	13	<b>41</b>
Systemic infection / endocarditis		#	14		#	7	3	5	3		#	#	12	<b>49</b>
All infections	0	4	15	4	5	10	5	8	7	0	#	5	25	<b>90</b>
Total number of operations	399	239	964	399	313	1231	835	1110	300	320	249	825	1091	<b>8275</b>
<b>Frequency of infection leading to removal of CIED system</b>	<b>0.00</b>	<b>1.67</b>	<b>1.56</b>	<b>1.00</b>	<b>1.60</b>	<b>0.81</b>	<b>0.60</b>	<b>0.72</b>	<b>2.33</b>	<b>0.00</b>	<b>0.80</b>	<b>0.61</b>	<b>2.29</b>	<b>1.09</b>

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn.

Table 5.5 Infection leading to removal of the CIED system within 365 days after implant operation in 2021.

### 5.2.2 Trends in CIED infection 2015 - 2021

#### Infection (either local pocket infection/skin erosion or systemic infection/endocarditis) leading to removal of the CIED system within 365 days after implant operation in 2015 - 2021

Frequency pr. institution	Institution													Total
	Bispebjerg	Esbjerg	Gentofte	Herning	Hillerød	Odense	Rigshosp	Roskilde	Vejle	Viborg	Aabenrå	Ålborg	Aarhus	
2015	0.70	0.00	0.60	0.34	0.37	0.66	1.15	0.75	0.37	0.00	0.58	1.02	1.72	<b>0.84</b>
2016	0.26	0.79	0.12	1.08	0.34	0.74	1.41	0.60	1.46	0.44	0.54	1.83	1.75	<b>0.98</b>
2017	0.60	0.45	0.62	1.83	0.63	0.71	1.09	0.87	0.99	0.43	1.12	1.47	0.61	<b>0.86</b>
2018	0.77	1.60	0.34	1.17	0.68	0.74	0.37	0.43	0.32	1.36	1.19	0.77	1.20	<b>0.75</b>
2019	0.77	1.26	0.72	1.10	0.30	1.08	0.89	0.40	0.96	0.31	0.50	0.36	2.14	<b>0.92</b>
2020	0.26	0.42	0.72	0.00	0.30	1.47	0.76	1.11	1.60	1.56	1.00	0.96	1.16	<b>0.97</b>
2021	0.00	1.67	1.56	1.00	1.60	0.81	0.60	0.72	2.33	0.00	0.80	0.61	2.29	<b>1.09</b>

Table 5.6 Infection (either local pocket infection/skin erosion or systemic infection/endocarditis) leading to removal of the CIED system within 365 days after implant operation in 2015-2021.

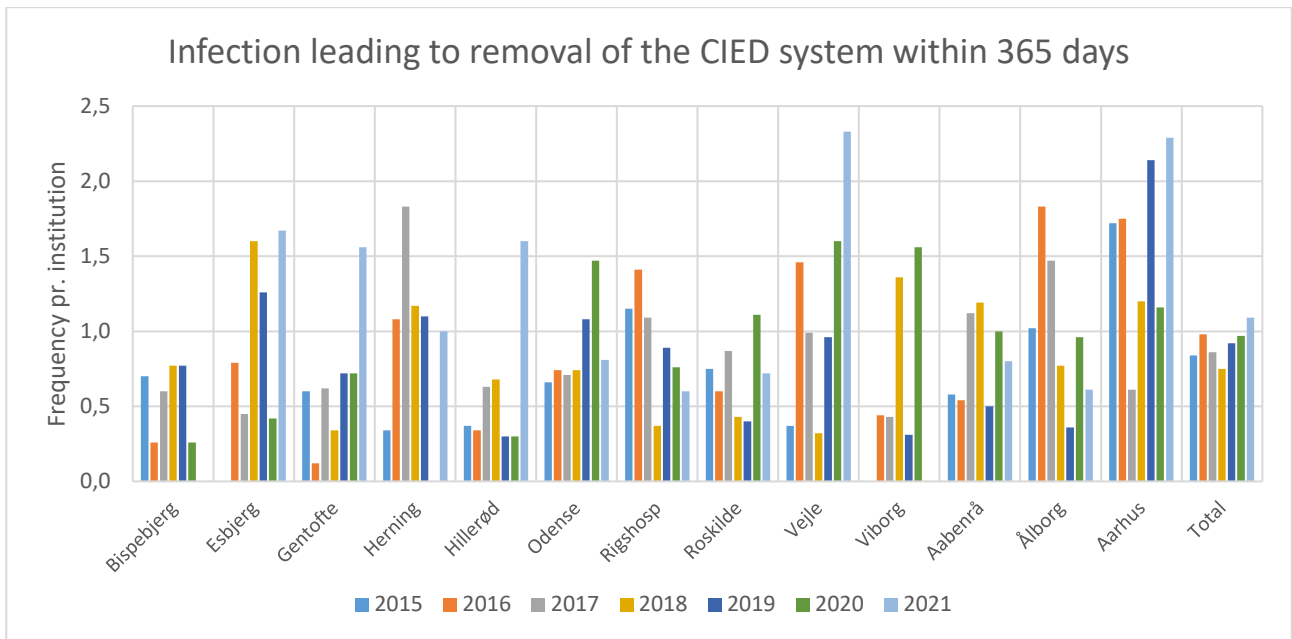


Figure 5.3 Infection (either local pocket infection/skin erosion or systemic infection/endocarditis) leading to removal of the CIED system within 365 days after implant in 2015-2021.

### 5.3 Lead access

#### 5.3.1 Ratio of cephalic vein cut-down to subclavian vein puncture in lead implants during first device implants

##### Lead access in first implants in 2022

Ratio of cephalic vein cut-down | subclavian vein puncture

Lead type	Institution													Mean
	Bispebjerg	Esbjerg	Gentofte	Herning	Hillerød	Odense	Rigshosp	Roskilde	Vejle	Viborg	Aabenrå	Ålborg	Aarhus	
Atrial	3.38	2.13	3.81	2.44	2.90	5.13	2.36	2.11	2.30	2.02	4.34	1.74	2.52	2.69
Right ventricular pace	3.91	2.28	3.99	2.64	3.88	5.49	3.51	2.14	2.66	2.35	4.05	2.47	2.69	3.00
Right ventricular defibrillation			7.46			5.47	4.00	2.94				1.75	2.40	3.45
Left ventricular pacing			0.03			1.03	0.05					0.05	2.27	0.57
<b>Total</b>	<b>3.66</b>	<b>2.21</b>	<b>3.64</b>	<b>2.55</b>	<b>3.46</b>	<b>4.24</b>	<b>1.95</b>	<b>2.20</b>	<b>2.49</b>	<b>2.22</b>	<b>4.18</b>	<b>1.72</b>	<b>2.53</b>	<b>2.66</b>

Table 5.7 Ratio of cephalic cut-down to subclavian vein puncture in lead access during first device implant in 2022

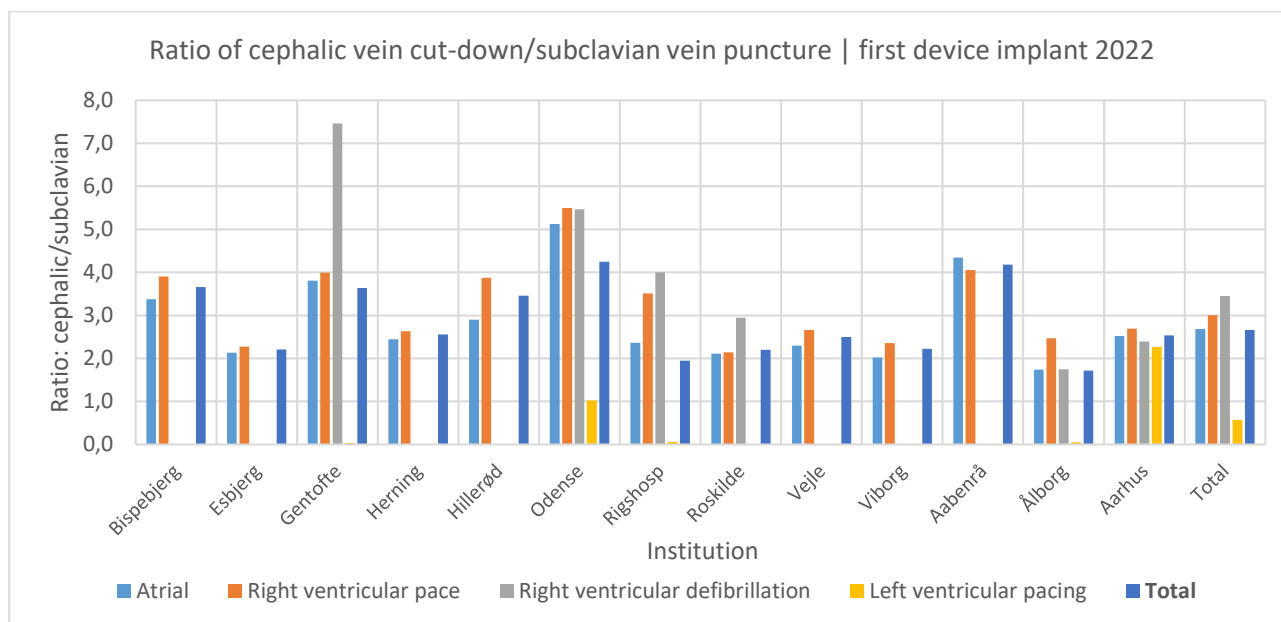


Figure 5.4 Ratio of cephalic cut-down to subclavian vein puncture in lead access during first device implant in 2022

### 5.4 Operator experience

#### 5.4.1 Number of operators fulfilling annual operator experience as recommended by the Danish National Board of Health

##### Operators fulfilling recommended annual operator experience out of total number of operators

(Figure in brackets denotes number of operators in training)

Device type	Institution												
	Bispebjerg	Esbjerg	Gentofte	Herning	Hillerød	Odense	Rigshosp	Roskilde	Vejle	Viborg	Aabenrå	Ålborg	Aarhus
Pacemaker, ≥50/year	3/4	2/3	8/8	3/3	3/3	7/9(2)	3/5	6/6	5/5	4/4	3/3	6/6	7/8(1)
ICD, ≥50/year	-	-	3/5	-	-		3/5	4/6	-	-	-	#	3/7
Biventricular device, ≥25/year	-	-	#	-	-	4/8(2)	4/5	-	-	-	-	3/6	5/7

#Resultater baseret på få patientforløb er fjernet af diskretionshensyn. Table 5.8 Number of operators fulfilling annual operator experience in 2022 as recommended by the Danish National Board of Health

## 6 Regionale kommentarer til årsrapporten 2022

### **Region Hovedstaden**

Ikke modtaget kommentarer.

### **Region Sjælland**

Ingen kommentarer til årsrapporten.

### **Region Syddanmark**

Ikke modtaget kommentarer.

### **Region Midtjylland**

Ingen kommentarer til årsrapporten.

### **Region Nordjylland**

Ikke modtaget kommentarer.