KAROLINSKA HOSPITAL
DEPARTMENT OF CARDIOLOGY
SWEDEN

ANNUAL STATISTICAL REPORT 2018

SWEDISH ICD & PACEMAKER REGISTRY

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Foreword

We are proud to present the annual report for 2018 regarding Pacemaker and ICD usage in Sweden. We have over the last years focused on reporting data on longevity of devices, leads and complications to pacemaker and ICD surgery.
We have also increased the data collected regarding lead extractions which is rapidly increasing in Sweden with an increased number of centres, now four major centres, Uppsala, Stockholm, Lund and Göteborg.
Complications are shown for each type of implantation on a national basis, for a specific region and each hospital.
There is an ongoing discussion regarding concentration of therapy to fewer centres to improve outcomes by increasing the numbers of procedures per operator. To aid in this transformation we publish data on all individual implanters.
The annual report contains data from all implanting hospitals and > 95% of all procedures are reported when validated against the Patient care registry from The National Board of Wellfare, Socialstyrelsen, in our annual validation process.

Implant rates Pacemaker

There are now more than 10 million inhabitants in Sweden and 56175 pacemaker patients in Sweden at the end of 2018.
As always there are regional differences in implant rates with the highest implant rates in the large northern region of Västernorrland. Lowest are South Eastern region and Stockholm. Stockholm has a low implant rate due to a younger population than the national average.
The overall implant rate has increased somewhat from 2017 to 2018, 689 to 719 new implants per million.
The total number of first implants increased to 7278 pacemakers.
The number of implanting hospitals increased with one new, Helsingborg to 44 centres.

Age and Gender distribution of pacemaker treatment

The average age for females receiving pacemaker treatment is 77 years and males 76 years and 3 patients over 100 years of age received primary implants. There is a male predominance with 60% of the new implants going to male patients but generator changes are more common in females due to the higher average survival of females in the country. There is no change in this distribution compared to previous years.

Pacemakers and leads

The manufacturers # shares of the market show only slight redistribution and all regions are bound by tenders for 1-3 years. St Jude Medical is now Abbot and again largest with 49%, and Medtronic with the brand Vitatron is now down to second place with 20% market share. Boston Scientific has decreased its market shares to 10% in brady segment. Biotronik is still increasing and now up to 18% and Sorin is almost out with 0,5% of the market.
Right side pacemaker leads are now solely bipolar. Active fixation is used to 99% in the atrium and 94% in the ventricle. We have now active fixation LV leads and their market share is increasing with 27% of the LV leads being active fixation. Quadripolar lead technology for CRT has rapidly increased and 82% of the LV leads are now quadripolar, an increase from 70% in 2017.
16307 leads were implanted all together.
Only a small number of epicardial systems are implanted in small children and patients without venous access and in some CRT patients. Venous access is cephalic cut-down technique, 50%, and direct subclavian puncture 34% and 15% axillary punction which has increased as an access route.
The leadless pacemaker systems are new in clinical use and Medtronic Micras were implanted in 19 patients in 2018, the same number as in 2017.

Pacemakers

All pacemakers implanted have RR capability and DDD-R is the most common subtype with 78% of all implanted pacemakers, SSI 16% and CRT-Ps are used in small numbers, 6%.
The rate of MRI safe systems increases rapidly, approximately 90% of the systems implanted are MRI safe. The trend from the manufacturers to label older leads together with new pulse generators as MRI safe has made it difficult to keep correct track of the actual percentage.
The most common aethiology for pacemaker treatment is still the “conductive tissue fibrosis” 77% and ischaemic disease is more common in males, 7% vs 4%. The usage of the term “conductive tissue fibrosis” is most probably too high and only represents a lack of proper diagnosis when entering registry data. System upgrade is at a steady state, especially in brady-paced patients with heart failure and 2018 a total of 273 patients were upgraded from normal brady pacing to CRT compared to 221 in 2017.
The most common symptom is syncope followed closely by dizziness and dyspnea. ECG indications are 2018 as before mainly related to sinus node disease with AV conduction disorders second. Sinus node disease is slightly more common as an indication in women than in men.
Smaller hospitals tend to use VVI-R pacing more often than larger hospitals for AV-block and SSS.
Generators used to ERI criteria are fulfilled in 66% of the cases and 0,6% exhibit premature EOL.
Lead failures are uncommon and survival rates are very good with a 10 year survival of 98%.

Implanting organisation

The number of procedures for each implanter vary to a large extent between hospitals. Recommendations as to minimum number of procedures from EHRA is not routinely followed especially regarding CRT implantation. A recommendation to implant volumes was made by the Swedish Cardiology Society #s Arrhythmia Group in 2016 and has so far had no impact on the organization in hospital with low individual implant numbers.

Implant rates ICD

There are 11679 active ICD patients in Sweden 2018 and this is a >1% increase over 2017. The number centers implanting ICDs is 32 and represents roughly 2/3 of the PM implanting centers although 7 centers do <20 implants per year, well below recommendations by ESC and the Swedish national society. The national implant rate is slightly higher in 2018 than 2017 144 vs 139 per million. Implant rates show the same regional differences as in pacemakers with the highest rates in the north, 221 in Västerbotten and the lowest in the Western region with 100 per million.
Primary prevention stand for roughly 67% of all implants. The implant rates for primary prevention varies much more than total implant with rates in the range 31-177 per million.
About 38 % of the ICD procedures are replacements but could be expected to go down with generators now showing increased longevity.
As with PM the regions are bound by ICD purchasing tenders and manufacturers share shows only slight variations over previous year. SJM is the largest with 42% market share, Medtronic second with 40% and Boston 15%. Biotronic is smallest with 4% market share.

ICD Subtypes and leads

92% of the leads are now single coil and 99% were active fixation. An increase in single coil use from 65% in 2015. Venous access is comparable to PM implants with an equal distribution between cephalic cut-down and direct subclavian puncture. Subtypes are 37% DDDR devices, 27% VVIR and 34% CRT-D devices.
A small number of S-ICD devices were implanted, 14, but numbers are not increasing.
Only 62% of the ICD's are used until normal EOL/ERI, 11% are changed due to system upgrade, usually to a CRT system. Technical recalls stand for 1,2% of all box changes and premature EOL is 3,4%.
ICD leads display larger failure rates compared to pacemaker leads but overall longevity is still good.
Specific statistics for Sprint Fidelis, Riata and Durata leads are displayed in the quality section.

The number of procedures per operator shows the same large variation in volumes as with pacemaker procedures at different hospitals and some are clearly below recommended volumes.

ICD Patients

The average age for ICD implant is stable at 65 years in males and 63 years in females for all types of implants, unchanged from previous years. 72 patients in the age group 80-89 received a first ICD implants of which 20 were primary prevention.
Aethiology was ischaemic heart disease in 56% of all patients but more common in males, 68% vs 32% in females. Medication at the start of therapy is displayed in tables.

CRT implant rates

Implant rates of CRT system are only increasing slowly in Sweden, 58 per million CRT-Ds and 60 per million CRT-Ps new implants. The number of CRT-P systems is slowly increasing in share and vary between regions.
The number of centres performing CRT implantations is less than the number doing ICDs, 22 vs 32. The number of CRT procedures per implanter range from 1-63 and only 3 implanters performed >50 implants and 15 implanters out of 72 perform > 20 implants per year which is the recommended minimum.
The failure rate at implant is according to the registry 5% but this is most likely an underestimation when compared to the literature.

CRT patients

The average age of CRT-P patients at first implant is 77 y and CRT-D patients 68 years with a large male predominance, the same as last year. The number of CRT implants in elderly patients is clearly increasing with 246 systems in patients 80-89 years and 8 in patients >90 years.
Medication for patients receiving CRT for the first time is given in tables.

ILR

A total of 1007 ILRs were implanted in Sweden 2018 is up from 947 in 2017 with the main indication being dizzy spells and syncope. The distribution between sexes is equal.
At the end of the ILR investigation period 65% of the patients were found to have a PM indication and 5% an ICD indication, the rest showed no pathological rhythm during the FU. In 6% a new ILR was implanted to extend the monitoring period.

Quality of device treatment, pacemakers, pacing modes

In high degree AV block only 5% of the patients receive VVI-R systems on average but to a higher degree, 9%, in small hospitals.

The use of pacing mode in sinus node disease shows 5% VVI-R systems on average and the same in small and large hospitals.

Lead extraction

The numbers of lead extractions are increasing and there are now 5 centers performing regular assisted lead extraction. Karolinska, 193 leads, Sahlgrenska 114 leads, Lund 101 leads, Uppsala 67 leads and Linköping 23 leads. The numbers are expected to increase further in 2020.
The most common reason is infection. Preventive extraction of leads with problems such as Medtronic Sprint Fidelis and SJM Riata is also performed in a lower number of cases in 2018 than before, due to decreasing numbers of leads still in use.
Methods and success rates are displayed for those hospitals that have complete reporting.

Complications Pacemaker

The total complication rate for pacemaker procedures is 4,4% vs 4,3% in 2017 with lead dislodgement being the most common. Passive atrial leads show the highest dislodgement rate with 4% vs 1.7 for active fix atrial leads. SC leads show the same tendency with 2,1% dislodgement for all passive types and 0,7% for the Medtronic screw-in type SC lead.

Infection rates are given as 0.5% in first implants, 1,8% in generator changes and 1,2% in upgrades to CRT systems.
There is a variation among the operating hospitals with possible under-reporting in many cases. Hospitals that have registered <3% in total complication can be regarded as not having complete registration. This is based on literature regarding pacemaker procedure complications with a common rate of 5-15%.

Complications and gender

Infections are more common during generator changes than new implants and most common in CRT system changes. In PMR female sex is associated with less complications of all types but perforation and pneumothorax. This is different from the literature that usually has an overrepresentation of females in all types of complications.

Complications ICD

The overall complication rate to ICD treatment is 7,3% and is up slightly from 6,4% in 2017.
The most common complication is lead dislodgement 2,8% followed by infection with 1,5% in first implants, 2,3% in generator changes and 1,6% in upgrades to CRT systems.

The rate between hospitals is also given in tables and as with pacemaker treatment, <3% is considered incomplete registration.

Complications CRT

This is presented both as CRT-D and CRT-P complications. Both values, 6,6% and 4,4% are very low and do not compare well with literature findings of up to 15% complications.
Most common is as with ICDs and PMs lead dislodgement 1.9% vs 2.8% for CRT-P and CRT-D. Most commonly it is the sc lead that dislodges.

Procedures

Duration of fluoroscopy and procedure times are given for all types and hospitals in tables. The procedures that have been performed in less than 10 at different sites are marked as not reliable for comparison.
A single chamber device as a mean takes 37-46 minutes to implant VVI and AAI systems, and a dual chamber device 48 min and a CRT system 88 min on average.

Device longevity ICD and PM

Generators generally have very good longevity with an average for Pacemakers of 99.4% after 5 years and 60% after 10 years but there are large differences between models and manufacturers. The survival rates are calculated on implants performed after 2006. Each model is given in the tables.
Pacemaker lead survival is very good with a survival rate of 98,3% after 10 years with very little difference between models. Only one of the standard leads is showing slightly lower values, the Boston 4470 Fineline lead with 94% 10 year survival.
ICD generator survival is more heterogenous than PM generator survival with larger differences between manufacturers and models and an average of 96% after 5 years and 19% 10 year survival based on implants after 2006.

SJM Fortify and Unify were identified as problem generators in 2014 in our registry, long before the SJM alert and survival curves were given for each model.
ICD lead survival is also shorter than pacemaker lead survival, 97% vs 99% after 10 years based on implants after 2006 and including Sprint Fidelis and Riata leads.
The Medtronic Sprint Fidelis models were implanted in 903 cases in Sweden and the survival rate is 67% after 10 years and has decreased rapidly as expected from previous year.

In the St Jude Riata models failures are increasing and 10 year survival is now down to 73%, down from 77% in 2016.
Biotronik Linox leads are 93% at 5 years and no values are available yet for 10 year survival of these leads in Sweden.

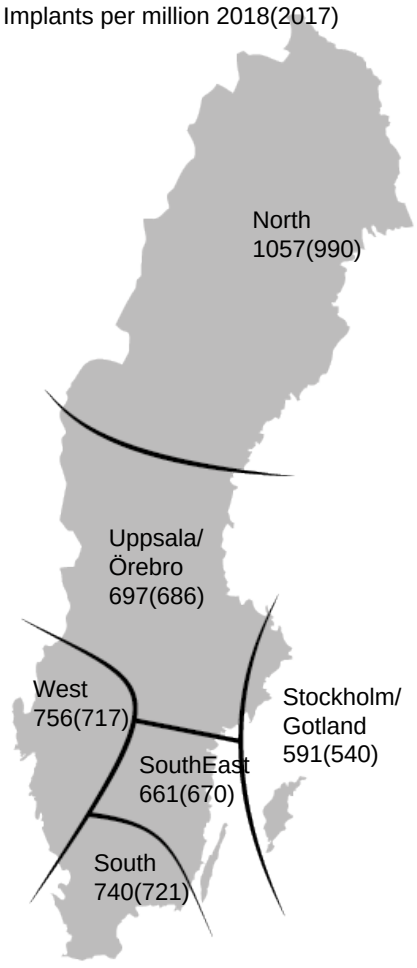
Patients

The ICD patient survival is 68% after 5 years for ICD patients vs 70% for pacemaker patients.
The ten year survival for PM patients is 45% and 52% for ICD patients.
The heart failure patients treated with CRT have also the shortest expected survival rate among the PM and ICD patients.
CRT-P patients have a 65% 5 year survival and CRT-D patients 33.3%.
Ten year survival is 35% for CRT-P patients and 30 for CRT-D patients.
One-year mortality is 9.1 % in PM patients, 4.4 % in ICD patients, 12.1 % in CRT-P patients and 5.4 % in CRT-D patients.

Fredrik Gadler
Manager Swedish National ICD and Pacemaker Registry

The regions are based on where the patients live, not where they are treated

Region	Population	No of first impl	No per million	Active patients
Stockholm/Gotland	2366738	1398	591	11529
Uppsala/Örebro	2082515	1451	697	12314
South-East Sweden	1058269	700	661	5374
Southern Sweden	1837468	1360	740	10111
Western Sweden	1879718	1422	756	10776
Northern Sweden	895534	947	1057	6071
Total	10120242	7278	719	56175



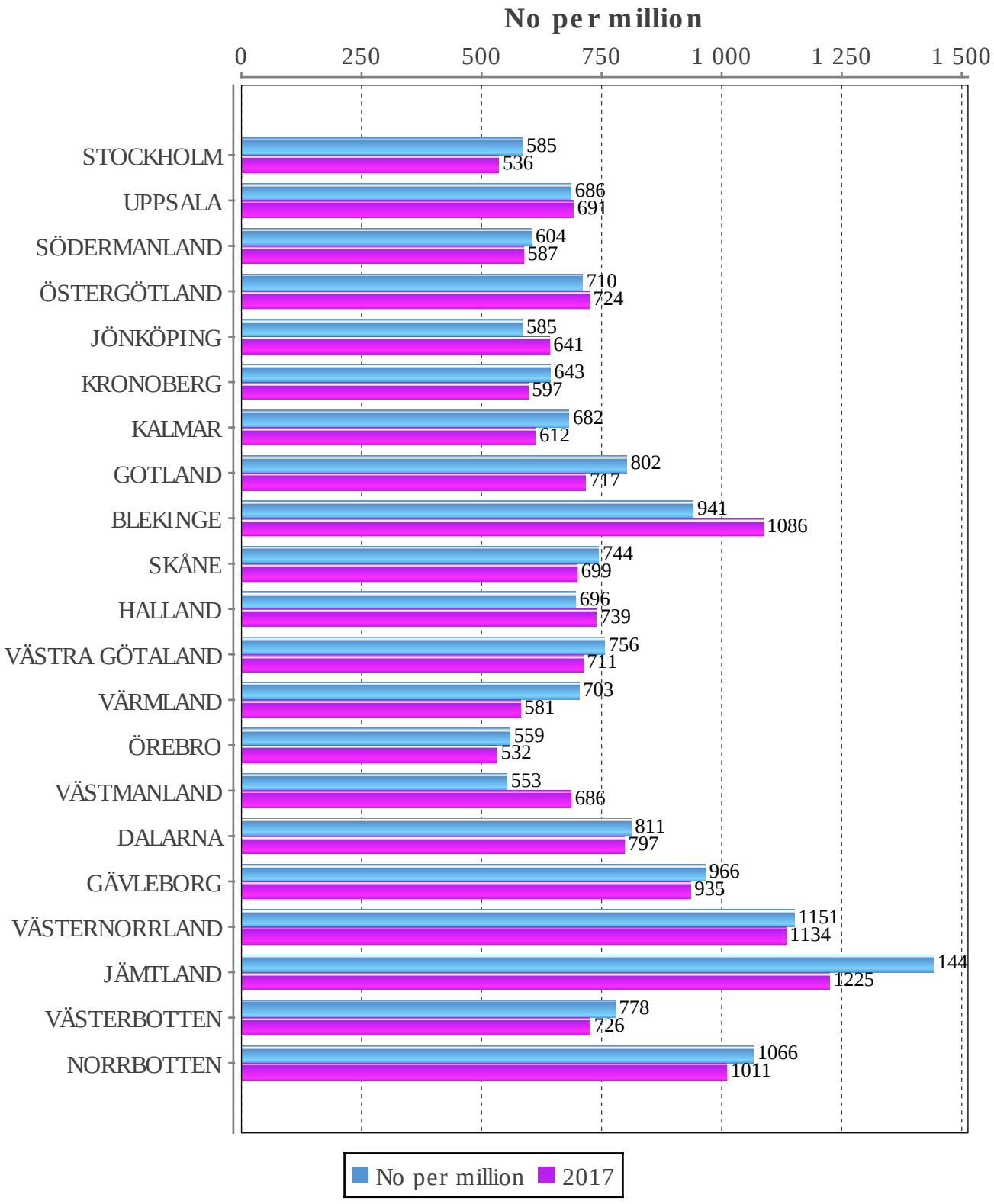
First implants per hospital

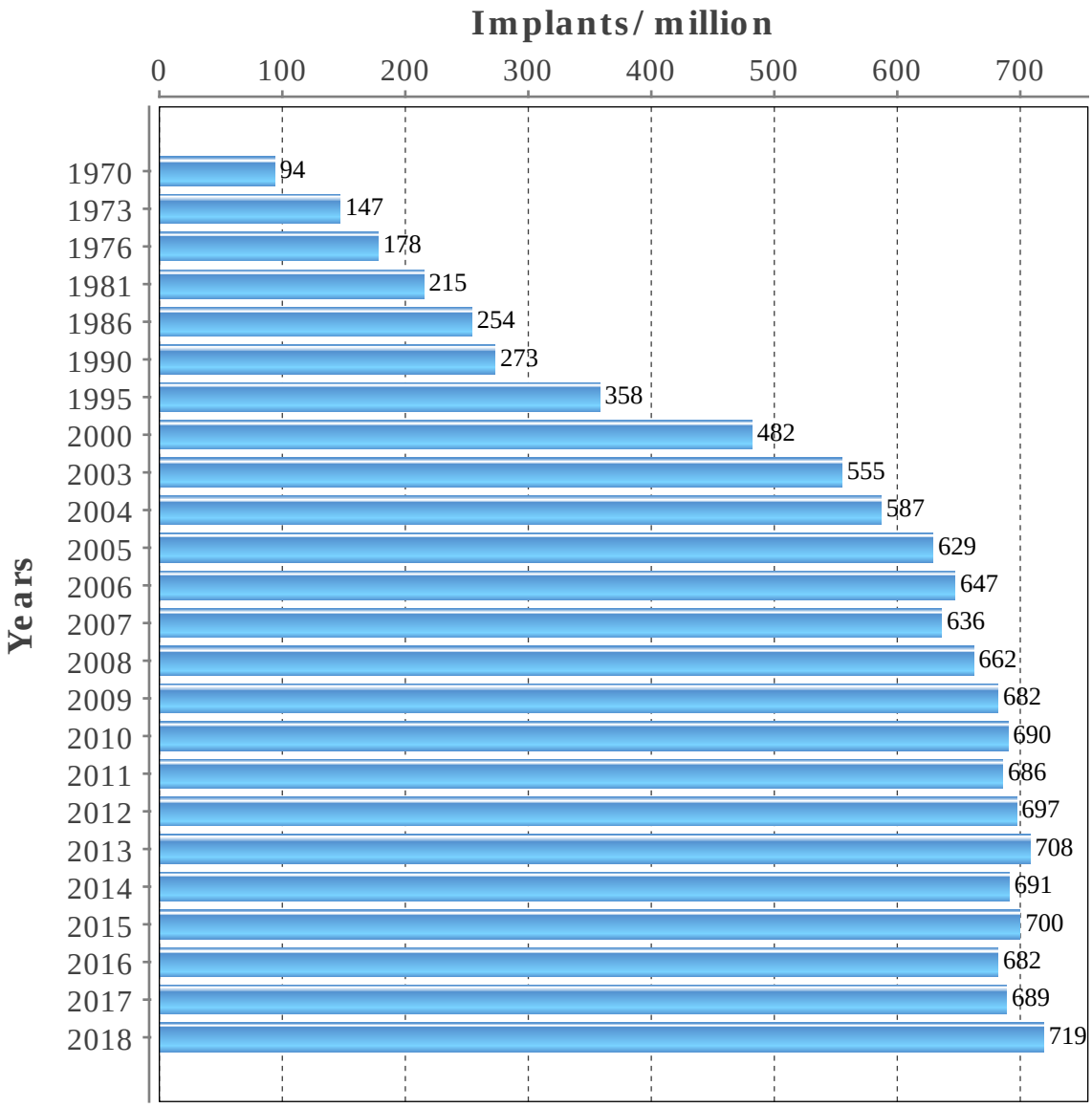
Region	Hospital	2018	2017
Northern Sweden	Norrlands Universitetssjukhus	187	162
	Skellefteå lasarett	52	54
	Sollefteå sjukhus	14	15
	Sunderby sjukhus	254	246
	Sundsvalls sjukhus	202	205
	Örnsköldsviks sjukhus	55	64
	Östersunds sjukhus	182	172
Southern Sweden	Blekingesjukhuset	158	180
	Centrallasarettet Växjö	122	117
	Centralsjukhuset Kristianstad	231	228
	Helsingborgs lasarett	224	38
	Länssjukhuset Halmstad	98	106
	Skånes universitetssjukhus, Lund	338	431
	Skånes universitetssjukhus, Malmö	236	268
	Varbergs sjukhus	119	117
South-East Sweden	Linköpings Universitetssjukhus	373	365
	Länssjukhuset Kalmar	106	85
	Länssjukhuset Ryhov	190	204
	Oskarshamns sjukhus	9	18
	Västerviks sjukhus	47	41
Stockholm/Gotland	Danderyds sjukhus	408	367
	Karolinska Universitetssjukhuset	417	363
	St Görans sjukhus	262	298
	Södersjukhuset	297	253
	Visby lasarett	26	25
Uppsala/Örebro	Akademiska sjukhuset	295	286
	Arvika sjukhus	1	4
	Centralsjukhuset Karlstad	154	125
	Centralsjukhuset Västerås	121	174
	Falu lasarett	230	224
	Hudiksvalls sjukhus	74	53
	Länssjukhuset Gävle	198	205
	Mälarsjukhuset	162	156
	Torsby sjukhus	36	28
	Universitetssjukhuset Örebro	196	169
Western Sweden	Alingsås lasarett	50	69
	Drottning Silvias Bus	10	11
	Kungälvs sjukhus	83	85
	Sahlgrenska Universitetssjukhuset	459	362
	Sahlgrenska Universitetssjukhuset /Östra	60	70
	Skaraborgs sjukhus Skövde	224	220
	Södra Älvsborgs sjukhus	202	162
	Trollhättan, NÄL	230	247

STATISTICS – PACEMAKER – IMPLANTS PER COUNTY

The regions are based on where the patients live, not where they are treated

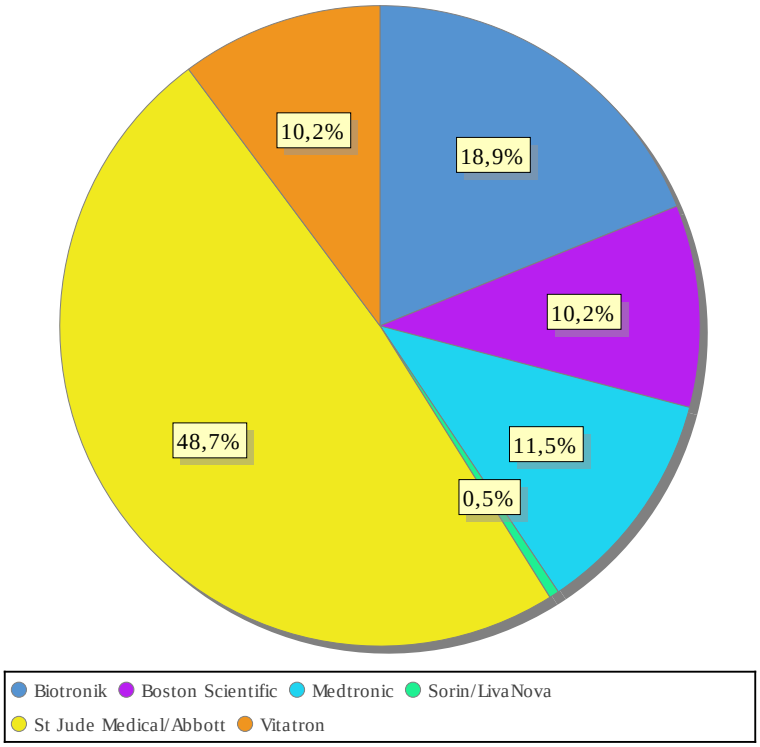
County	Population	No of first	No per million	Active patients
STOCKHOLM	2308143	1351	585	11082
UPPSALA	368971	253	686	2143
SÖDERMANLAND	291341	176	604	1694
ÖSTERGÖTLAND	457496	325	710	2494
JÖNKÖPING	357237	209	585	1738
KRONOBERG	197519	127	643	767
KALMAR	243536	166	682	1142
GOTLAND	58595	47	802	447
BLEKINGE	159371	150	941	999
SKÅNE	1344689	1000	744	7656
HALLAND	324825	226	696	1718
VÄSTRA GÖTALAND	1690782	1279	756	9746
VÄRMLAND	280399	197	703	1578
ÖREBRO	298907	167	559	1551
VÄSTMANLAND	271095	150	553	1492
DALARNA	286165	232	811	1832
GÄVLEBORG	285637	276	966	2024
VÄSTERNORRLAND	245968	283	1151	1771
JÄMTLAND	129806	187	1441	738
VÄSTERBOTTEN	268465	209	778	1608
NORRBOTTEN	251295	268	1066	1954
Total	10120242	7278	719	56174


No per million
0
250
500
750
1 000
1 250
1 500
STOCKHOLM
585
536
UPPSALA
686
691
SÖDERMANLAND
604
587
ÖSTERGÖTLAND
710
724
JÖNKÖPING
585
641
KRONOBERG
643
597
KALMAR
682
612
GOTLAND
802
717
BLEKINGE
941
1086
SKÅNE
744
699
HALLAND
696
739
VÄSTRA GÖTALAND
756
711
VÄRMLAND
703
581
ÖREBRO
559
532
VÄSTMANLAND
553
686
DALARNA
811
797
GÄVLEBORG
966
935
VÄSTERNORRLAND
1151
1134
JÄMTLAND
144
1225
VÄSTERBOTTEN
778
726
NORRBOTTEN
1066
1011
No per million
2017


Implants/ million
0
100
200
300
400
500
600
700
Years
1970
1973
1976
1981
1986
1990
1995
2000
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
94
147
178
215
254
273
358
482
555
587
629
647
636
662
682
690
686
697
708
691
700
682
689
719

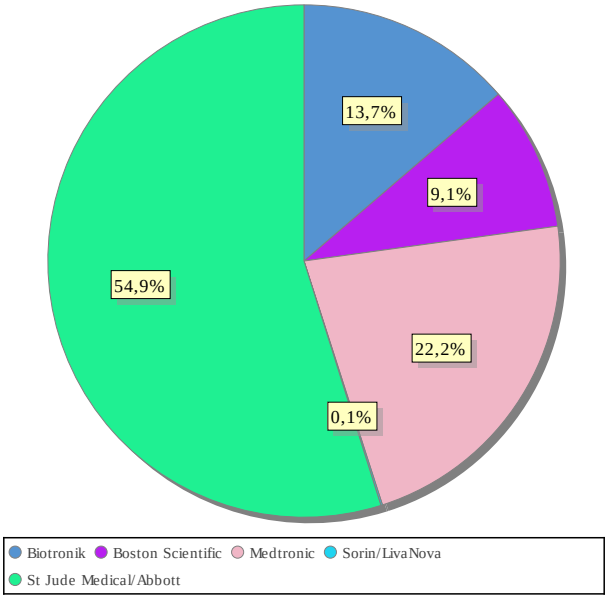
Market share per manufacturer in Sweden. Medtronic and Vitatron regarded as separat companies

Manufacturer	2015 %	2016 %	2017 %	2018 %
Biotronik	6.5	10.0	14.4	18.9
Boston Scientific	14.8	18.8	14.7	10.2
Medtronic	22.0	21.2	19.6	11.5
Sorin/LivaNova	5.7	2.0	1.4	0.5
St. Jude Medical	36.2	41.2	45.4	48.7
Vitatron	15.9	6.9	4.6	10.2
Nayamed International	0.1	-	-	-
Impulse Dynamics	-	-	-	-



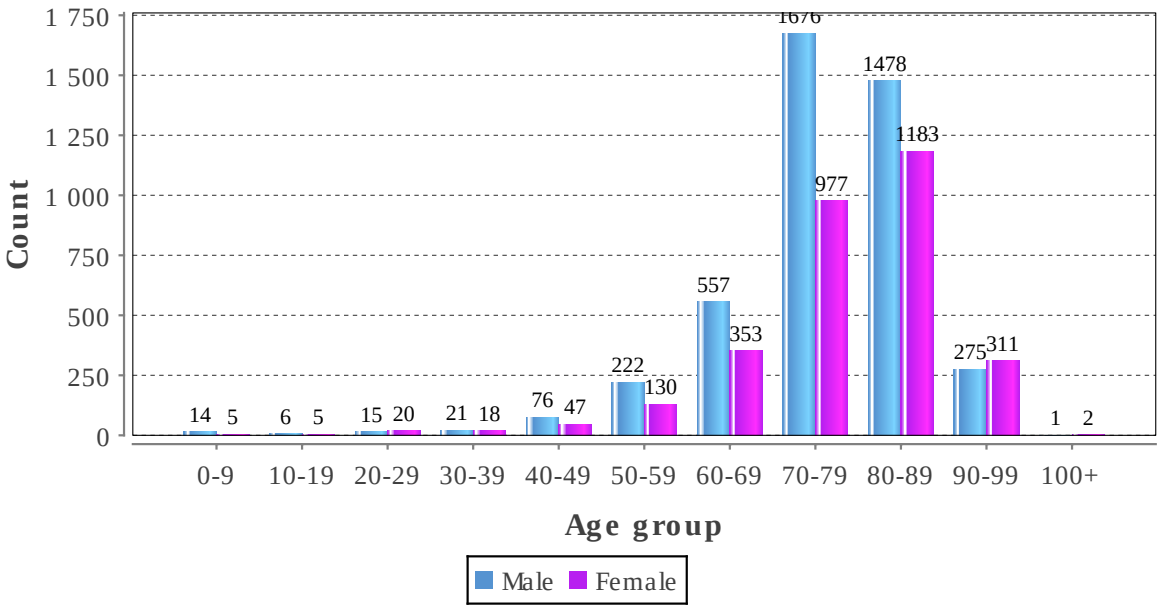
Market share per manufacturer in Sweden. Medtronic and Vitatron regarded as separat companies. From 2011 even including leads implanted in ICD systems.

Manufacturer	2015 %	2016 %	2017 %	2018 %
Biotronik	5.7	6.6	9.8	13.7
Boston Scientific	14.2	17.0	13.6	9.1
Medtronic	30.4	23.1	22.7	22.2
St. Jude Medical	49.5	52.9	53.5	54.8
Vitatron	0.1	0.2	0.2	-
Sorin/LivaNova	0.1	0.2	0.2	0.1



Age and gender distribution for new implants, total numbers

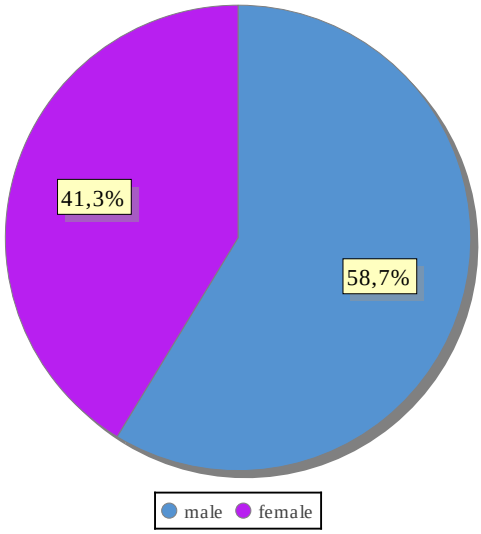
Age (years)	Total no	%	Male	Female
0-9	19	0.3	14	5
10-19	11	0.1	6	5
20-29	35	0.5	15	20
30-39	39	0.5	21	18
40-49	123	1.7	76	47
50-59	352	4.8	222	130
60-69	910	12.3	557	353
70-79	2653	35.9	1676	977
80-89	2661	36.0	1478	1183
90-99	586	7.9	275	311
100+	3	0.0	1	2
Average age	76	0.0	76	77
				Total number of implants: 7392



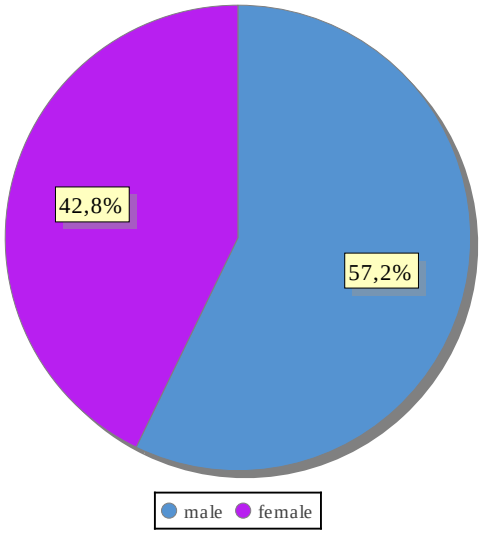
Ratio of new implants versus generator changes

	Total		Male		Female	
	no	%	no	%	no	%
First implant	7392	72.8	4341	58.7	3051	41.3
Replacement	2766	27.2	1582	57.2	1184	42.8
Total	10158	100.0	5923	58.3	4235	41.7

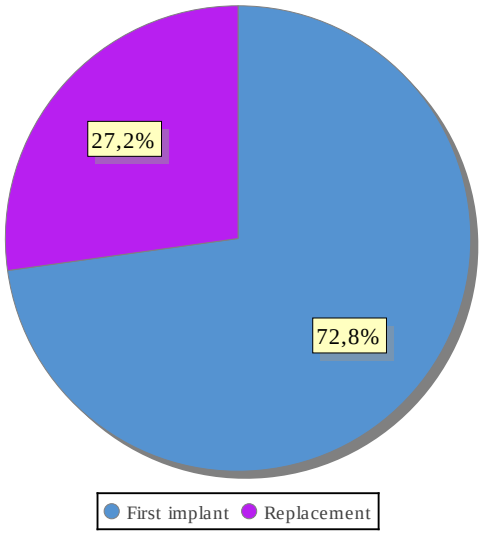
First implant



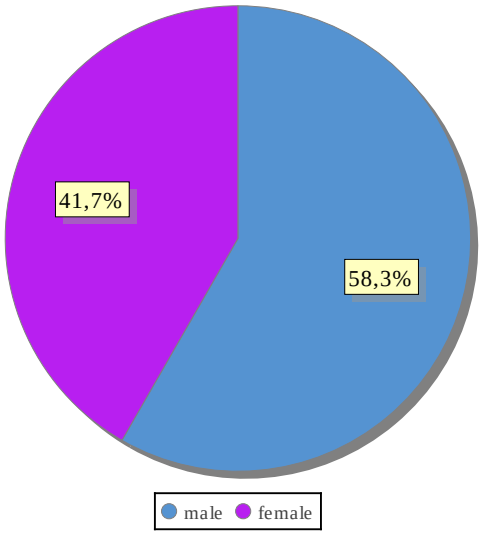
Replacement



Replacement ratio



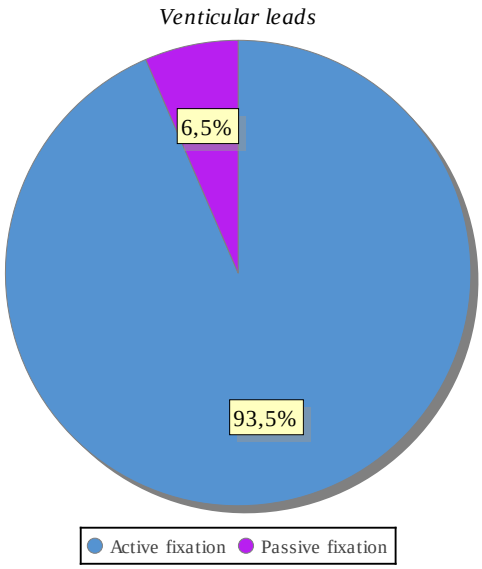
All implant

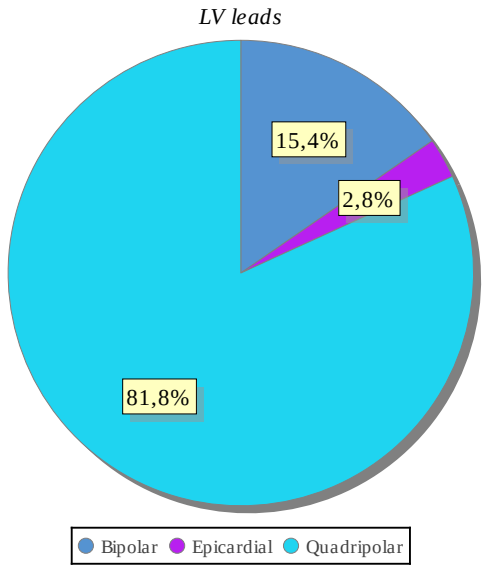


Lead type distribution for atrial and venticular use for first implants and replacements including all pace leads, pace and ICD systems

	Atrial		Venticular		LV-lead	
	no	%	no	%	no	%
Bipolar	7236	99.6	7686	99.4	201	15.4
Epicardial	29	0.4	43	0.6	36	2.8
Unipolar	1	-	-	-	-	-
Quadripolar	-	-	5	0.1	1070	81.9

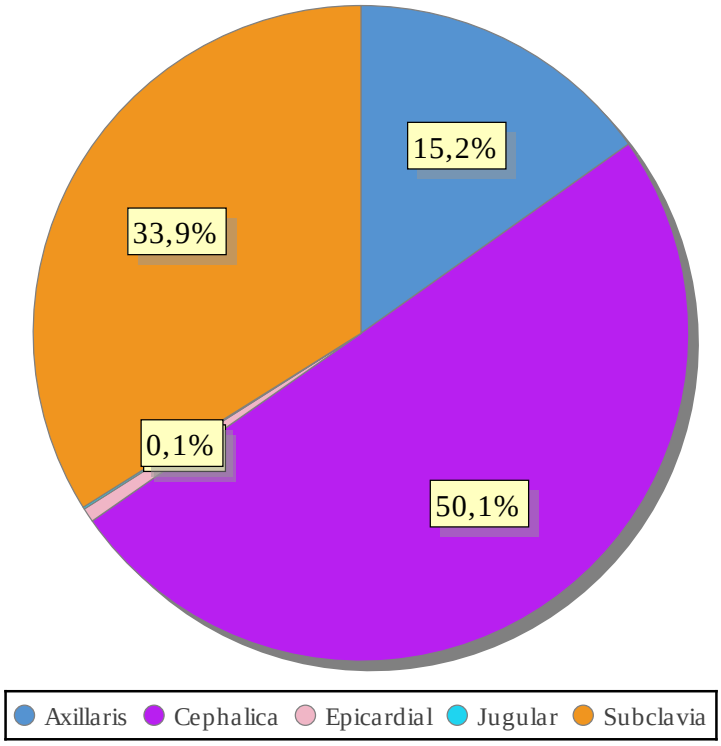
	Atrial		Venticular		LV-lead	
	no	%	no	%	no	%
Active fixation	7259	99.9	7231	93.5	357	27.3
Passive fixation	7	0.1	503	6.5	950	72.7
					Total number of leads: 16307	





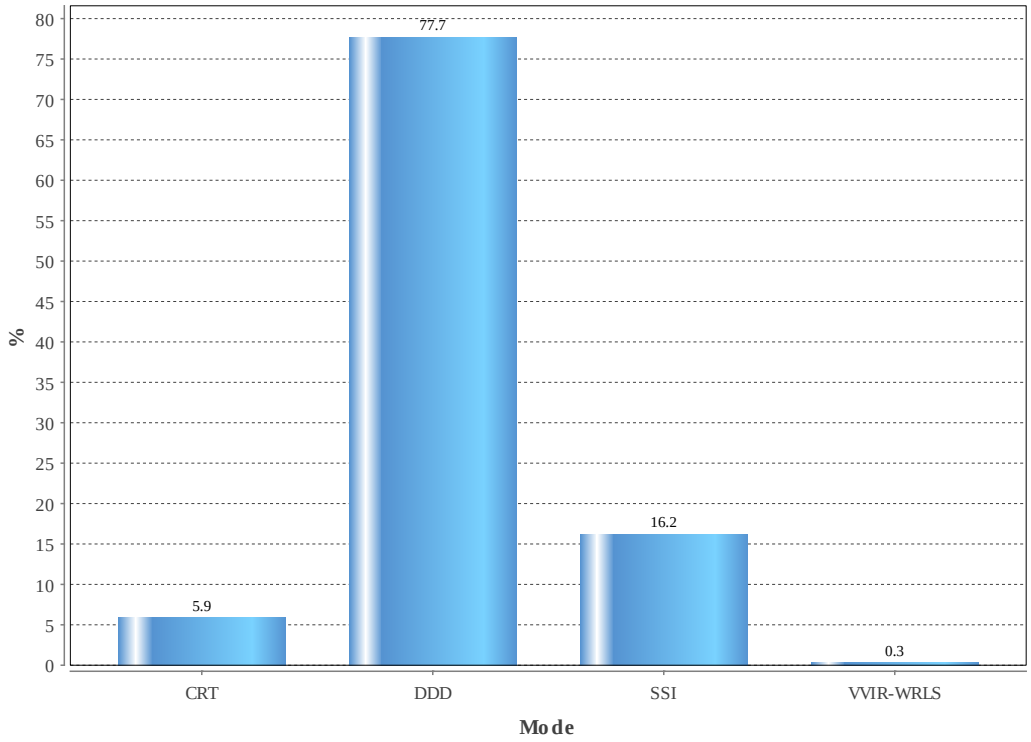
Venous access for first implants and replacements, all types of pace leads.

Lead access	No	%
Axillaris	2471	15.2
Cephalica	8176	50.1
Epicardial	111	0.7
Jugular	11	0.1
N/A	3	0.0
Other	3	0.0
Subclavia	5532	33.9



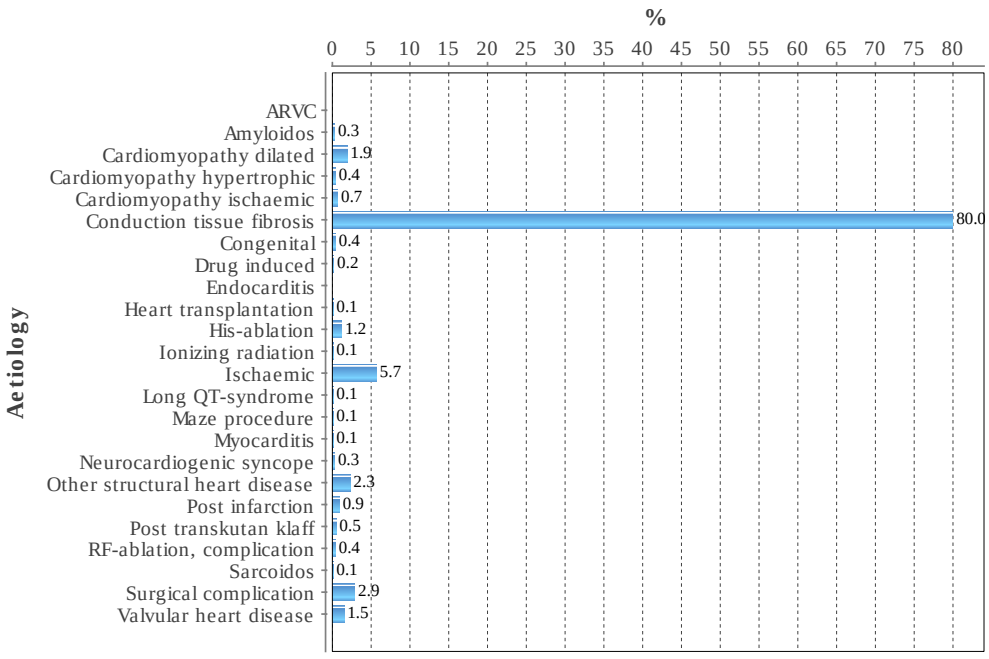
Implants by subtype (WRLS: wireless)

Mode	%	No
CRT	5.9	436
DDD	77.7	5740
SSI	16.2	1197
VVIR-WRLS	0.3	19
Total number of first implants 7392		



Main aetiology for implanting pacemakers

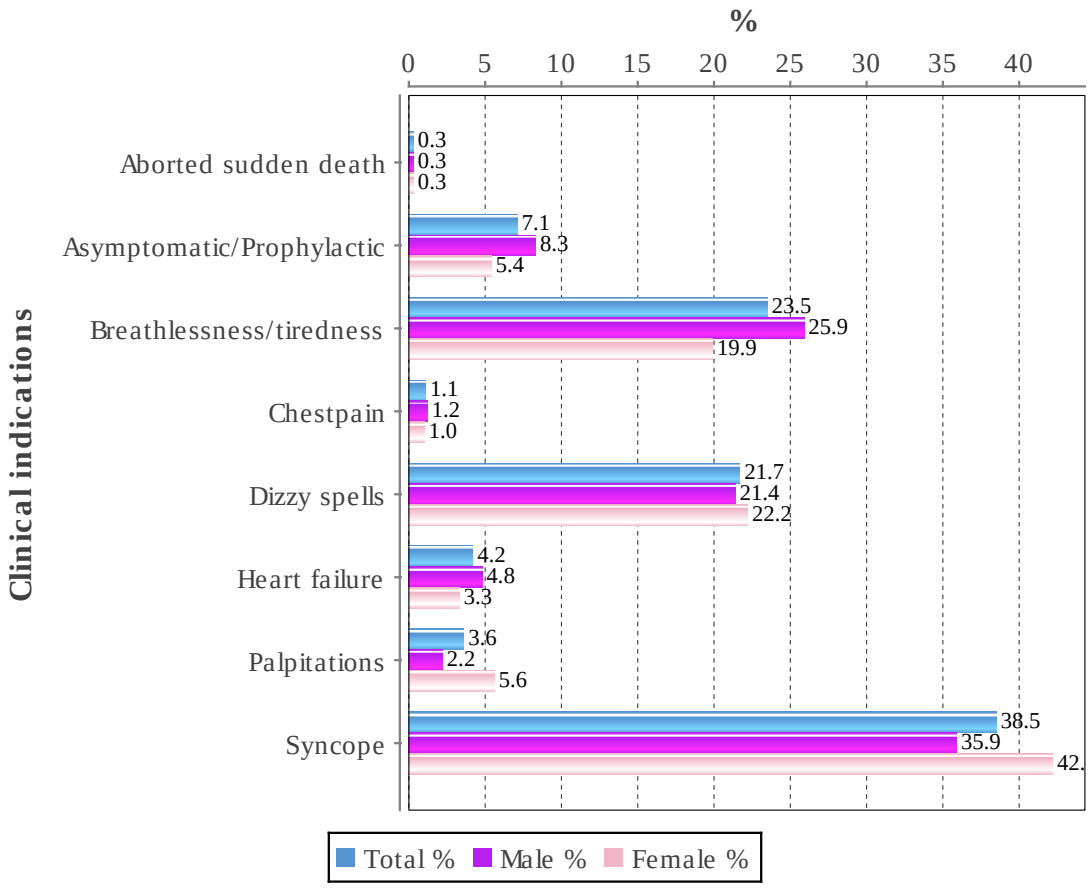
Aetiology	Total %	Male %	Female %
ARVC	0.0	0.0	0.0
Amyloidos	0.3	0.4	0.0
Cardiomyopathy dilated	1.9	2.0	1.8
Cardiomyopathy hypertrophic	0.4	0.3	0.4
Cardiomyopathy ischaemic	0.7	0.9	0.4
Conduction tissue fibrosis	80.0	78.3	82.4
Congenital	0.4	0.4	0.3
Drug induced	0.2	0.1	0.3
Endocarditis	0.0	0.0	0.0
Heart transplantation	0.1	0.1	0.0
His-ablation	1.2	0.7	1.9
Ionizing radiation	0.1	0.1	0.0
Ischaemic	5.7	6.8	4.0
Long QT-syndrome	0.1	0.0	0.2
Maze procedure	0.1	0.0	0.1
Myocarditis	0.1	0.1	0.1
Neurocardiogenic syncope	0.3	0.3	0.3
Other structural heart disease	2.3	2.3	2.4
Post infarction	0.9	0.9	0.8
Post transkutan klaff	0.5	0.5	0.6
RF-ablation, complication	0.4	0.4	0.5
Sarcoidos	0.1	0.1	0.0
Surgical complication	2.9	3.4	2.3
Valvular heart disease	1.5	1.6	1.2

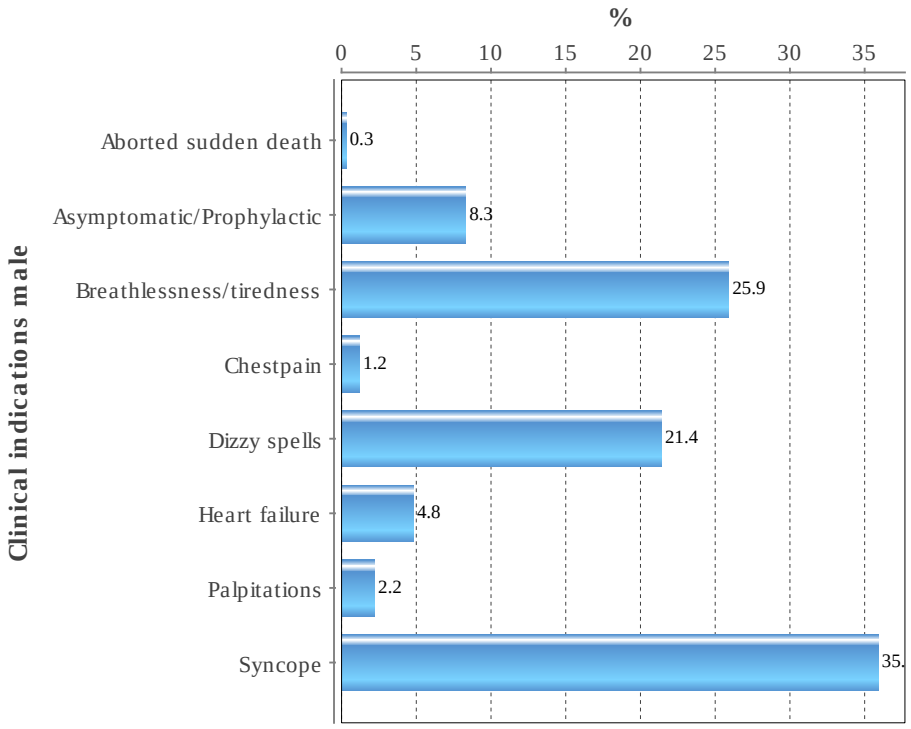


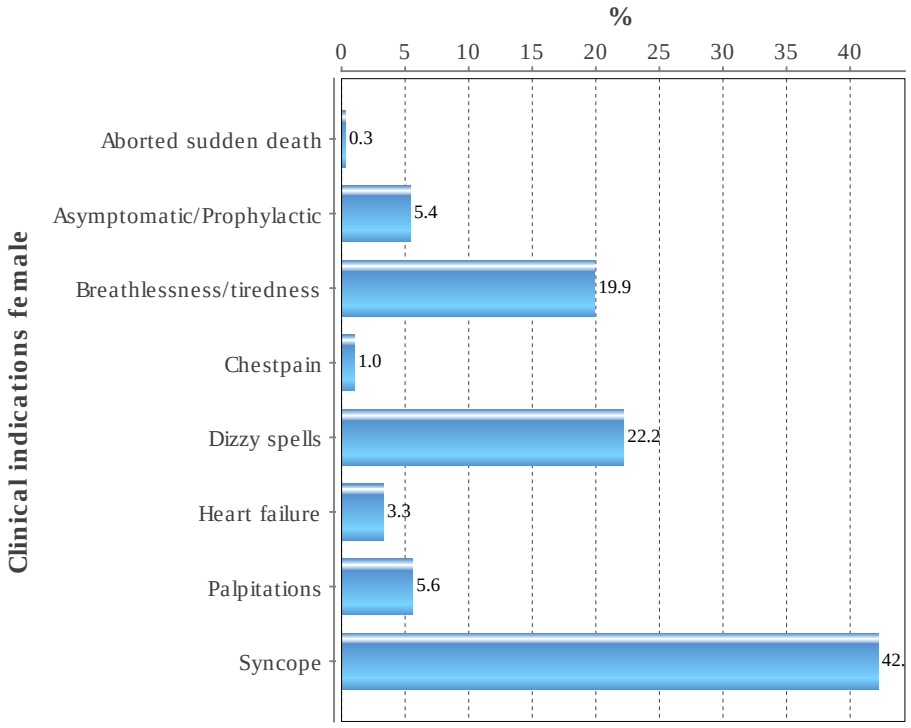
	2018	2017	2016	2015	2014	2013
VVI to VVIR	4	3	5	5	5	8
AAI/AAIR to DDD/DDDR	21	21	21	21	20	54
VVI/VVIR to DDD/DDDR	23	24	22	22	43	85
VVI/VVIR/DDD/DDDR to CRT	274	221	239	216	142	185

Main symptom for implanting pacemakers

Indication	Total %	Male %	Female %
Aborted sudden death	0.3	0.3	0.3
Asymptomatic/Prophylactic	7.1	8.3	5.4
Breathlessness/tiredness	23.5	25.9	19.9
Chestpain	1.1	1.2	1.0
Dizzy spells	21.7	21.4	22.2
Heart failure	4.2	4.8	3.3
Palpitations	3.6	2.2	5.6
Syncope	38.5	35.9	42.2

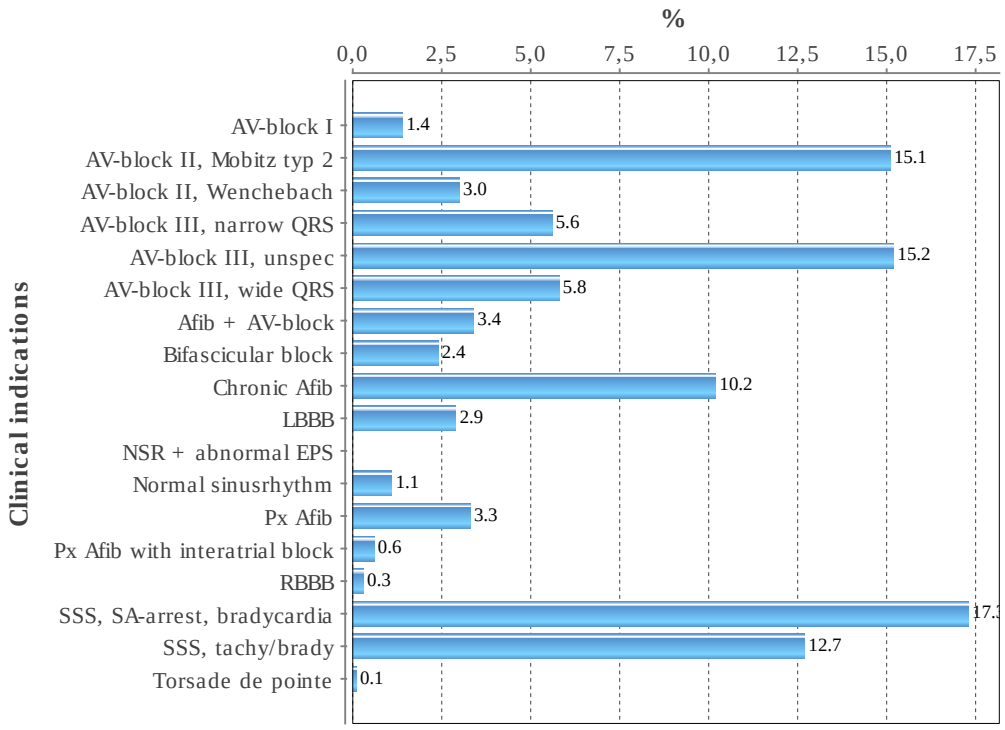



%
0
5
10
15
20
25
30
35
Clinical indications male
Aborted sudden death
0.3
Asymptomatic/Prophylactic
8.3
Breathlessness/tiredness
25.9
Chestpain
1.2
Dizzy spells
21.4
Heart failure
4.8
Palpitations
2.2
Syncope
35.


%
0
5
10
15
20
25
30
35
40
Clinical indications female
Aborted sudden death
0.3
Asymptomatic/Prophylactic
5.4
Breathlessness/tiredness
19.9
Chestpain
1.0
Dizzy spells
22.2
Heart failure
3.3
Palpitations
5.6
Syncope
42.

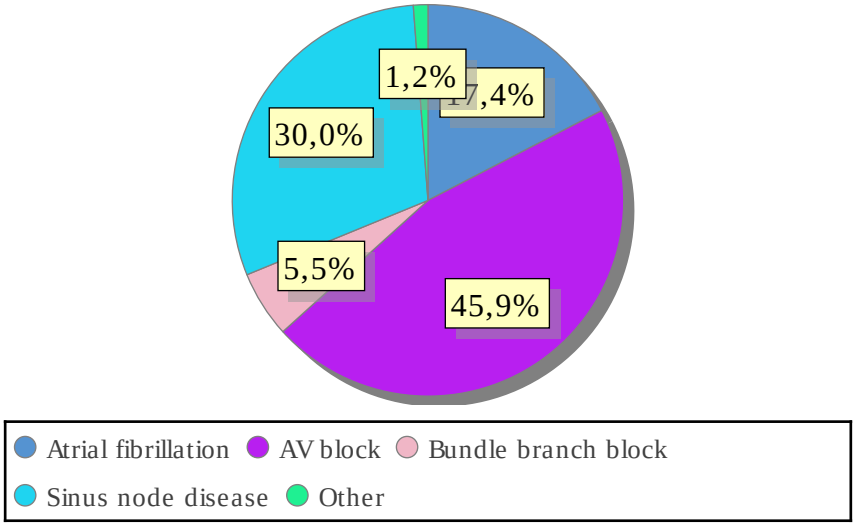
Main ECG indication, total

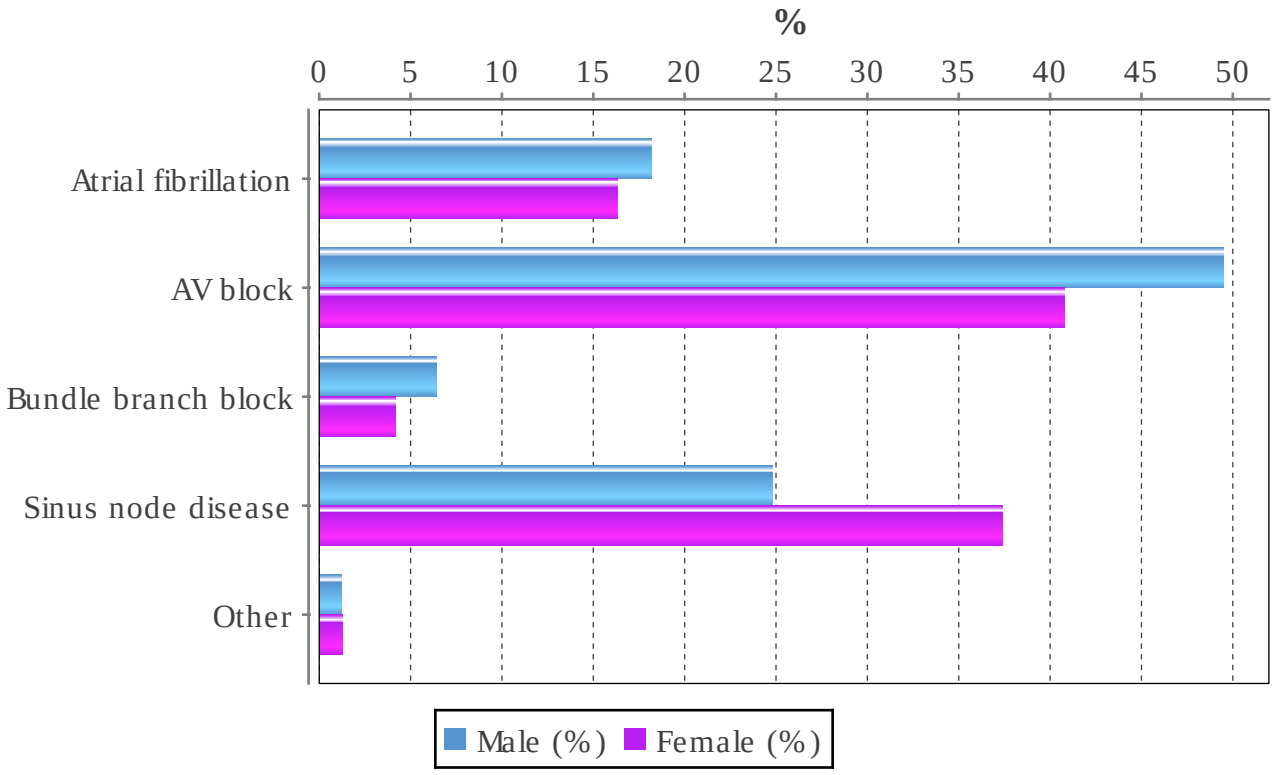
Indication	%
AV-block I	1.4
AV-block II, Mobitz typ 2	15.1
AV-block II, Wenchebach	3.0
AV-block III, narrow QRS	5.6
AV-block III, unspec	15.2
AV-block III, wide QRS	5.8
Afib + AV-block	3.4
Bifascicular block	2.4
Chronic Afib	10.2
LBBB	2.9
NSR + abnormal EPS	0.0
Normal sinusrhythm	1.1
Px Afib	3.3
Px Afib with interatrial block	0.6
RBBB	0.3
SSS, SA-arrest, bradycardia	17.3
SSS, tachy/brady	12.7
Torsade de pointe	0.1



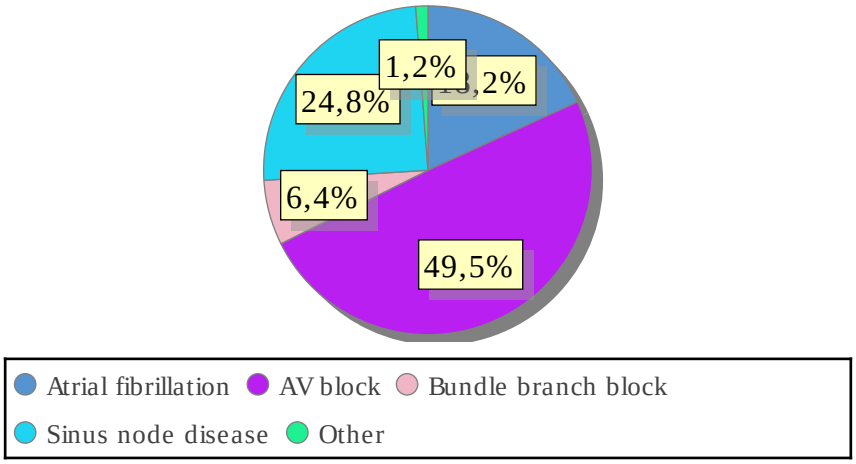
Main ECG indication by gender and for patients < 18 years of age

Indication	No	%	Male (%)	Female (%)	Younger than 18 (%)
Atrial fibrillation	1286	17.4	18.2	16.3	0.0
AV block	3393	45.9	49.5	40.8	91.7
Bundle branch block	405	5.5	6.4	4.2	0.0
Sinus node disease	2217	30.0	24.8	37.4	8.3
Other	91	1.2	1.2	1.3	0.0
					Total number of implants 7392

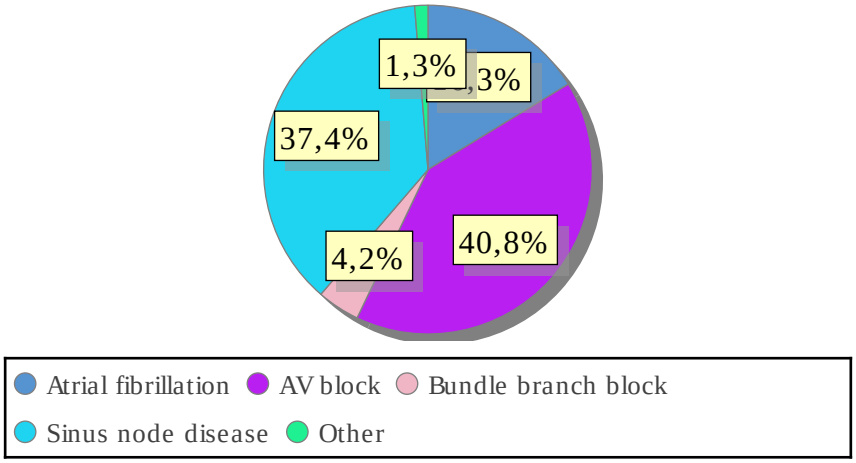




Male



Female



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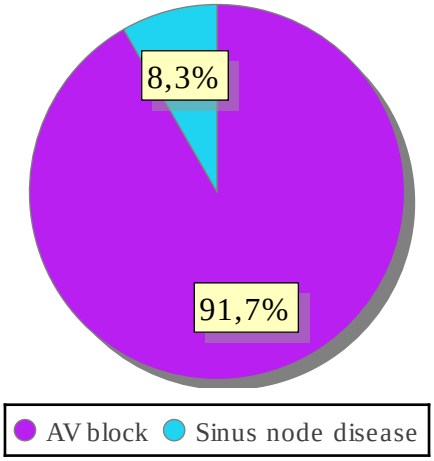
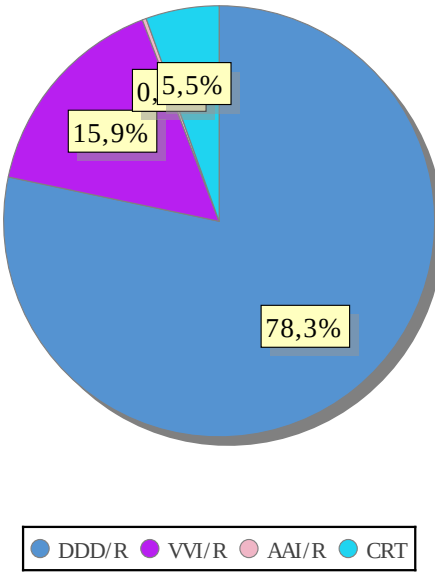


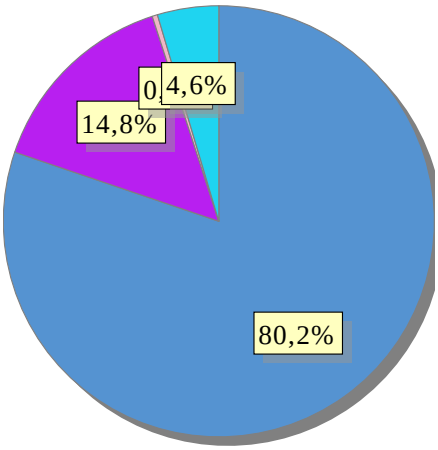
Use of pacemaker subtype for all indications per hospital size (number of new implants/year and hospital)

Size	Hospitals	DDD %	VVI %	AAI %	CRT %
Large	17	77.1	16.0	0.2	6.7
Medium	13	80.2	14.8	0.4	4.6
Small	13	80.9	18.1	0.7	0.4
Total	43	78.3	15.9	0.3	5.5

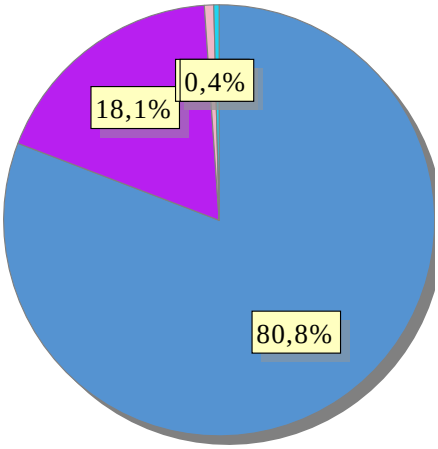
All hospitals



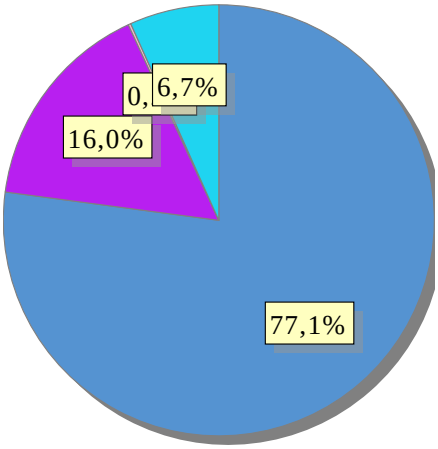
Medium hospitals



Small hospitals



Large hospitals



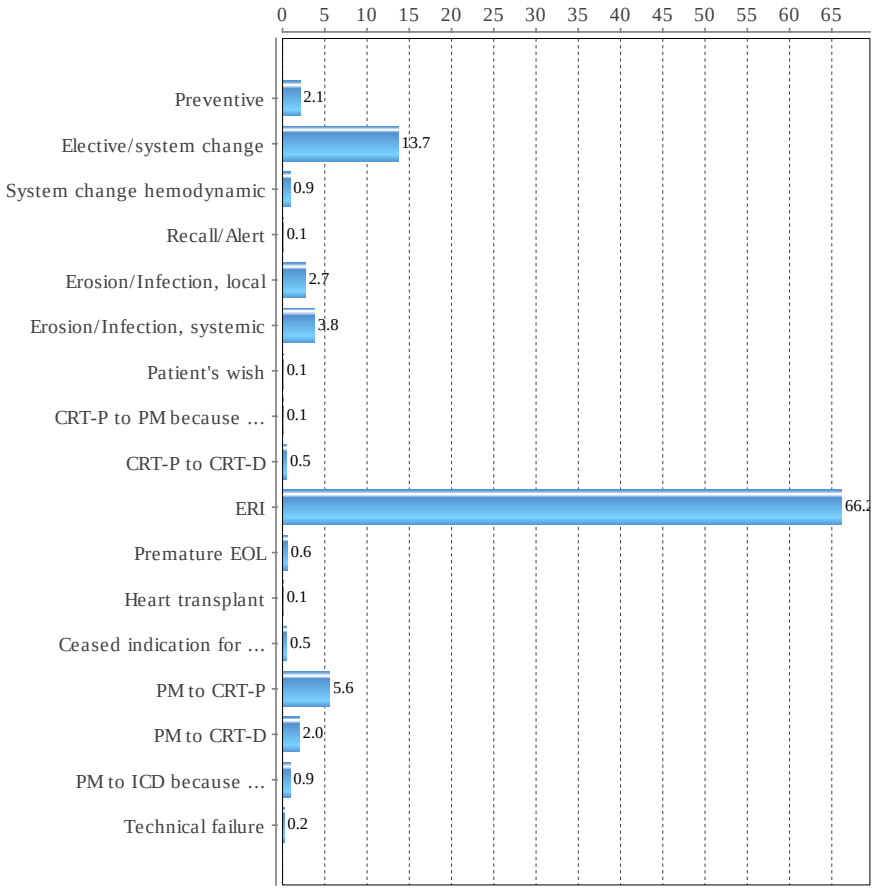
STATISTICS – PACEMAKER – USE OF PACING
MODES FIRST IMPLANT PER HOSPITAL

Use of pacemaker sub type for all indications per hospital (number of new implants / year and hospital))

Hospital	Number	DDD %	VVI %	AAI %	CRT %
Akademiska sjukhuset	292	78.1	16.8	0.3	4.8
Alingsås lasarett	50	86.0	8.0	6.0	0.0
Arvika sjukhus	1	0.0	100.0	0.0	0.0
Blekingesjukhuset	158	86.7	9.5	1.3	2.5
Centrallasarettet Växjö	122	84.4	11.5	0.0	4.1
Centralsjukhuset Karlstad	154	83.1	13.0	0.0	3.9
Centralsjukhuset Kristianstad	231	79.2	20.8	0.0	0.0
Centralsjukhuset Västerås	121	76.9	23.1	0.0	0.0
Danderyds sjukhus	408	79.4	12.5	0.2	7.8
Drottning Silvias Bus	7	71.4	14.3	14.3	0.0
Falu lasarett	230	70.4	22.6	0.0	7.0
Helsingborgs lasarett	224	78.1	21.9	0.0	0.0
Hudiksvalls sjukhus	74	90.5	9.5	0.0	0.0
Karolinska Universitetssjukhuset	413	76.5	14.5	0.0	9.0
Kungälvs sjukhus	83	75.9	18.1	6.0	0.0
Linköpings Universitetssjukhus	373	82.3	8.8	0.5	8.3
Länssjukhuset Gävle	198	77.3	19.7	0.0	3.0
Länssjukhuset Halmstad	98	78.6	19.4	1.0	1.0
Länssjukhuset Kalmar	104	64.4	32.7	0.0	2.9
Länssjukhuset Ryhov	190	81.6	18.4	0.0	0.0
Mälarsjukhuset	162	79.0	9.3	0.0	11.7
Norrlands Universitetssjukhus	187	69.5	20.9	0.0	9.6
Oskarshamns sjukhus	9	66.7	33.3	0.0	0.0
Sahlgrenska Universitetssjukhuset	456	79.4	13.6	0.4	6.6
Sahlgrenska Universitetssjukhuset /Östra	60	86.7	13.3	0.0	0.0
Skaraborgs sjukhus Skövde	224	61.6	15.6	0.0	22.8
Skellefteå lasarett	52	82.7	17.3	0.0	0.0
Skånes universitetssjukhus, Lund	331	71.3	17.5	0.0	11.2
Skånes universitetssjukhus, Malmö	236	83.5	15.7	0.8	0.0
Sollefteå sjukhus	14	85.7	14.3	0.0	0.0
St Görans sjukhus	262	80.5	16.8	0.0	2.7
Sunderby sjukhus	254	75.2	18.9	0.0	5.9
Sundsvalls sjukhus	202	78.7	18.3	1.0	2.0
Södersjukhuset	297	76.4	18.9	0.0	4.7
Södra Älvsborgs sjukhus	202	78.7	13.4	0.0	7.9
Torsby sjukhus	36	72.2	27.8	0.0	0.0
Trollhättan, NÄL	230	78.3	15.2	0.0	6.5
Universitetssjukhuset Örebro	195	83.6	11.3	0.0	5.1
Varbergs sjukhus	119	79.8	14.3	0.0	5.9
Visby lasarett	26	88.5	11.5	0.0	0.0
Västerviks sjukhus	47	91.5	6.4	2.1	0.0
Örnsköldsviks sjukhus	55	94.5	5.5	0.0	0.0
Östersunds sjukhus	182	84.6	12.6	0.0	2.7

Reason for generator explant. Elective used for changes performed before reached ERI/EOL.

Reason	All hospitals %	(large) %	(medium) %	(small) %
Preventive	2.1	1.4	4.0	1.5
Elective/system change	13.7	18.6	2.9	5.9
System change hemodynamic	0.9	1.0	1.1	0.0
Recall/Alert	0.1	0.1	0.0	0.0
Erosion/Infection, local	2.7	3.4	1.3	1.1
Erosion/Infection, systemic	3.8	5.0	1.7	0.4
Patient's wish	0.1	0.2	0.0	0.0
CRT-P to PM because of discontinued CRT-indication	0.1	0.1	0.0	0.0
CRT-P to CRT-D	0.5	0.5	0.8	0.0
ERI	66.2	58.5	79.1	87.8
Premature EOL	0.6	0.6	0.4	1.5
Heart transplant	0.1	0.1	0.1	0.4
Ceased indication for PM therapy	0.5	0.6	0.3	0.0
PM to CRT-P	5.6	6.6	4.6	0.7
PM to CRT-D	2.0	2.3	1.9	0.0
PM to ICD because of arrhythmia	0.9	0.9	1.0	0.4
Technical failure	0.2	0.1	0.7	0.4

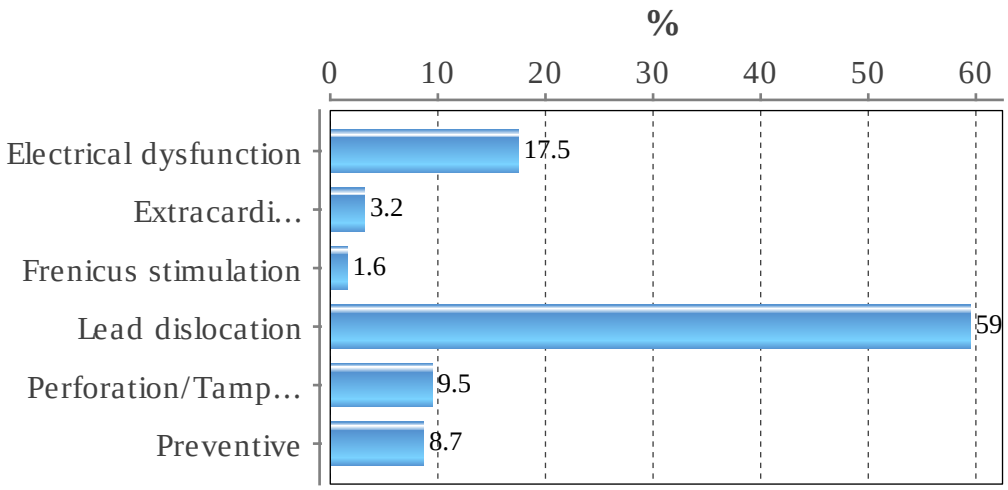


Historical explant indications

Reason	2014 %	2015 %	2016 %	2017 %	2018 %
Preventive	5.4	4.3	3.6	3.7	2.1
Elective/system change	3.8	10.3	11.7	12.6	13.7
System change hemodynamic	0.8	0.8	0.9	0.7	0.9
Erosion/Infection, local	3.3	3.1	2.9	2.8	2.7
Erosion/Infection, systemic	1.9	2.2	2.9	3.5	3.8
Patient's wish	0.3	0.4	0.2	0.4	0.1
ERI	73.1	68.4	64.8	66.4	66.2
Premature EOL	2.3	0.8	0.8	0.8	0.6
Ceased indication for PM therapy	0.3	0.3	0.5	0.3	0.5
PM to CRT-P	3.8	4.5	5.6	4.9	5.6
PM to CRT-D	2.4	3.0	2.4	1.9	2.0
PM to ICD because of arrhythmia	1.7	1.0	1.3	1.2	0.9
Technical failure	0.9	0.4	0.6	0.1	0.2
CRT-P to CRT-D	0.0	0.4	0.5	0.6	0.5
Heart transplant	0.0	0.1	0.1	0.0	0.1
Recall/Alert	0.0	0.0	1.2	0.0	0.1
CRT-P to PM because of discontinued CRT-indication	0.0	0.0	0.0	0.0	0.1

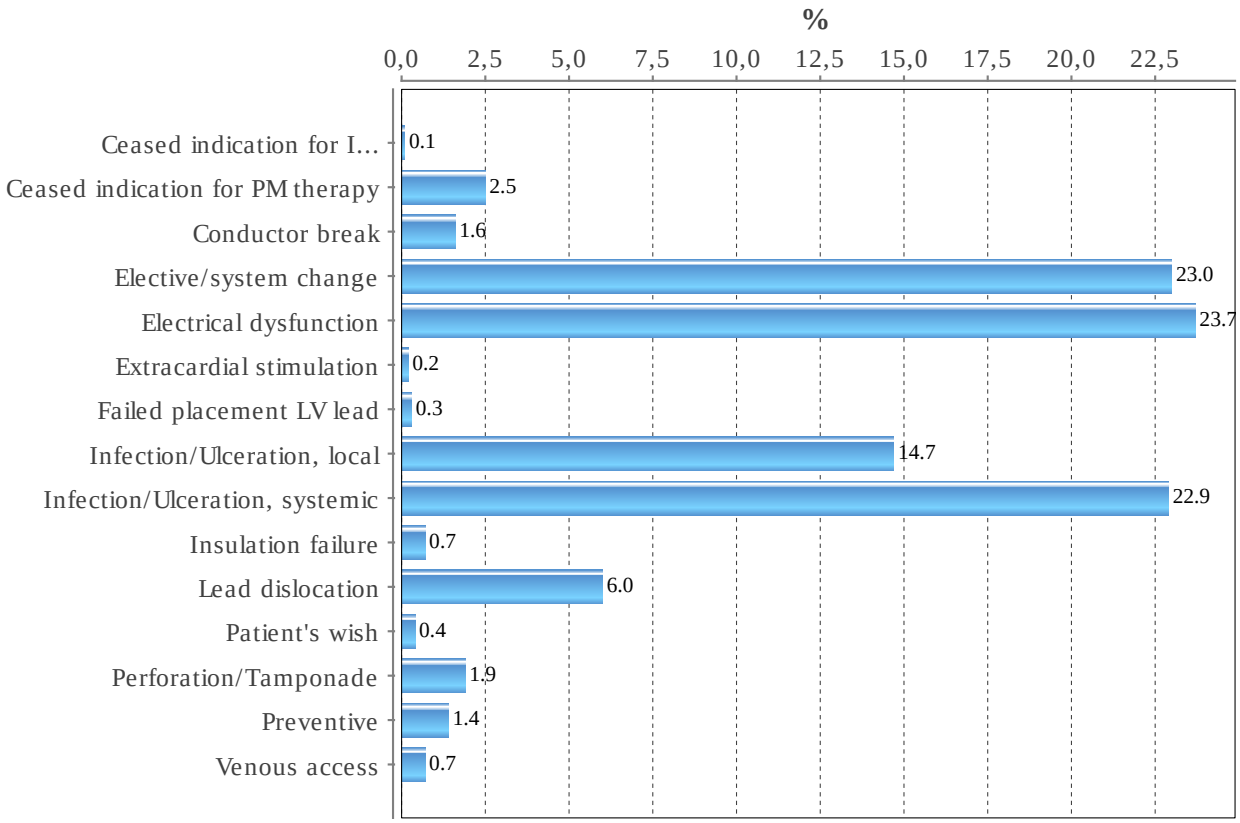
Reason for lead correction/reoperation by hospital size (number of new implants/ year and hospital) Electrical dysfunction including undersense and threshold increase.

Reason	All hospital (%)	Small (%)	Medium (%)	Large (%)
Electrical dysfunction	17.5	0.0	10.7	22.1
Extracardial stimulation	3.2	0.0	3.6	3.5
Frenicus stimulation	1.6	8.3	3.6	0.0
Lead dislocation	59.5	50.0	71.4	57.0
Perforation/Tamponade	9.5	0.0	7.1	11.6
Preventive	8.7	41.7	3.6	5.8
				Total no 126



Reason for lead explants by hospital size. (number of new implants/year and hospital)

Reason	All hospitals(%)	Small (%)	Medium (%)	Large (%)
Ceased indication for ICD therapy	0.1	-	0.6	-
Ceased indication for PM therapy	2.5	1.5	1.7	2.8
Conductor break	1.6	5.9	1.1	1.3
Elective/system change	23.0	26.5	33.3	20.4
Electrical dysfunction	23.7	39.7	25.4	22.0
Extracardial stimulation	0.2	-	-	0.2
Failed placement LV lead	0.3	-	1.1	0.1
Infection/Ulceration, local	14.7	2.9	10.2	16.6
Infection/Ulceration, systemic	22.9	5.9	12.4	26.6
Insulation failure	0.7	-	1.1	0.6
Lead dislocation	6.0	16.2	8.5	4.7
Patient's wish	0.4	1.5	-	0.4
Perforation/Tamponade	1.9	-	1.7	2.1
Preventive	1.4	-	2.8	1.2
Venous access	0.7	-	-	0.9
				Total no 1062



Procedures per operator (exclusive CRT)

Hospital	Operator	No
Akademiska sjukhuset	Albåge	1
	Arvanitis	67
	Dimberg	7
	Janiec	2
	Jidéus	7
	Landelius	1
	Lindblom	1
	Melki	13
	Ostrowska	56
	Schiller	2
	Sciaraffia	126
	Teder	94
	Vali	2
	Vikholm	1
	Zemgulis	10
Alingsås lasarett	Kennergren	34
	Westerberg	49
Arvika sjukhus	Westbom	10
Ålands centralsjukhus	Ove Carlström	1
	Slotte	20
Blekingesjukhuset	Anders Ericsson	21
	Annan	9
	Genadi Kaninski	9
	Jan-Olov Borg	117
	Martin Stefanik	3
	Michael Ringborn	31
Centrallasarettet Växjö	Johansson P	44
	Jonasson	40
	Kir. allm	1
	Rosén Helena	33
	Strandberg	43
	Strandberg-Jonasson	1
	Weber	8
Centralsjukhuset Karlstad	Hallén	1
	Khalili	69
	Niklas Aldergård	62
	Nordanstig	1
	Saidi	62
Centralsjukhuset Kristianstad	Babiak	95
	Bakos	115
	Gadler	1
	Östenson	103
Centralsjukhuset Västerås	Annan	1
	Azizi	2
	SkoglundAndersson	61
	Wiberg	110
Danderyds sjukhus	1	5
	2	98
	3	187
	4	206
	6	29
	Annan	3
Drottning Silvias Bus	Berggren	1
	Hallhagen	6
	Oskar Väärt	11
	Synnergren	4
Falu lasarett	Monheim	49
	Berglund	64
	Forsgren	78
	Guggi	94
	MFO	1
Gävle sjukhus	Falck	2
	Johansson Staffan	39
	Kastberg	69
	Larsson Anders	1
	Magnusson Peter	80
	Mati Jalakas	95
Helsingborgs lasarett	Bergqvist	1
	Borgquist	5
	Jacobsson	54
	Rorsman	60
	Svensson	1
	Utter	156
Hudiksvalls sjukhus	Roussinne	88
Karolinska Universitetssjukhus	Gadler	198
	Hörnsten	182
	Mortensen	1
	Reistam	181
	Reistam/Gadler	2
Kungälvs sjukhus	Annan	1
	Schultz	107
Länssjukhuset Halmstad	Martin Löfgren	62
	Rikard Berggren	70
	Rorsman-Söderström	1
Länssjukhuset Kalmar	David Olsson	66
	Hendrik Schreyer	56
	Jörg Carlsson	2
Länssjukhuset Ryhov	Asking	1
	Lagerberg	100
	Säfström	7
	Sonesson	12
	Stefanik	27
	Stumpf	106
	Szamlewski	2

Hospital	Operator	No
	Szymanowski	3
	Walid El-Saadi	6
Linköpings universitetssjukhus	Pinna C	66
	Säfström K	111
	Sonesson L	99
	Svenson A	77
	Szymanowski A	76
Mälarsjukhuset	Carl Westholm	46
	Georgios Matthaiou	67
	Kave Keshavarz	52
	Linda Ärlehag	20
Norrlands Universitetssjukhus	Andersson	60
	Forsgren	3
	Höglund	21
	Jensen	14
	Kesek	45
	Landström	26
	Rönn	34
Oskarshamns sjukhus	Verstraaten	10
Örnsköldsviks sjukhus	Ehlin	48
	Meidell	22
Östersunds sjukhus	Björklund	14
	Christian Gjessing	6
	Friberg	89
	Friberg/Hansson	1
	Hansson	97
Sahlgrenska universitetssjukhuset	Ammar Taha	36
	Annan	3
	Gäbel/ Szamlewski	2
	Jakob Gäbel	3
	Johansson B	14
	Kennergren	1
	Kennergren/ Szamlewski	1
	Konstantinos Liakatsidas	145
	Piotr Szamlewski	134
	Shabbar Jamaly	51
	Stefan Jakobsson	140
Sahlgrenska universitetssjukhuset / Östra	Javid	1
	Johansson B	86
	Johansson/ Morales Martinez	12
	Morales Martinez	6
Skaraborgs sjukhus Skövde	Anna Widunder	60
	Daniel Hellner	7
	Falmer	11
	Lorentzen	58
	Paulsson	31
	Winterfeldt	56
Skånes universitetssjukhus, Lund	Annan	7
	David Mörtsell	55
	Erik Ljungström	4
	Jesper van der Pals	37
	Johan Brandt	185
	LingWei Wang	53
	Maiwand Farouq	32
	Pyotr Platonov	4
	Rorsman-Söderström	5
	Steen Jensen	12
	Tina Tanha	1
	Uzma Chaudry	46
Skånes universitetssjukhus, Malmö	Annan	183
	Johan Brandt	74
	Lingwei Wang	7
	Maiwand Farouq	32
	Torbjörn Persson	32
Skellefteå lasarett	Annan	2
	Boström	10
	Bygdén	26
	Lindqvist	27
Sollefteå sjukhus	Åström	12
	Rudenstam	16
Södersjukhuset	Jonsson J-E	82
	Kjellman B	121
	Olson J	119
	Rydlund K	98
Södra Älvsborgs sjukhus	Lodin	120
	Riemer	83
	Widfeldt	46
St Görans sjukhus	1	128
	1+2	3
	2	97
	3	107
Sunderby sjukhus	Agneta Johansson	97

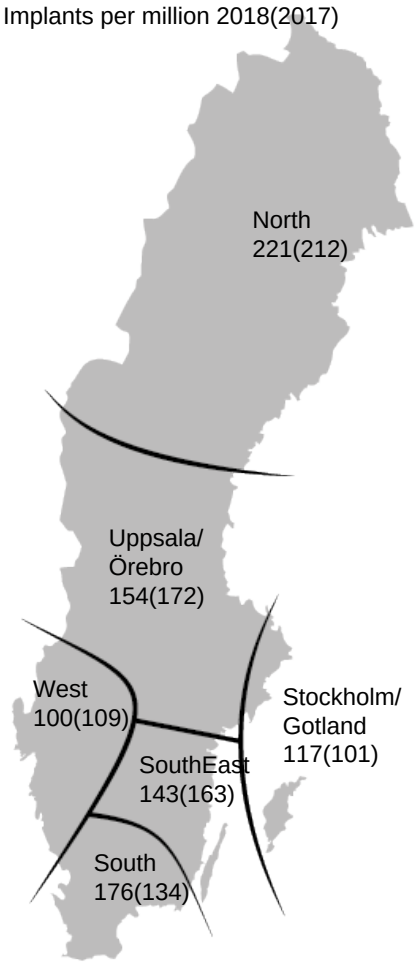
Hospital	Operator	No
	Annica Wennberg	21
	Marcus Baas	66
	Peter Johansson	37
	Peter Rangson	88
Sundsvalls sjukhus	Ciubine	74
	Haupt	44
	Khadhim	41
	Sundelin	60
	Teder	12
Torsby sjukhus	Bentjerodt	40
Trollhättan, NÄL	Alice David	52
	Dinu Dusceac	12
	Jabbar	23
	Javid	101
	Orsolya Bene	103
	Söderbergh	5
	Wetterling	8
Universitetssjukhuset Örebro	Anna Björkenheim	85
	Áron Sztanislav	63
	Barbara Kurt	3
	Lindell	98
	Örjan Friberg	3
Varbergs sjukhus	Emma Sandgren	103
	Rorsman	38
Västerviks sjukhus	Emil Tomov	38
	Joachim Starck	17
Visby lasarett	Jacobsson L	32
	Litorell	4
	Mattsson	4

First implants per hospital (inclusive CRT)

Region	Hospital	2018	2017
Northern Sweden	Norrlands Universitetssjukhus	50	51
	Skellefteå lasarett	7	2
	Sunderby sjukhus	41	50
	Sundsvalls sjukhus	53	56
	Örnsköldsviks sjukhus	8	9
	Östersunds sjukhus	36	27
Southern Sweden	Blekingesjukhuset	41	34
	Centrallasarettet Växjö	32	23
	Länssjukhuset Halmstad	1	1
	Skånes universitetssjukhus, Lund	236	175
	Varbergs sjukhus	39	36
South-East Sweden	Linköpings Universitetssjukhus	79	116
	Länssjukhuset Kalmar	45	35
	Länssjukhuset Ryhov	29	29
Stockholm/Gotland	Danderyds sjukhus	56	49
	Karolinska Universitetssjukhuset	120	109
	St Görans sjukhus	61	48
	Södersjukhuset	51	44
	Visby lasarett	3	3
Uppsala/Örebro	Akademiska sjukhuset	71	65
	Centralsjukhuset Karlstad	37	36
	Centralsjukhuset Västerås	26	37
	Falu lasarett	53	58
	Hudiksvalls sjukhus	9	4
	Länssjukhuset Gävle	57	61
	Mälarsjukhuset	15	35
	Universitetssjukhuset Örebro	52	51
Western Sweden	Drottning Silvias Bus	1	1
	Sahlgrenska Universitetssjukhuset	76	80
	Skaraborgs sjukhus Skövde	25	27
	Södra Älvsborgs sjukhus	19	37
	Trollhättan, NÄL	49	47

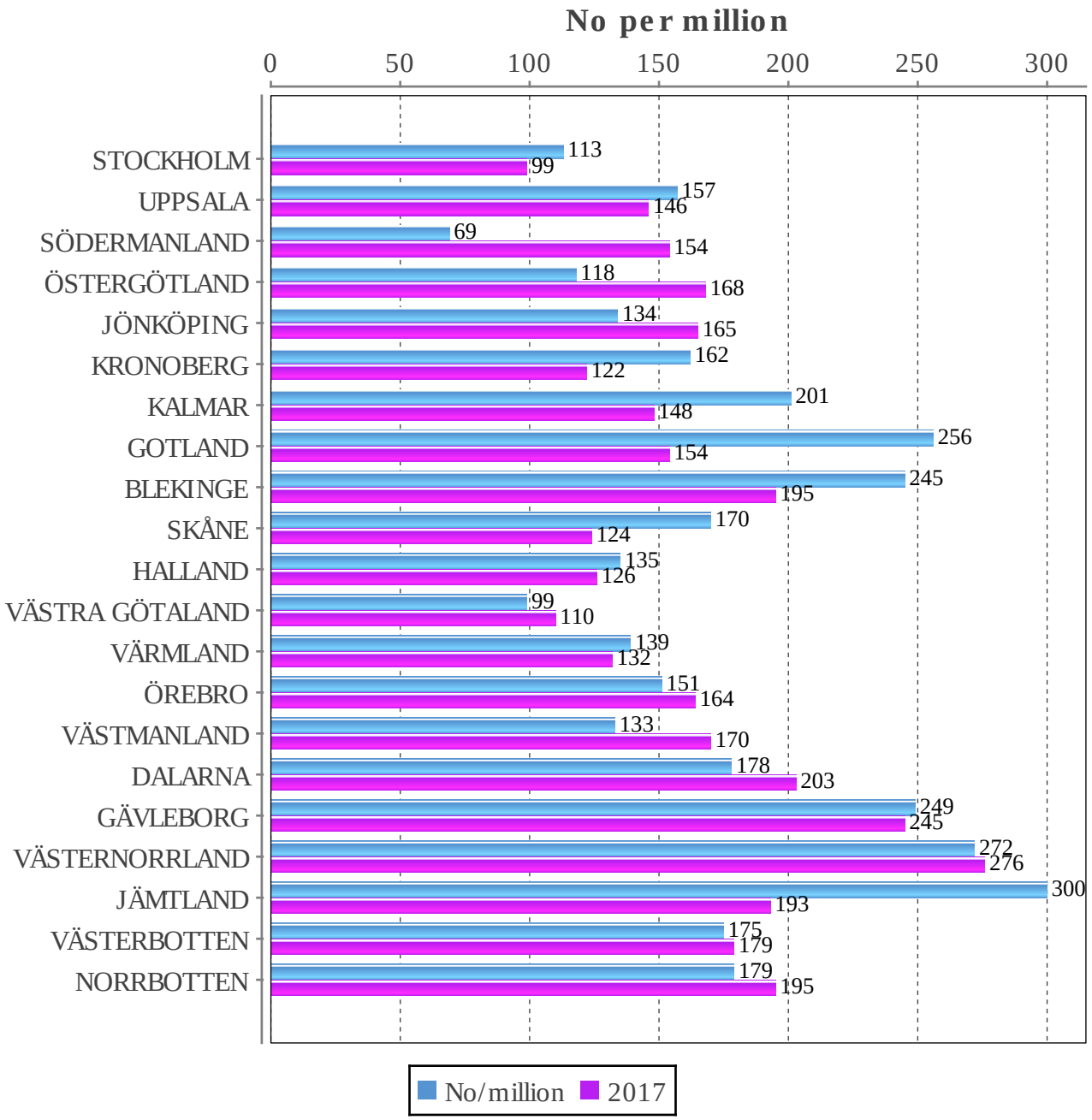
The regions are based on where the patients live, not where they are treated

Region	Population	No of first impl	No per million	Active patients
Stockholm/Gotland	2366738	276	117	2615
Uppsala/Örebro	2082515	320	154	2664
South-East Sweden	1058269	151	143	1206
Southern Sweden	1837468	324	176	2158
Western Sweden	1879718	188	100	1693
Northern Sweden	895534	198	221	1344
Total	10120242	1457	144	11680



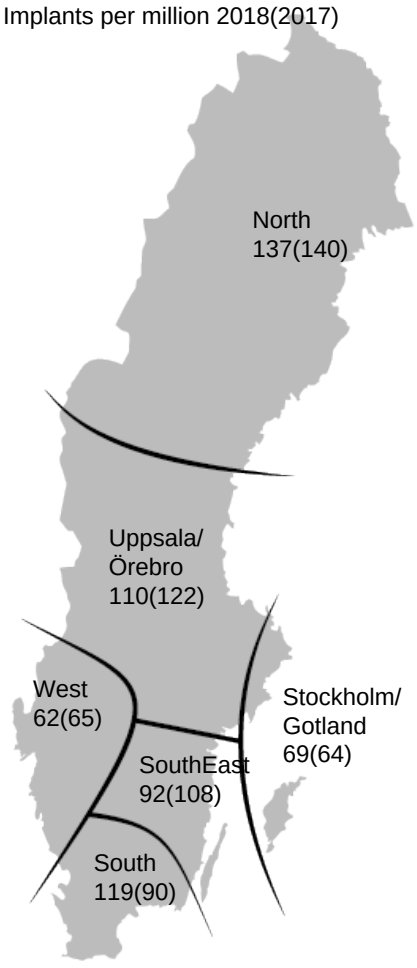
The regions are based on where the patients live, not where they are treated

County	Population	No of first	No/million	Active patients
STOCKHOLM	2308143	261	113	2516
UPPSALA	368971	58	157	510
SÖDERMANLAND	291341	20	69	330
ÖSTERGÖTLAND	457496	54	118	473
JÖNKÖPING	357237	48	134	392
KRONOBERG	197519	32	162	216
KALMAR	243536	49	201	341
GOTLAND	58595	15	256	99
BLEKINGE	159371	39	245	213
SKÅNE	1344689	229	170	1544
HALLAND	324825	44	135	385
VÄSTRA GÖTALAND	1690782	168	99	1492
VÄRMLAND	280399	39	139	271
ÖREBRO	298907	45	151	377
VÄSTMANLAND	271095	36	133	333
DALARNA	286165	51	178	417
GÄVLEBORG	285637	71	249	426
VÄSTERNORRLAND	245968	67	272	369
JÄMTLAND	129806	39	300	148
VÄSTERBOTTEN	268465	47	175	379
NORRBOTTEN	251295	45	179	448
Total	10120242	1457	144	11679


No per million
0
50
100
150
200
250
300
STOCKHOLM
113
99
UPPSALA
157
146
SÖDERMANLAND
69
154
ÖSTERGÖTLAND
118
168
JÖNKÖPING
134
165
KRONOBERG
162
122
KALMAR
201
148
GOTLAND
256
154
BLEKINGE
245
195
SKÅNE
170
124
HALLAND
135
126
VÄSTRA GÖTALAND
99
110
VÄRMLAND
139
132
ÖREBRO
151
164
VÄSTMANLAND
133
170
DALARNA
178
203
GÄVLEBORG
249
245
VÄSTERNORRLAND
272
276
JÄMTLAND
300
193
VÄSTERBOTTEN
175
179
NORRBOTTEN
179
195
No/million
2017

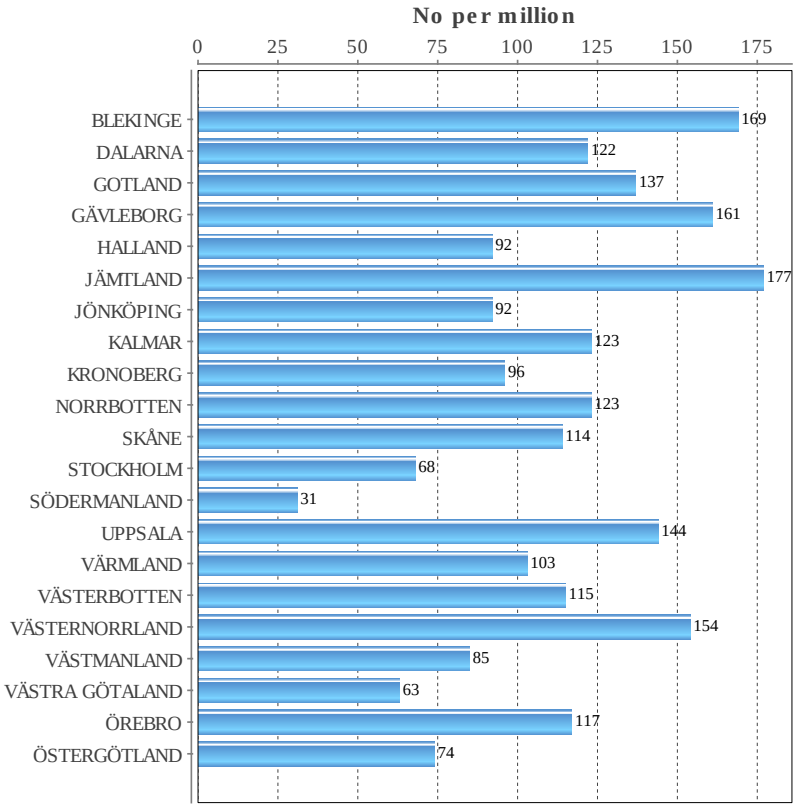
The regions are based on where the patients live, not where they are treated

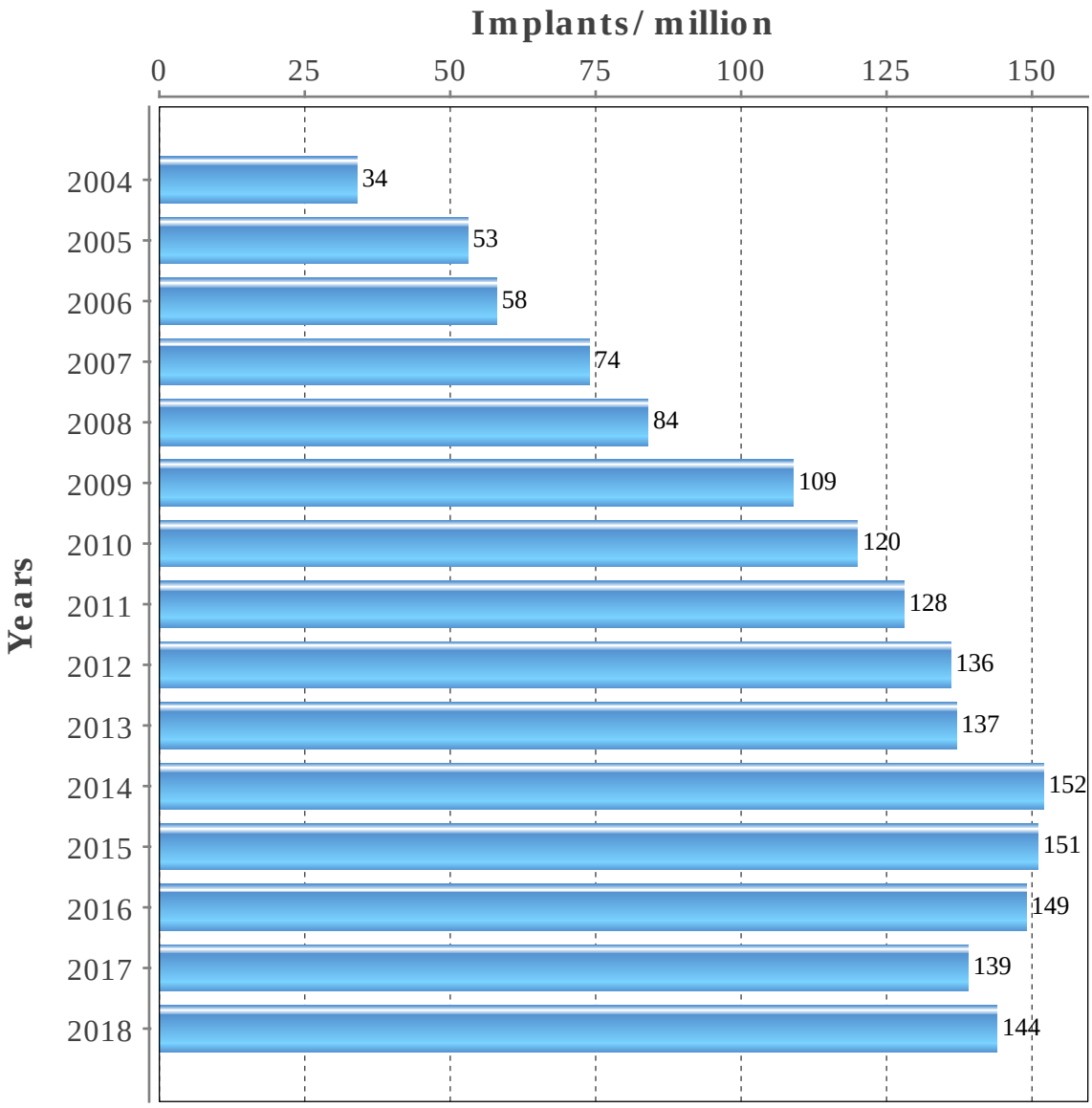
Region	Population	No of first impl	No per million	Active patients
Stockholm/Gotland	2366738	164	69	1649
Uppsala/Örebro	2082515	230	110	1614
South-East Sweden	1058269	97	92	768
Southern Sweden	1837468	218	119	1341
Western Sweden	1879718	117	62	855
Northern Sweden	895534	123	137	754
Total	10120242	949	94	6981



The regions are based on where the patients live, not where they are treated

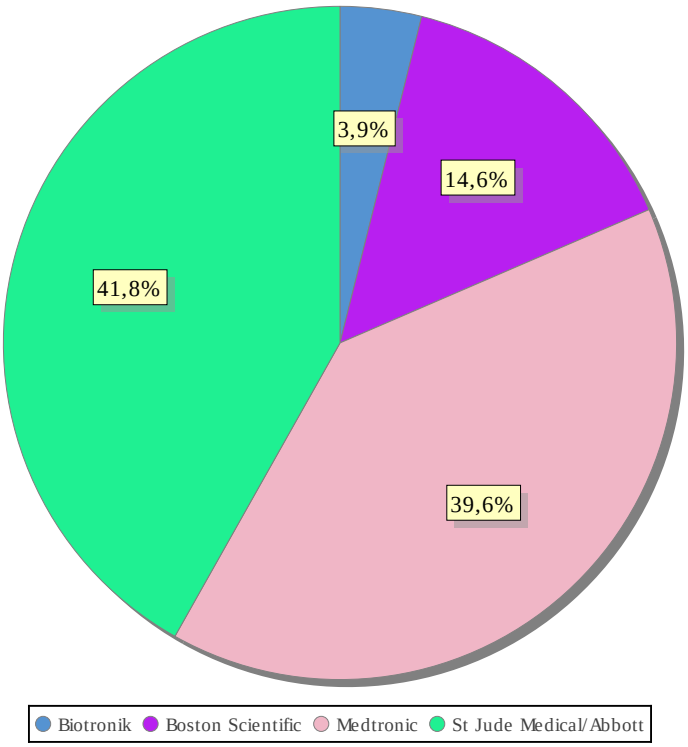
County	Population	No of first	No/million
BLEKINGE	159371	27	169
DALARNA	286165	35	122
GOTLAND	58595	8	137
GÄVLEBORG	285637	46	161
HALLAND	324825	30	92
JÄMTLAND	129806	23	177
JÖNKÖPING	357237	33	92
KALMAR	243536	30	123
KRONOBERG	197519	19	96
NORRBOTTEN	251295	31	123
SKÅNE	1344689	153	114
STOCKHOLM	2308143	156	68
SÖDERMANLAND	291341	9	31
UPPSALA	368971	53	144
VÄRMLAND	280399	29	103
VÄSTERBOTTEN	268465	31	115
VÄSTERNORRLAND	245968	38	154
VÄSTMANLAND	271095	23	85
VÄSTRA GÖTALAND	1690782	106	63
ÖREBRO	298907	35	117
ÖSTERGÖTLAND	457496	34	74
Total	10120242	949	94




Implants/ million
0
25
50
75
100
125
150
Years
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
34
53
58
74
84
109
120
128
136
137
152
151
149
139
144

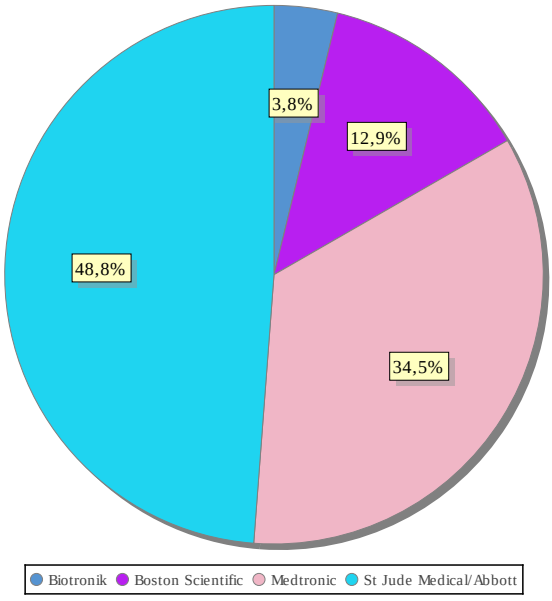
Market share per manufacturer in Sweden

Manufacturer	2015 %	2016 %	2017 %	2018 %
Biotronik	3.1	4.9	4.7	3.9
Boston Scientific	7.1	10.9	11.6	14.6
Medtronic	46.8	39.6	38.3	39.6
St. Jude Medical	41.8	44.2	45.3	41.8
Cameron Health	-	-	-	-
NayaMed International	1.3	0.4	-	-
Sorin/LivaNova	-	-	-	-
Boston Scientific includes Cameron Health from 2015				



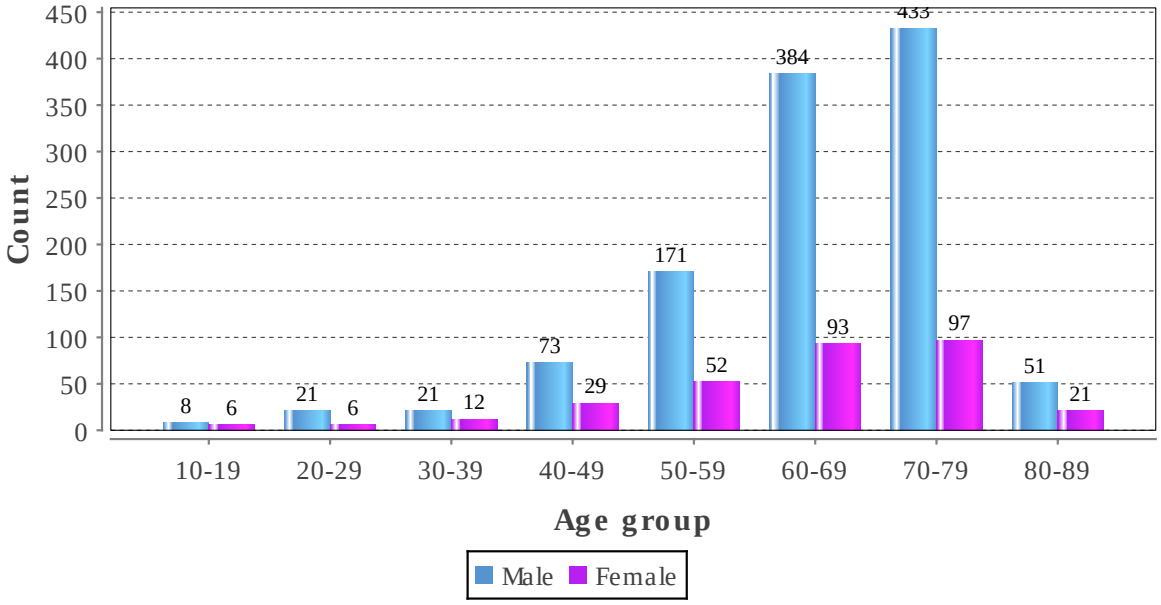
Market share per manufacturer in Sweden

Manufacturer	2015 %	2016 %	2017 %	2018 %
Biotronik	6.2	5.9	4.3	3.8
Boston Scientific	6.9	9.2	11.0	12.9
Medtronic	25.3	29.6	30.8	34.5
St. Jude Medical	60.7	55.2	53.8	48.8
NayaMed International	0.8	0.1	-	-
Boston Scientific includes Cameron Health from 2015				



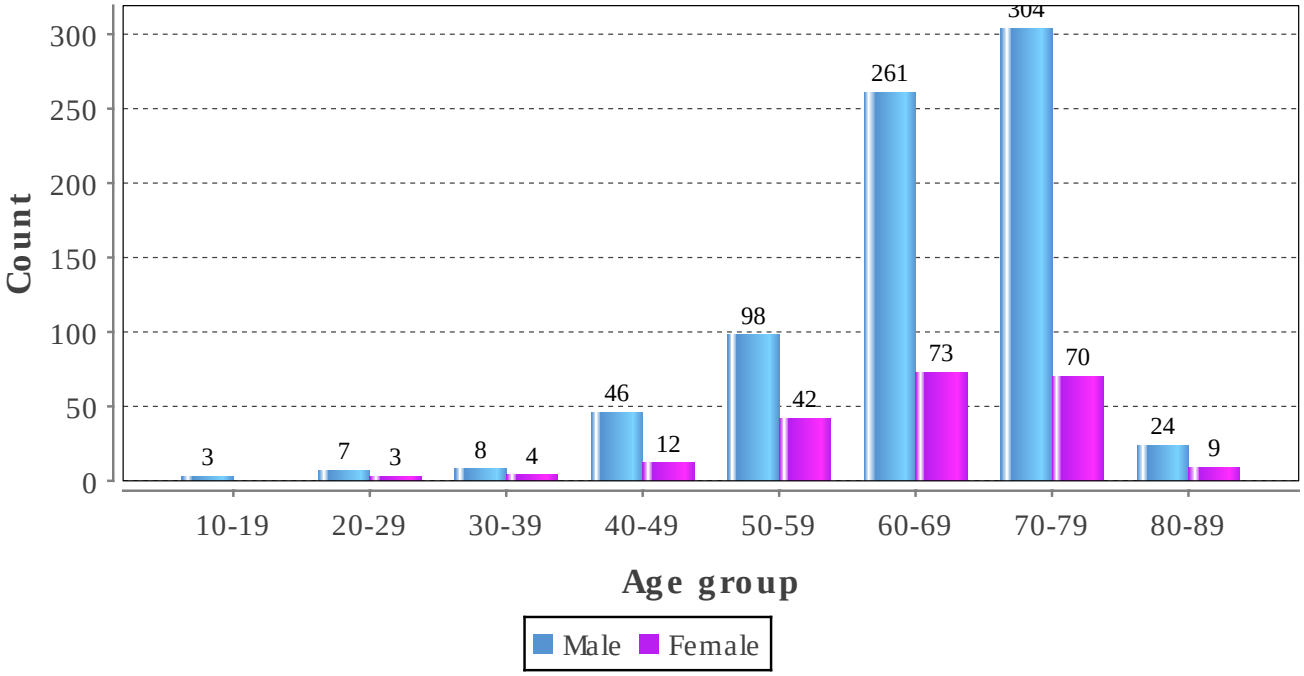
Age and gender distribution for new implants, total numbers

Age (years)	Total no	%	Male	Female
10-19	14	0.9	8	6
20-29	27	1.8	21	6
30-39	33	2.2	21	12
40-49	102	6.9	73	29
50-59	223	15.1	171	52
60-69	477	32.3	384	93
70-79	530	35.9	433	97
80-89	72	4.9	51	21
Average age	64	-	65	63
			Total number of implants: 1478	



Primary prevention divided by gender and age.

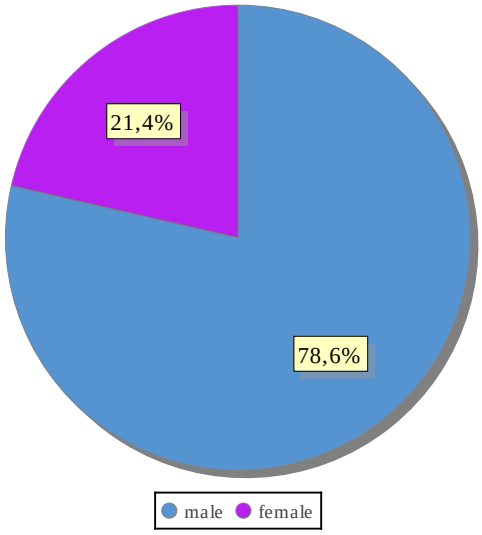
Age (years)	Total no	%	Male	Female
10-19	3	0.3	3	0
20-29	10	1.0	7	3
30-39	12	1.2	8	4
40-49	58	6.0	46	12
50-59	140	14.5	98	42
60-69	334	34.6	261	73
70-79	374	38.8	304	70
80-89	33	3.4	24	9
Average age	65	-	66	64
				Total number of implants: 964



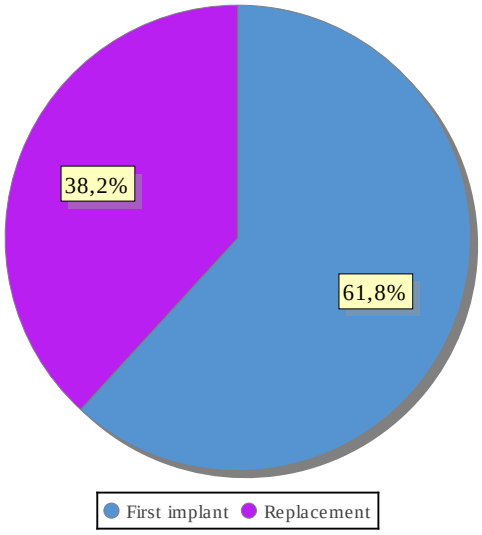
Ratio of new implants versus generator changes

	Total		Male		Female	
	no	%	no	%	no	%
First implant	1478	61.8	1162	78.6	316	21.4
Replacement	914	38.2	725	79.3	189	20.7
Total	2392	100.0	1887	78.9	505	21.1

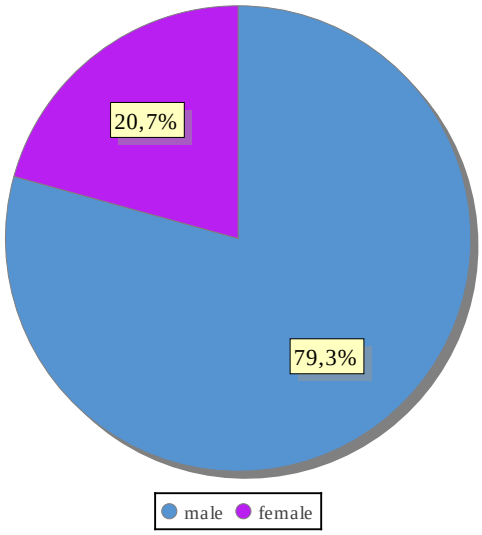
First implant



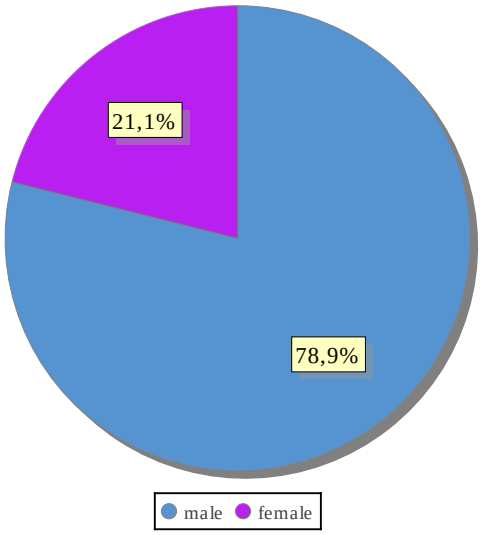
Replacement ratio



Replacement

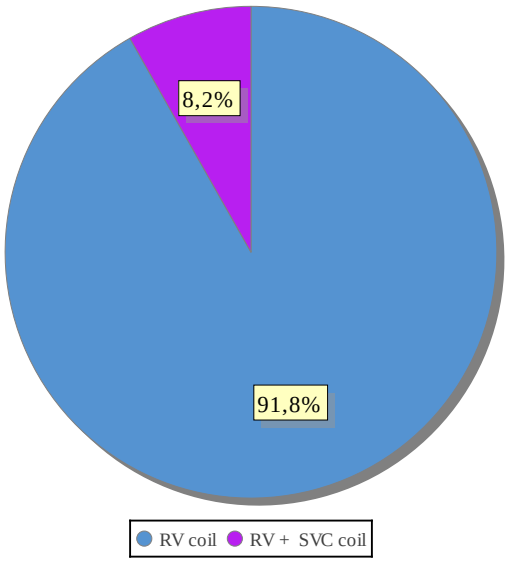


All implant



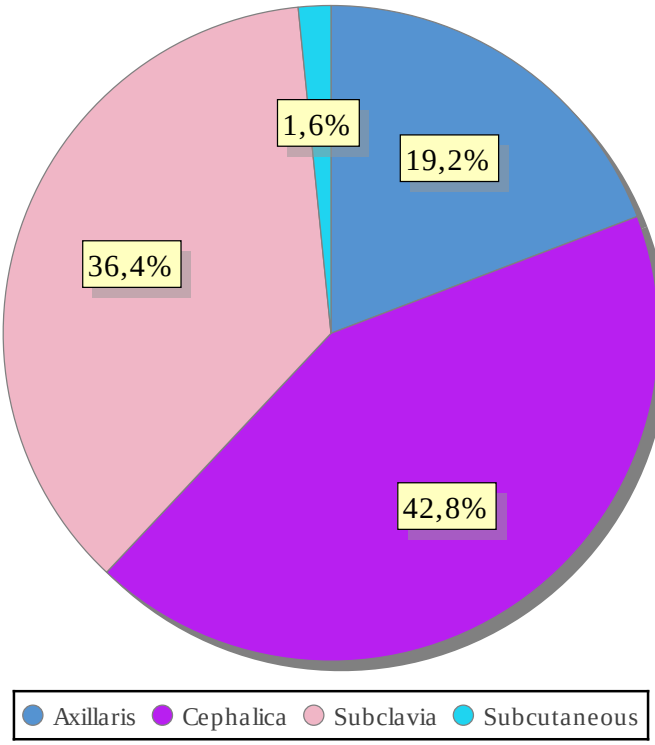
Lead type distribution for atrial and venticular use for new implants and replacements.

	2018		2017	
	no	%	no	%
RV coil	1491	91.8	1413	89.1
RV + SVC coil	133	8.2	171	10.8
Active fixation	1618	99.6	1559	98.3
Passive fixation	6	0.4	26	1.6
Total number of leads - 2018: 1624, 2017: 1585				



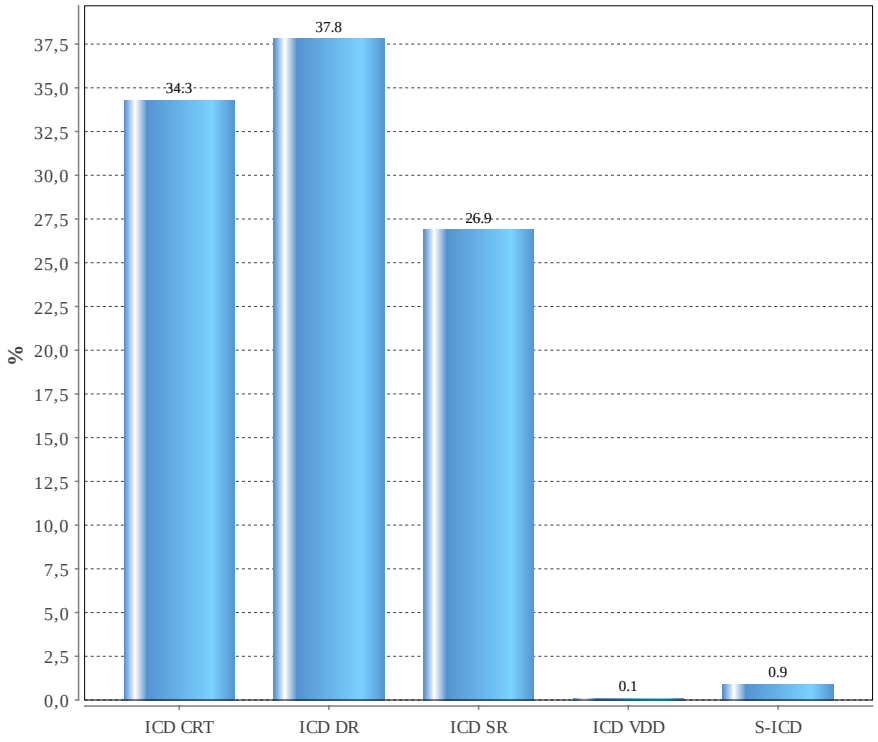
Venous access for new implants and replacements, all type of pacemakers

Lead access	No	%
Axillaris	316	19.2
Cephalica	706	42.8
Subclavia	600	36.4
Subcutaneous	26	1.6



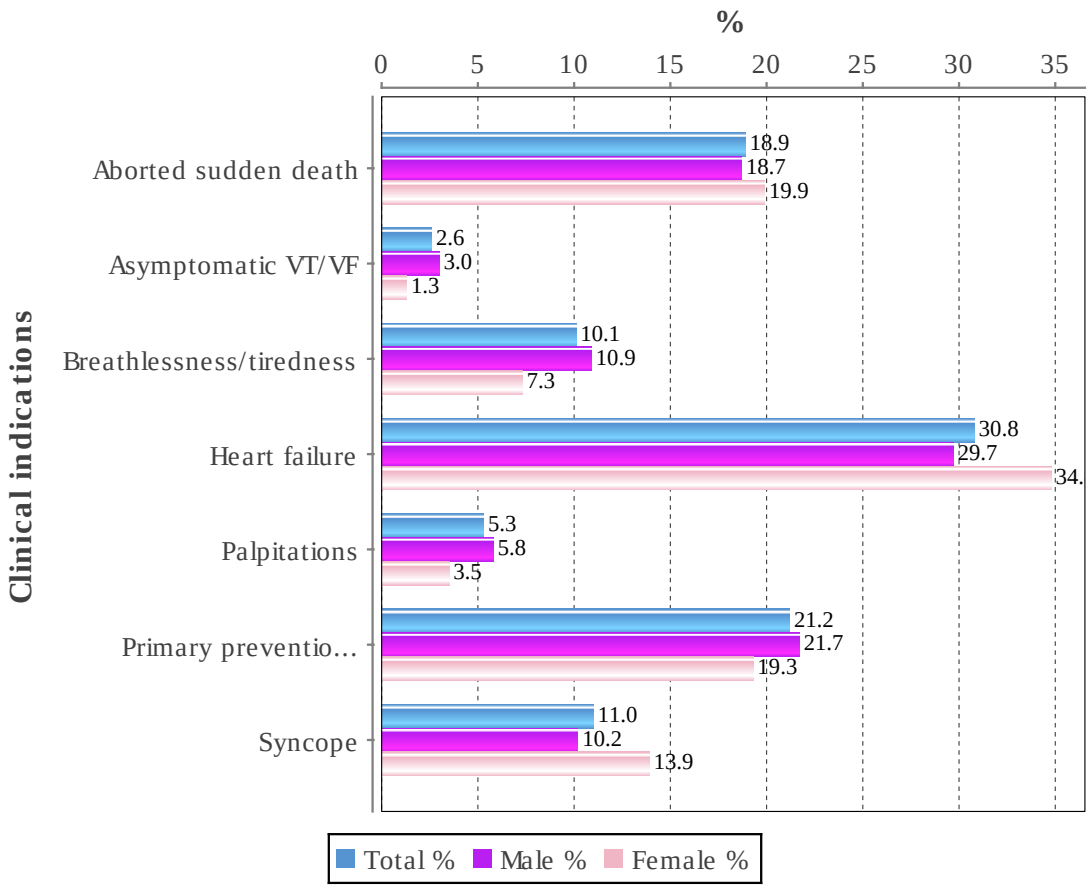
ICD subtype for new implants

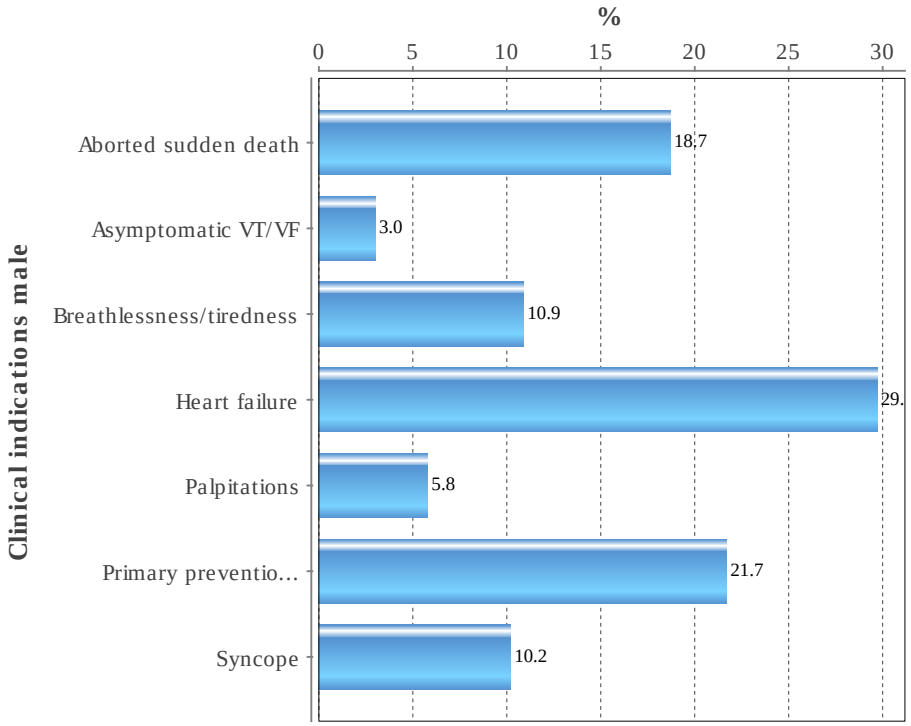
Mode	%	No
ICD CRT	34.3	507
ICD DR	37.8	558
ICD SR	26.9	398
ICD VDD	0.1	1
S-ICD	0.9	14

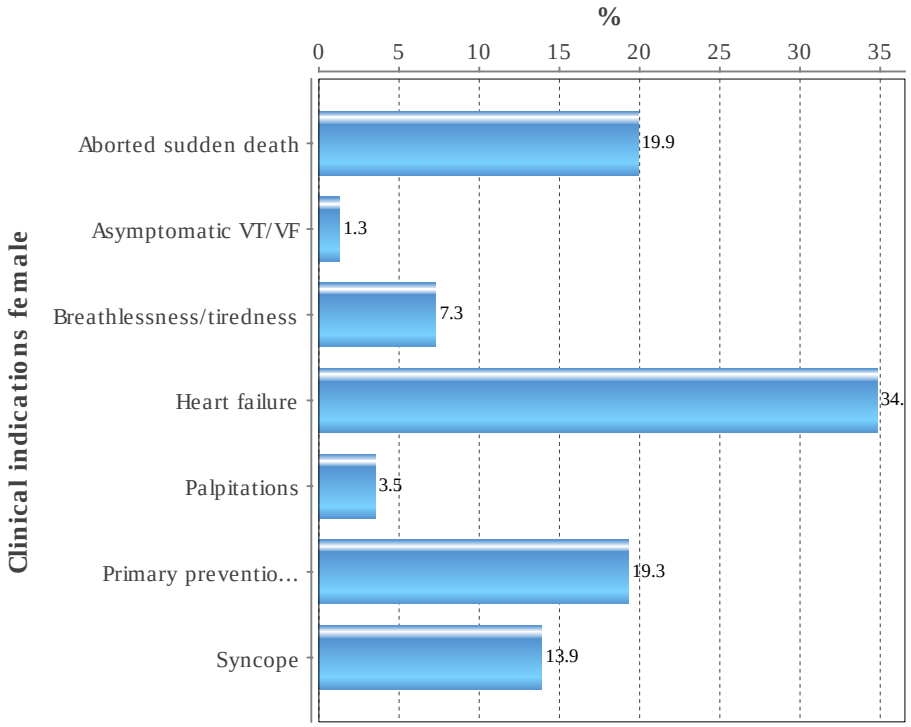


Main symptom for implanting ICDs

Indication	Total %	Male %	Female %
Aborted sudden death	18.9	18.7	19.9
Asymptomatic VT/VF	2.6	3.0	1.3
Breathlessness/tiredness	10.1	10.9	7.3
Heart failure	30.8	29.7	34.8
Palpitations	5.3	5.8	3.5
Primary prevention, asymptomatic	21.2	21.7	19.3
Syncope	11.0	10.2	13.9




%
0
5
10
15
20
25
30
Clinical indications male
Aborted sudden death
18.7
Asymptomatic VT/VF
3.0
Breathlessness/tiredness
10.9
Heart failure
29.
Palpitations
5.8
Primary preventio...
21.7
Syncope
10.2

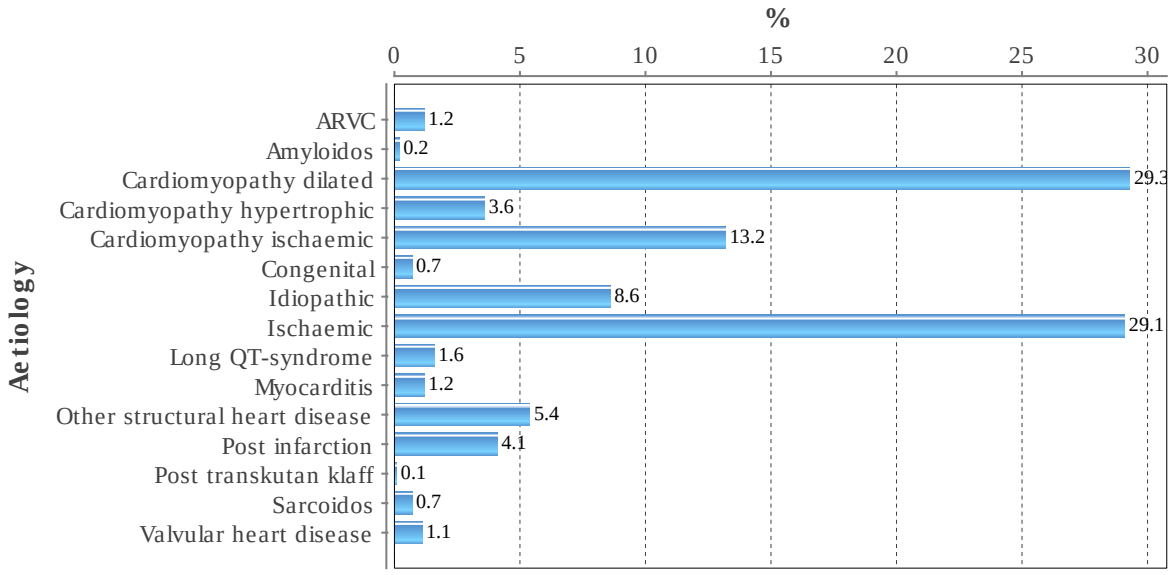

%
0
5
10
15
20
25
30
35
Clinical indications female
Aborted sudden death
19.9
Asymptomatic VT/VF
1.3
Breathlessness/tiredness
7.3
Heart failure
34.
Palpitations
3.5
Primary preventio...
19.3
Syncope
13.9

Main symptom for implanting ICDs, historical distribution

Indication	2017 %	2018 %
Aborted sudden death	16.8	18.9
Asymptomatic VT/VF	3.3	2.6
Primary prevention	66.8	67.4
Syncope	13.1	11.0

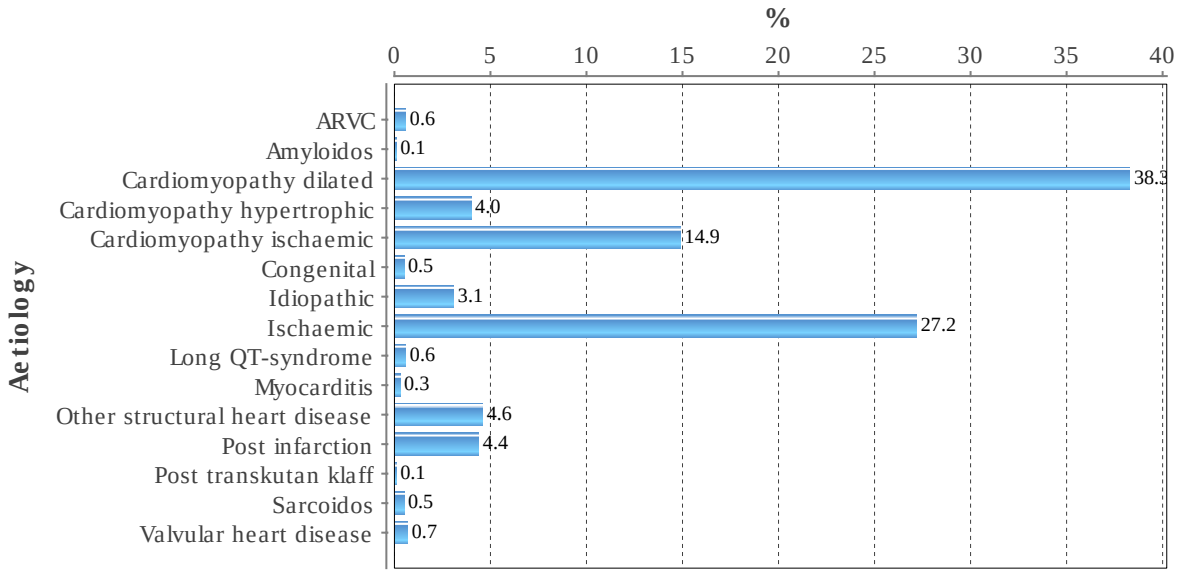
Main aetiology for implanting pacemakers

Aetiology	Total %	Male %	Female %
ARVC	1.2	1.1	1.3
Amyloidos	0.2	0.3	0.0
Cardiomyopathy dilated	29.3	27.4	36.4
Cardiomyopathy hypertrophic	3.6	3.4	4.1
Cardiomyopathy ischaemic	13.2	15.0	6.6
Congenital	0.7	0.5	1.3
Idiopathic	8.6	8.0	10.8
Ischaemic	29.1	30.9	22.5
Long QT-syndrome	1.6	0.4	5.7
Myocarditis	1.2	1.3	0.9
Other structural heart disease	5.4	5.2	6.0
Post infarction	4.1	4.6	2.5
Post transkutan klaff	0.1	0.1	0.3
Sarcoidos	0.7	0.5	1.3
Valvular heart disease	1.1	1.3	0.3



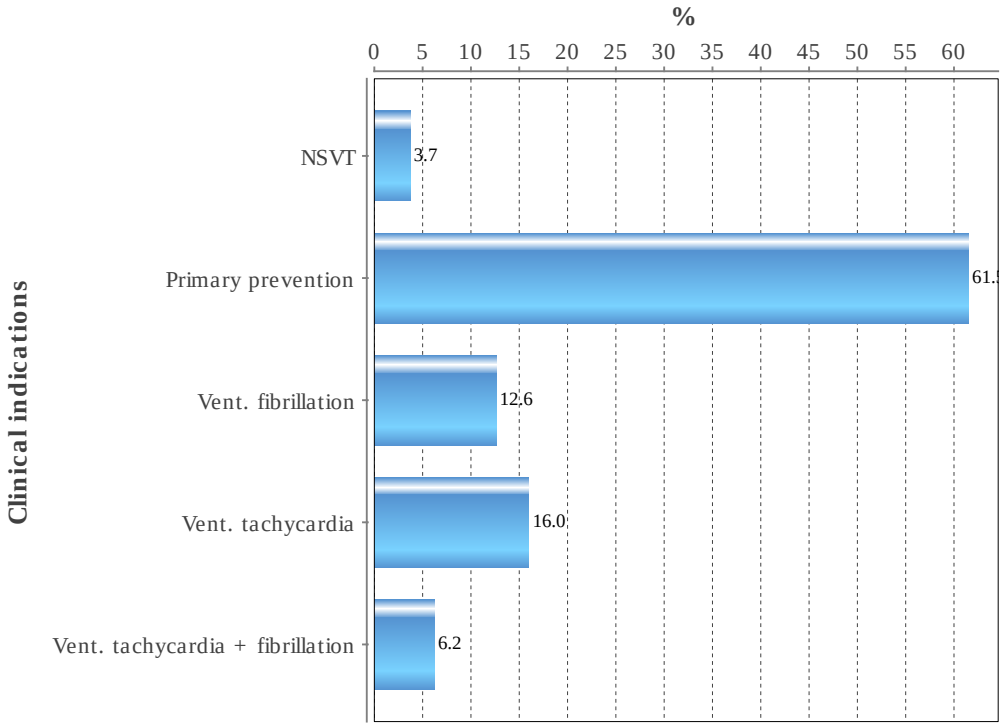
Main aetiology for implanting ICDs due to primary prevention

Aetiology	Total %	Male %	Female %
ARVC	0.6	0.4	1.4
Amyloidos	0.1	0.1	0.0
Cardiomyopathy dilated	38.3	35.6	47.9
Cardiomyopathy hypertrophic	4.0	3.7	5.2
Cardiomyopathy ischaemic	14.9	16.9	8.0
Congenital	0.5	0.4	0.9
Idiopathic	3.1	3.3	2.3
Ischaemic	27.2	29.3	19.7
Long QT-syndrome	0.6	0.0	2.8
Myocarditis	0.3	0.3	0.5
Other structural heart disease	4.6	4.0	6.6
Post infarction	4.4	4.9	2.3
Post transkutan klaff	0.1	0.1	0.0
Sarcoidos	0.5	0.1	1.9
Valvular heart disease	0.7	0.8	0.5



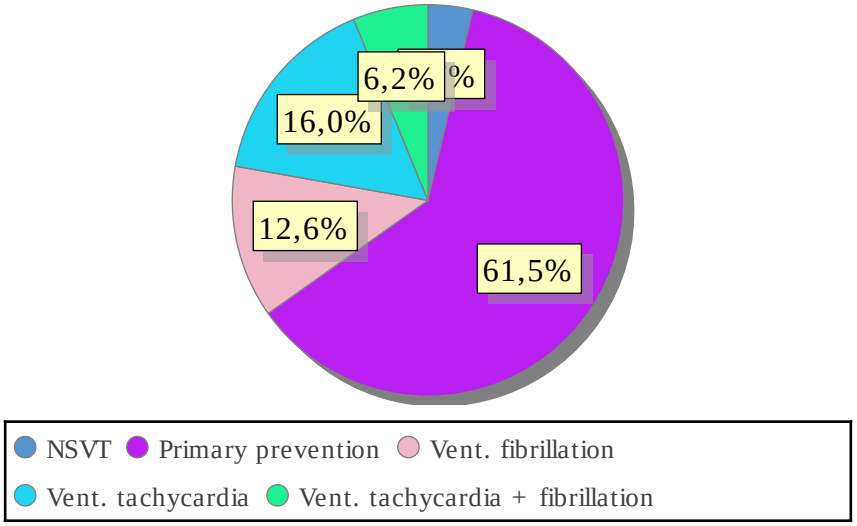
Documented ECG leading to ICD implant. (NSVT=non sustained VT)

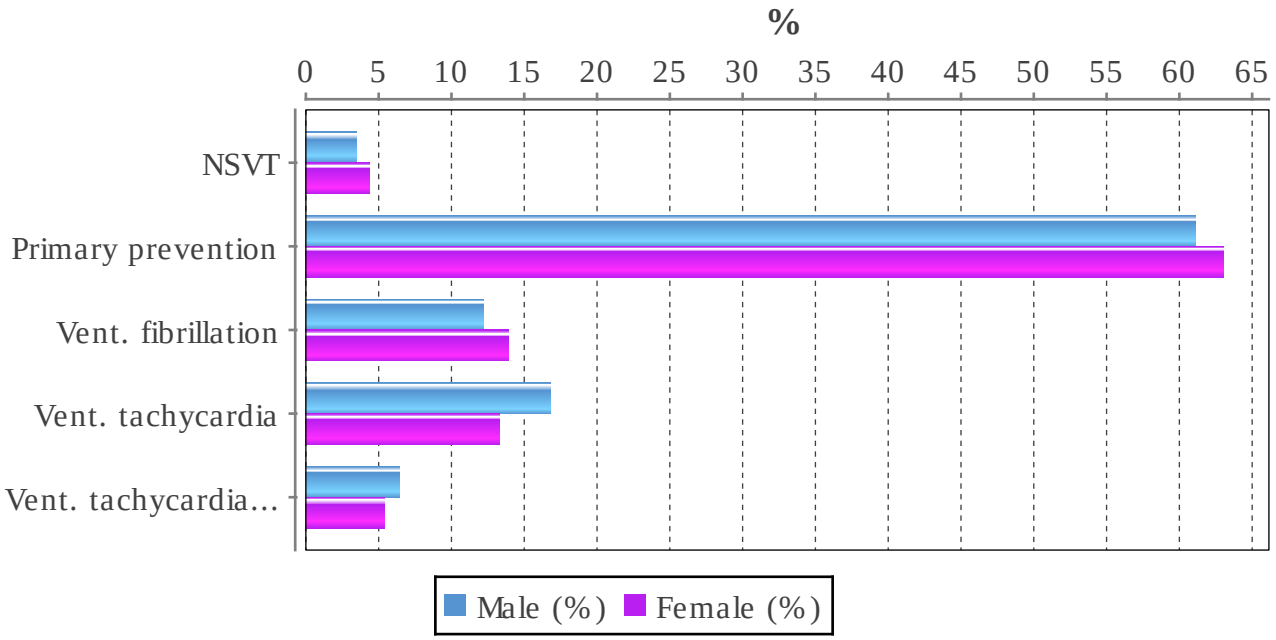
Indication	%
NSVT	3.7
Primary prevention	61.5
Vent. fibrillation	12.6
Vent. tachycardia	16.0
Vent. tachycardia + fibrillation	6.2



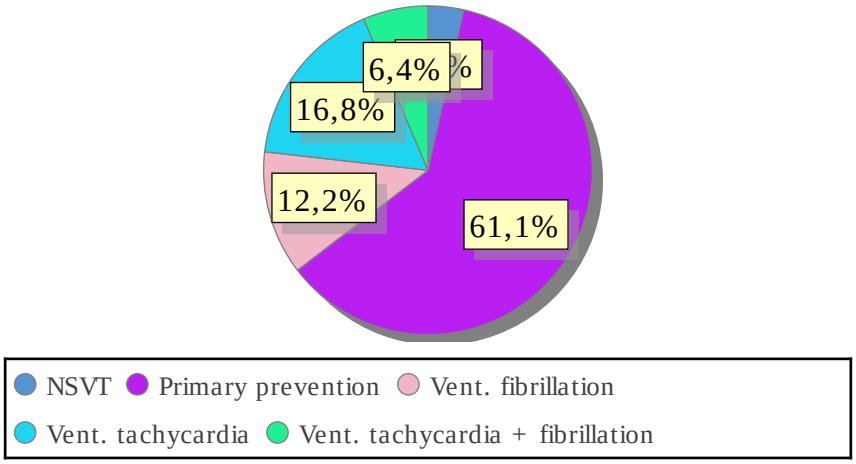
Documented ECG leading to ICD implant.(NSVT = non sustained VT) by gender and patients < 18 years

Indication	No	Total %	Male (%)	Female (%)	lt 18 (%)
NSVT	55	3.7	3.5	4.4	0.0
Primary prevention	909	61.5	61.1	63.0	22.2
Vent. fibrillation	186	12.6	12.2	13.9	44.4
Vent. tachycardia	237	16.0	16.8	13.3	0.0
Vent. tachycardia + fibrillation	91	6.2	6.4	5.4	33.3
				Total number of implants	1478

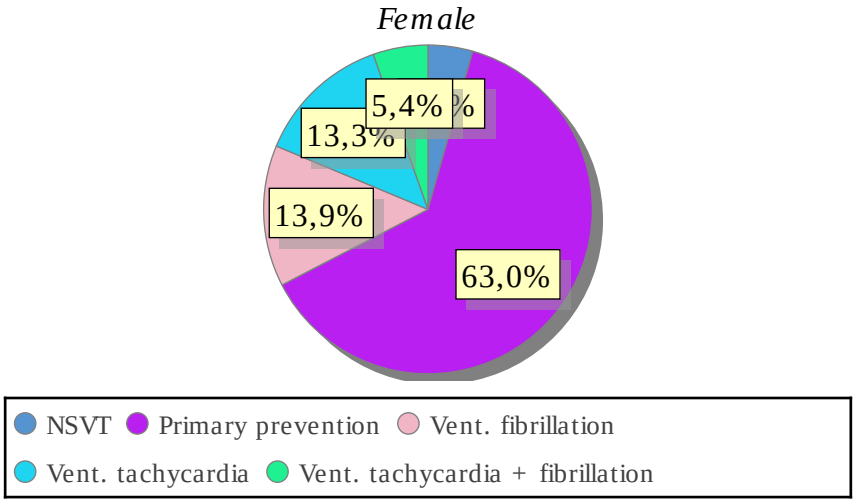




Male



Female



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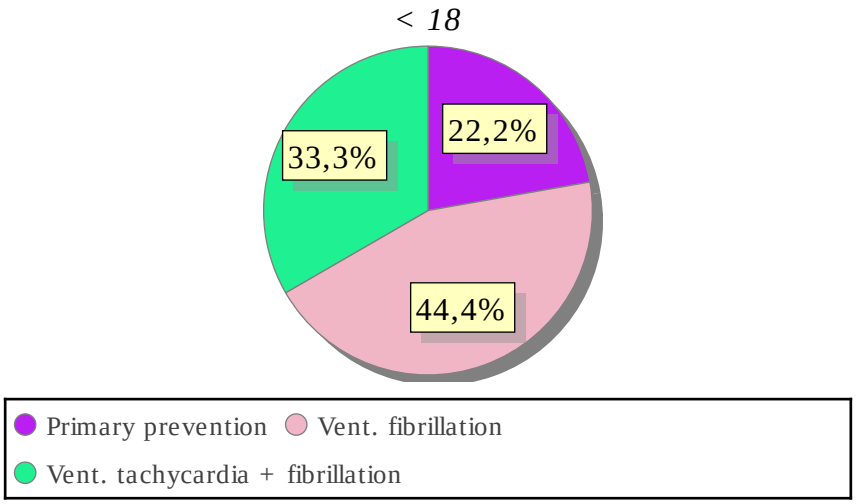
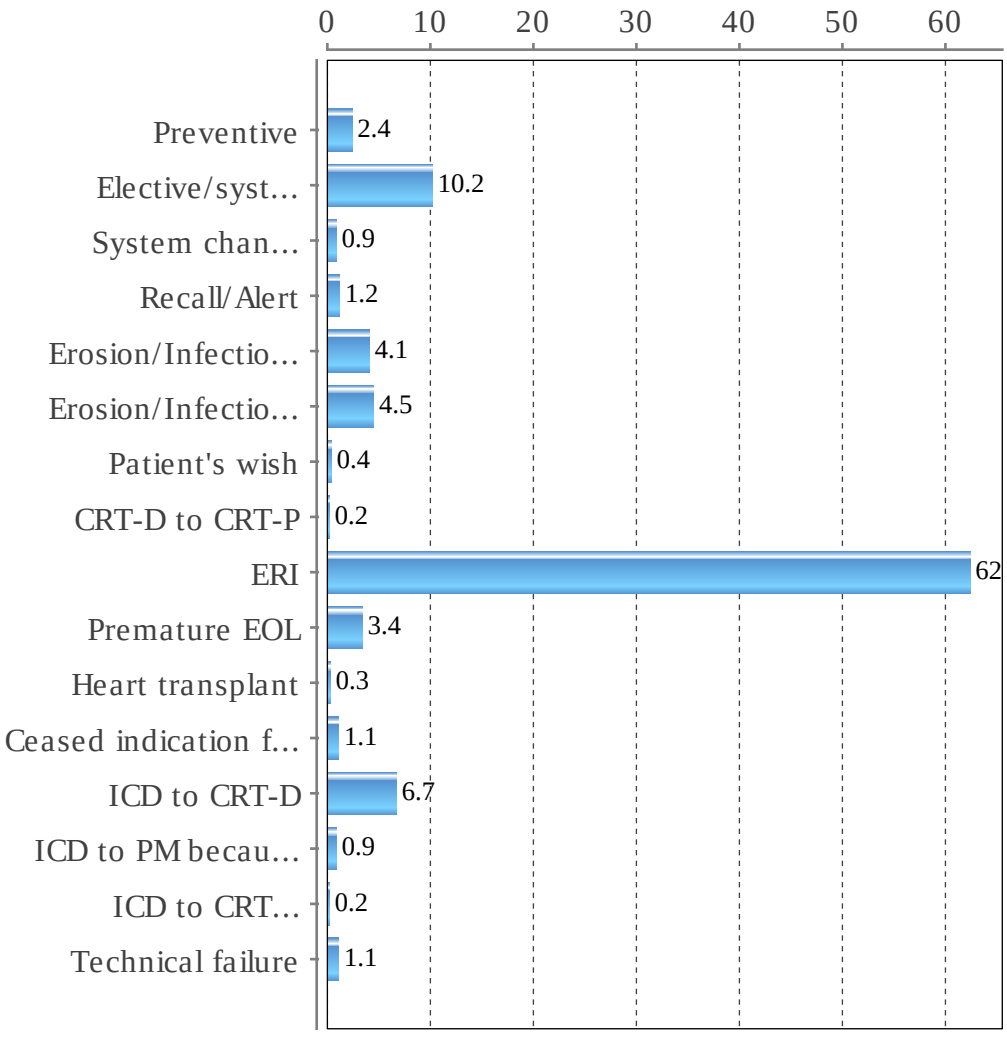


Use of ICD sub type for all indications per hospital (number of new implants / year and hospital))

Hospital	Number	ICD DR %	ICD SR %	ICD CRT %
Akademiska sjukhuset	71	19.7	35.2	45.1
Blekingesjukhuset	41	41.5	17.1	41.5
Centrallasarettet Växjö	32	68.8	6.3	25.0
Centralsjukhuset Karlstad	37	35.1	35.1	29.7
Centralsjukhuset Västerås	26	65.4	30.8	3.8
Danderyds sjukhus	55	41.8	25.5	32.7
Falu lasarett	53	20.8	52.8	26.4
Hudiksvalls sjukhus	9	44.4	55.6	0.0
Karolinska Universitetssjukhuset	120	38.3	30.0	31.7
Linköpings Universitetssjukhus	77	44.2	11.7	44.2
Länssjukhuset Gävle	57	33.3	15.8	50.9
Länssjukhuset Halmstad	1	100.0	0.0	0.0
Länssjukhuset Kalmar	45	15.6	51.1	33.3
Länssjukhuset Ryhov	29	69.0	31.0	0.0
Mälarsjukhuset	15	26.7	26.7	46.7
Norrlands Universitetssjukhus	47	17.0	31.9	51.1
Sahlgrenska Universitetssjukhuset	73	53.4	21.9	24.7
Skaraborgs sjukhus Skövde	25	36.0	20.0	44.0
Skellefteå lasarett	7	85.7	14.3	0.0
Skånes universitetssjukhus, Lund	233	41.2	26.2	32.6
St Görans sjukhus	61	39.3	18.0	42.6
Sunderby sjukhus	41	46.3	12.2	41.5
Sundsvalls sjukhus	53	41.5	24.5	34.0
Södersjukhuset	51	47.1	41.2	11.8
Södra Älvsborgs sjukhus	19	57.9	21.1	21.1
Trollhättan, NÄL	49	55.1	10.2	34.7
Universitetssjukhuset Örebro	52	13.5	38.5	48.1
Varbergs sjukhus	39	23.1	51.3	25.6
Visby lasarett	3	66.7	33.3	0.0
Örnsköldsviks sjukhus	8	87.5	12.5	0.0
Östersunds sjukhus	36	58.3	16.7	25.0

Reason for generator explant. Elective used for changes performed before reached ERI/EOL

Reason	All hospitals %	(large) %	(medium) %	(small) %
Preventive	2.4	1.5	5.1	0.0
Elective/system change	10.2	12.5	4.7	4.9
System change hemodynamic	0.9	0.9	1.2	0.0
Recall/Alert	1.2	1.5	0.8	0.0
Erosion/Infection, local	4.1	5.3	1.6	0.0
Erosion/Infection, systemic	4.5	5.9	1.6	0.0
Patient's wish	0.4	0.4	0.4	0.0
CRT-D to CRT-P	0.2	0.1	0.4	0.0
ERI	62.4	57.5	71.7	85.4
Premature EOL	3.4	2.9	3.9	7.3
Heart transplant	0.3	0.4	0.0	0.0
Ceased indication for ICD therapy	1.1	1.2	1.2	0.0
ICD to CRT-D	6.7	7.6	4.7	2.4
ICD to PM because of ceased indication	0.9	0.6	2.0	0.0
ICD to CRT-P because of heart failure	0.2	0.3	0.0	0.0
Technical failure	1.1	1.3	0.8	0.0

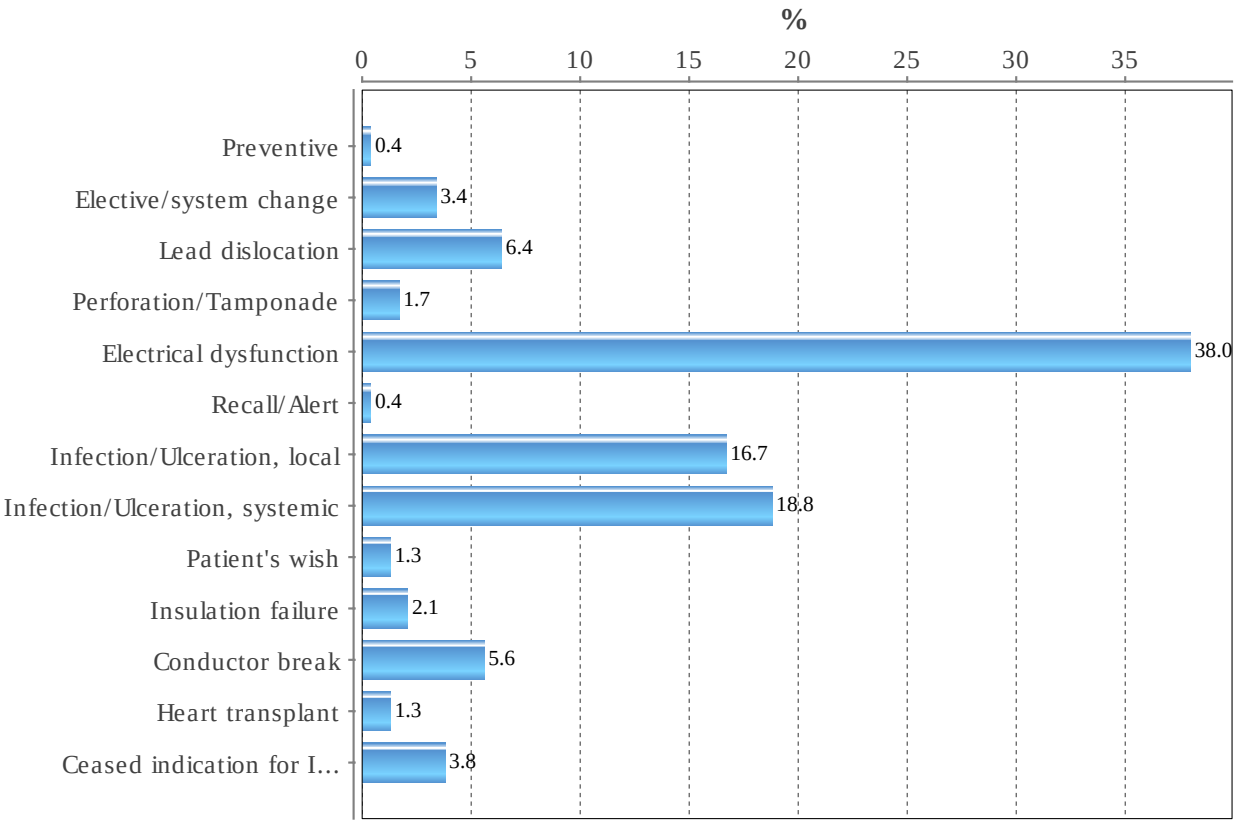


Historical explants indications

Reason	2016 %	2017 %	2018 %
Preventive	4.5	5.6	2.4
Elective/system change	4.9	5.8	10.2
System change hemodynamic	0.4	1.1	0.9
Recall/Alert	8.6	3.3	1.2
Erosion/Infection, local	2.1	5.0	4.1
Erosion/Infection, systemic	5.0	3.9	4.5
Patient's wish	0.3	0.5	0.4
CRT-D to CRT-P	0.8	0.9	0.2
ERI	58.9	60.8	62.4
Premature EOL	2.4	2.1	3.4
Heart transplant	1.3	1.0	0.3
Ceased indication for ICD therapy	1.2	0.8	1.1
ICD to CRT-D	8.4	7.8	6.7
ICD to PM because of ceased indication	0.1	0.2	0.9
Technical failure	1.2	1.2	1.1
CRT-D to ICD because of ceased CRT-indication	0.0	0.1	0.0
ICD to CRT-P because of heart failure	0.0	0.0	0.2

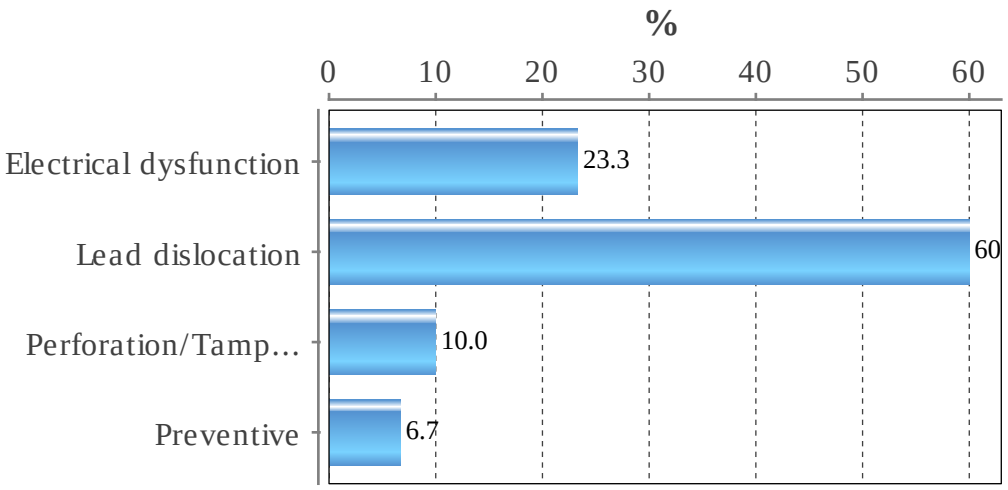
Historical lead explants indications

Reason	2016 %	2017 %	2018 %
Preventive	1.5	0.4	0.4
Elective/system change	8.0	3.7	3.4
Lead dislocation	7.0	4.6	6.4
Perforation/Tamponade	1.5	0.8	1.7
Electrical dysfunction	36.3	30.3	38.0
Infection/Ulceration, local	9.0	21.6	16.7
Infection/Ulceration, systemic	22.4	18.7	18.8
Patient's wish	1.0	2.1	1.3
Insulation failure	1.0	2.5	2.1
Conductor break	2.5	4.1	5.6
Heart transplant	6.5	4.1	1.3
Ceased indication for ICD therapy	3.5	5.8	3.8
Extracardial stimulation	0.0	0.8	0.0
Connector failure	0.0	0.4	0.0
Recall/Alert	0.0	0.0	0.4


%
0
5
10
15
20
25
30
35
Preventive
0.4
Elective/system change
3.4
Lead dislocation
6.4
Perforation/Tamponade
1.7
Electrical dysfunction
38.0
Recall/Alert
0.4
Infection/Ulceration, local
16.7
Infection/Ulceration, systemic
18.8
Patient's wish
1.3
Insulation failure
2.1
Conductor break
5.6
Heart transplant
1.3
Ceased indication for I...
3.8

Lead correction indications

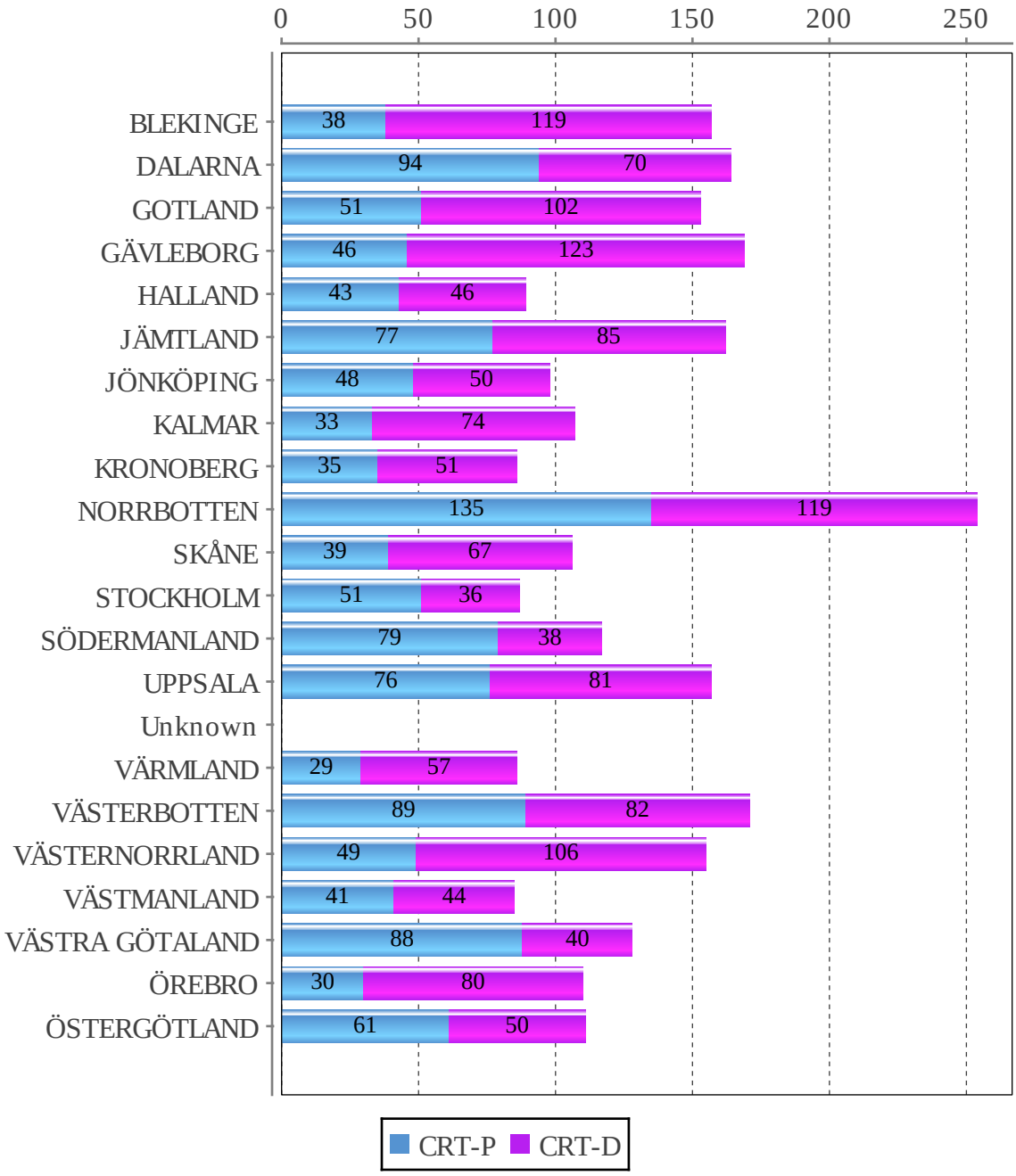
Reason	%
Electrical dysfunction	23.3
Lead dislocation	60.0
Perforation/Tamponade	10.0
Preventive	6.7
	Total no 30



Procedures per operator (exclusive CRT)

Hospital	Operator	No
Akademiska sjukhuset	Arvanitis	19
	Ostrowska	7
	Sciaraffia	11
	Teder	36
Ålands centralsjukhus	Slotte	5
Blekingesjukhuset	Anders Ericsson	3
	Annan	1
	Genadi Kaninski	3
	Jan-Olov Borg	29
	Martin Stefanik	2
	Michael Ringborn	1
	Nicoleta Sora	1
Centrallasarettet Växjö	Annan	1
	Johansson P	11
	Jonasson	9
	Rosén Helena	4
	Strandberg	10
	Strandberg-Jonasson-Johansson	1
	Weber	2
Centralsjukhuset Karlstad	Khalili	18
	Niklas Aldergård	8
	Saidi	6
Centralsjukhuset Västerås	SkoglundAndersson	18
	Wiberg	25
Danderyds sjukhus	1	3
	2	12
	3	26
	4	12
	6	3
Drottning Silvias Bus	Anders Nygren	1
Falu lasarett	Berglund	9
	Forsgren	16
	Guggi	25
Gävle sjukhus	Falck	2
	Johansson Staffan	5
	Kastberg	15
	Magnusson Peter	13
	Mati Jalakas	9
Hudiksvalls sjukhus	Roussinne	12
Karolinska Universitetssjukhus	Annan	1
	Gadler	57
	Hörnsten	49
	Reistam	33
Länssjukhuset Halmstad	Rorsman-Söderström	2
Länssjukhuset Kalmar	David Olsson	19
	Hendrik Schreyer	22
Länssjukhuset Ryhov	Lagerberg	18
	Säfström	1
	Sonesson	4
	Stefanik	4
	Stumpf	9
	Szamlewski	1
	Szymanowski	3
Linköpings universitetssjukhus	Pinna C	6
	Säfström K	14
	Sonesson L	18
	Svenson A	11
	Szymanowski A	14
Mälarsjukhuset	Carl Westholm	8
	Georgios Matthaiou	7
	Kave Keshavarz	6
	Linda Ärlehag	4
Norrlands Universitetssjukhus	Andersson	16
	Höglund	6
	Jensen	3
	Kesek	6
	Landström	3
	Rönn	6
Örnsköldsviks sjukhus	Ehlin	9
	Meidell	6
Östersunds sjukhus	Björklund	2
	Friberg	11
	Friberg/Hansson	1
	Hansson	14
Sahlgrenska universitetssjukhuset	Kennergren	1
	Konstantinos Liakatsidas	19
	Piotr Szamlewski	40
	Shabbar Jamaly	7
	Stefan Jakobsson	30
Skaraborgs sjukhus Skövde	Anna Widunder	7
	Lorentzen	11
	Paulsson	8
	Winterfeldt	6
Skånes universitetssjukhus, Lund	Annan	1
	David Mörtsell	35

Hospital	Operator	No
	Jesper van der Pals	11
	Johan Brandt	110
	LingWei Wang	41
	Maiwand Farouq	16
	Pyotr Platonov	3
	Rorsman-Söderström	4
	Steen Jensen	11
	Uzma Chaudry	15
Skellefteå lasarett	Annan	1
	Bygdén	1
	Lindqvist	8
Södersjukhuset	Jonsson J-E	15
	Kjellman B	21
	Olson J	16
	Rydlund K	18
Södra Älvsborgs sjukhus	Lodin	10
	Riemer	11
St Görans sjukhus	1	20
	1+2	1
	2	16
	3	13
Sunderby sjukhus	Agneta Johansson	7
	Annica Wennberg	2
	Marcus Baas	9
	Peter Johansson	7
	Peter Rangson	10
Sundsvalls sjukhus	Ciubine	16
	Haupt	9
	Khadhim	9
	Sundelin	8
	Teder	4
Trollhättan, NÄL	Alice David	3
	Dinu Dusceac	2
	Jabbar	4
	Javid	18
	Orsolya Bene	20
Universitetssjukhuset Örebro	Anna Björkenheim	15
	Áron Sztanislav	5
	Barbara Kurt	1
	Lindell	21
Varbergs sjukhus	Emma Sandgren	22
	Rorsman	17
Visby lasarett	Jacobsson L	8


0
50
100
150
200
250
BLEKINGE
38
119
DALARNA
94
70
GOTLAND
51
102
GÄVLEBORG
46
123
HALLAND
43
46
JÄMTLAND
77
85
JÖNKÖPING
48
50
KALMAR
33
74
KRONOBERG
35
51
NORRBOTTEN
135
119
SKÅNE
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67
STOCKHOLM
51
36
SÖDERMANLAND
79
38
UPPSALA
76
81
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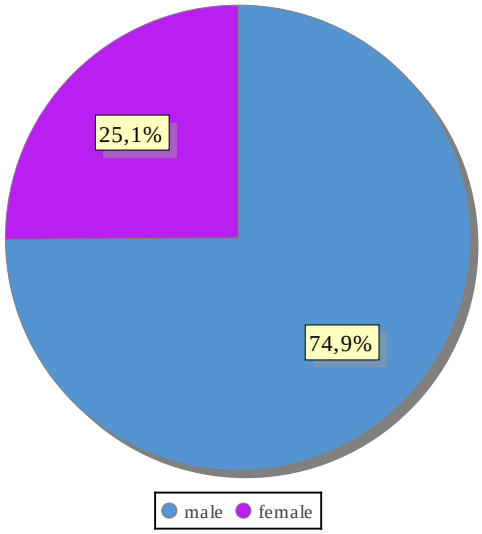
29
57
VÄSTERBOTTEN
89
82
VÄSTERNORRLAND
49
106
VÄSTMANLAND
41
44
VÄSTRA GÖTALAND
88
40
ÖREBRO
30
80
ÖSTERGÖTLAND
61
50
CRT-P
CRT-D

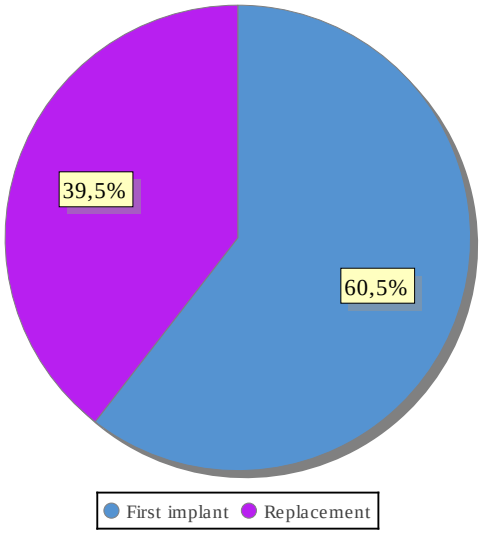
Based on both CRT-P and CRT-D

	Total		Male		Female	
	no	%	no	%	no	%
First implant	1208	60.5	905	74.9	303	25.1
Replacement	790	39.5	593	75.1	197	24.9
Total	1998	100.0	1498	75.0	500	25.0

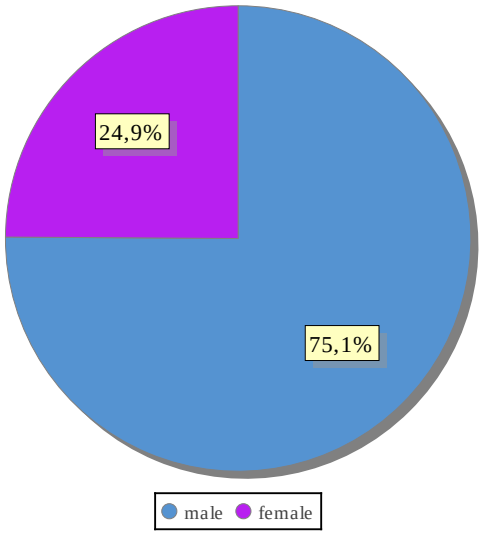
First implant



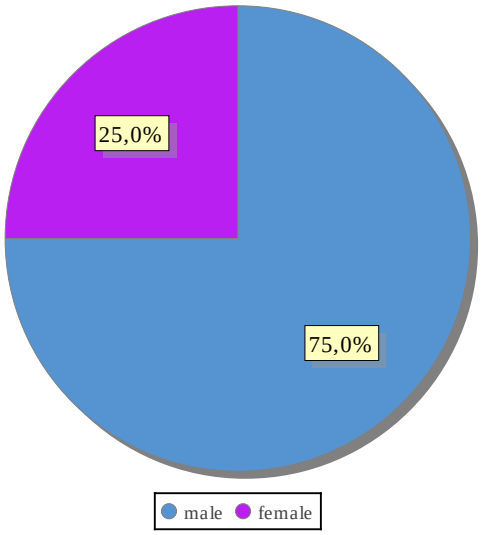
Replacement ratio



Replacement



All implant



CRT Historical implant rates per hundred thousand residents

			CRT-P		CRT-D	
Year	**Population**	**No First Impl**	**No**	**Rate**	**No**	**Rate**
2014	9747355	987	395	4.1	592	6.1
2015	9851017	1059	448	4.5	611	6.2
2016	9995153	1138	479	4.8	659	6.6
2017	10120242	1191	549	5.4	642	6.3
2018	10230185	1209	611	6.0	598	5.8

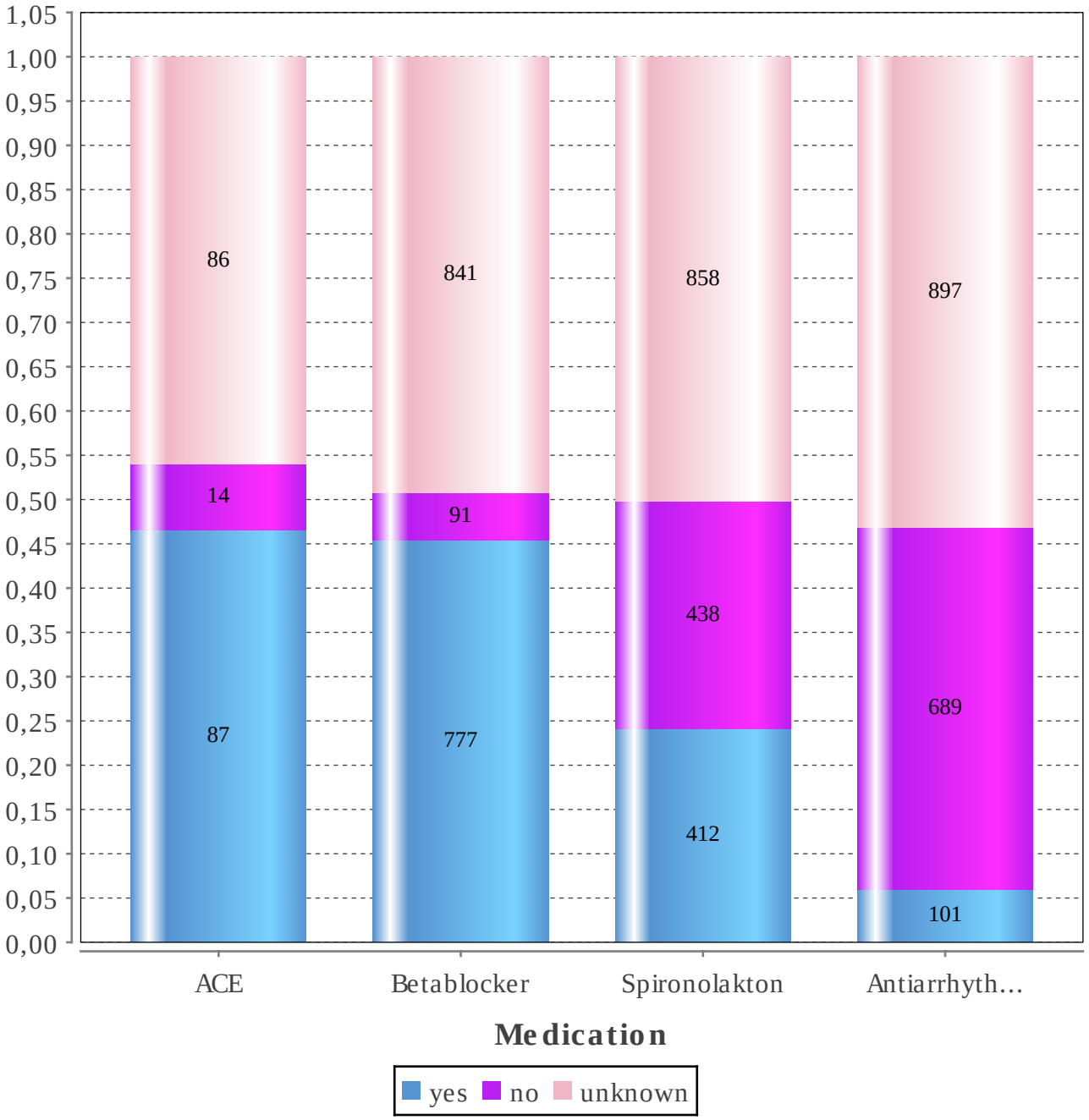
CRT-P (generator)

Status	First implant	Replacement
SC-lead plugged	9	3
SC-lead failed implant	11	2
SC-lead active system	626	366

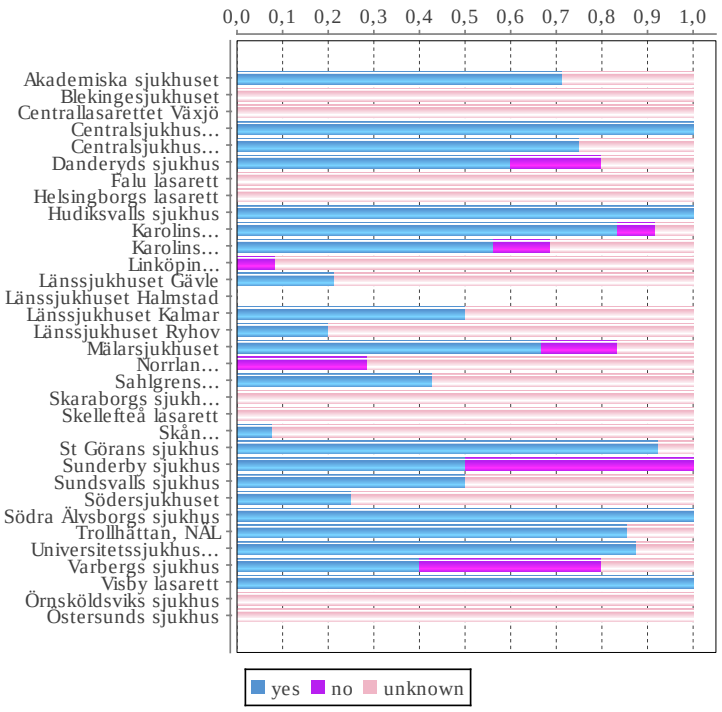
CRT-D (generator)

Status	First implant	Replacement
SC-lead plugged	10	5
SC-lead failed implant	14	0
SC-lead active system	598	419

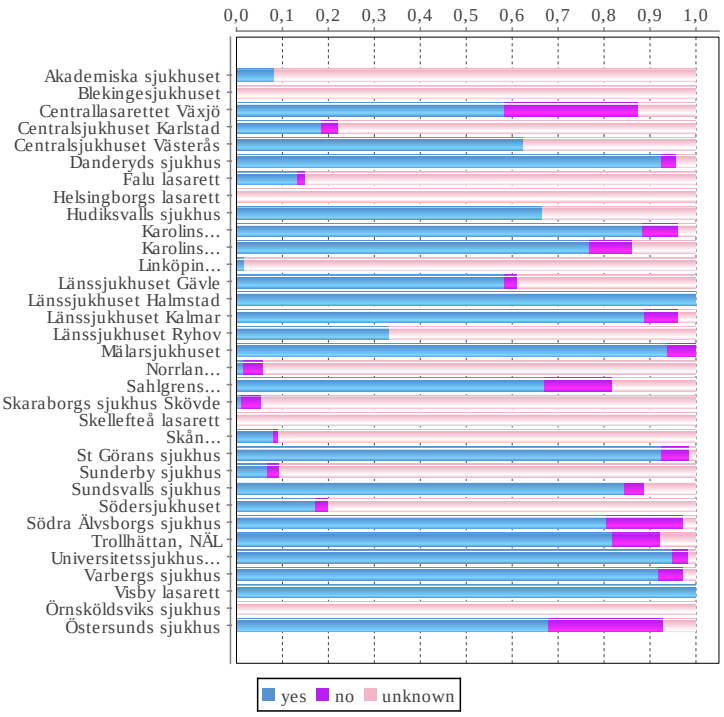
Previous medication for patients having CRT implant

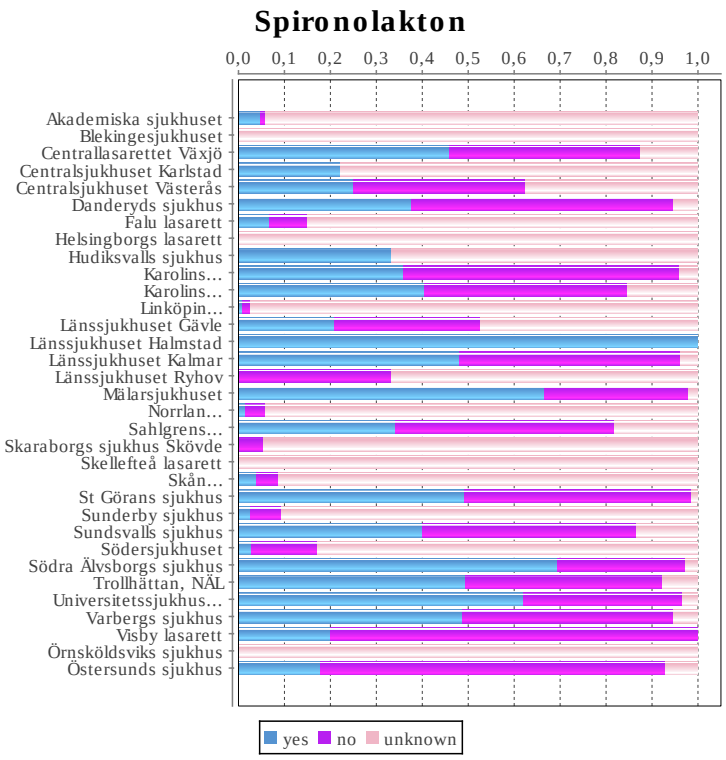


ACE



Betablocker




Spironolakton
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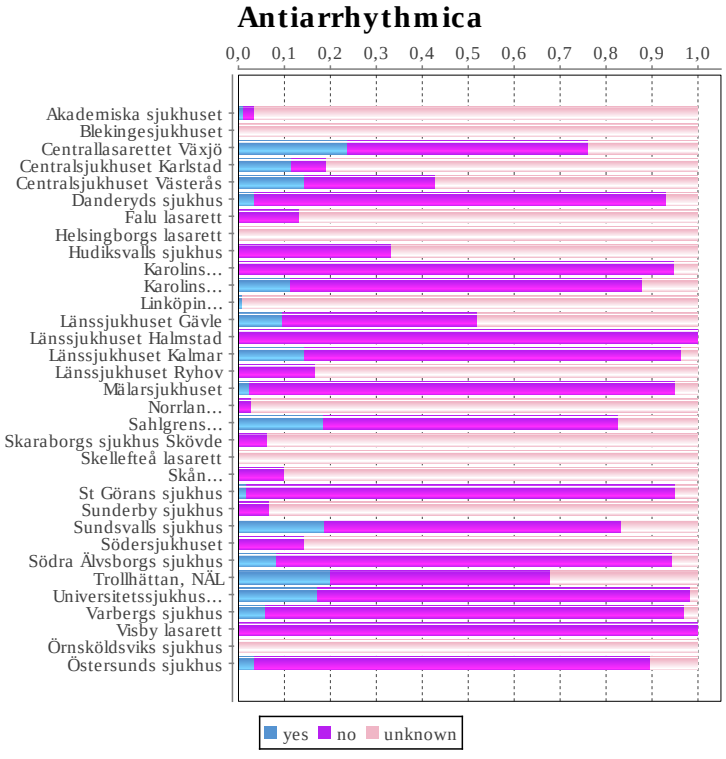
Akademiska sjukhuset
Blekingesjukhuset
Centrallasarettet Växjö
Centralsjukhuset Karlstad
Centralsjukhuset Västerås
Danderyds sjukhus
Falu lasarett
Helsingborgs lasarett
Hudiksvalls sjukhus
Karolins...
Karolins...
Linköpin...
Länssjukhuset Gävle
Länssjukhuset Halmstad
Länssjukhuset Kalmar
Länssjukhuset Ryhov
Mälarsjukhuset
Norrlan...
Sahlgrens...
Skaraborgs sjukhus Skövde
Skellefteå lasarett
Skån...
St Görans sjukhus
Sunderby sjukhus
Sundsvalls sjukhus
Södersjukhuset
Södra Älvsborgs sjukhus
Trollhättan, NÄL
Universitetssjukhus...
Varbergs sjukhus
Visby lasarett
Örnsköldsviks sjukhus
Östersunds sjukhus
yes no unknown


Antiarrhythmica
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Akademiska sjukhuset
Blekingesjukhuset
Centrallasarettet Växjö
Centralsjukhuset Karlstad
Centralsjukhuset Västerås
Danderyds sjukhus
Falu lasarett
Helsingborgs lasarett
Hudiksvalls sjukhus
Karolins...
Karolins...
Linköpin...
Länssjukhuset Gävle
Länssjukhuset Halmstad
Länssjukhuset Kalmar
Länssjukhuset Ryhov
Mälarsjukhuset
Norrlan...
Sahlgrens...
Skaraborgs sjukhus Skövde
Skellefteå lasarett
Skån...
St Görans sjukhus
Sunderby sjukhus
Sundsvalls sjukhus
Södersjukhuset
Södra Älvsborgs sjukhus
Trollhättan, NÄL
Universitetssjukhus...
Varbergs sjukhus
Visby lasarett
Örnsköldsviks sjukhus
Östersunds sjukhus
yes no unknown

Procedures per operator

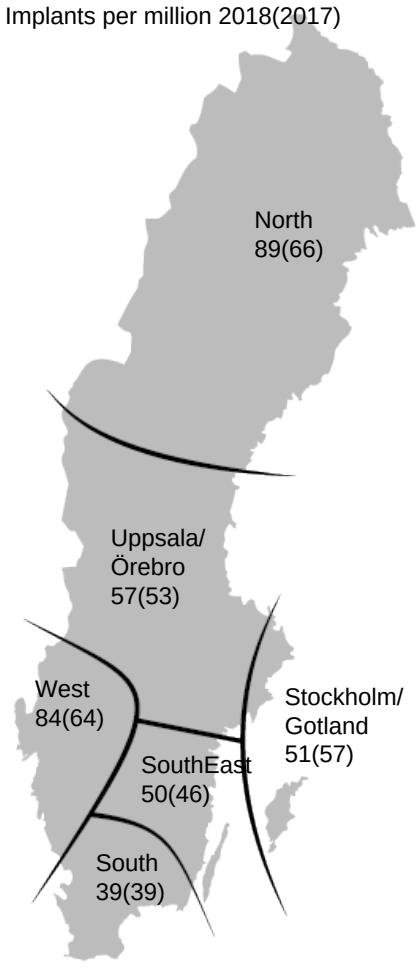
Hospital	Operator	No
Akademiska sjukhuset	Arvanitis	13
	Teder	18
Ålands centralsjukhus	Slotte	2
Blekingesjukhuset	Jan-Olov Borg	7
	Nicoleta Sora	1
Centrallasarettet Växjö	Johansson P	2
	Jonasson	3
	Strandberg	1
	Strandberg-Jonasson	2
Centralsjukhuset Karlstad	Khalili	1
	Niklas Aldergård	6
Danderyds sjukhus	3	10
	4	30
Falu lasarett	Forsgren	22
	Guggi	6
Gävle sjukhus	Falck	5
	Kastberg	8
Karolinska Universitetssjukhus	Gadler	24
	Hörnsten	24
	Reistam	12
	Reistam/Gadler	1
	Reistam/ Hörnsten	4
Länssjukhuset Halmstad	Rorsman-Söderström	1
Länssjukhuset Kalmar	Hendrik Schreyer	3
	Ove Carlström	2
Linköpings universitetssjukhus	Säfström K	18
	Sonesson L	19
	Szymanowski A	10
Mälarsjukhuset	Carl Westholm	24
Norrlands Universitetssjukhus	Andersson	3
	Forsgren	4
	Höglund	4
	Jensen	1
	Landström	9
	Rönn	7
Östersunds sjukhus	Björklund	1
	Björklund Friberg	1
	Friberg/Hansson	6
	Hansson	2
Sahlgrenska universitetssjukhuset	Annan	1
	Jakob Gäbel	1
	Konstantinos Liakatsidas	6
	Piotr Szamlewski	22
	Shabbar Jamaly	4
	Stefan Jakobsson	5
Skaraborgs sjukhus Skövde	Anna Widunder	1
	Daniel Hellner	1
	Falmer	6
	Lorentzen	43
	Paulsson	16
Skånes universitetssjukhus, Lund	Annan	2
	David Mörtsell	12
	Johan Brandt	19
	LingWei Wang	13
	Maiwand Farouq	13
	Rorsman-Söderström	1
	Steen Jensen	2
Södersjukhuset	Jonsson J-E	2
	Kjellman B	9
	Olson J	8
Södra Älvsborgs sjukhus	Riemer	20
St Görans sjukhus	1	5
	1+2	1
	2	3
Sunderby sjukhus	Marcus Baas	15
	Peter Johansson	16
Sundsvalls sjukhus	Ciubine	3
	Haupt	6
Trollhättan, NÄL	Dinu Dusceac	1
	Javid	23
	Orsolya Bene	7
Universitetssjukhuset Örebro	Anna Björkenheim	5
	Lindell	9
Varbergs sjukhus	Emma Sandgren	8
	Rorsman	6

Procedures per operator

Hospital	Operator	No
Akademiska sjukhuset	Arvanitis	10
	Teder	28
Ålands centralsjukhus	Slotte	6
Blekingesjukhuset	Annan	1
	Jan-Olov Borg	22
	Michael Ringborn	1
Centrallasarettet Växjö	Johansson P	1
	Jonasson	2
	Strandberg	1
	Strandberg-Jonasson	3
	Strandberg-Jonasson-Johansson	1
Centralsjukhuset Karlstad	Khalili	1
	Niklas Aldergård	11
Centralsjukhuset Västerås	SkoglundAndersson	1
	Wiberg	1
Danderyds sjukhus	3	9
	4	11
Falu lasarett	Forsgren	14
	Guggi	6
Gävle sjukhus	Falck	18
	Kastberg	14
Karolinska Universitetssjukhus	Gadler	32
	Hörnsten	9
	Reistam	8
	Reistam/Gadler	1
	Reistam/ Hörnsten	2
Länssjukhuset Kalmar	David Olsson	3
	Hendrik Schreyer	13
	Ove Carlström	1
Linköpings universitetssjukhus	Säfström K	23
	Sonesson L	19
	Szymanowski A	5
Mälarsjukhuset	Carl Westholm	10
Norrlands Universitetssjukhus	Andersson	3
	Forsgren	1
	Höglund	2
	Jensen	1
	Kesek	2
	Landström	15
	Rönn	5
Östersunds sjukhus	Björklund	1
	Friberg/Hansson	7
	Hansson	3
Sahlgrenska universitetssjukhuset	Kennergren	1
	Kennergren/ Szamlewski	1
	Konstantinos Liakatsidas	5
	Piotr Szamlewski	22
	Stefan Jakobsson	2
Skaraborgs sjukhus Skövde	Falmer	2
	Lorentzen	10
	Paulsson	5
Skånes universitetssjukhus, Lund	Annan	1
	David Mörtsell	19
	Johan Brandt	29
	LingWei Wang	35
	Maiwand Farouq	14
	Rorsman-Söderström	2
	Steen Jensen	2
Södersjukhuset	Jonsson J-E	1
	Kjellman B	1
	Olson J	6
Södra Älvsborgs sjukhus	Riemer	4
St Görans sjukhus	1	22
	1+2	4
	2	6
Sunderby sjukhus	Marcus Baas	15
	Peter Johansson	16
Sundsvalls sjukhus	Ciubine	8
	Haupt	12
	Teder	3
Trollhättan, NÄL	Javid	13
	Orsolya Bene	10
Universitetssjukhuset Örebro	Anna Björkenheim	5
	Áron Sztanislav	10
	Lindell	16
Varbergs sjukhus	Emma Sandgren	7
	Rorsman	8

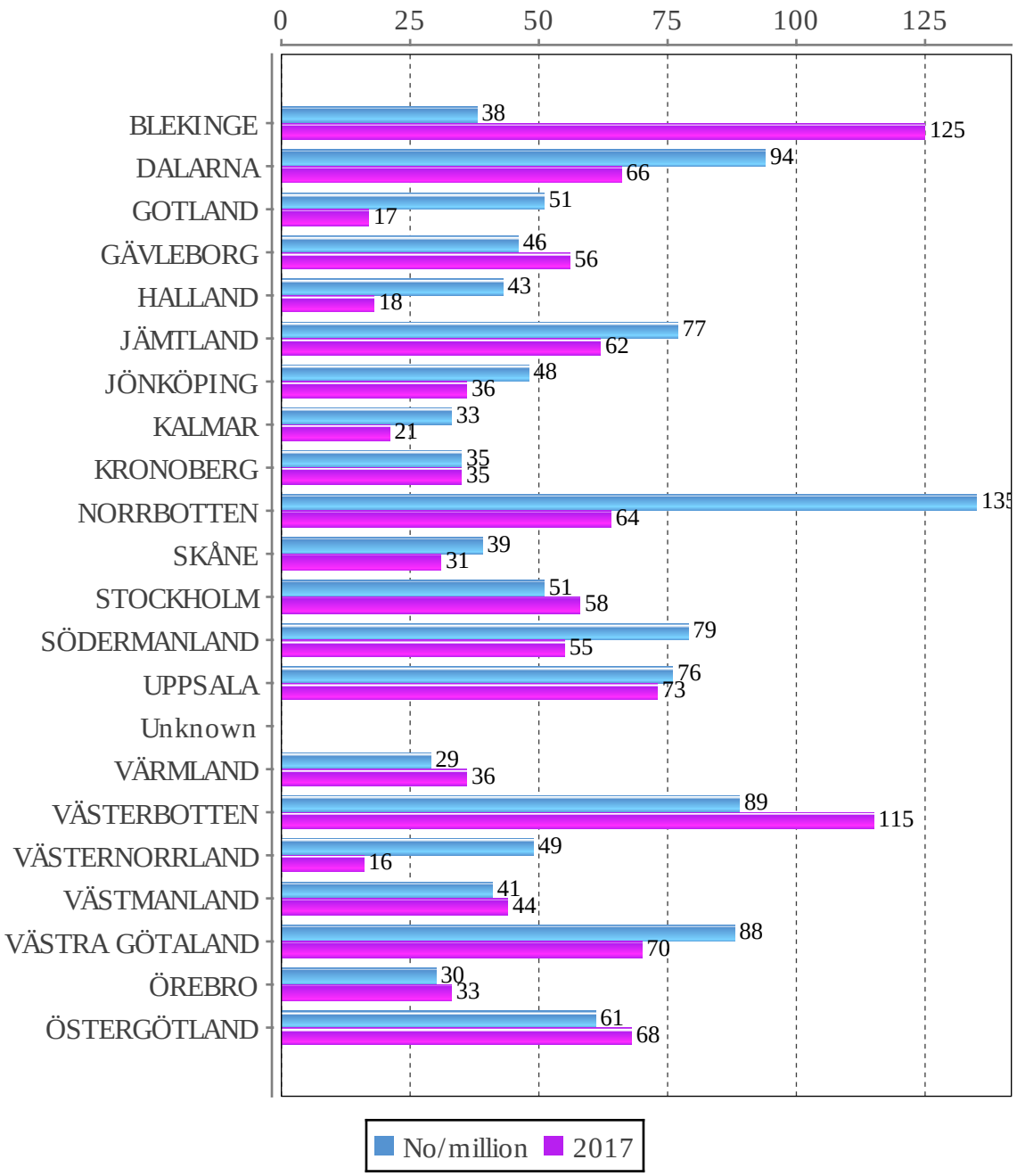
The regions are based on where the patients live, not where they are treated

Region	Population	No of first impl	No per million
Stockholm/Gotland	2366738	120	51
Uppsala/Örebro	2082515	119	57
South-East Sweden	1058269	53	50
Southern Sweden	1837468	71	39
Western Sweden	1879718	157	84
Northern Sweden	895534	80	89
Total	10120242	600	59



The regions are based on where the patients live, not where they are treated

	Population	No first impl	No/million
BLEKINGE	159371	6	38
DALARNA	286165	27	94
GOTLAND	58595	3	51
GÄVLEBORG	285637	13	46
HALLAND	324825	14	43
JÄMTLAND	129806	10	77
JÖNKÖPING	357237	17	48
KALMAR	243536	8	33
KRONOBERG	197519	7	35
NORRBOTTEN	251295	34	135
SKÅNE	1344689	53	39
STOCKHOLM	2308143	117	51
SÖDERMANLAND	291341	23	79
UPPSALA	368971	28	76
Unknown	0	8	0
VÄRMLAND	280399	8	29
VÄSTERBOTTEN	268465	24	89
VÄSTERNORRLAND	245968	12	49
VÄSTMANLAND	271095	11	41
VÄSTRA GÖTALAND	1690782	148	88
ÖREBRO	298907	9	30
ÖSTERGÖTLAND	457496	28	61
Total	10120242	608	60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25
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75
100
125
BLEKINGE
38
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DALARNA
94
66
GOTLAND
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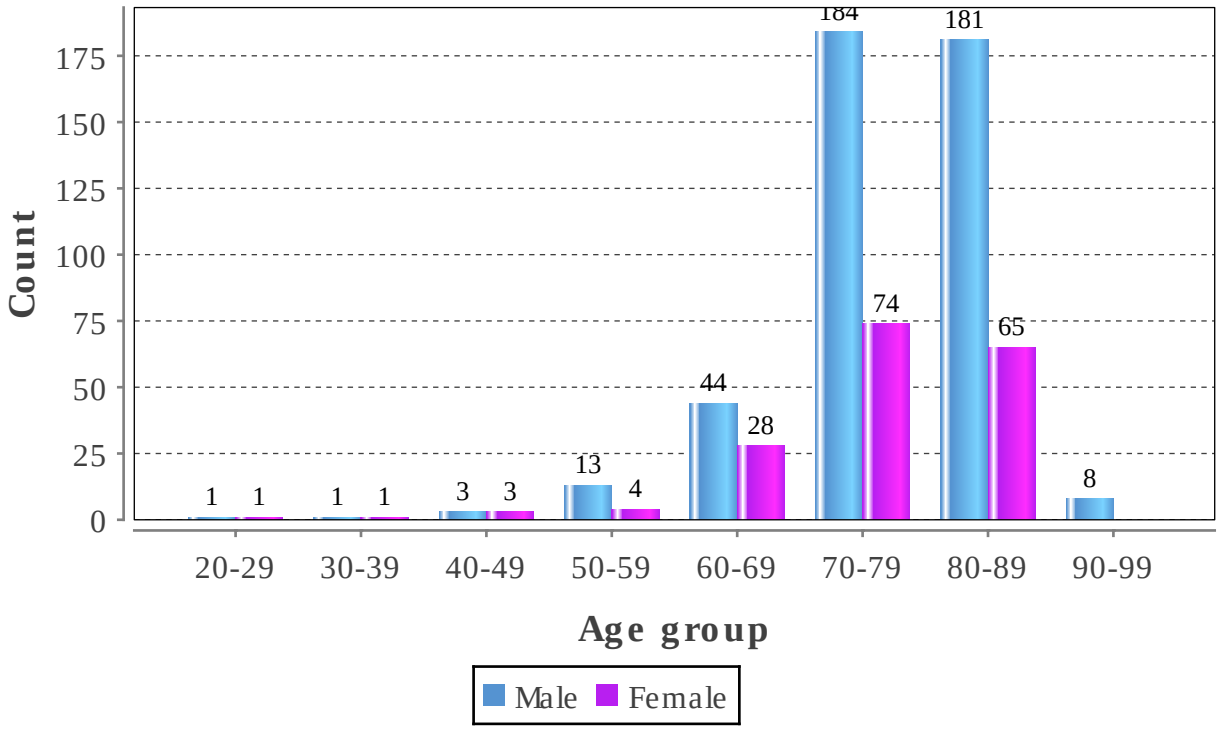
17
GÄVLEBORG
46
56
HALLAND
43
18
JÄMTLAND
77
62
JÖNKÖPING
48
36
KALMAR
33
21
KRONOBERG
35
35
NORRBOTTEN
135
64
SKÅNE
39
31
STOCKHOLM
51
58
SÖDERMANLAND
79
55
UPPSALA
76
73
Unknown
VÄRMLAND
29
36
VÄSTERBOTTEN
89
115
VÄSTERNORRLAND
49
16
VÄSTMANLAND
41
44
VÄSTRA GÖTALAND
88
70
ÖREBRO
30
33
ÖSTERGÖTLAND
61
68
No/million
2017

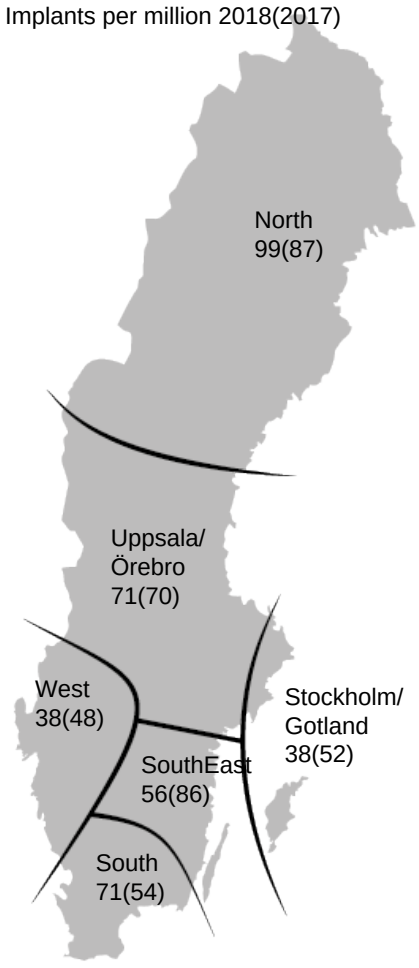
Age and gender distribution for new implants, total numbers

Age (years)	Total no	%	Male	Female
20-29	2	0.3	1	1
30-39	2	0.3	1	1
40-49	6	1.0	3	3
50-59	17	2.8	13	4
60-69	72	11.8	44	28
70-79	258	42.2	184	74
80-89	246	40.3	181	65
90-99	8	1.3	8	0
Average age	76	0.0	77	75
				Total number of implants: 611



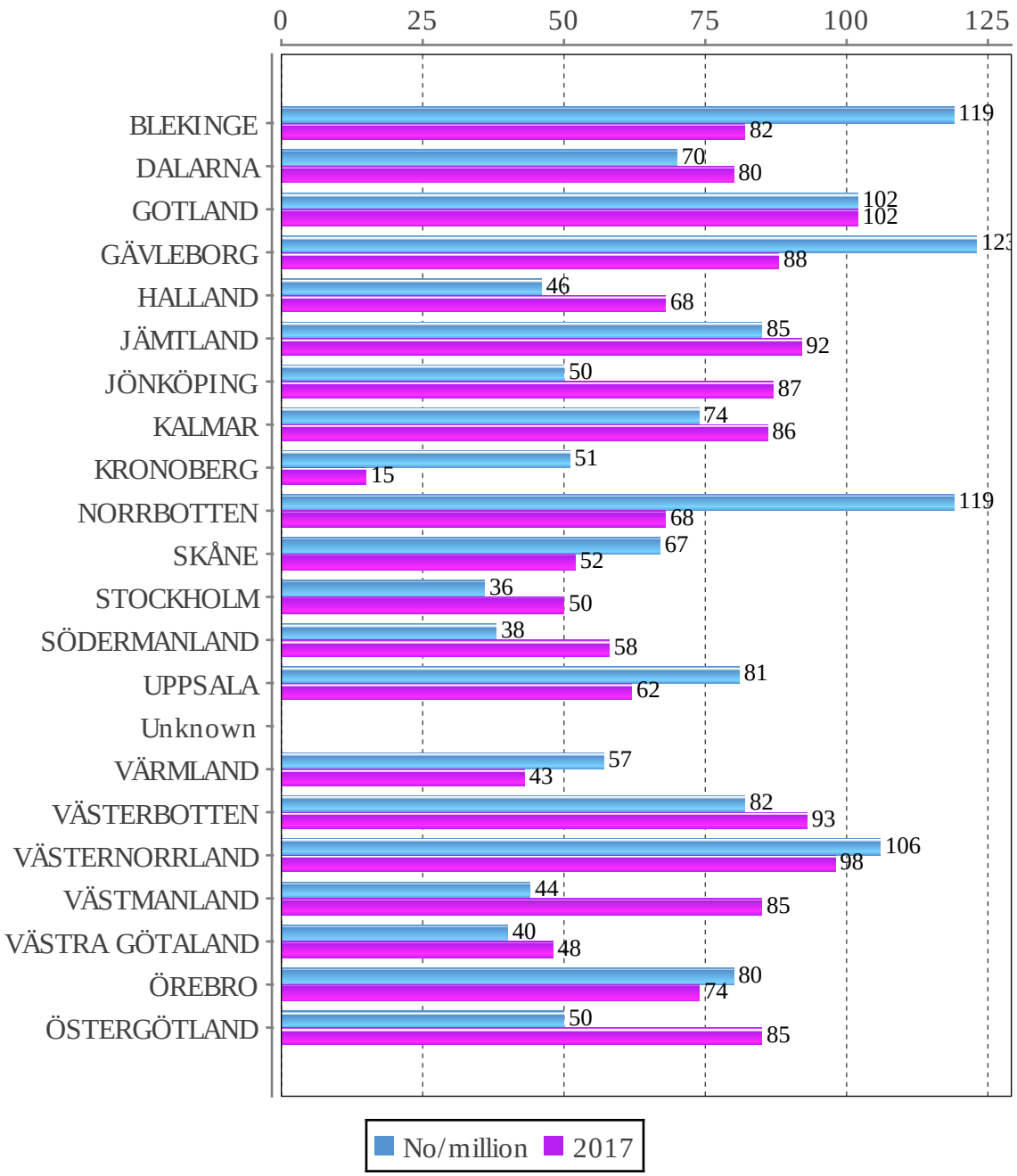
The regions are based on where the patients live, not where they are treated

Region	Population	No of first impl	No per million
Stockholm/Gotland	2366738	89	38
Uppsala/Örebro	2082515	148	71
South-East Sweden	1058269	59	56
Southern Sweden	1837468	130	71
Western Sweden	1879718	72	38
Northern Sweden	895534	89	99
Total	10120242	587	58



The regions are based on where the patients live, not where they are treated

	Population	No first impl	No/million
BLEKINGE	159371	19	119
DALARNA	286165	20	70
GOTLAND	58595	6	102
GÄVLEBORG	285637	35	123
HALLAND	324825	15	46
JÄMTLAND	129806	11	85
JÖNKÖPING	357237	18	50
KALMAR	243536	18	74
KRONOBERG	197519	10	51
NORRBOTTEN	251295	30	119
SKÅNE	1344689	90	67
STOCKHOLM	2308143	83	36
SÖDERMANLAND	291341	11	38
UPPSALA	368971	30	81
Unknown	0	13	0
VÄRMLAND	280399	16	57
VÄSTERBOTTEN	268465	22	82
VÄSTERNORRLAND	245968	26	106
VÄSTMANLAND	271095	12	44
VÄSTRA GÖTALAND	1690782	67	40
ÖREBRO	298907	24	80
ÖSTERGÖTLAND	457496	23	50
Total	10120242	599	59


0
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125
BLEKINGE
DALARNA
GOTLAND
GÄVLEBORG
HALLAND
JÄMTLAND
JÖNKÖPING
KALMAR
KRONOBERG
NORRBOTTEN
SKÅNE
STOCKHOLM
SÖDERMANLAND
UPPSALA
Unknown
VÄRMLAND
VÄSTERBOTTEN
VÄSTERNORRLAND
VÄSTMANLAND
VÄSTRA GÖTALAND
ÖREBRO
ÖSTERGÖTLAND
119
82
70
80
102
102
123
88
46
68
85
92
50
87
74
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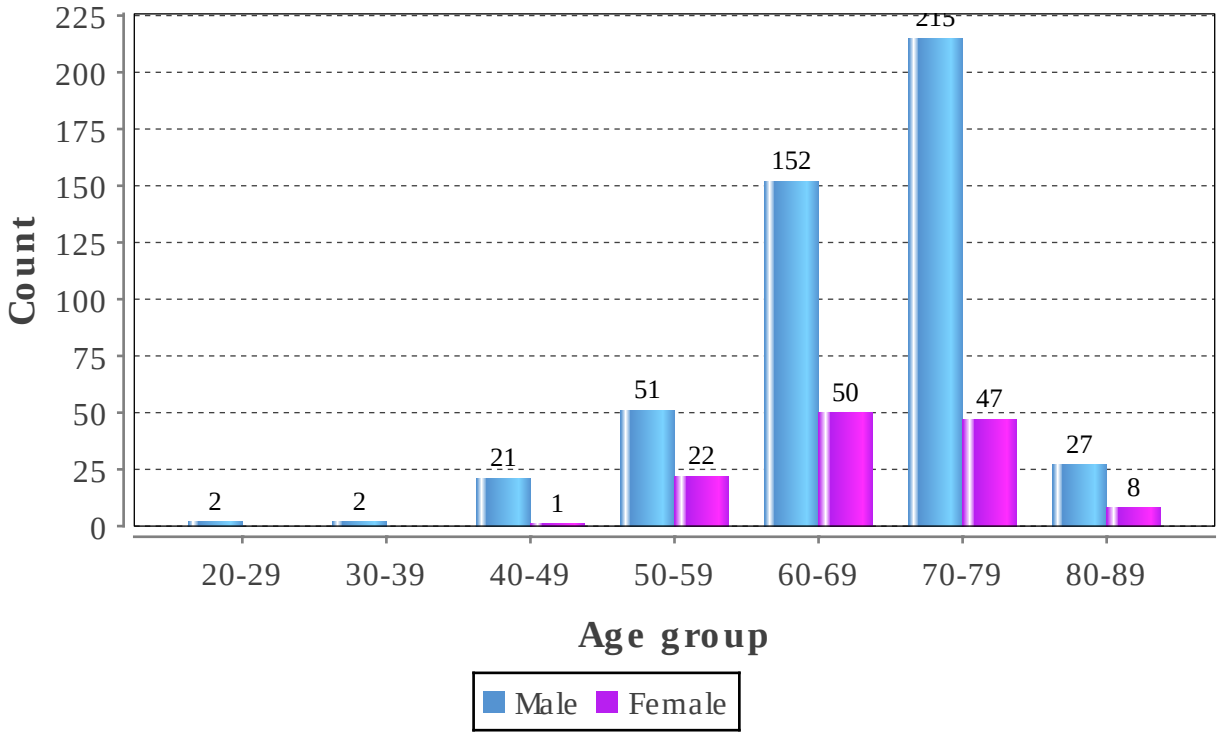
51
15
119
68
67
52
36
50
38
58
81
62
57
43
82
93
106
98
44
85
40
48
80
74
50
85
No/million
2017

Age and gender distribution for new implants, total numbers

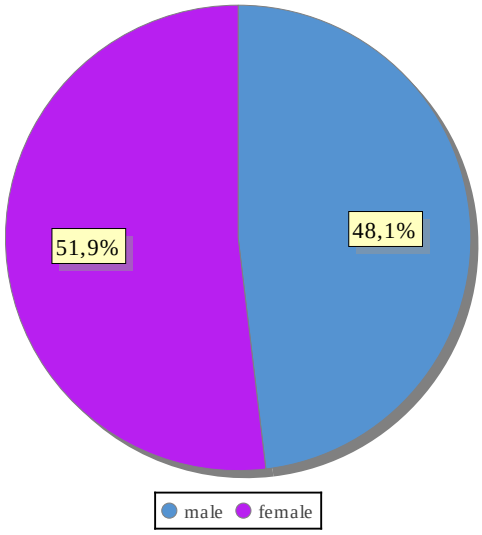
Age (years)	Total no	%	Male	Female
20-29	2	0.3	2	0
30-39	2	0.3	2	0
40-49	22	3.7	21	1
50-59	73	12.2	51	22
60-69	202	33.8	152	50
70-79	262	43.8	215	47
80-89	35	5.9	27	8
Average age	68	0.0	68	68
				Total number of implants: 598



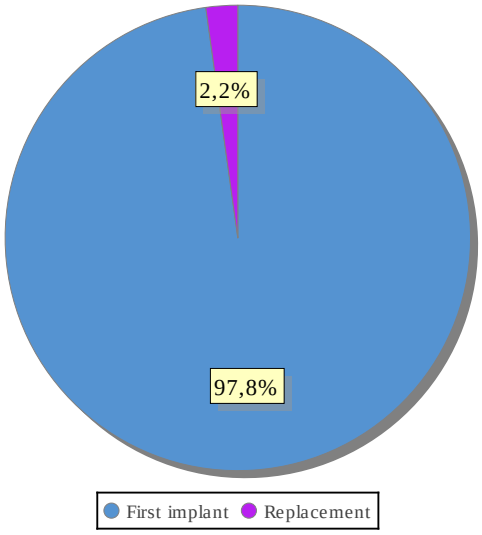
Ratio of new implants versus generator changes

	Total		Male		Female	
	no	%	no	%	no	%
First implant	985	97.8	474	48.1	511	51.9
Replacement	22	2.2	13	59.1	9	40.9
Total	1007	100.0	487	48.4	520	51.6

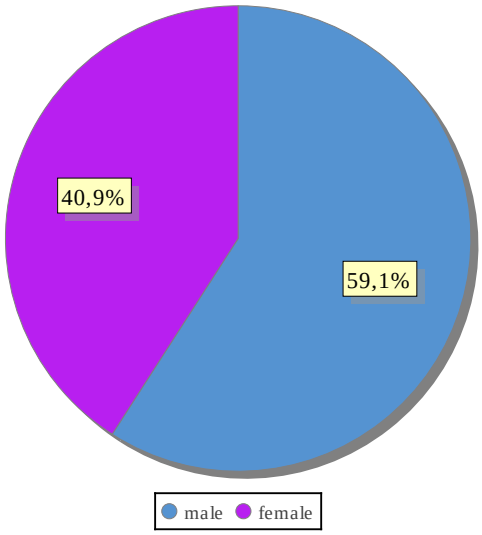
First implant



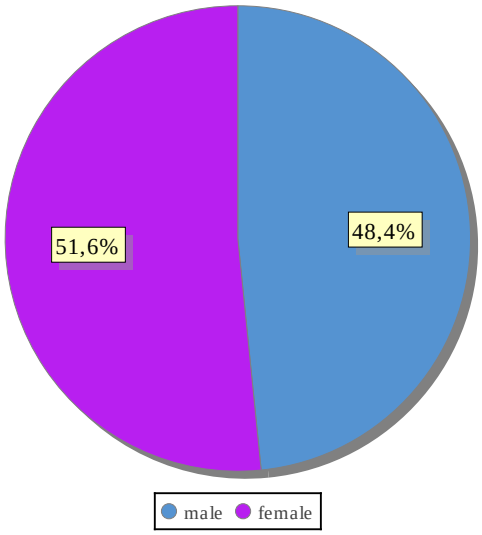
Replacement ratio



Replacement

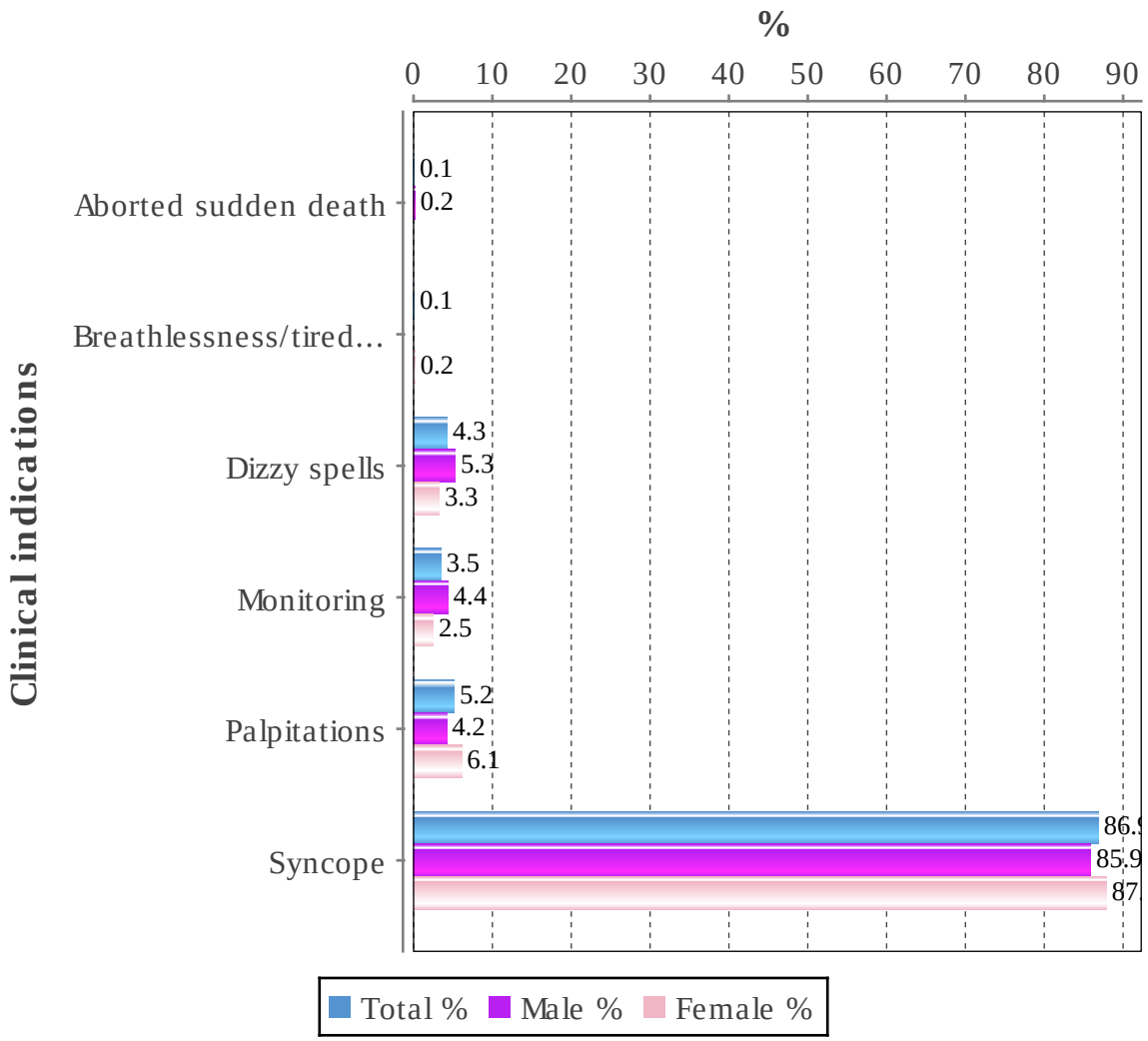


All implant



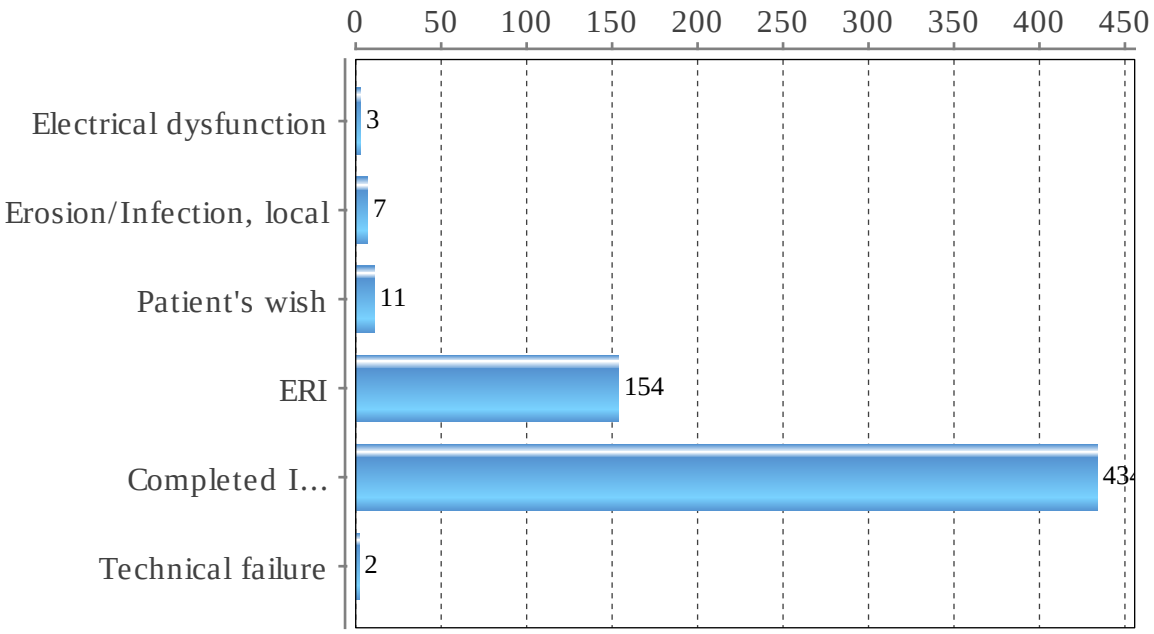
Main symptom for implanting ILR

Indication	Total %	Male %	Female %
Aborted sudden death	0.1	0.2	0.0
Breathlessness/tiredness	0.1	0.0	0.2
Dizzy spells	4.3	5.3	3.3
Monitoring	3.5	4.4	2.5
Palpitations	5.2	4.2	6.1
Syncope	86.9	85.9	87.9



Reason for generator removal

Reason	No	%
Electrical dysfunction	3	0.5
Erosion/Infection, local	7	1.1
Patient's wish	11	1.8
ERI	154	25.2
Completed ILR investigation	434	71.0
Technical failure	2	0.3

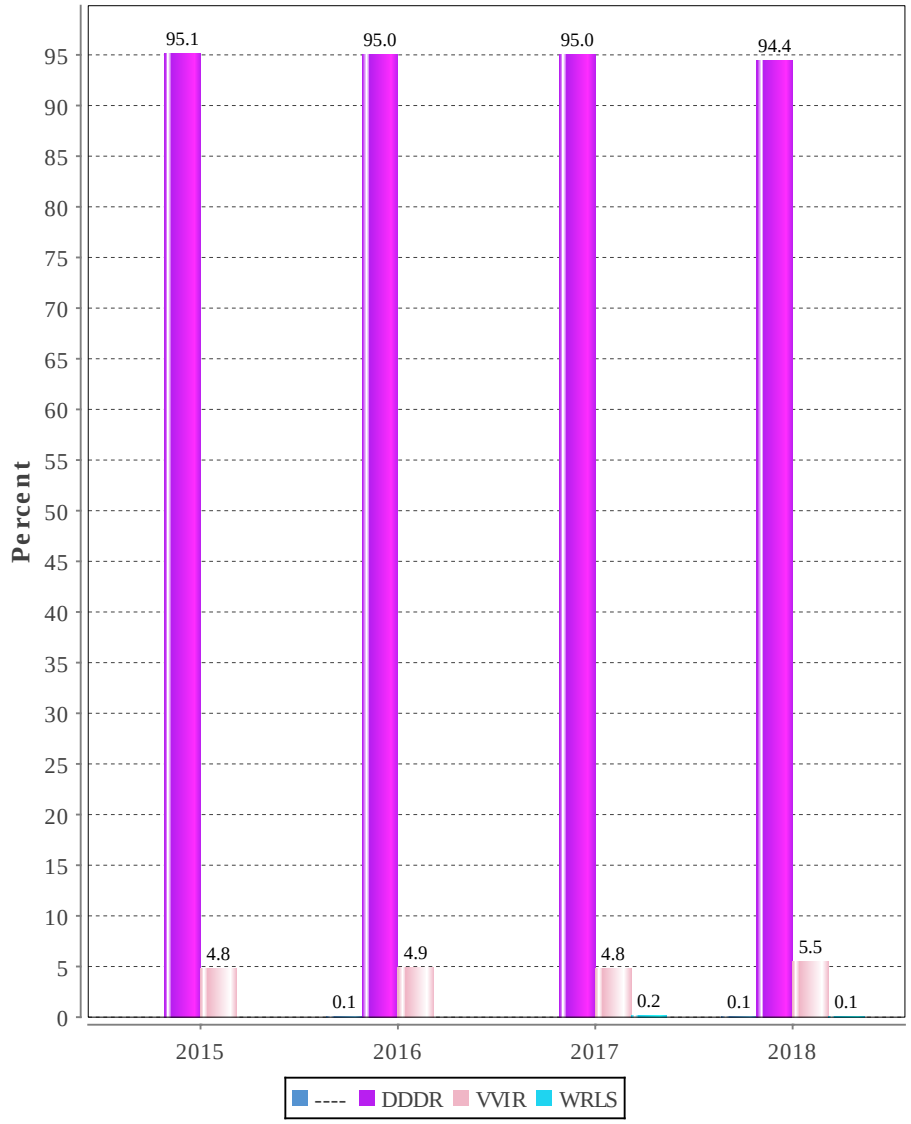


Investigation after first ILR implant in % of completed ILR investigation

Action	No	%
Pacemaker implant	282	65.0
ICD implant	21	4.8
New ILR implant	27	6.2

Use of pacing mode for total AV block indication, historical data

Mode %	2015	2016	2017	2018
----	0.0	0.1	0.0	0.1
DDDR	95.1	95.0	95.0	94.4
VVIR	4.8	4.9	4.8	5.5
WRLS	0.0	0.0	0.2	0.1



Use of pacing mode for total AV block indication per hospital (number of new implants / year)

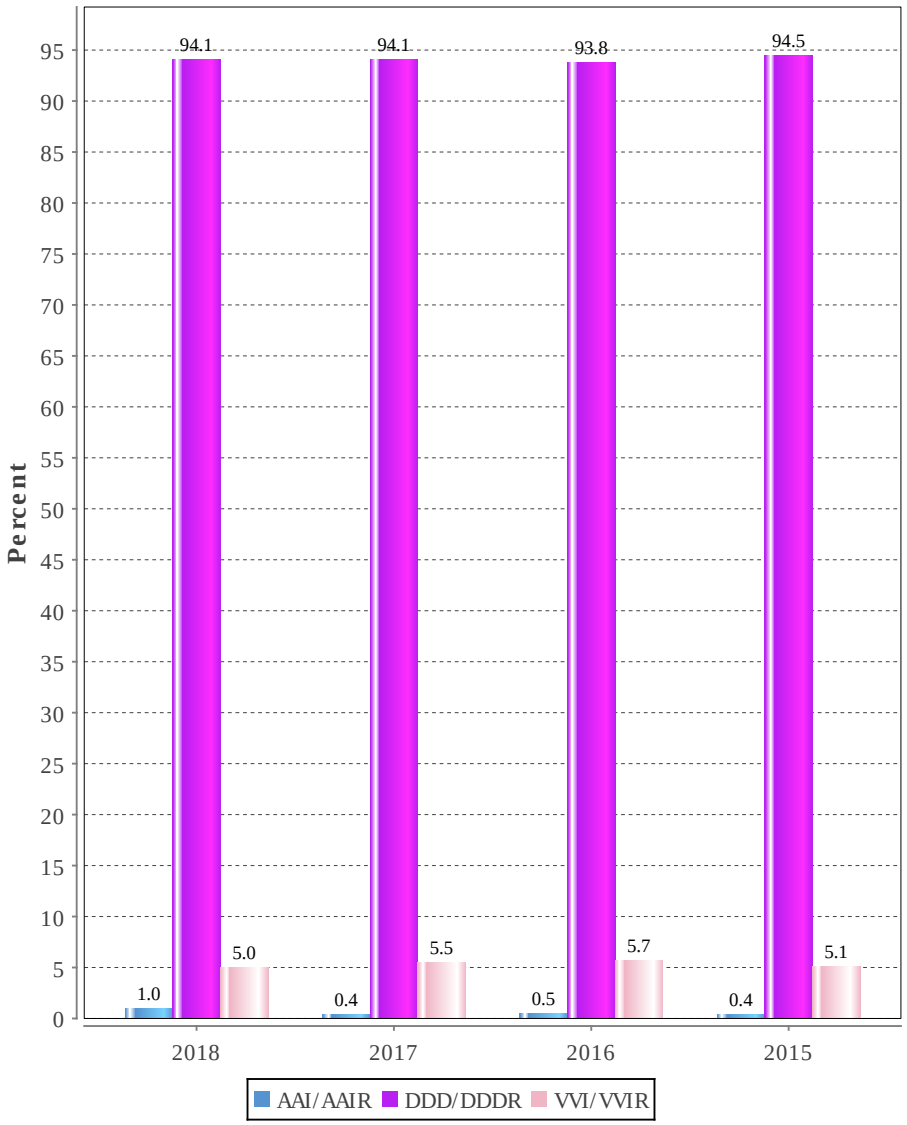
Hospital (%)	DDD	VVI
Akademiska sjukhuset	91.1	8.9
Alingsås lasarett	100.0	-
Arvika sjukhus	-	100.0
Blekingesjukhuset	97.4	2.6
Centrallasarettet Växjö	92.4	7.6
Centralsjukhuset Karlstad	93.8	6.2
Centralsjukhuset Kristianstad	99.0	1.0
Centralsjukhuset Västerås	87.7	12.3
Danderyds sjukhus	97.5	2.5
Drottning Silvias Bus	83.3	16.7
Falu lasarett	98.9	1.1
Helsingborgs lasarett	87.5	12.5
Hudiksvalls sjukhus	100.0	-
Karolinska Universitetssjukhuset	98.4	1.6
Kungälvs sjukhus	88.6	11.4
Linköpings Universitetssjukhus	95.9	4.1
Länssjukhuset Gävle	93.4	6.6
Länssjukhuset Halmstad	97.6	2.4
Länssjukhuset Kalmar	74.0	26.0
Länssjukhuset Ryhov	92.9	7.1
Mälarsjukhuset	98.7	1.3
Norrlands Universitetssjukhus	89.3	10.7
Oskarshamns sjukhus	100.0	-
Sahlgrenska Universitetssjukhuset	90.0	10.0
Sahlgrenska Universitetssjukhuset /Östra	95.7	4.3
Skaraborgs sjukhus Skövde	91.6	8.4
Skellefteå lasarett	94.7	5.3
Skånes universitetssjukhus, Lund	93.5	6.5
Skånes universitetssjukhus, Malmö	95.6	4.4
Sollefteå sjukhus	100.0	-
St Görans sjukhus	94.0	6.0
Sunderby sjukhus	94.8	5.2
Sundsvalls sjukhus	95.7	4.3
Södersjukhuset	97.0	3.0
Södra Älvsborgs sjukhus	97.8	2.2
Torsby sjukhus	100.0	-
Trollhättan, NÄL	93.5	6.5
Universitetssjukhuset Örebro	99.0	1.0
Varbergs sjukhus	96.2	3.8
Visby lasarett	91.7	8.3
Västerviks sjukhus	100.0	-
Örnsköldsviks sjukhus	100.0	-
Östersunds sjukhus	98.9	1.1

Use of pacing mode for total AV block indication per hospital size

Year	Mode	All hospitals (%)	Large (%)	Medium (%)	Small (%)
2018	DDD	94.5	94.8	95.3	91.3
	VVI	5.5	5.2	4.7	8.7
2017	DDD	95.2	95.0	97.5	89.7
	VVI	4.8	5.0	2.5	10.3
2016	DDD	95.1	95.9	95.4	88.8
	VVI	4.9	4.1	4.6	11.2
2015	DDD	95.2	95.9	96.0	85.7
	VVI	4.8	4.1	4.0	14.3
2014	DDDR	95.7	97.0	94.2	89.3
	DDDC	-	-	-	-
	VVIC	-	0.1	-	-
	VVIR	4.3	2.9	5.8	10.7
2013	DDDR	94.4	95.8	92.9	90.1
	DDDC	-	0.1	-	-
	VVIC	-	-	-	-

Use of pacing mode for Sinus Node Disease, historical data

Mode (%)	2018	2017	2016	2015
AAI/AAIR	1.0	0.4	0.5	0.4
DDD/DDDR	94.1	94.1	93.8	94.5
VVI/VVIR	5.0	5.5	5.7	5.1



QUALITY – PACEMAKER – FIRST IMPLANT
SINUS NODE DYSFUNCTION PER HOSPITAL

Use of pacing mode for Sinus Node Dysfunction indication per hospital size (number of new implants / year)

Year	Mode	All hospitals	Small %	Medium %	Large %
2018	AAI	1.0	1.6	1.5	0.6
	VVI	5.0	10.5	3.1	4.7
	DDD	94.1	87.9	95.4	94.7
2017	AAI	0.4	2.8	0.2	0.2
	VVI	5.5	17.9	2.4	5.1
	DDD	94.1	79.3	97.4	94.7
2016	AAI	0.5	2.4	0.3	0.3
	VVI	5.7	17.1	6.5	3.8
	DDD	93.8	80.6	93.2	95.9
2015	AAI	0.4	1.9	0.3	0.3
	VVI	5.1	12.3	6.5	3.8
	DDD	94.5	85.8	93.2	95.9
2014	AAIR	0.8	1.1	0.9	0.8
	VVIR	5.9	16.1	7.7	4.1
	DDDR	93.3	82.8	91.4	95.1
2013	AAIR	1.1	0.9	1.0	1.2
	VVIR	6.6	12.8	8.7	4.7
	DDDR	92.2	86.3	90.0	94.2
	DDDC	-	-	0.1	-
	VVIC	-	-	0.1	-
2012	AAIC	-	-	-	-
	DDDC	-	-	-	-
	AAIR	1.2	0.6	1.3	1.2
	VVIC	-	0.6	-	-
	VVIR	7.8	13.4	8.6	6.1
	DDDR	91.0	85.4	90.2	92.6
2011	AAIC	-	-	-	-
	AAIR	1.4	0.4	1.0	2.3
	VVIC	0.1	0.4	0.1	-
	VVIR	7.5	19.6	8.3	2.8
	DDDR	91.0	79.6	90.6	95.0
2010	AAIR	3.4	2.5	2.9	4.2
	VVIC	0.1	1.2	-	-
	VVIR	9.2	20.1	10.3	6.1
	DDDR	87.3	76.2	86.8	89.7
2009	AAIR	5.1	6.3	4.8	5.2
	VVIC	0.2	-	0.1	-
	VVIR	9.3	17.6	11.9	5.6
	DDDR	85.4	73.9	83.2	89.2

QUALITY – PACEMAKER – FIRST IMPLANT
SINUS NODE DYSFUNCTION PER HOSPITAL

Use of pacing mode for Sinus Node Dysfunction indication per hospital (number of new implants / year)

Hospital (%)	DDD	VVI	AAI
Akademiska sjukhuset	88.9	9.7	1.4
Alingsås lasarett	85.7	4.8	9.5
Blekingesjukhuset	96.3	-	3.7
Centrallasarettet Växjö	100.0	-	-
Centralsjukhuset Karlstad	95.2	4.8	-
Centralsjukhuset Kristianstad	98.8	1.2	-
Centralsjukhuset Västerås	90.9	9.1	-
Danderyds sjukhus	97.5	2.5	-
Drottning Silvias Bus	-	-	100.0
Falu lasarett	93.2	6.8	-
Helsingborgs lasarett	95.5	4.5	-
Hudiksvalls sjukhus	90.0	10.0	-
Karolinska Universitetssjukhuset	97.1	2.9	-
Kungälvs sjukhus	73.9	4.3	21.7
Linköpings Universitetssjukhus	96.4	1.8	1.8
Länssjukhuset Gävle	88.6	11.4	-
Länssjukhuset Halmstad	93.3	3.3	3.3
Länssjukhuset Kalmar	64.1	35.9	-
Länssjukhuset Ryhov	89.9	10.1	-
Mälarsjukhuset	100.0	-	-
Norrlands Universitetssjukhus	95.2	4.8	-
Oskarshamns sjukhus	50.0	50.0	-
Sahlgrenska Universitetssjukhuset	94.8	3.9	1.3
Sahlgrenska Universitetssjukhuset /Östra	96.6	3.4	-
Skaraborgs sjukhus Skövde	94.3	5.7	-
Skellefteå lasarett	83.3	16.7	-
Skånes universitetssjukhus, Lund	98.9	1.1	-
Skånes universitetssjukhus, Malmö	95.0	3.0	2.0
Sollefteå sjukhus	100.0	-	-
St Görans sjukhus	97.4	2.6	-
Sunderby sjukhus	96.4	3.6	-
Sundsvalls sjukhus	86.8	10.5	2.6
Södersjukhuset	96.6	3.4	-
Södra Älvsborgs sjukhus	93.9	6.1	-
Torsby sjukhus	90.0	10.0	-
Trollhättan, NÄL	94.0	6.0	-
Universitetssjukhuset Örebro	100.0	-	-
Varbergs sjukhus	94.9	5.1	-
Visby lasarett	100.0	-	-
Västerviks sjukhus	92.3	-	7.7
Örnsköldsviks sjukhus	100.0	-	-
Östersunds sjukhus	100.0	-	-

Dislocation rate for different lead types in atrial or ventricular placement. Based on all implants implanted 2007 and later and explanted/corrected 2018 or earlier

Type	Right atrium %	Right ventricle %	Left ventricle %	Total %
Fixed screw	1.6	1.0	0.9	1.3
Retractable screw	1.6	1.0	0.9	1.3
Passive	3.4	1.7	2.0	1.4
All	1.6	1.1	1.8	1.3

Extractions per hospital

Hospital	No of leads
Akademiska sjukhuset	67
Blekingesjukhuset	25
Karolinska Solna	193
Linköpings universitetssjukhus	23
Sahlgrenska universitetssjukhuset	102
Skånes universitetssjukhus, Lund	115
Sunderby sjukhus	6

Extractions per type

Type	Extractions
ICD lead	91
Pacemaker lead	464

Extractions per model (more then 5 extractions)

Manfacturer	Model	Extractions
Boston Scientific	4470 Fineline II Sterox EZ MRI	19
Boston Scientific	4471 Fineline II Sterox EZ MRI	6
Boston Scientific	4473 Fineline II Sterox EZ MRI	7
Boston Scientific	7741 Ingevity MRI	7
Boston Scientific	7742 Ingevity MRI	7
Medtronic	4074 Capsure Sense MRI	15
Medtronic	4076 CapSureFix Novus MRI	57
Medtronic	5076 CapSureFix MRI	17
Medtronic	6935M Sprint Quattro S MRI DF4	6
St Jude Medical/ Abbott	1258T QuickFlex	14
St Jude Medical/ Abbott	1458Q Quartet MRI	14
St Jude Medical/ Abbott	1636T Isoflex	7
St Jude Medical/ Abbott	1688T Tendril SDX	12
St Jude Medical/ Abbott	1699TC OptiSense	7
St Jude Medical/ Abbott	1948 Isoflex MRI	13
St Jude Medical/ Abbott	1999 Optisense	35
St Jude Medical/ Abbott	2088TC Tendril STS MRI	69
St Jude Medical/ Abbott	7122 Durata	6
St Jude Medical/ Abbott	7122Q Durata	15

Manfacturer	Model	Extractions
St Jude Medical/ Abbott	LDA210Q Optisure DF4	6
St Jude Medical/ Abbott	LPA1200M58cm TendrilMRI	6
Vitatron	ICM09B Crystalline	7
Vitatron	ICQ09B Crystalline	7

Extractions per reason

Reason	Extractions
Ceased indication for ICD therapy	6
Ceased indication for PM therapy	8
Conductor break	9
Elective/system change	34
Electrical dysfunction	52
Heart transplant	7
Infection/Ulceration, local	161
Infection/Ulceration, systemic	229
Lead dislocation	23
Preventive	6
Venous access	11

*Extraction positions**

Hospital	Femoral	Left superior	N/A	Right superior
Akademiska sjukhuset	5	57	0	5
Blekingesjukhuset	0	13	0	12
Karolinska Solna	2	186	0	5
Linköpings universitetssjukhus	0	22	0	1
Skånes universitetssjukhus, Lund	7	105	0	3

*Hospital Sahlgrenska and Sunderby excluded

*Extraction problems**

Hospital	I	E	O	P	X	D
Akademiska sjukhuset	0	0	0	1	0	0
Blekingesjukhuset	0	0	0	0	0	0
Karolinska Solna	0	1	0	0	0	1
Linköpings universitetssjukhus	0	0	0	0	0	0
Skånes universitetssjukhus, Lund	0	0	0	2	0	0

(*Hospital Sahlgrenska and Sunderby excluded), I: Insulation break, E: Conductor break, O: Unintentional extraction of another lead, P: Perforation/Tamponade, X: Pneumothorax, D: Death

*Extraction results**

Hospital	Failed	Partially successfull	Successfull
Akademiska sjukhuset	0	4	63
Blekingesjukhuset	0	0	25
Karolinska Solna	0	6	187
Linköpings universitetssjukhus	0	0	23
Skånes universitetssjukhus, Lund	0	3	112

*Hospital Sahlgrenska and Sunderby excluded

*Extraction tools**

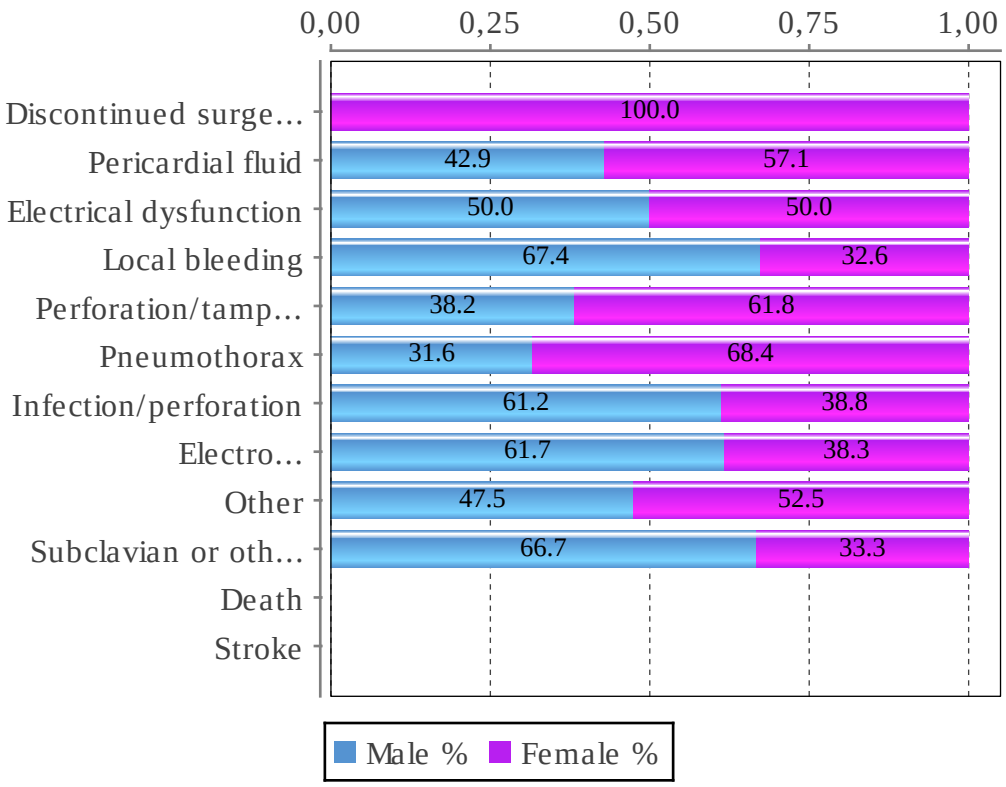
Hospital	SS	LS	PS	AM	L	S	PK	EK	AL
Akademiska sjukhuset	24	35	16	17	1	0	0	0	6
Blekingesjukhuset	0	2	0	9	1	0	0	0	0
Karolinska Solna	19	127	43	86	0	0	0	1	0
Linköpings universitetssjukhus	13	0	0	2	0	0	0	0	0
Skånes universitetssjukhus, Lund	14	33	3	45	0	2	2	0	0

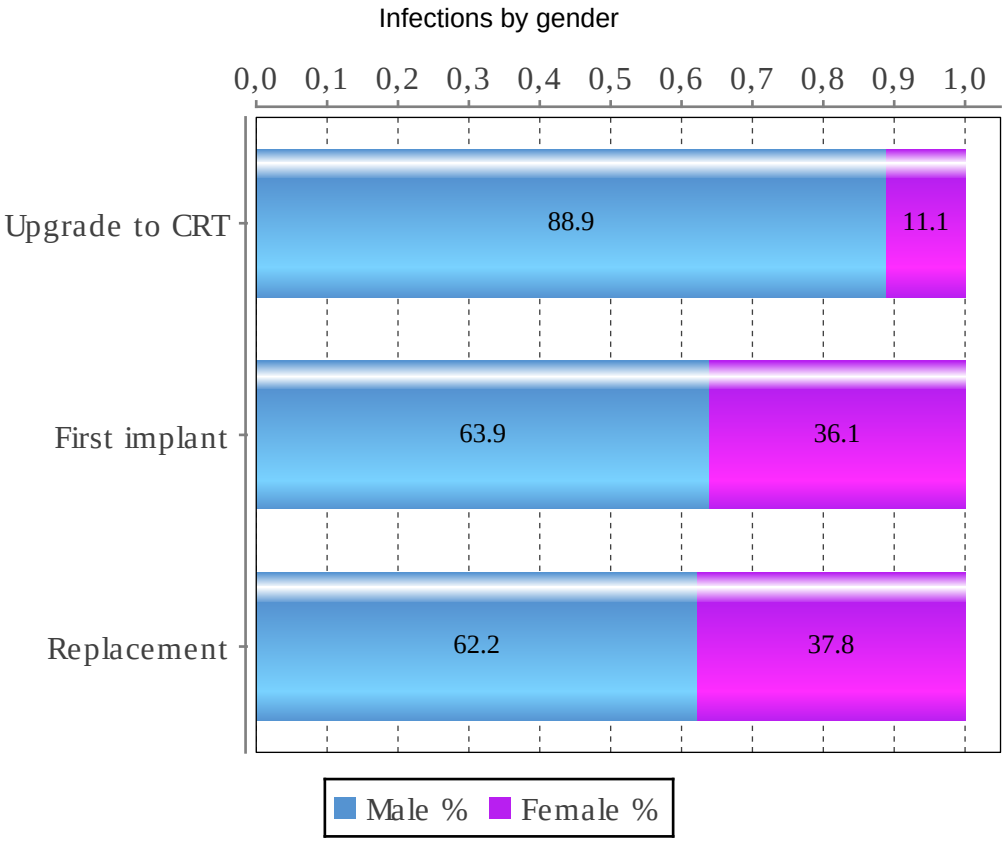
(*Hospital Sahlgrenska and Sunderby excluded), SS: Standard stylet, LS: Locking stylet, PS: Passive sheath, AM: Active mechanical sheath, L: Lasso, S: Snare, PK: Pigtail catheter, EP: EP catheter, AL: Active laser sheath

Registered complications for new implants and for bleeding, infection and other also including replacements

Complication	2017 %	2018 %	Based on
Discontinued surgery due to hemodynamic reasons	0.1	0.0	A
Pericardial fluid	0.1	0.1	A
Electrical dysfunction	0.7	0.4	B
Local bleeding	0.2	0.4	A
Perforation/tamponade	0.2	0.4	B
Pneumothorax	0.5	0.5	B
Infection/perforation	0.5	0.5	A
Electrode displacement	1.5	1.6	B
Other	0.4	0.4	A
Subclavian or other related thrombosis	0.1	0.1	B
Death	0.0	0.0	A
Stroke	0.0	0.0	A
Total	4.3	4.4	
Based on A=10158 (all implants) alternatively B=7944 (first implants + lead replacement) validated events			

Complications by gender

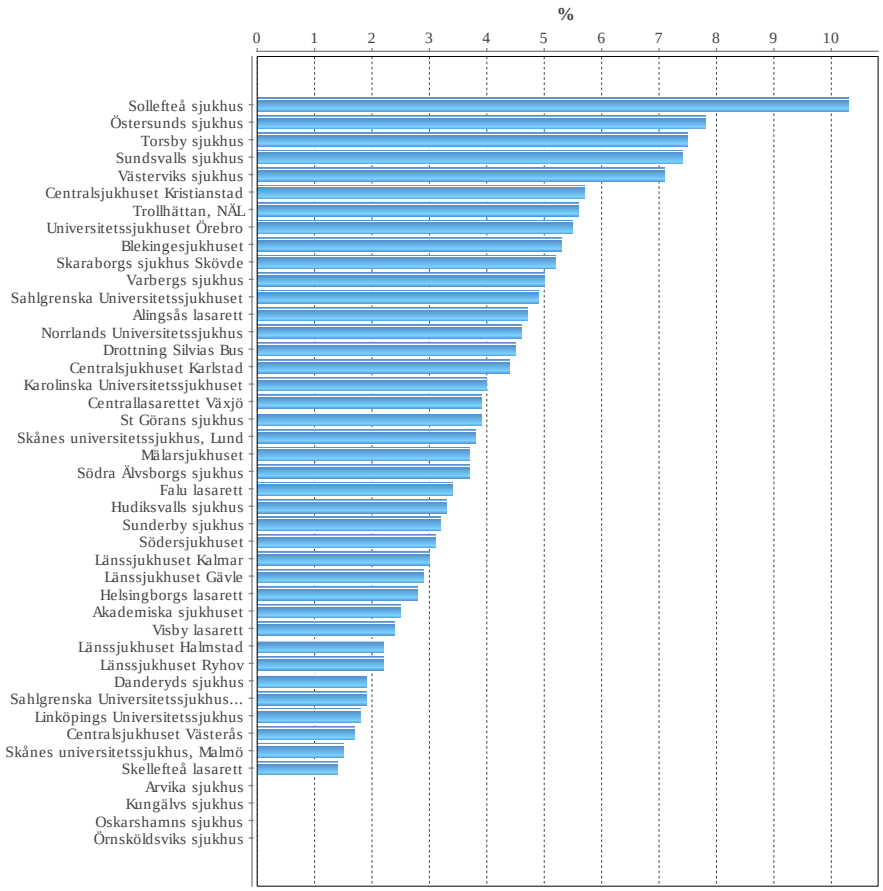




Infections related to all interventions by gender

Reason	Male %	Female %
First implant	*0.5*	*0.4*
Replacement	*1.8*	*1.4*
Upgrade to CRT	*1.2*	*0.4*

QUALITY – PACEMAKER – COMPLICATIONS PER HOSPITAL



De.: Death, **Dc.**: Discontinued surgery, **Df.**: Electrical dysfunction, **Dp.**: Lead dislocation, **In.**: Infection/Perforation, **Tr.**: Subclavian or other related thrombosis

Hospital	No	De. %	Dc. %	Df. %	Dp. %	In. %	Tr. %
Akademiska sjukhuset	440	-	-	0.2	0.5	0.5	-
Alingsås lasarett	85	-	-	-	1.2	1.2	-
Arvika sjukhus	10	-	-	-	-	-	-
Blekingesjukhuset	206	-	-	1.0	1.9	-	-
Centrallasarettet Växjö	181	-	-	1.1	1.1	-	-
Centralsjukhuset Karlstad	205	-	-	0.5	1.5	-	-
Centralsjukhuset Kristianstad	318	-	-	0.3	1.6	1.3	0.3
Centralsjukhuset Västerås	177	-	-	-	-	-	-
Danderyds sjukhus	581	-	-	-	1.0	-	-
Drottning Silvias Bus	22	-	-	-	4.5	-	-
Falu lasarett	325	-	-	0.6	0.6	0.3	-
Helsingborgs lasarett	283	-	-	-	0.7	0.4	-
Hudiksvalls sjukhus	90	-	-	-	2.2	-	-
Karolinska Universitetssjukhuset	658	-	-	0.2	1.2	0.5	0.5
Kungälvs sjukhus	107	-	-	-	-	-	-
Linköpings Universitetssjukhus	503	-	-	0.4	0.2	0.2	0.2
Länssjukhuset Gävle	307	-	-	-	1.6	-	0.3
Länssjukhuset Halmstad	134	-	-	-	-	-	-
Länssjukhuset Kalmar	132	-	-	-	-	-	-
Länssjukhuset Ryhov	270	-	-	-	0.7	0.4	-
Mälarsjukhuset	215	-	-	-	1.9	1.4	-
Norrlands Universitetssjukhus	238	-	-	0.8	0.8	0.4	-
Oskarshamns sjukhus	10	-	-	-	-	-	-
Sahlgrenska Universitetssjukhuset	596	-	-	-	2.2	0.7	0.2
Sahlgrenska Universitetssjukhuset /Östra	107	-	0.9	-	-	-	-
Skaraborgs sjukhus Skövde	305	-	-	-	1.6	-	-
Skellefteå lasarett	69	-	-	-	-	1.4	-
Skånes universitetssjukhus, Lund	523	-	-	0.4	1.5	1.1	-
Skånes universitetssjukhus, Malmö	330	-	-	-	0.3	0.3	-
Sollefteå sjukhus	29	-	-	3.4	3.4	-	-
St Görans sjukhus	358	-	-	-	2.2	-	0.6
Sunderby sjukhus	343	-	-	-	0.9	1.2	-
Sundsvalls sjukhus	256	-	-	0.4	4.7	0.4	-
Södersjukhuset	448	-	-	0.7	0.4	0.7	-
Södra Älvsborgs sjukhus	270	-	-	1.1	1.1	0.7	-
Torsby sjukhus	40	-	-	2.5	-	2.5	-
Trollhättan, NÄL	337	-	-	1.2	1.2	-	-
Universitetssjukhuset Örebro	273	-	-	0.4	2.2	1.1	-
Varbergs sjukhus	159	-	-	0.6	1.3	-	0.6
Visby lasarett	41	-	-	-	2.4	-	-
Västerviks sjukhus	56	-	-	3.6	1.8	1.8	-
Örnsköldsviks sjukhus	75	-	-	-	-	-	-
Östersunds sjukhus	218	-	-	-	2.3	1.8	0.5

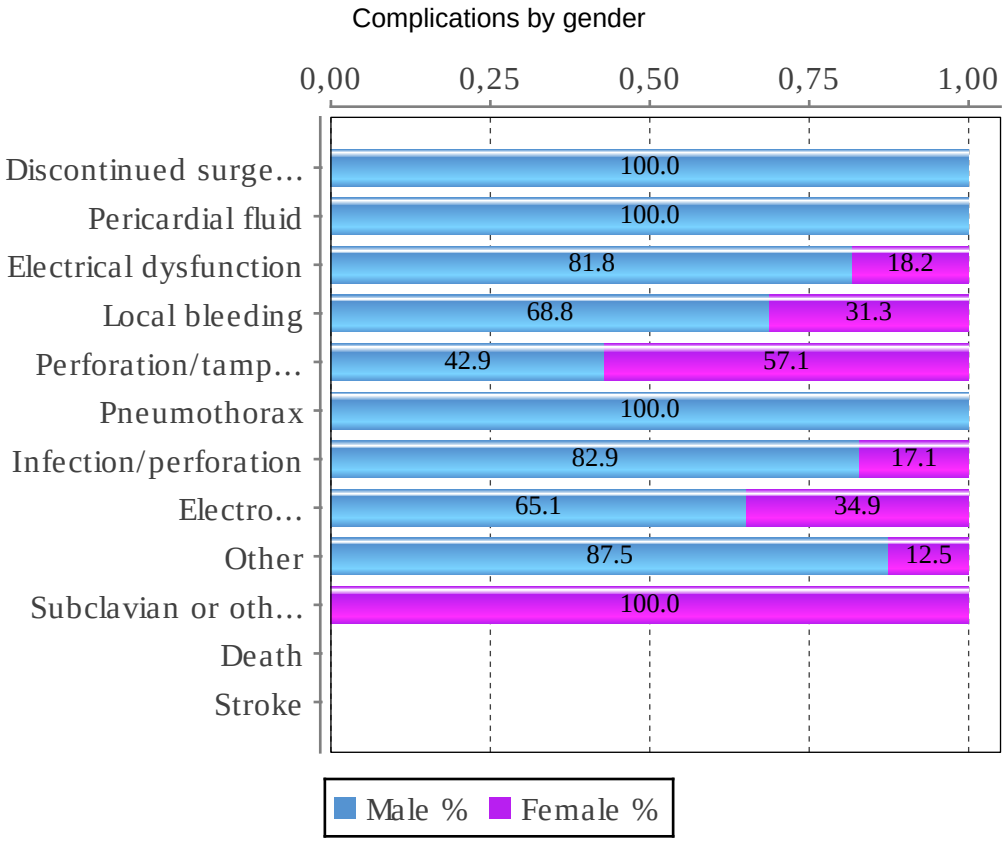
QUALITY – PACEMAKER – COMPLICATIONS PER HOSPITAL

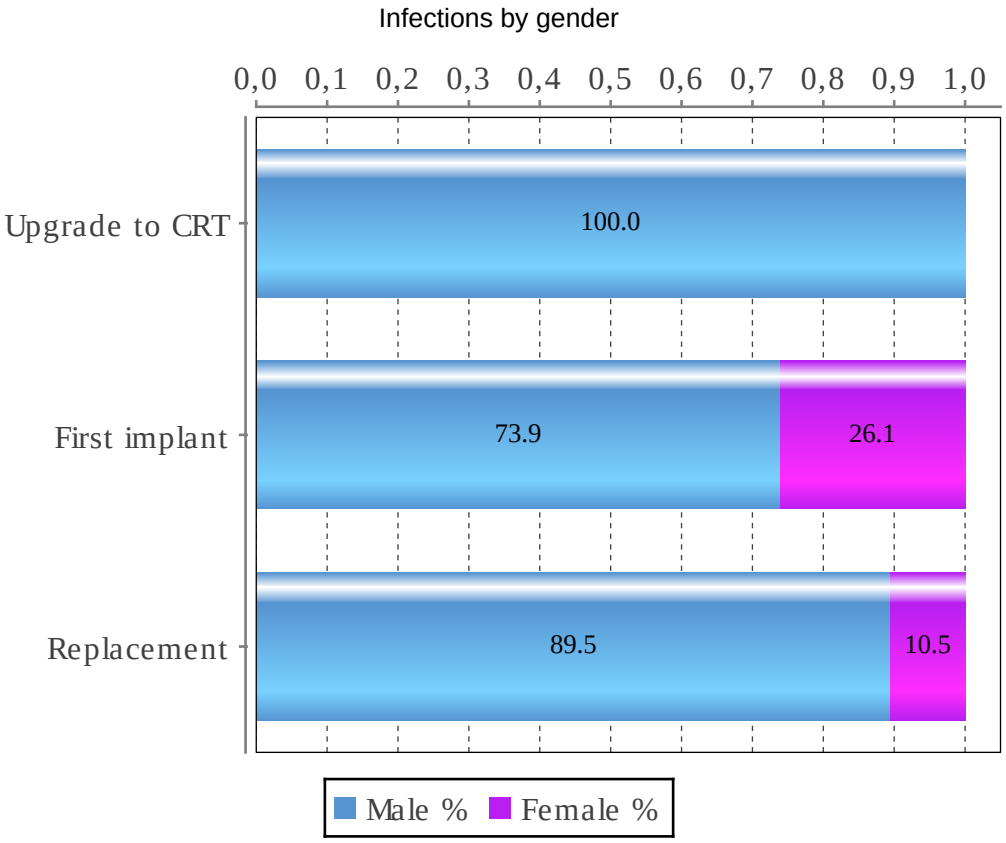
Bl.: Bleeding, **Ot.**: Other, **Tm.**: Perforation/Tamponade, **Pn.**: Pneumothorax, **Pf.**: Pericardial fluid, **St.**: Stroke

Hospital	No	Bl. %	Ot. %	Tm. %	Pn. %	Pf. %	St. %	All %
Akademiska sjukhuset	440	0.2	0.5	0.5	0.2	-	-	2.5
Alingsås lasarett	85	-	1.2	1.2	-	-	-	4.7
Arvika sjukhus	10	-	-	-	-	-	-	-
Blekingesjukhuset	206	0.5	1.5	-	0.5	-	-	5.3
Centrallasarettet Växjö	181	-	-	1.7	-	-	-	3.9
Centralsjukhuset Karlstad	205	-	-	1.5	0.5	0.5	-	4.4
Centralsjukhuset Kristianstad	318	0.6	1.3	-	-	0.3	-	5.7
Centralsjukhuset Västerås	177	0.6	0.6	0.6	-	-	-	1.7
Danderyds sjukhus	581	0.2	0.5	0.2	-	-	-	1.9
Drottning Silvias Bus	22	-	-	-	-	-	-	4.5
Falu lasarett	325	0.9	0.9	-	-	-	-	3.4
Helsingborgs lasarett	283	-	1.1	-	0.7	-	-	2.8
Hudiksvalls sjukhus	90	-	1.1	-	-	-	-	3.3
Karolinska Universitetssjukhuset	658	0.8	-	0.2	0.8	-	-	4.0
Kungälvs sjukhus	107	-	-	-	-	-	-	-
Linköpings Universitetssjukhus	503	0.4	-	-	0.2	0.2	-	1.8
Länssjukhuset Gävle	307	0.3	-	-	0.3	0.3	-	2.9
Länssjukhuset Halmstad	134	-	0.7	-	0.7	0.7	-	2.2
Länssjukhuset Kalmar	132	0.8	-	1.5	0.8	-	-	3.0
Länssjukhuset Ryhov	270	-	-	0.7	0.4	-	-	2.2
Mälarsjukhuset	215	-	-	-	0.5	-	-	3.7
Norrlands Universitetssjukhus	238	0.8	-	0.4	1.3	-	-	4.6
Oskarshamns sjukhus	10	-	-	-	-	-	-	-
Sahlgrenska Universitetssjukhuset	596	1.0	0.2	0.5	0.2	-	-	4.9
Sahlgrenska Universitetssjukhuset /Östra	107	-	0.9	-	-	-	-	1.9
Skaraborgs sjukhus Skövde	305	1.3	1.0	1.0	-	0.3	-	5.2
Skellefteå lasarett	69	-	-	-	-	-	-	1.4
Skånes universitetssjukhus, Lund	523	-	0.4	0.2	0.2	-	-	3.8
Skånes universitetssjukhus, Malmö	330	-	0.6	0.3	-	-	-	1.5
Sollefteå sjukhus	29	-	3.4	-	-	-	-	10.3
St Görans sjukhus	358	0.6	0.3	-	0.3	-	-	3.9
Sunderby sjukhus	343	-	0.6	-	0.6	-	-	3.2
Sundsvalls sjukhus	256	0.8	0.4	0.4	0.4	-	-	7.4
Södersjukhuset	448	-	-	1.1	0.2	-	-	3.1
Södra Älvsborgs sjukhus	270	0.4	-	-	0.4	-	-	3.7
Torsby sjukhus	40	-	-	2.5	-	-	-	7.5
Trollhättan, NÄL	337	0.6	-	0.6	1.8	0.3	-	5.6
Universitetssjukhuset Örebro	273	0.7	0.4	-	0.7	-	-	5.5
Varbergs sjukhus	159	-	1.3	0.6	0.6	-	-	5.0
Visby lasarett	41	-	-	-	-	-	-	2.4
Västerviks sjukhus	56	-	-	-	-	-	-	7.1
Örnsköldsviks sjukhus	75	-	-	-	-	-	-	-
Östersunds sjukhus	218	1.8	0.5	-	0.9	-	-	7.8

Registered complications for new implants and for bleeding, infection and other also including replacements

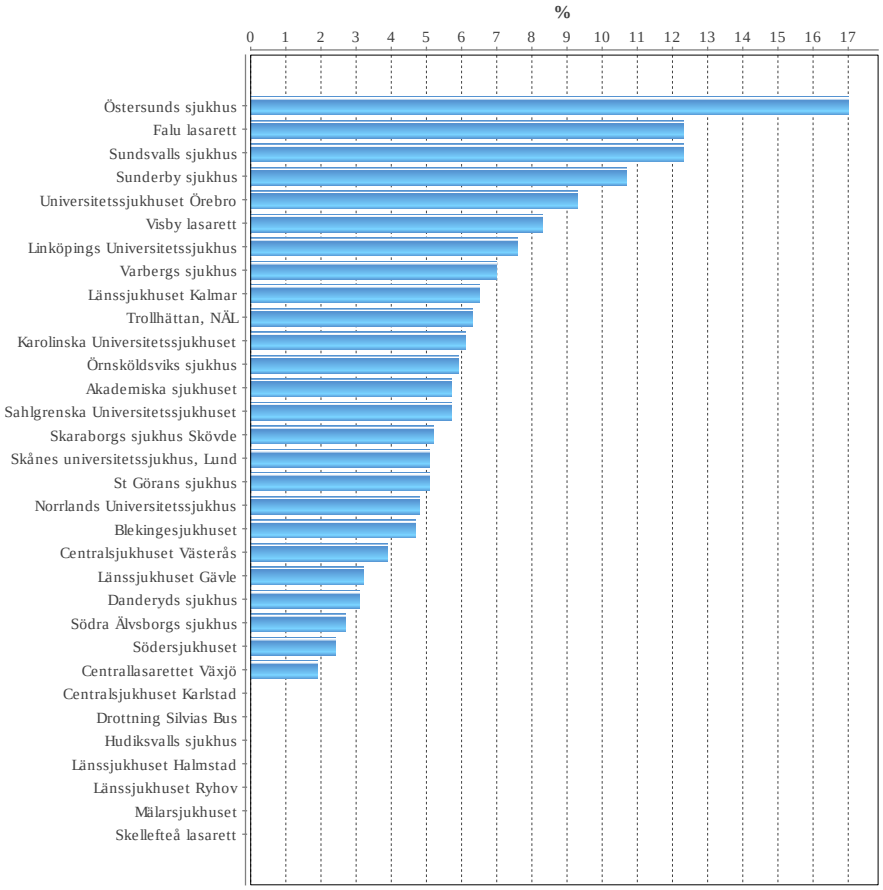
Complication	2017 %	2018 %
Discontinued surgery due to hemodynamic reasons	0.0	0.0
Electrical dysfunction	1.5	1.3
Local bleeding	0.2	0.7
Perforation/tamponade	0.3	0.4
Pneumothorax	0.3	0.4
Infection/perforation	1.0	1.5
Electrode displacement	2.5	2.6
Other	0.5	0.3
Subclavian or other related thrombosis	0.0	0.1
Death	0.0	0.0
Pericardial fluid	0.1	0.0
Stroke	0.0	0.0
Total	6.4	7.3
Based on 2392 (all implants) alternatively 1633 (first implants + lead replacements) validated events		





Infections related to all interventions by gender

Reason	Male %	Female %
First implant	*1.5*	*1.9*
Replacement	*2.3*	*1.1*
Upgrade to CRT	*1.6*	*0.0*


%
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Östersunds sjukhus
Falu lasarett
Sundsvalls sjukhus
Sunderby sjukhus
Universitetssjukhuset Örebro
Visby lasarett
Linköpings Universitetssjukhus
Varbergs sjukhus
Länssjukhuset Kalmar
Trollhättan, NÄL
Karolinska Universitetssjukhuset
Örnsköldsviks sjukhus
Akademiska sjukhuset
Sahlgrenska Universitetssjukhuset
Skaraborgs sjukhus Skövde
Skånes universitetssjukhus, Lund
St Görans sjukhus
Norrlands Universitetssjukhus
Blekingesjukhuset
Centralsjukhuset Västerås
Länssjukhuset Gävle
Danderyds sjukhus
Södra Älvsborgs sjukhus
Södersjukhuset
Centrallasarettet Växjö
Centralsjukhuset Karlstad
Drottning Silvias Bus
Hudiksvalls sjukhus
Länssjukhuset Halmstad
Länssjukhuset Ryhov
Mälarsjukhuset
Skellefteå lasarett

QUALITY – ICD – COMPLICATIONS PER HOSPITAL

De.: Death, **Dc.**: Discontinued surgery, **Df.**: Electrical dysfunction, **Dp.**: Lead dislocation, **In.**: Infection/Perforation, **Tr.**: Subclavian and other related trombosis, **Bl.**: Bleeding

Hospital	No	De. %	Dc. %	Df. %	Dp. %	In. %	Tr. %	Bl. %
Akademiska sjukhuset	122	-	-	0.8	-	1.6	-	0.8
Blekingesjukhuset	64	-	-	-	-	1.6	1.6	-
Centrallasarettet Växjö	53	-	-	1.9	-	-	-	-
Centralsjukhuset Karlstad	49	-	-	-	-	-	-	-
Centralsjukhuset Västerås	51	-	-	-	-	2.0	-	2.0
Danderyds sjukhus	97	-	-	1.0	1.0	1.0	-	-
Drottning Silvias Bus	1	-	-	-	-	-	-	-
Falu lasarett	81	-	-	1.2	8.6	-	-	1.2
Hudiksvalls sjukhus	16	-	-	-	-	-	-	-
Karolinska Universitetssjukhuset	229	-	-	1.3	1.3	1.3	-	1.3
Linköpings Universitetssjukhus	131	-	-	0.8	3.1	1.5	-	0.8
Länssjukhuset Gävle	93	-	-	-	1.1	1.1	-	1.1
Länssjukhuset Halmstad	3	-	-	-	-	-	-	-
Länssjukhuset Kalmar	62	-	-	1.6	1.6	1.6	-	1.6
Länssjukhuset Ryhov	49	-	-	-	-	-	-	-
Mälarsjukhuset	44	-	-	-	-	-	-	-
Norrlands Universitetssjukhus	84	-	-	-	1.2	1.2	-	1.2
Sahlgrenska Universitetssjukhuset	141	-	-	1.4	2.1	1.4	-	0.7
Skaraborgs sjukhus Skövde	58	-	-	1.7	3.4	-	-	-
Skellefteå lasarett	11	-	-	-	-	-	-	-
Skånes universitetssjukhus, Lund	394	-	-	0.8	2.5	1.5	-	-
St Görans sjukhus	98	-	-	1.0	2.0	1.0	-	1.0
Sunderby sjukhus	75	-	-	-	2.7	5.3	-	-
Sundsvalls sjukhus	81	-	-	1.2	1.2	2.5	1.2	2.5
Södersjukhuset	82	-	-	-	1.2	1.2	-	-
Södra Älvsborgs sjukhus	37	-	-	-	-	-	-	-
Trollhättan, NÄL	80	-	-	2.5	1.3	-	-	2.5
Universitetssjukhuset Örebro	86	-	-	1.2	3.5	3.5	-	-
Varbergs sjukhus	57	-	-	3.5	-	3.5	-	-
Visby lasarett	12	-	-	-	-	-	-	-
Örnsköldsviks sjukhus	17	-	-	-	5.9	-	-	-
Östersunds sjukhus	47	-	2.1	2.1	4.3	2.1	-	-

QUALITY – ICD – COMPLICATIONS PER HOSPITAL

Ot.: Other, **Pa.**: Perioperative arrhythmia, **Tm.**: Perforation/Tamponade, **Pn.**: Pneumothorax, **Pf.**: Pericardial fluid, **St.**: Stroke

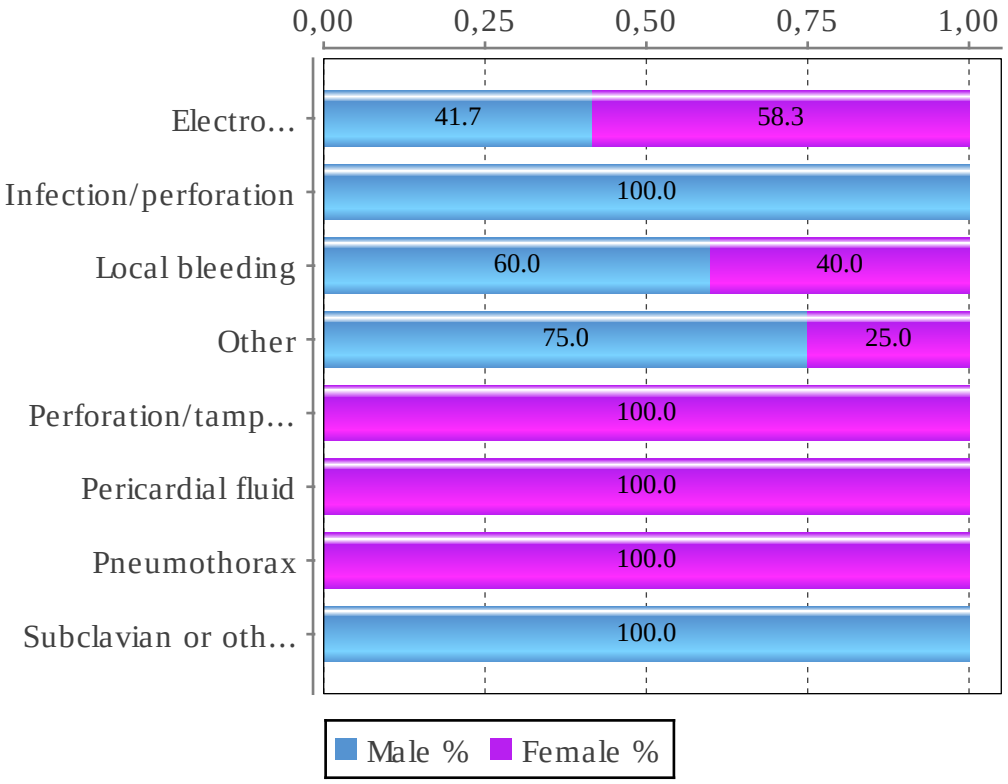
Hospital	No	Ot. %	Pa. %	Tm. %	Pn. %	Pf. %	St. %	All %
Akademiska sjukhuset	122	-	-	2.5	-	-	-	5.7
Blekingesjukhuset	64	-	-	1.6	-	-	-	4.7
Centrallasarettet Växjö	53	-	-	-	-	-	-	1.9
Centralsjukhuset Karlstad	49	-	-	-	-	-	-	-
Centralsjukhuset Västerås	51	-	-	-	-	-	-	3.9
Danderyds sjukhus	97	-	-	-	-	-	-	3.1
Drottning Silvias Bus	1	-	-	-	-	-	-	-
Falu lasarett	81	1.2	-	-	-	-	-	12.3
Hudiksvalls sjukhus	16	-	-	-	-	-	-	-
Karolinska Universitetssjukhuset	229	0.4	-	-	0.4	-	-	6.1
Linköpings Universitetssjukhus	131	0.8	-	0.8	-	-	-	7.6
Länssjukhuset Gävle	93	-	-	-	-	-	-	3.2
Länssjukhuset Halmstad	3	-	-	-	-	-	-	-
Länssjukhuset Kalmar	62	-	-	-	-	-	-	6.5
Länssjukhuset Ryhov	49	-	-	-	-	-	-	-
Mälarsjukhuset	44	-	-	-	-	-	-	-
Norrlands Universitetssjukhus	84	-	-	1.2	-	-	-	4.8
Sahlgrenska Universitetssjukhuset	141	-	-	-	-	-	-	5.7
Skaraborgs sjukhus Skövde	58	-	-	-	-	-	-	5.2
Skellefteå lasarett	11	-	-	-	-	-	-	-
Skånes universitetssjukhus, Lund	394	0.3	-	-	-	-	-	5.1
St Görans sjukhus	98	-	-	-	-	-	-	5.1
Sunderby sjukhus	75	-	-	-	2.7	-	-	10.7
Sundsvalls sjukhus	81	1.2	-	-	2.5	-	-	12.3
Södersjukhuset	82	-	-	-	-	-	-	2.4
Södra Älvsborgs sjukhus	37	-	-	-	2.7	-	-	2.7
Trollhättan, NÄL	80	-	-	-	-	-	-	6.3
Universitetssjukhuset Örebro	86	-	-	-	-	1.2	-	9.3
Varbergs sjukhus	57	-	-	-	-	-	-	7.0
Visby lasarett	12	8.3	-	-	-	-	-	8.3
Örnsköldsviks sjukhus	17	-	-	-	-	-	-	5.9
Östersunds sjukhus	47	4.3	-	2.1	-	-	-	17.0

Registered complications for new implants and for bleeding, infection and other also including replacements.

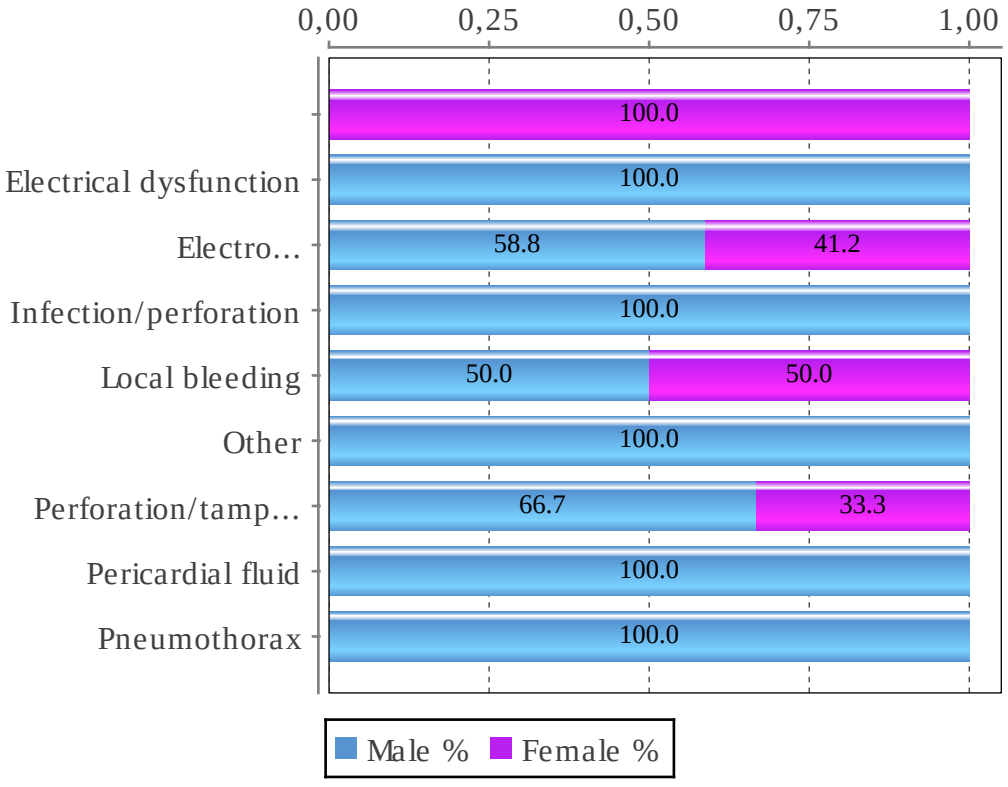
CRT-P Complication	%
Death	-
Discontinued surgery due to hemodynamic reasons	-
Electrical dysfunction	-
Electrode displacement	1.9
Infection/perforation	0.2
Local bleeding	0.8
Other	0.6
Perforation/tamponade	0.2
Pericardial fluid	0.2
Peroperative arrhythmia requiring acute medication	-
Pneumothorax	0.3
Stroke	-
Subclavian or other related thrombosis	0.2
Total	4.4
Total no of implants	617

CRT-D Complication	%
Death	-
Discontinued surgery due to hemodynamic reasons	-
Electrical dysfunction	0.8
Electrode displacement	2.8
Infection/perforation	1.0
Local bleeding	0.7
Other	0.2
Perforation/tamponade	0.5
Pericardial fluid	0.2
Peroperative arrhythmia requiring acute medication	-
Pneumothorax	0.5
Stroke	-
Subclavian or other related thrombosis	-
Total	6.6
Total no of implants	608

CRT-P complications by gender

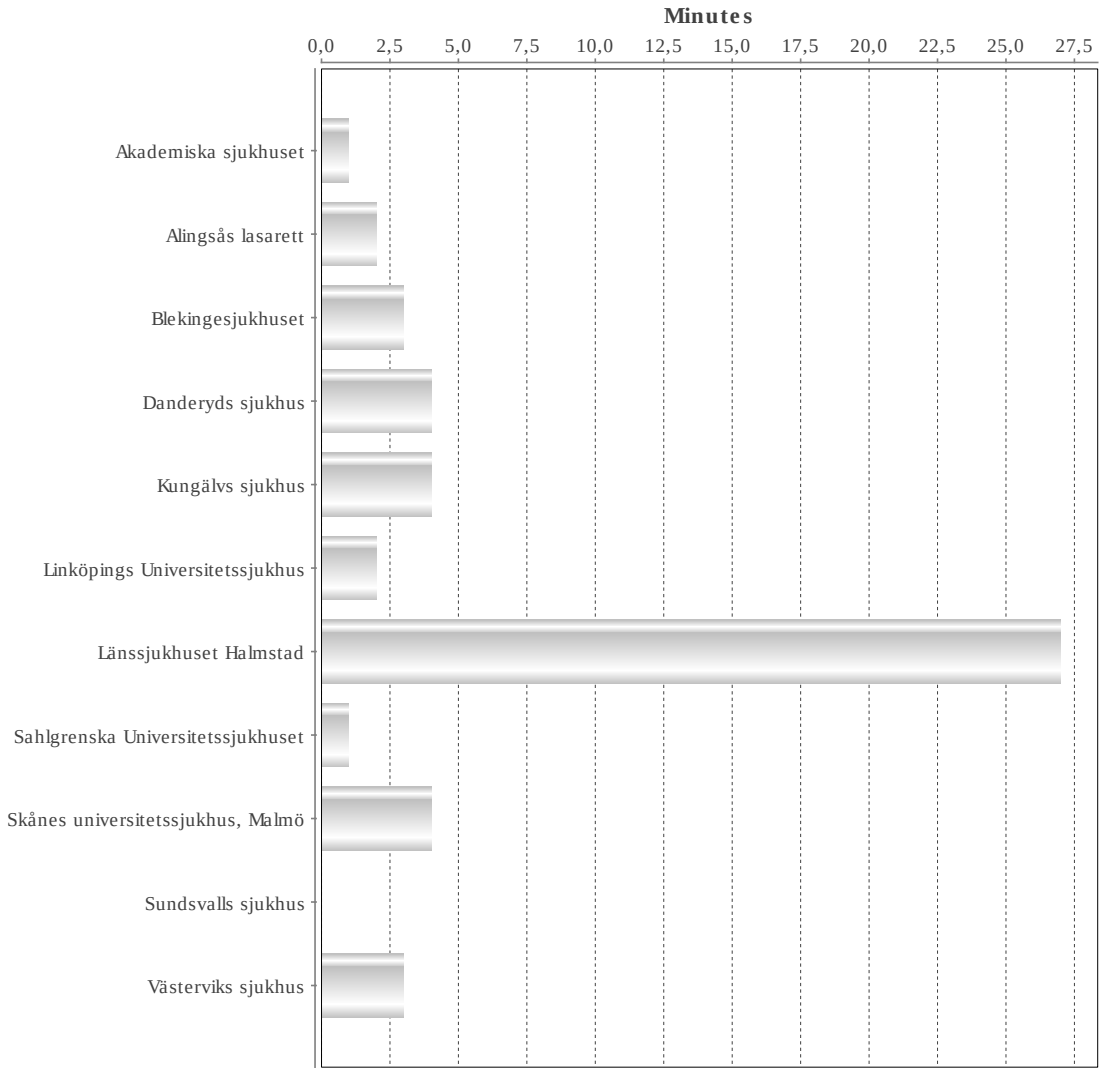


CRT-D complications by gender



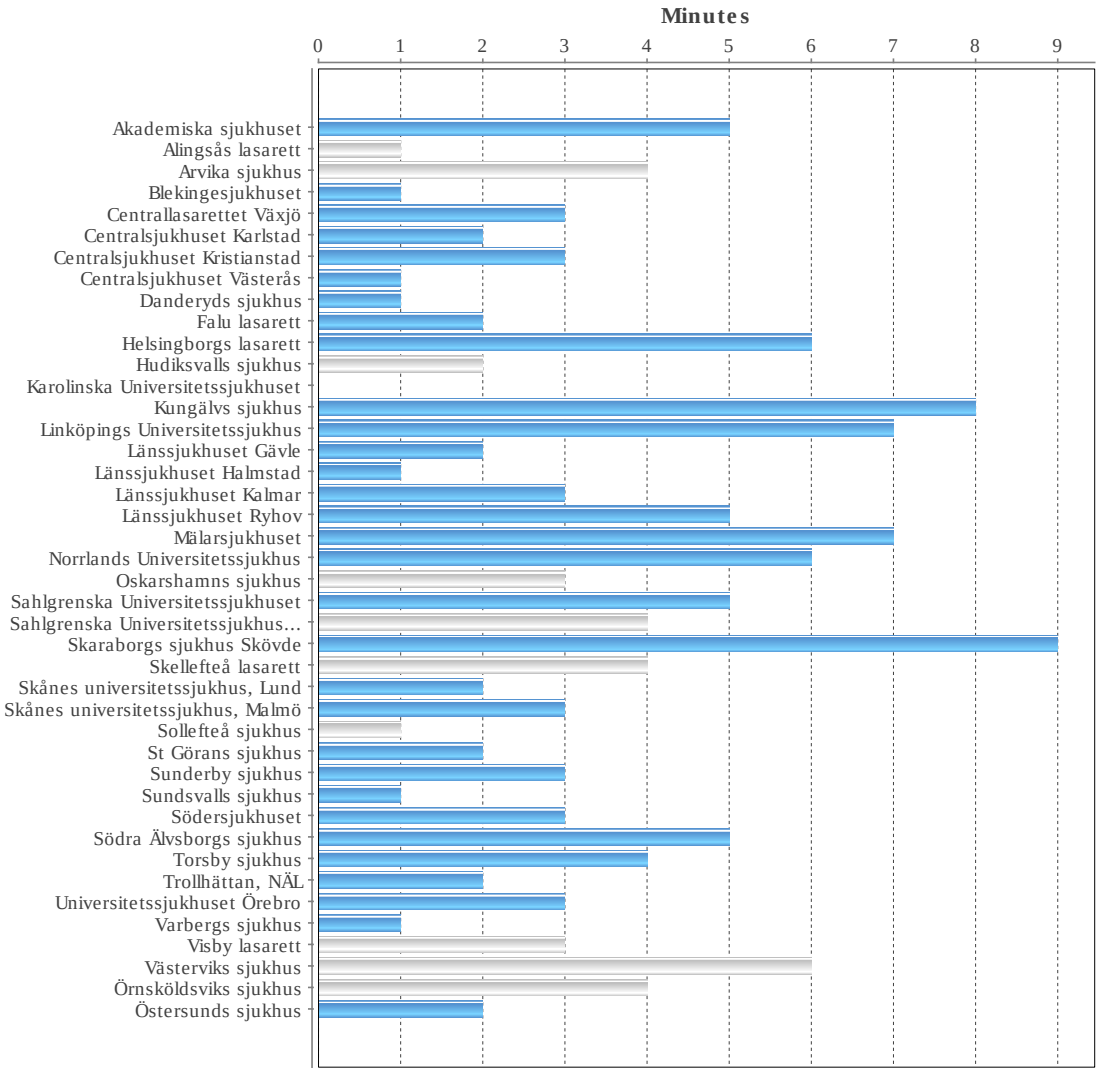
Mean fluoroscopy duration for a new implant of different subtypes per hospital. Hospitals with less than 10 implants of a specific subtype are marked in grey, blue indicates 10 or more implants of this subtype, performed yearly at this hospital.

AAI



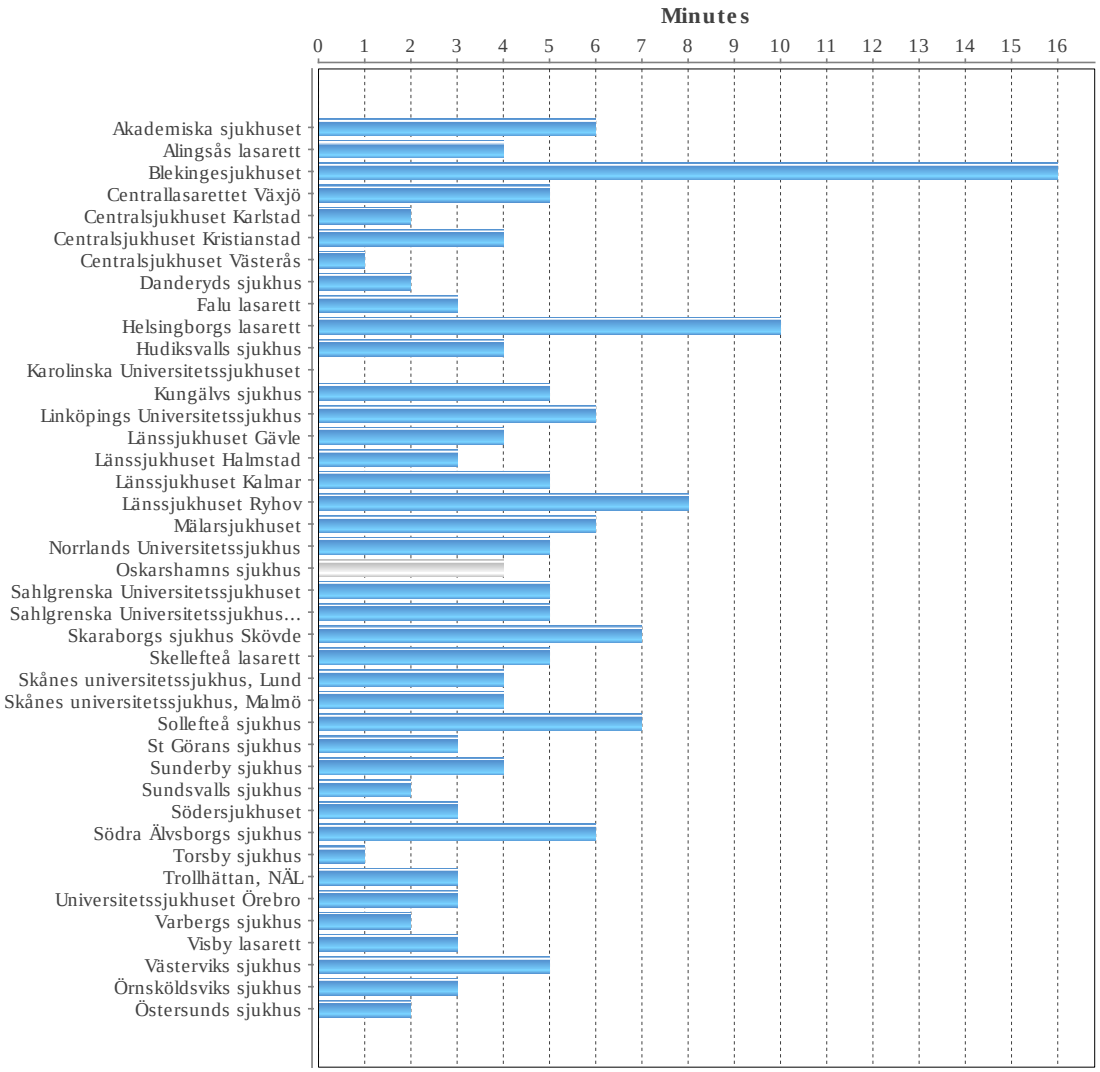
Mean fluoroscopy duration for a new implant of different subtypes per hospital. Hospitals with less than 10 implants of a specific subtype are marked in grey, blue indicates 10 or more implants of this subtype, performed yearly at this hospital.

VVI



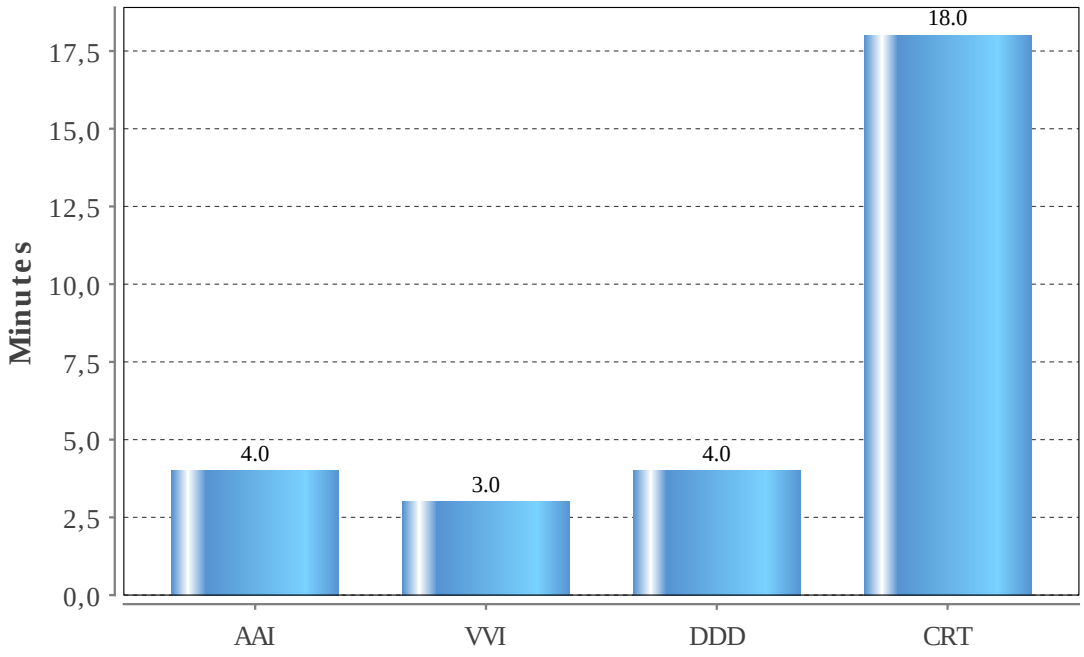
Mean fluoroscopy duration for a new implant of different subtypes per hospital. Hospitals with less than 10 implants of a specific subtype are marked in grey, blue indicates 10 or more implants of this subtype, performed yearly at this hospital.

DDD



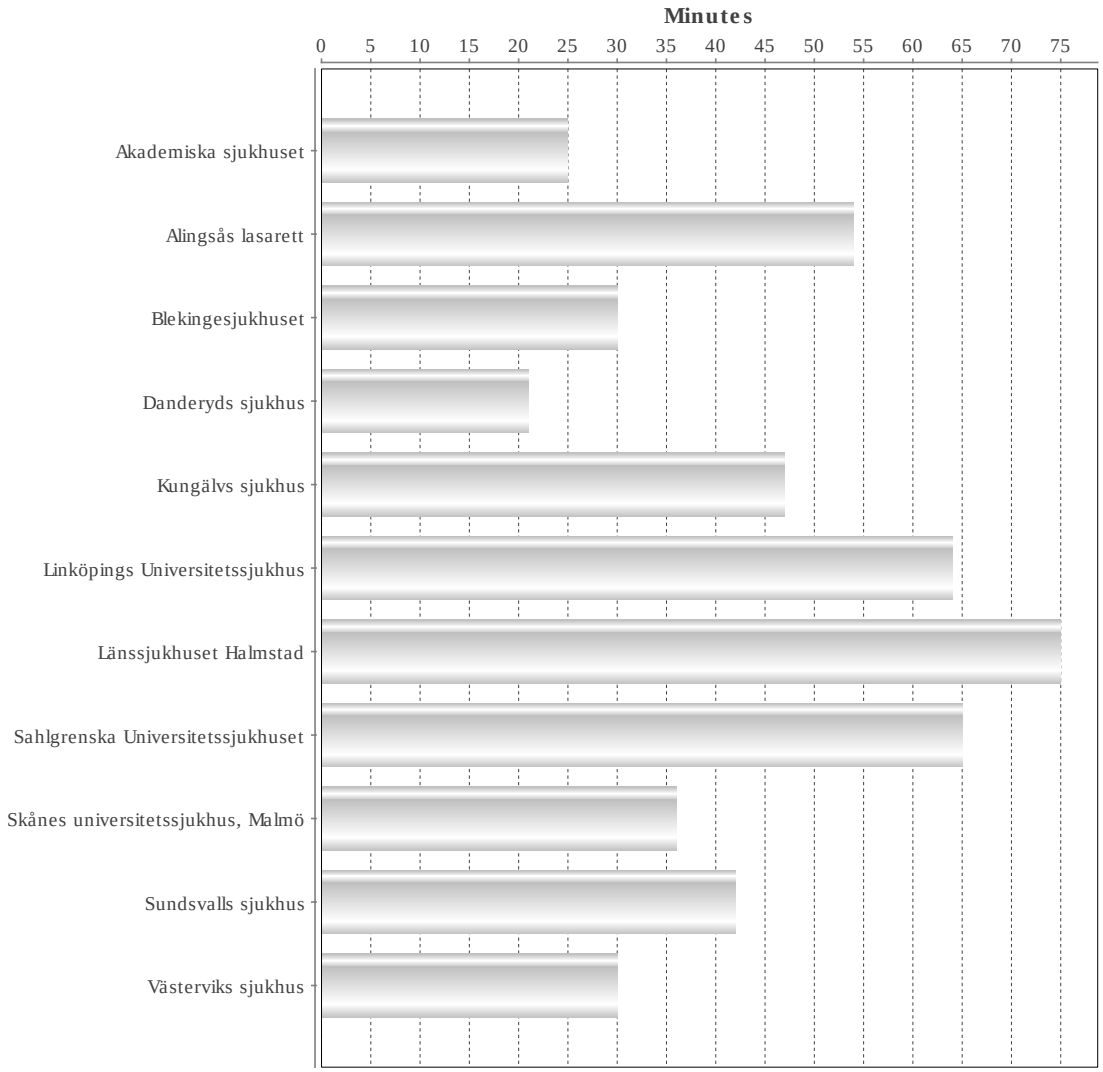
National mean skin to skin duration for a new implant of different subtypes

Knife time	Average	Standard deviation
AAI	4.0	6.9
VVI	3.0	8.3
DDD	4.0	14.4
CRT	18.0	27.6



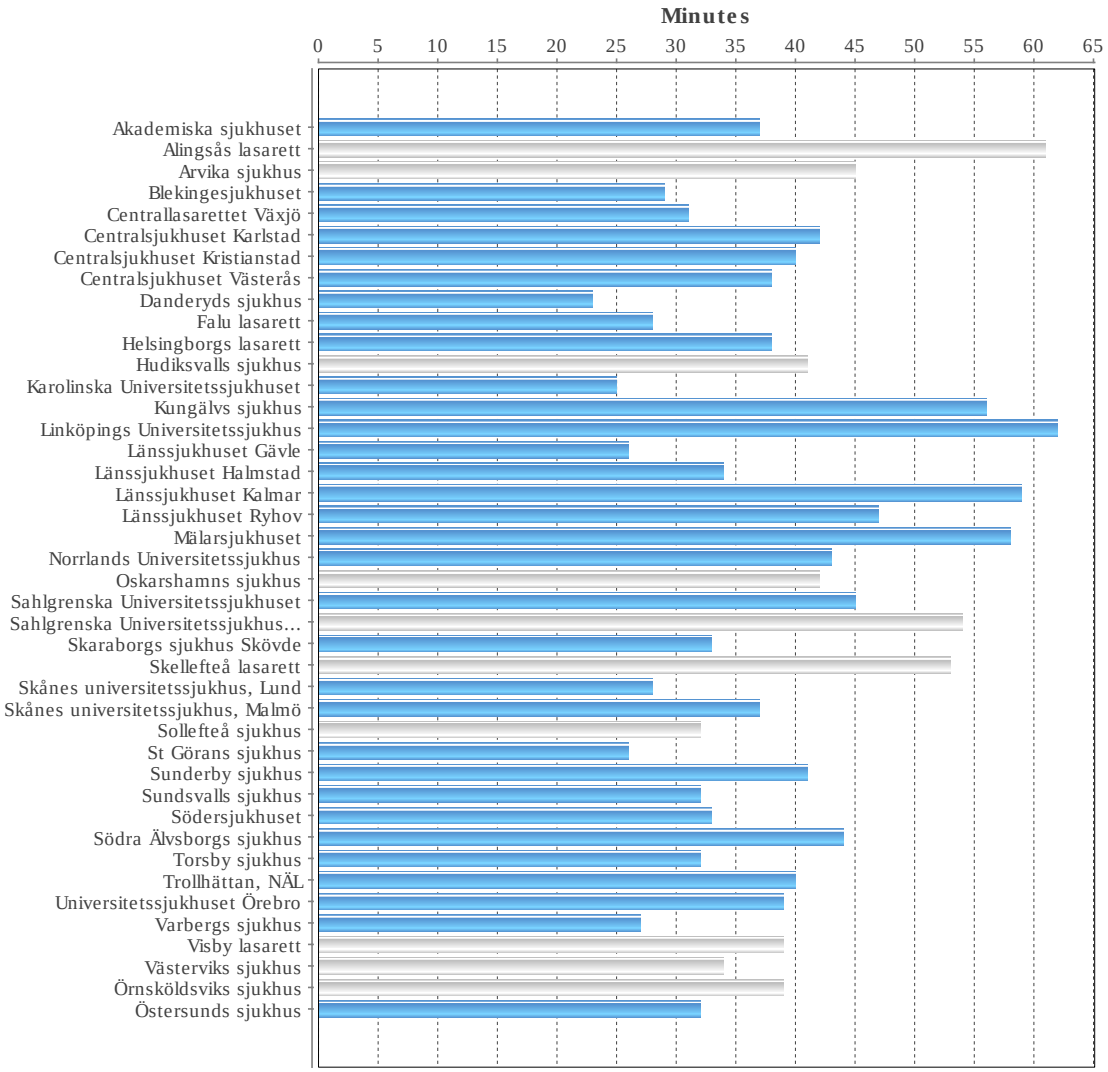
Mean duration for a new implant of different subtypes per hospital. Hospitals with less than 10 implants of a specific subtype are marked in grey, blue indicates 10 or more implants of this subtype, performed yearly at this hospital.

AAI



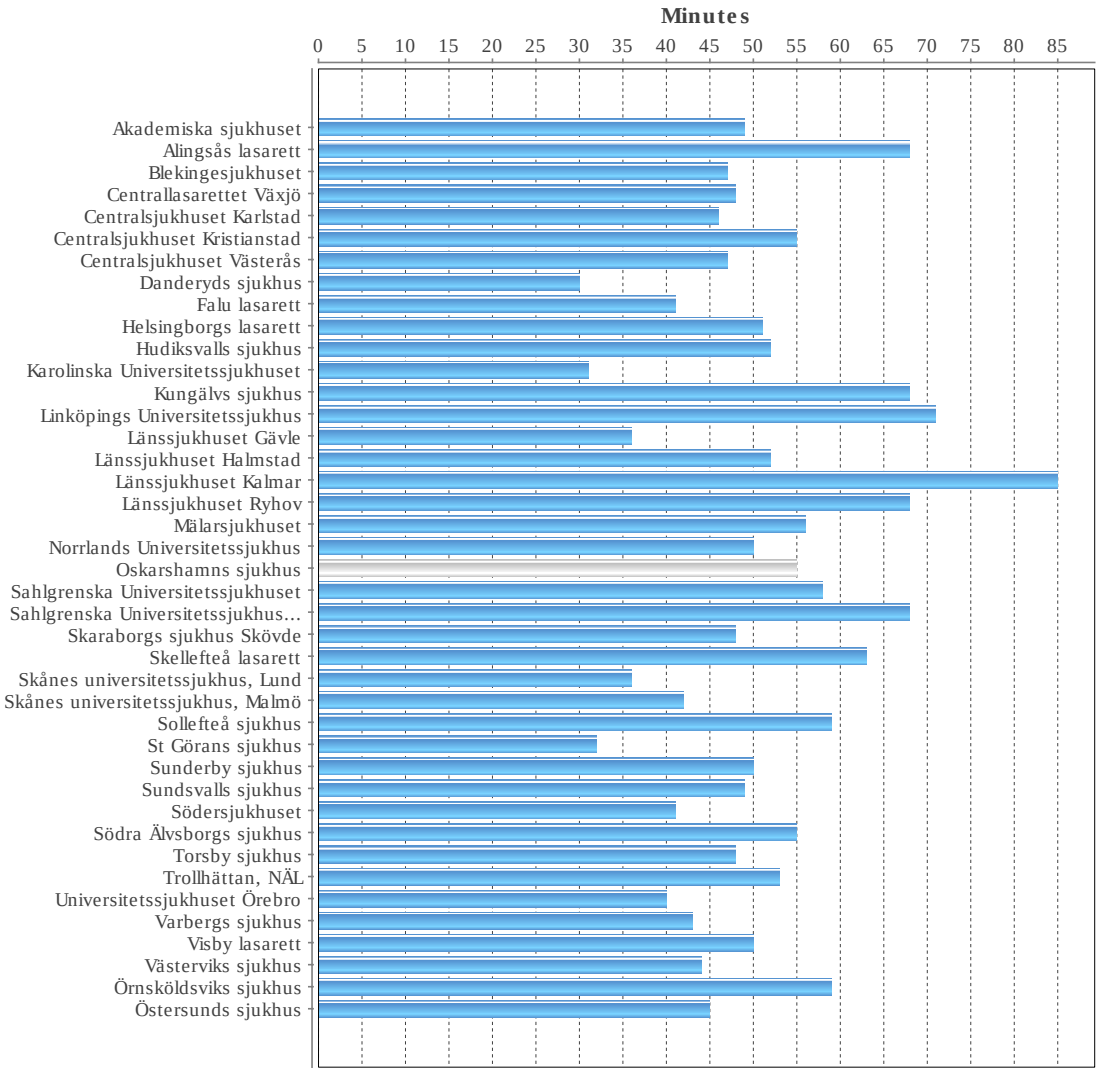
Mean duration for a new implant of different subtypes per hospital. Hospitals with less than 10 implants of a specific subtype are marked in grey, blue indicates 10 or more implants of this subtype, performed yearly at this hospital.

VVI



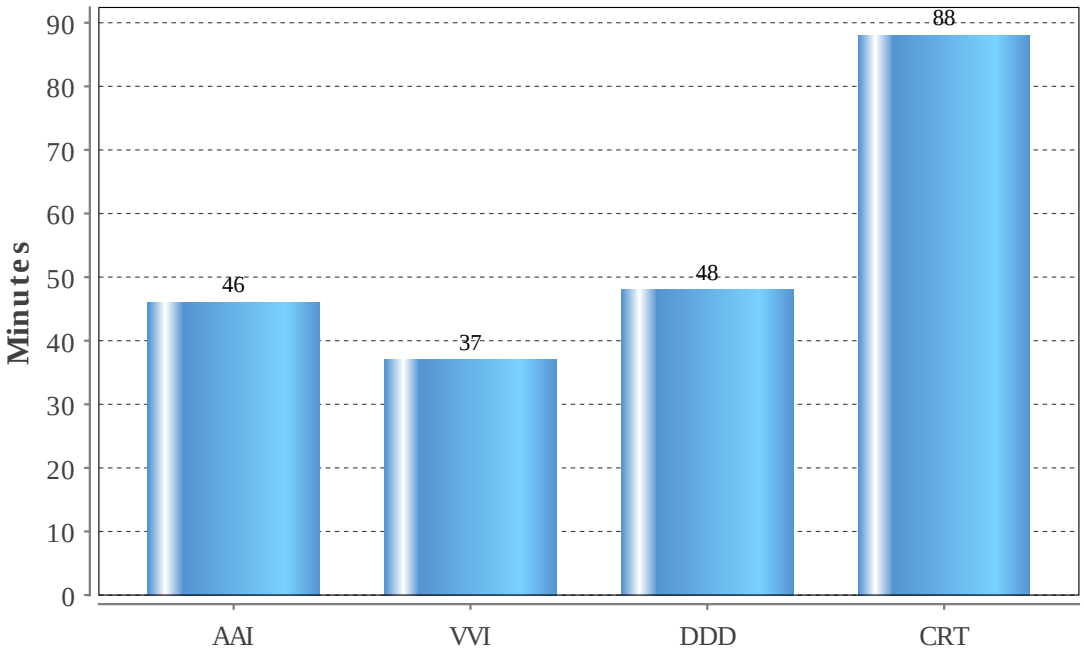
Mean duration for a new implant of different subtypes per hospital. Hospitals with less than 10 implants of a specific subtype are marked in grey, blue indicates 10 or more implants of this subtype, performed yearly at this hospital.

DDD



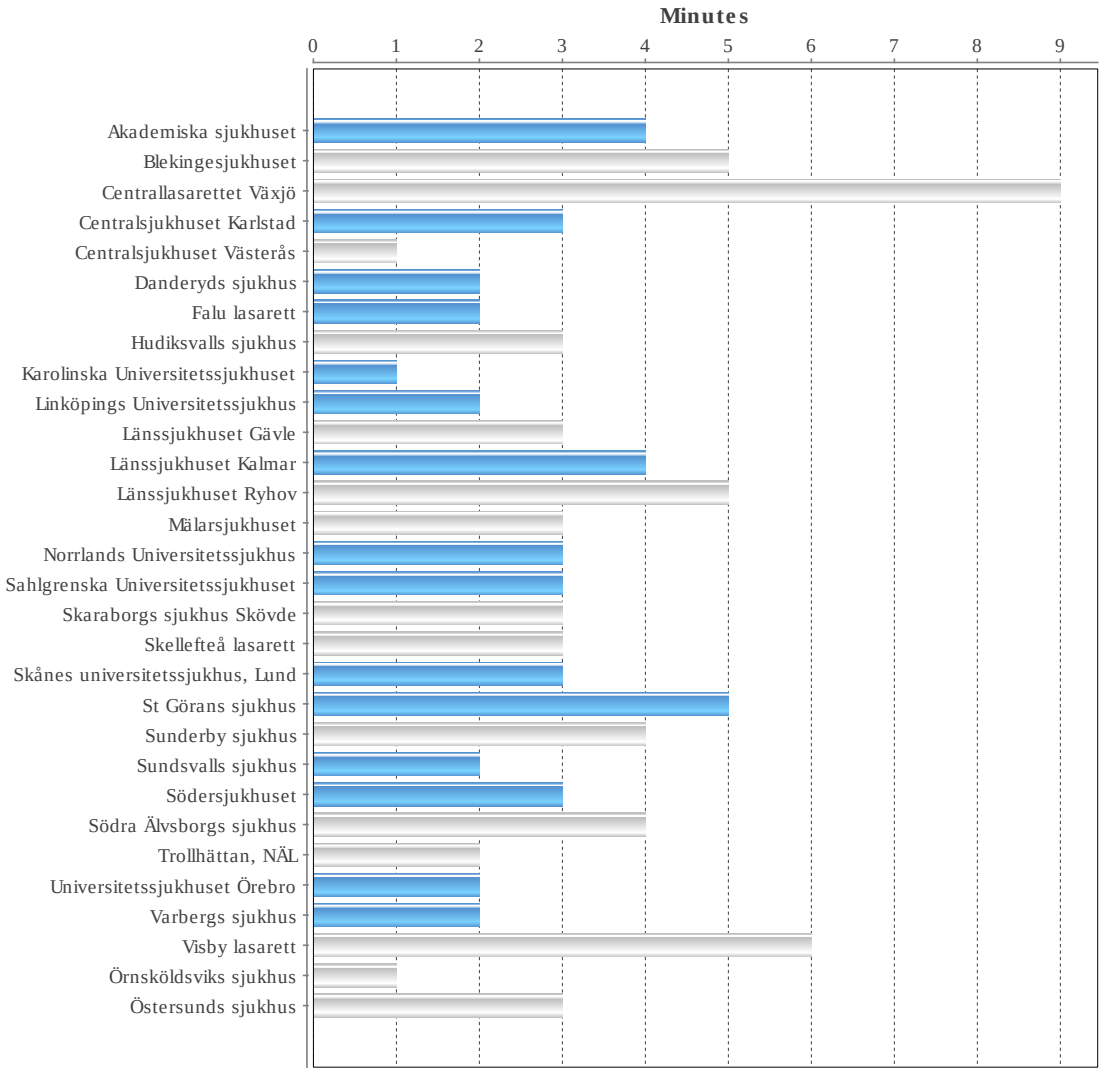
National mean skin to skin duration for a new implant of different subtypes

Knife time	Average	Standard deviation
AAI	46	16.9
VVI	37	18.8
DDD	48	21.7
CRT	88	43.9

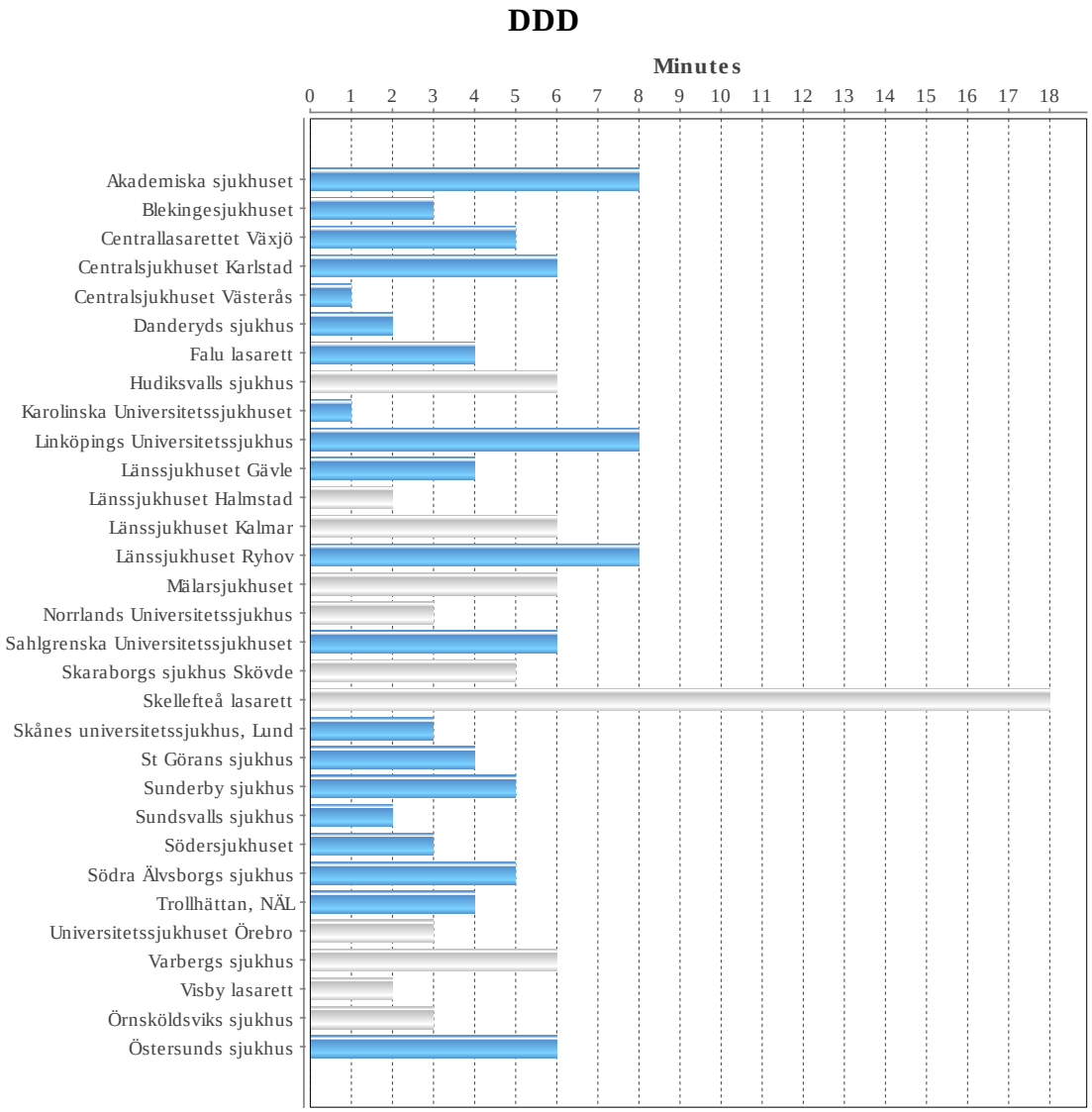


Mean fluoroscopy duration for a new implant of different subtypes per hospital. Hospitals with less than 10 implants of a specific subtype are marked in grey, blue indicates 10 or more implants of this subtype, performed yearly at this hospital.

VVI

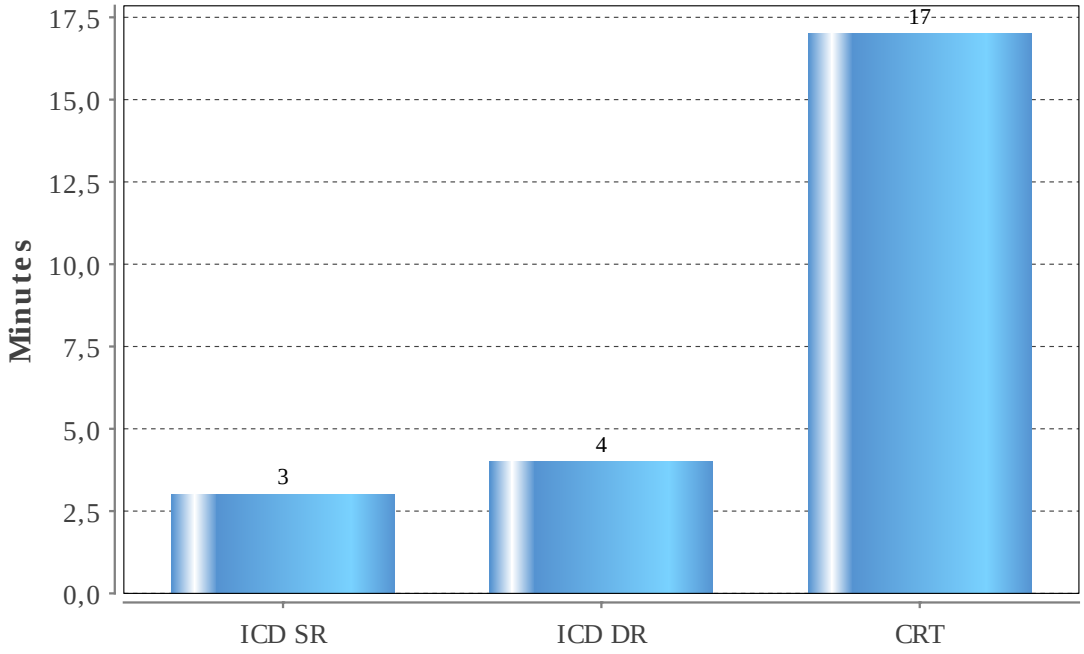


Mean fluoroscopy duration for a new implant of different subtypes per hospital. Hospitals with less than 10 implants of a specific subtype are marked in grey, blue indicates 10 or more implants of this subtype, performed yearly at this hospital.



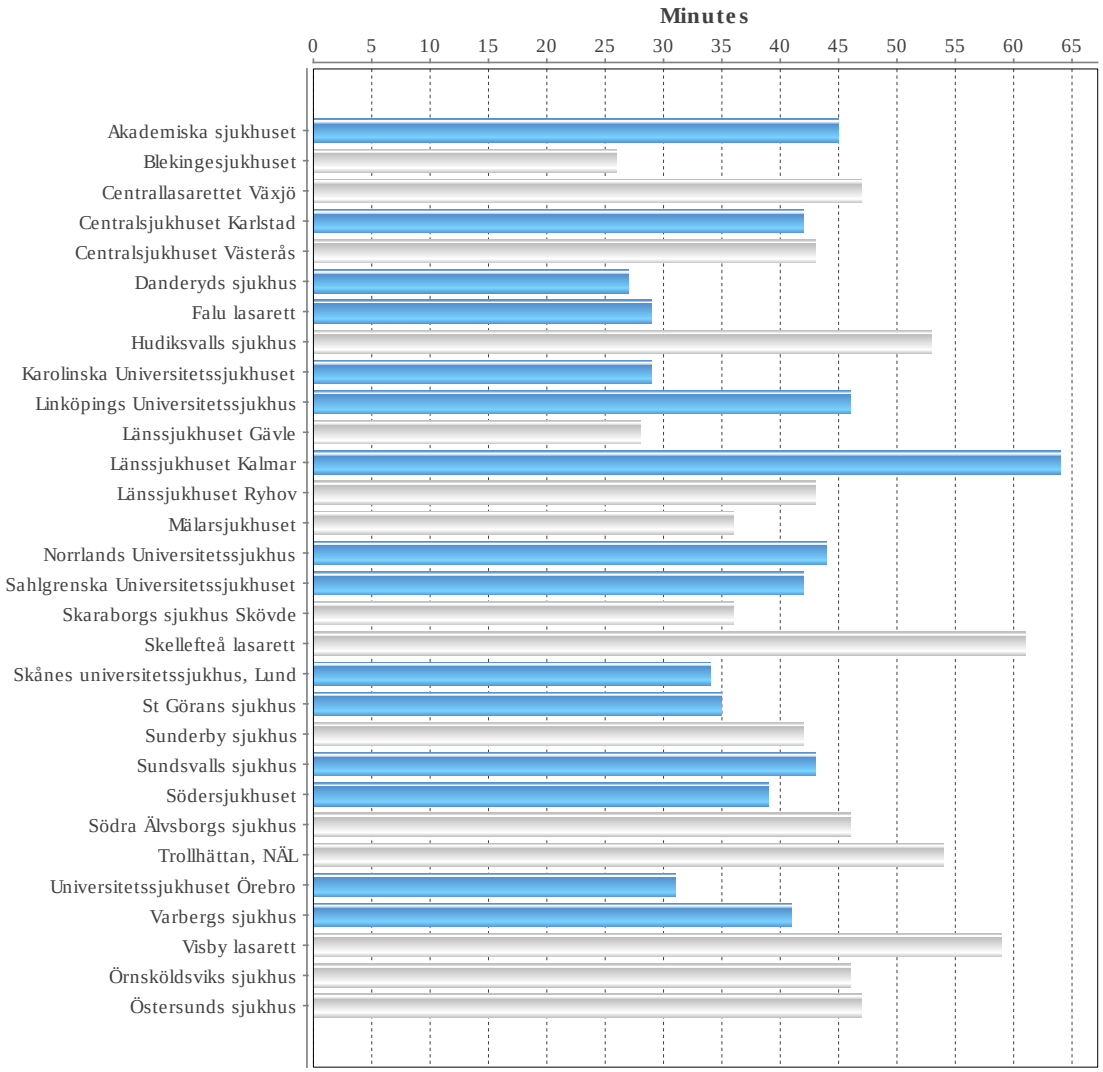
National mean skin to skin duration for a new implant of different subtypes

Fluoroscopy time	Average	Standard deviation
ICD SR	3	3.8
ICD DR	4	5.7
CRT	17	21.7

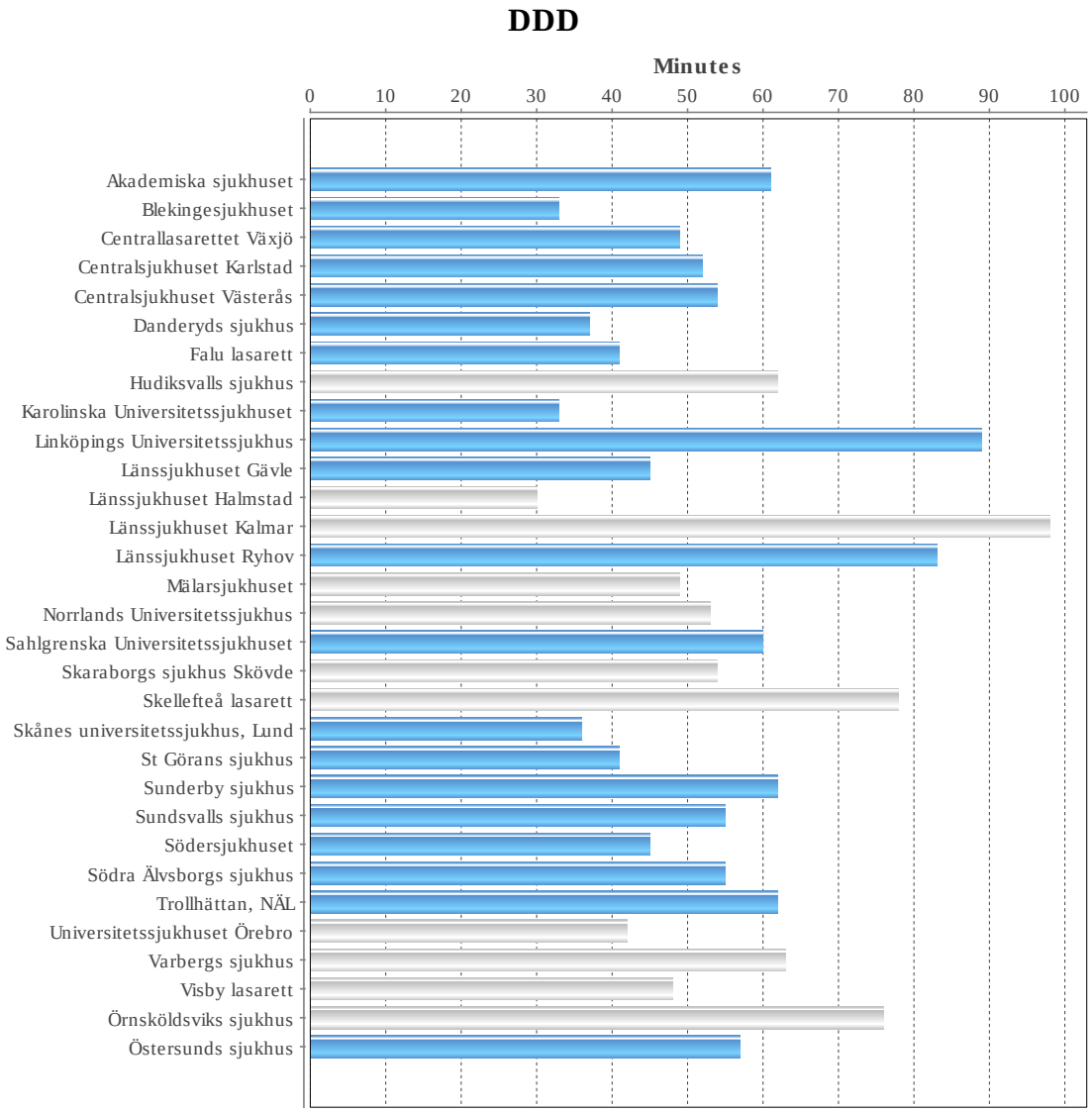


Mean duration for a new implant of different subtypes per hospital. Hospitals with less than 10 implants of a specific subtype are marked in grey, blue indicates 10 or more implants of this subtype, performed yearly at this hospital.

VVI

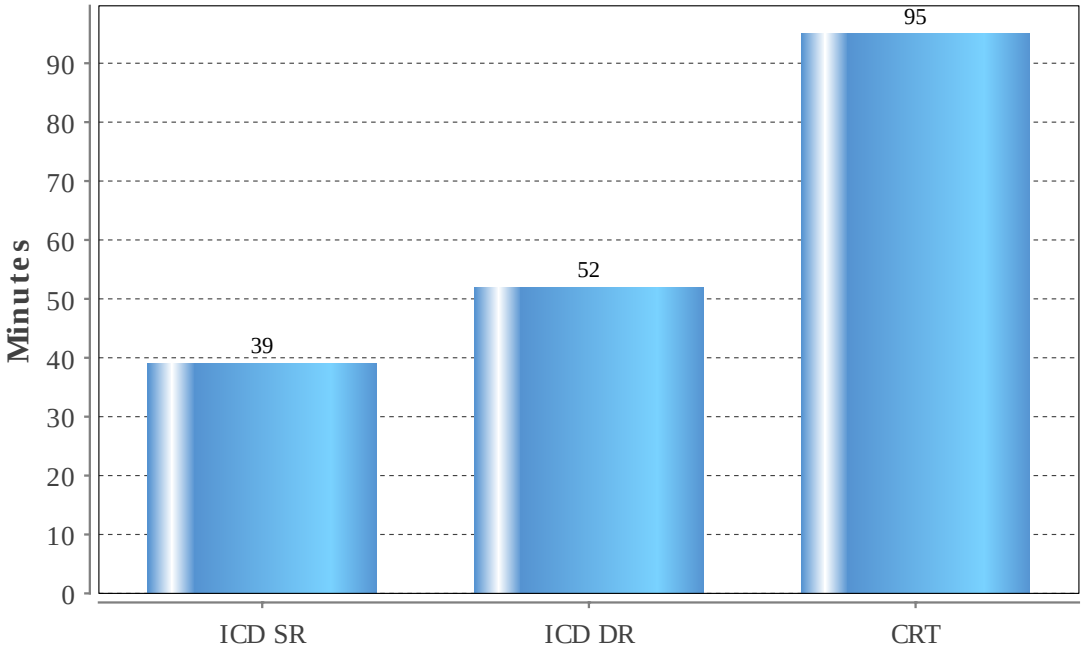


Mean duration for a new implant of different subtypes per hospital. Hospitals with less than 10 implants of a specific subtype are marked in grey, blue indicates 10 or more implants of this subtype, performed yearly at this hospital.

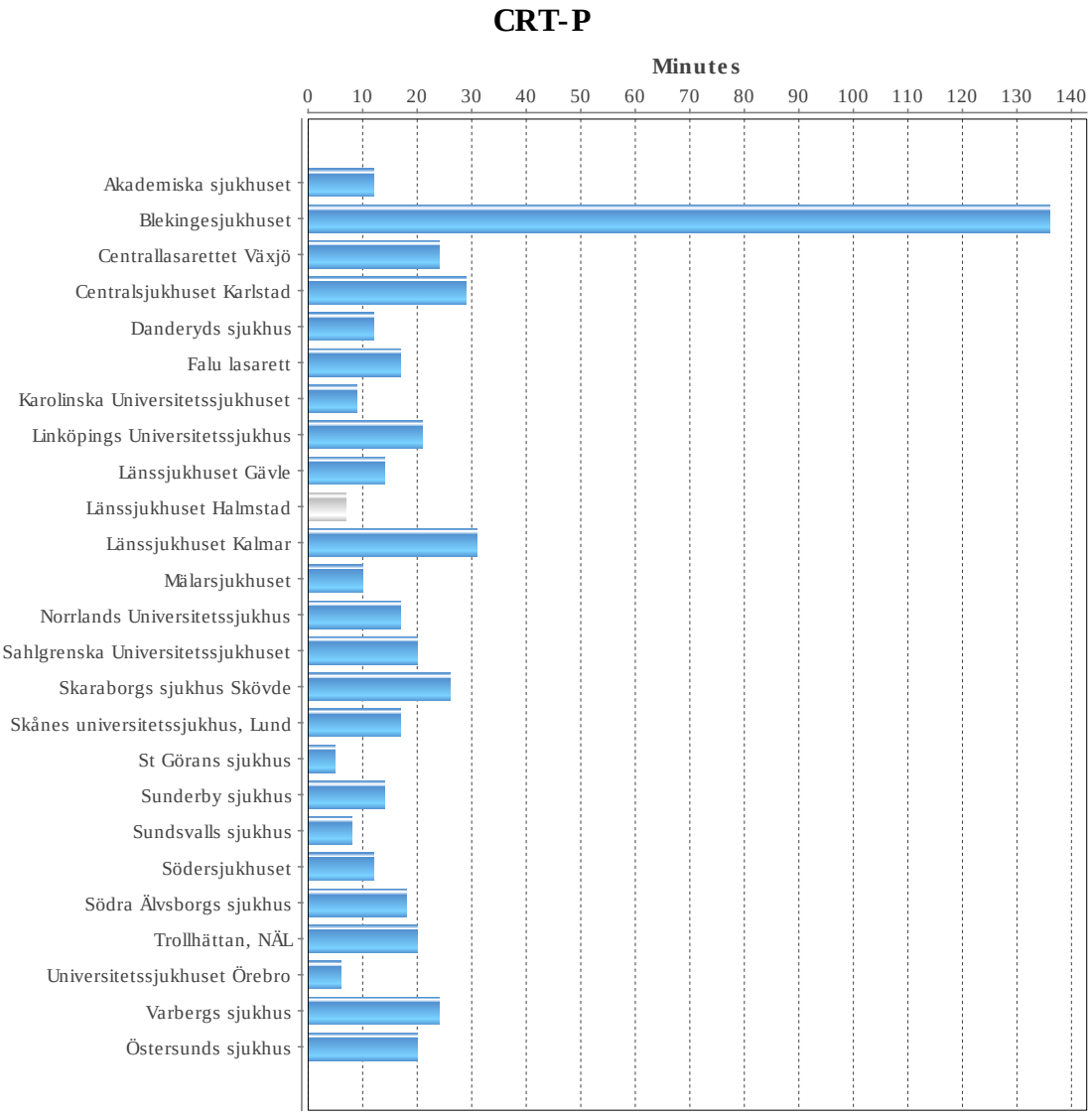


National mean skin to skin duration for a new implant of different subtypes

Knife time	Average	Standard deviation
ICD SR	39	16.0
ICD DR	52	25.9
CRT	95	40.4

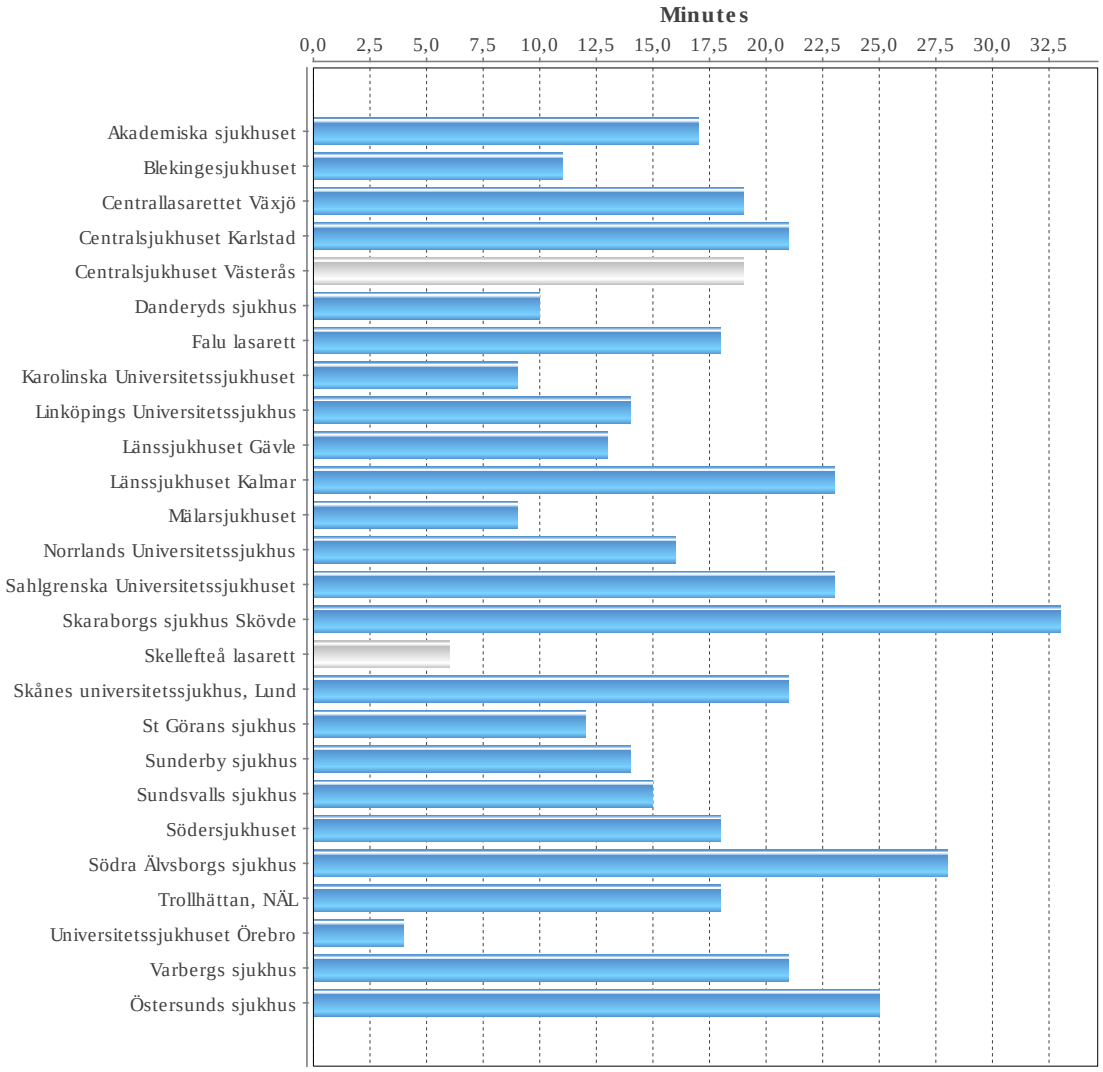


Mean fluoroscopy duration per different CRT implantation per hospital. Bars colored in grey are based on less then 10 observations

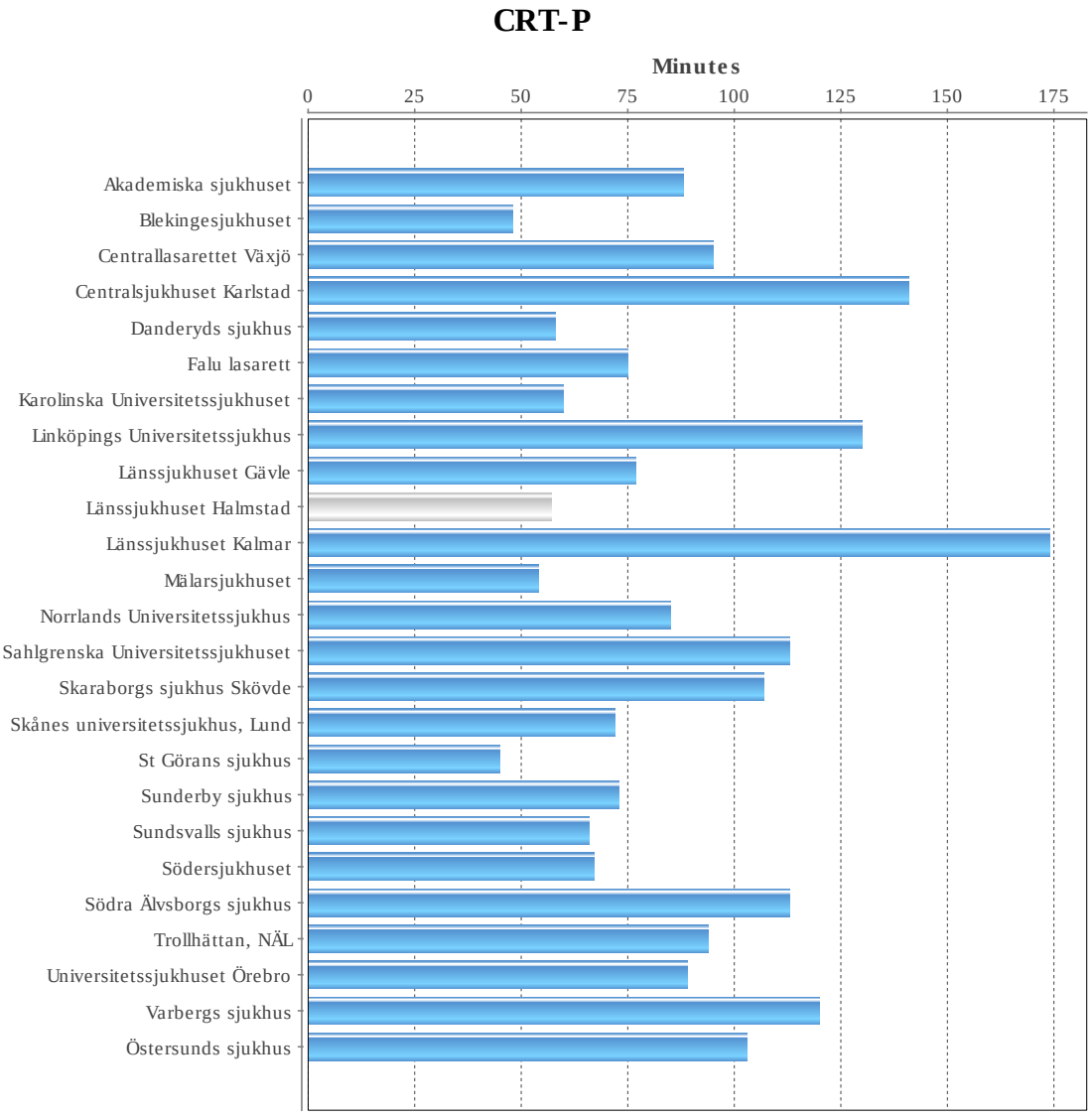


Mean fluoroscopy duration per different CRT implantation per hospital. Bars colored in grey are based on less then 10 observations

CRT-D

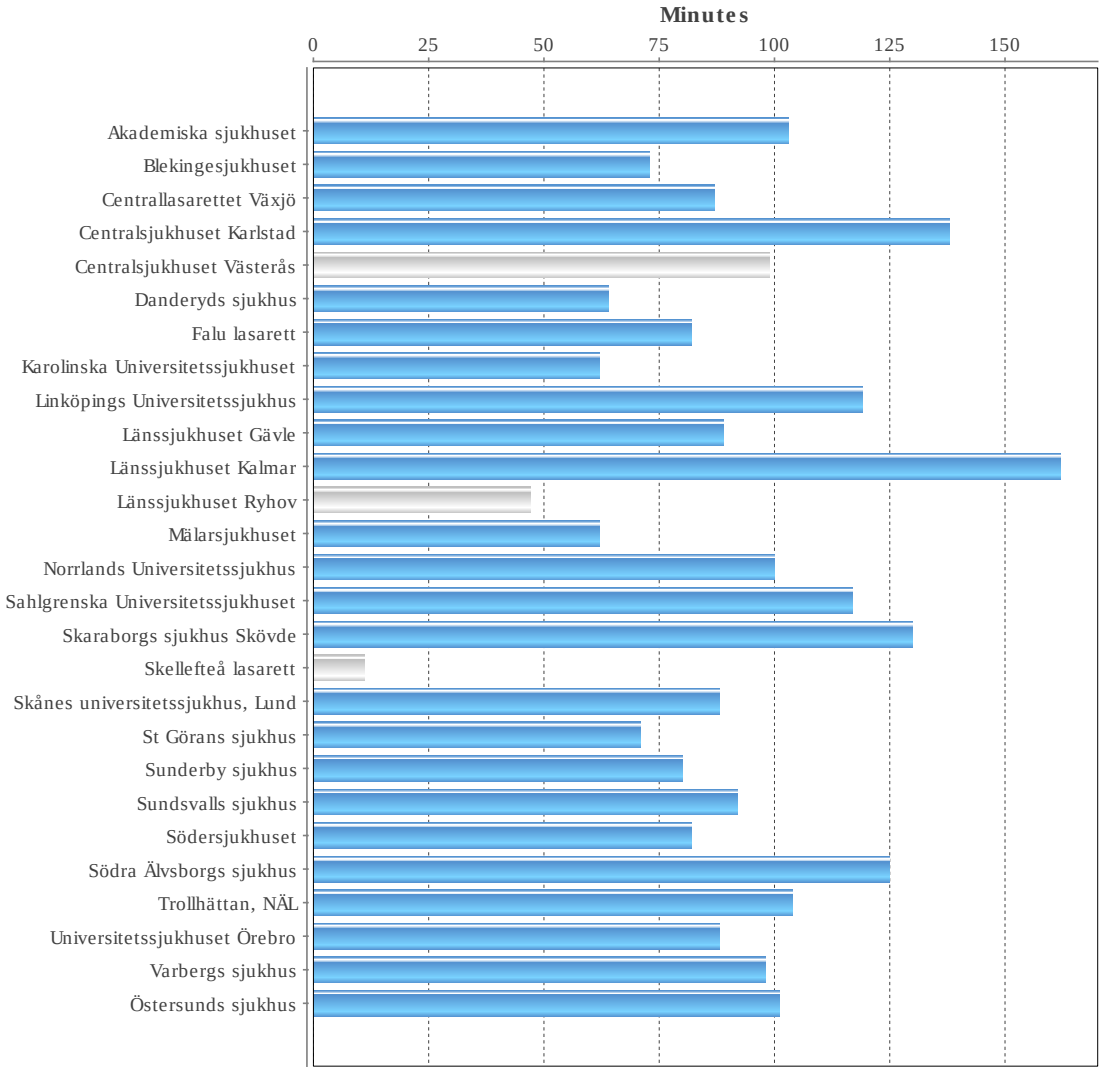


Mean skin to skin duration per subtype and hospital. Bars colored in grey are based on less then 10 observations



Mean skin to skin duration per subtype and hospital. Bars colored in grey are based on less then 10 observations

CRT-D

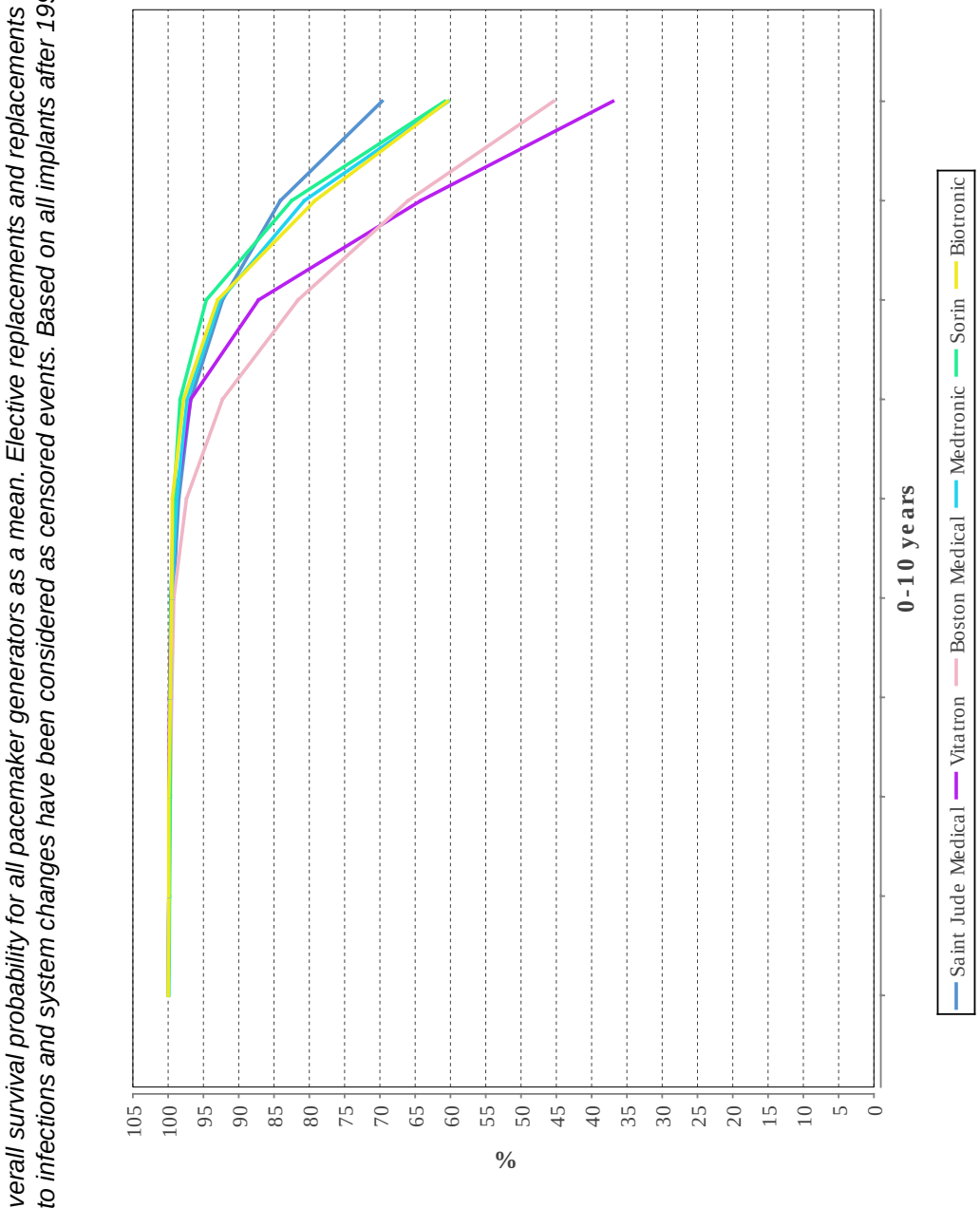


Year	At risk	Survival probability %
1	111977	100.0
2	94755	99.9
3	78098	99.8
4	63437	99.7
5	50548	99.4
6	39260	98.6
7	28977	96.6
8	19282	90.5
9	10691	77.1
10	4143	56.3

Overall survival probability for all PM generators as a mean. Elective replacements and replacements due to infections and system changes have been considered as censored events. Based on all implants after 2006

Year	Total		Biotronic		Boston Scient		Medtronic		St Jude Medical		Vitatron		Sorin	
	At risk	Surv. prob. %	At risk	Surv. prob. %	At risk	Surv. prob. %	At risk	Surv. prob. %	At risk	Surv. prob. %	At risk	Surv. prob. %	At risk	Surv. prob. %
1	111944	100.0	8557	100.0	14174	100.0	29334	100.0	37507	100.0	17864	100.0	4508	99.9
2	94729	99.9	6466	99.9	12316	99.9	25860	99.9	30864	99.9	15107	99.9	4116	99.8
3	78074	99.8	4540	99.9	10290	99.7	22113	99.8	24366	99.8	13049	99.9	3716	99.7
4	63415	99.7	3351	99.7	7882	99.5	18500	99.7	19106	99.7	11249	99.8	3327	99.7
5	50533	99.5	2451	99.5	5814	99.2	15263	99.5	14739	99.3	9424	99.6	2842	99.6
6	39253	98.7	1900	99.4	4567	97.4	12303	98.8	11292	98.5	6908	98.9	2283	99.2
7	28977	96.6	1384	97.8	3329	92.3	9760	97.3	7817	96.8	4904	96.8	1783	98.3
8	19282	90.2	750	93.0	2222	81.6	7246	92.6	4939	92.3	2833	87.2	1292	94.6
9	10691	76.1	301	79.2	1379	66.0	4218	80.7	2513	84.1	1511	64.2	769	82.5
10	4143	55.6	90	60.4	555	45.4	1563	60.3	1090	69.7	632	37.0	213	60.8

Overall survival probability for all pacemaker generators as a mean. Elective replacements and replacements due to infections and system changes have been considered as censored events. Based on all implants after 1990



Models that have at least 100 implants and 50 explants

Manuf	Model	Year 1 %	Year 2 %	Year 3 %	Year 4 %	Year 5 %	Year 6 %	Year 7 %	Year 8 %	Year 9 %
Biotronik	Philos SR	100.0	100.0	100.0	100.0	100.0	100.0	96.2	96.2	96.2
Biotronik	Axios SR	100.0	100.0	100.0	100.0	100.0	94.7	77.3	71.3	61.1
Biotronik	Estella DR-T ProMRI	100.0	100.0	100.0	100.0	100.0	100.0	99.5	NaN	NaN
Biotronik	Etrinsa 8 DR-T ProMRI	99.8	99.8	99.8	NaN	NaN	NaN	NaN	NaN	NaN
Biotronik	Philos II DR-T	99.7	99.7	99.3	99.3	99.3	98.3	94.1	80.1	68.8
Biotronik	Philos II DR	100.0	100.0	99.6	99.2	98.8	97.2	87.0	63.6	42.9
Biotronik	Enitra 8 DR-T proMRI	100.0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Biotronik	Etrinsa 6 DR-T ProMRI	99.9	99.7	99.7	99.7	NaN	NaN	NaN	NaN	NaN
Biotronik	Effecta DR	100.0	100.0	99.8	99.6	99.6	99.6	99.6	NaN	NaN
Biotronik	Talos SR	99.8	99.8	99.8	99.8	99.8	99.4	96.9	87.4	65.4
Biotronik	Effecta SR	99.9	99.9	99.9	99.9	99.6	99.6	99.6	NaN	NaN
Biotronik	Enitra 6 DR-T proMRI	100.0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Boston Scientific	1294 Insignia I	98.0	98.0	98.0	98.0	98.0	98.0	98.0	98.0	58.8
Boston Scientific	1297 Insignia I	100.0	100.0	100.0	100.0	96.7	96.7	92.1	85.9	72.5
Boston Scientific	1192 Insignia	100.0	100.0	100.0	100.0	97.9	97.9	97.9	88.6	66.4
Boston Scientific	J172 Ingenio	98.6	98.6	98.6	98.6	98.6	98.6	NaN	NaN	NaN
Boston Scientific	J174 Ingenio EL	100.0	100.0	100.0	100.0	100.0	99.1	NaN	NaN	NaN
Boston Scientific	J062 Advantio	99.4	98.8	98.8	98.8	98.8	98.8	NaN	NaN	NaN
Boston Scientific	J065 Advantio	100.0	100.0	100.0	100.0	100.0	100.0	NaN	NaN	NaN
Boston Scientific	W173 Invive CRT	100.0	100.0	99.4	98.8	98.0	97.0	91.0	NaN	NaN
Boston Scientific	S601 Altrua 60	100.0	99.6	99.0	99.0	99.0	95.9	88.4	69.6	51.6
Boston Scientific	S603 Altrua 60	100.0	100.0	99.5	98.5	96.7	87.4	60.9	36.8	10.3
Boston Scientific	S402 Altrua 40	99.6	99.6	99.6	99.6	98.8	98.8	95.7	89.3	69.6
Boston Scientific	J064 Adventio EL	99.8	99.8	99.8	99.8	99.8	99.0	NaN	NaN	NaN
Boston Scientific	S606 Altrua 60	99.8	99.8	99.8	99.5	98.8	97.8	95.9	94.0	87.8
Boston Scientific	H140 Contak Renewal TR2	100.0	100.0	99.4	98.6	95.2	84.9	58.4	27.6	4.5
Boston Scientific	1291 Insignia I	99.4	99.4	99.4	99.4	98.3	95.7	92.7	80.6	52.3
Boston Scientific	S602 Altrua 60	100.0	99.5	99.5	99.2	98.6	96.8	93.6	87.7	73.4
Boston Scientific	S501 Altrua 50	100.0	100.0	99.2	99.2	98.9	97.6	94.1	83.8	70.1
Boston Scientific	L210 Proponent MRI SR	100.0	99.6	99.6	98.5	NaN	NaN	NaN	NaN	NaN

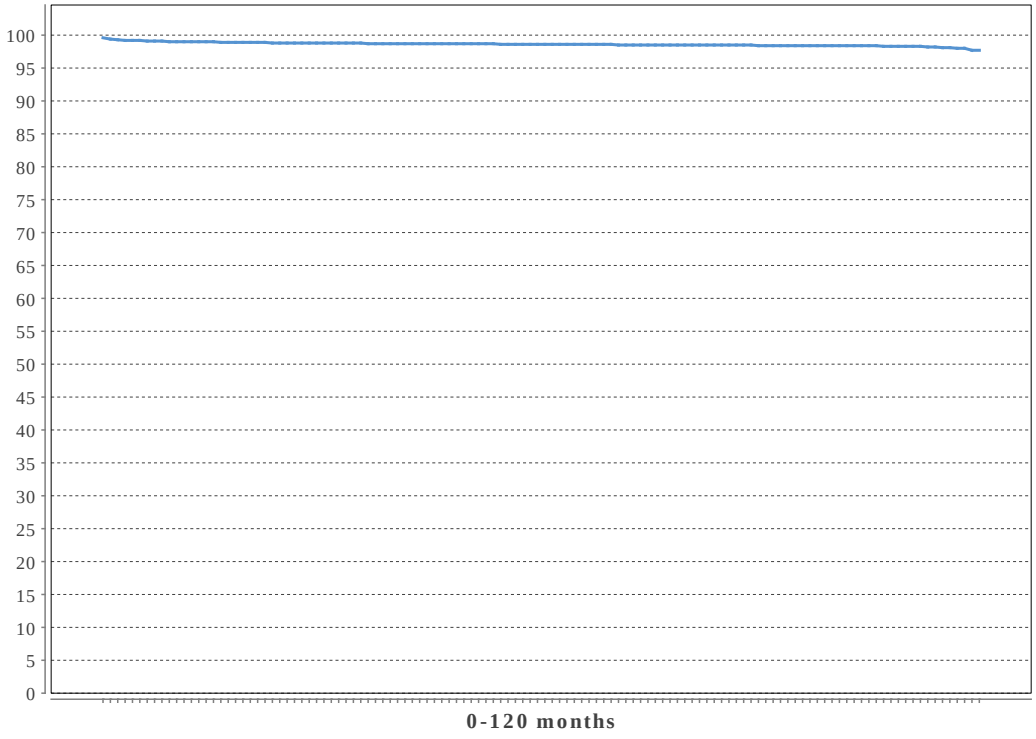
Manuf	Model	Year 1 %	Year 2 %	Year 3 %	Year 4 %	Year 5 %	Year 6 %	Year 7 %	Year 8 %	Year 9 %
Boston Scientific	J277 Vitalio MRI	99.5	99.2	99.2	99.2	99.2	NaN	NaN	NaN	NaN
Boston Scientific	S404 EL Altrua 40	100.0	99.9	99.8	99.5	99.1	98.7	97.3	93.4	87.4
Boston Scientific	1190 Insignia	99.9	99.0	98.5	98.3	96.6	92.9	84.4	64.3	41.2
Boston Scientific	1290 Insignia I	99.9	99.8	99.6	98.6	92.9	79.2	57.7	32.2	8.7
Boston Scientific	L231 Proponent MRI EL DR	99.9	99.8	99.8	99.5	NaN	NaN	NaN	NaN	NaN
Medtronic	KDR931 Kappa DR	100.0	100.0	100.0	100.0	100.0	100.0	100.0	94.1	58.7
Medtronic	SS303 Sigma S	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	NaN
Medtronic	P1501DR EnRhythm	100.0	100.0	100.0	100.0	97.2	79.3	47.0	29.6	18.6
Medtronic	ADSR01 Adapta	100.0	99.1	99.1	99.1	99.1	99.1	77.8	44.3	19.2
Medtronic	KSR703 Kappa SR	100.0	100.0	100.0	97.1	93.8	79.4	49.4	29.3	10.1
Medtronic	E2DR31 EnPulse	100.0	100.0	100.0	98.8	98.8	98.8	97.2	92.0	75.9
Medtronic	E2SR01 EnPulse	100.0	100.0	100.0	99.3	96.6	91.5	53.4	13.1	4.4
Medtronic	EN1SR01 Ensura SR MRI	100.0	100.0	100.0	100.0	NaN	NaN	NaN	NaN	NaN
Medtronic	KSR901 Kappa SR	98.6	98.6	98.6	98.6	98.6	89.5	45.0	15.6	6.8
Medtronic	SEDR01 Sensia	100.0	100.0	100.0	100.0	99.6	99.1	96.8	81.6	60.9
Medtronic	C2TR01 Syncra CRT	99.8	99.7	99.5	98.5	94.7	89.8	78.5	67.9	NaN
Medtronic	ADDR01 Adapta	100.0	99.8	99.6	99.3	98.5	98.2	95.1	80.4	45.4
Medtronic	VEDR01 Versa	100.0	99.6	99.4	99.2	99.0	97.0	93.4	73.6	42.0
Medtronic	A3DR01 Advisa DR MRI	100.0	100.0	100.0	100.0	100.0	98.6	96.8	85.3	NaN
Medtronic	8042 InSync III	100.0	99.8	99.0	97.9	95.8	87.3	68.1	36.7	10.6
Medtronic	SESR01 Sensia	99.8	99.8	99.7	99.4	98.4	96.8	94.8	75.7	47.5
Medtronic	E2DR01 EnPulse	100.0	99.8	99.7	99.2	98.4	96.5	88.9	60.4	21.3
Medtronic	RESR01 Relia SR	99.7	99.7	99.7	99.4	98.6	97.1	90.7	73.9	49.8
Medtronic	EN1DR01 Ensura DR MRI	99.9	99.8	99.7	99.6	99.0	98.1	94.7	87.4	NaN

Manuf	Model	Year 1 %	Year 2 %	Year 3 %	Year 4 %	Year 5 %	Year 6 %	Year 7 %	Year 8 %	Year 9 %
Medtronic	ADDRL1 Adapta	99.9	99.8	99.8	99.8	99.7	99.1	98.9	97.2	90.7
Medtronic	SEDRL1 Sensia	100.0	99.9	99.8	99.8	99.7	99.4	98.8	97.4	92.6
Medtronic	REDR01 Relia DR	99.9	99.8	99.7	99.6	99.4	98.7	97.1	91.0	75.6
Sorin/LivaNova	2530 Rhapsody	100.0	100.0	100.0	100.0	100.0	97.6	94.9	86.6	68.2
Sorin/LivaNova	Kora 250 DR	100.0	99.3	99.3	NaN	NaN	NaN	NaN	NaN	NaN
Sorin/LivaNova	Reply SR	100.0	100.0	100.0	100.0	98.8	97.4	95.4	95.4	75.7
Sorin/LivaNova	Esprit DR	100.0	100.0	100.0	99.7	99.7	98.3	92.6	78.8	62.6
Sorin/LivaNova	2550 Symphony DR	100.0	100.0	100.0	100.0	99.5	99.1	97.4	94.7	85.4
Sorin/LivaNova	Reply 200 DR	99.9	99.6	99.5	99.5	99.5	NaN	NaN	NaN	NaN
Sorin/LivaNova	Reply DR	99.7	99.6	99.6	99.6	99.0	98.1	94.3	79.0	50.7
St Jude Medical/ Abbott	5157 M/S Verity ADx XL SR	100.0	100.0	100.0	100.0	100.0	95.7	95.7	95.7	95.7
St Jude Medical/ Abbott	5610 Victory	100.0	100.0	100.0	100.0	97.1	84.0	46.9	14.9	NaN
St Jude Medical/ Abbott	3112 Anthem	100.0	100.0	99.0	97.8	94.0	89.8	80.2	74.5	NaN
St Jude Medical/ Abbott	2525T Microny II	98.7	98.7	98.7	94.3	82.8	80.1	70.0	51.3	36.5
St Jude Medical/ Abbott	5180 Identity ADx SR	100.0	100.0	97.9	97.9	88.2	77.7	51.1	13.9	4.6
St Jude Medical/ Abbott	1110 Accent SR	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	NaN
St Jude Medical/ Abbott	5810 Victory DR	100.0	100.0	94.4	87.4	69.2	42.6	27.1	16.4	16.4
St Jude Medical/ Abbott	1136 Sustain XL	100.0	100.0	100.0	99.2	99.2	99.2	99.2	NaN	NaN
St Jude Medical/ Abbott	3262 Quadra Allure MP RF	100.0	100.0	100.0	NaN	NaN	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	5356 Verity ADx XL DR	100.0	100.0	100.0	99.0	96.7	96.7	96.7	94.2	73.2
St Jude Medical/ Abbott	2136 Sustain XL DR	99.5	99.5	99.5	99.2	98.8	98.4	98.0	NaN	NaN
St Jude Medical/ Abbott	3242 Allure RF	99.8	99.8	99.8	99.8	98.9	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	1162 Endurity SR	99.8	99.8	99.8	99.8	99.8	99.8	99.8	99.8	NaN
St Jude Medical/ Abbott	2172 Endurity MRI DR	100.0	100.0	100.0	NaN	NaN	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	5596 Frontier II	100.0	100.0	99.4	97.4	90.0	79.5	60.4	39.9	24.3
St Jude Medical/ Abbott	3562 Quadra Allure MP RF	100.0	100.0	NaN	NaN	NaN	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	2224 Accent DR MRI	99.8	99.8	99.8	99.5	99.5	98.5	98.5	NaN	NaN

Manuf	Model	Year 1 %	Year 2 %	Year 3 %	Year 4 %	Year 5 %	Year 6 %	Year 7 %	Year 8 %	Year 9 %
St Jude Medical/ Abbott	2212 Accent DR	99.8	99.6	99.6	99.0	98.4	97.9	94.7	86.3	80.6
St Jude Medical/ Abbott	2160 Endurity	99.6	99.6	99.6	99.6	99.3	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	1160 Endurity SR	99.9	99.7	99.7	99.7	99.7	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	3212 Anthem	99.6	99.1	98.3	97.3	93.1	82.0	72.1	55.3	33.8
St Jude Medical/ Abbott	3222 Allure RF	99.8	99.6	99.6	97.6	94.6	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	5386 Identity ADx XL DR	98.9	98.5	98.0	98.0	95.1	94.4	90.9	75.1	53.7
St Jude Medical/ Abbott	5626 Zephyr XL SR	99.9	99.6	99.6	99.4	99.2	99.2	99.0	98.4	97.3
St Jude Medical/ Abbott	2112 Accent DR	99.9	99.9	99.9	99.8	99.7	99.2	98.4	96.1	NaN
St Jude Medical/ Abbott	1272 Assurity MRI SR	99.9	99.9	99.9	99.9	NaN	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	2260 Assurity + DR	99.7	99.7	99.6	99.6	99.1	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	5156 Verity ADx XL SR	100.0	100.0	100.0	99.7	99.6	98.9	98.8	98.2	95.5
St Jude Medical/ Abbott	5826 Zephyr XL DR	99.8	99.7	99.6	99.4	99.0	98.2	94.2	84.8	71.0
St Jude Medical/ Abbott	5816 Victory XL	99.8	99.7	99.6	99.5	99.0	97.7	92.5	84.2	65.8
St Jude Medical/ Abbott	2272 Assurity MRI DR	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	NaN
Vitatron	T20SR	99.8	99.8	99.8	99.1	97.7	94.8	91.5	87.3	79.9
Vitatron	Q80A2 DR MRI	100.0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Vitatron	C10S	99.9	99.9	99.7	99.4	99.0	98.5	96.3	93.8	92.0
Vitatron	C70DR	100.0	100.0	100.0	100.0	99.8	97.6	86.7	62.2	27.6
Vitatron	E60A1 DR	100.0	100.0	100.0	99.7	99.5	98.6	97.8	97.8	NaN
Vitatron	T70DR	99.5	99.3	99.3	98.9	96.8	91.6	70.9	41.9	17.8
Vitatron	C20SR	100.0	99.9	99.9	99.9	99.3	97.7	95.7	94.0	85.8
Vitatron	T60DR	100.0	100.0	99.6	99.2	98.1	95.4	82.0	54.5	29.5
Vitatron	G20A1	99.9	99.9	99.9	99.8	99.4	97.3	88.1	88.1	NaN
Vitatron	C60DR	99.9	99.8	99.6	99.4	98.3	95.5	83.6	56.8	27.8
Vitatron	G70A1	99.9	99.9	99.8	99.7	99.5	99.0	98.9	98.9	NaN

Based on all implants after 1990

Year	At risk	Survival probabilty %
1	164313	99.6
2	139412	99.0
3	115071	98.8
4	93007	98.7
5	73322	98.7
6	56148	98.6
7	40925	98.5
8	27674	98.5
9	16729	98.4
10	7607	98.3



Models that have at least 50 implants and 10 explants

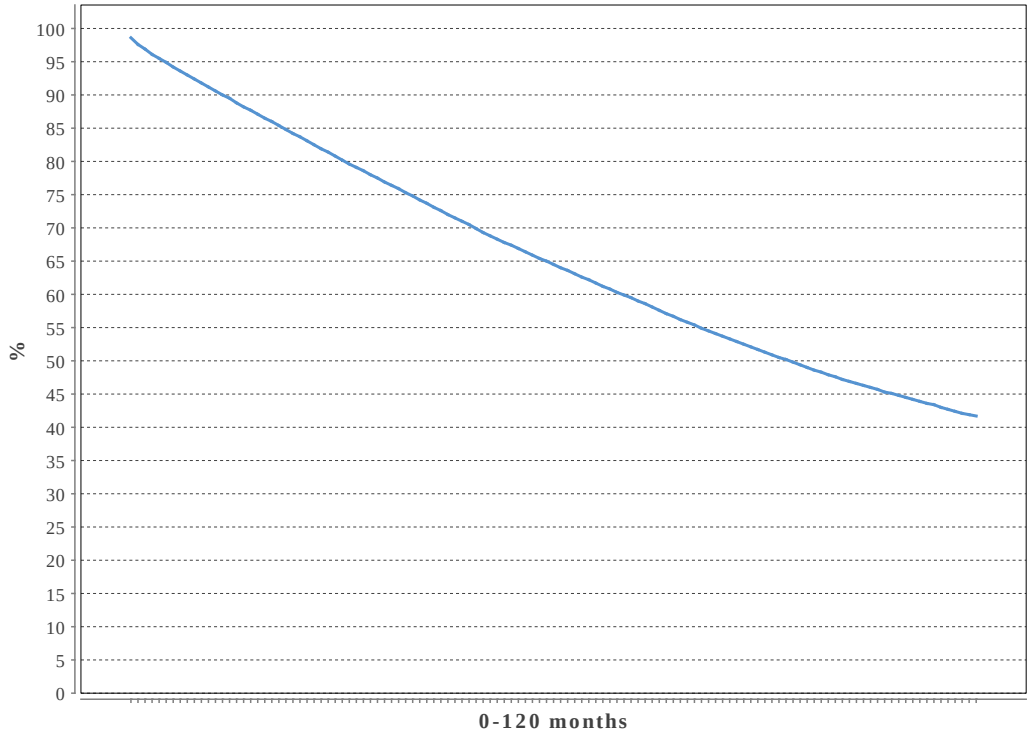
Manufacturer	Model	Years								
		1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	8 (%)	9 (%)
Biotronik	Y53-BP	100.0	100.0	100.0	100.0	100.0	95.0	95.0	95.0	95.0
Biotronik	Selox SR 60	97.7	97.7	96.2	96.2	96.2	96.2	96.2	96.2	96.2
Biotronik	PX60-UP	99.9	99.7	99.7	99.7	99.7	99.7	99.7	99.7	99.7
Biotronik	Selox ST 60	100.0	100.0	100.0	98.9	98.9	98.9	98.9	98.9	98.9
Biotronik	Safio ProMRI S53	99.0	98.6	98.6	98.6	98.6	98.6	98.6	98.6	NaN
Biotronik	Y60-BP	99.7	99.7	99.7	99.7	99.7	99.7	99.7	99.7	99.7
Biotronik	PX60-BP	99.8	99.8	99.8	99.8	99.8	99.8	99.8	99.8	99.8
Biotronik	Safio ProMRI S60	99.1	99.1	99.1	99.1	99.1	99.1	99.1	99.1	NaN
Biotronik	Siello S60	98.5	98.5	98.5	98.5	98.5	98.5	98.5	98.5	98.5
Biotronik	Siello S53	98.6	98.5	98.4	98.4	98.4	98.4	98.4	98.4	98.4
Biotronik	Solia S60 MRI	99.2	99.2	99.2	99.2	99.2	99.2	99.2	NaN	NaN
Biotronik	Solia S53 MRI	99.1	99.1	99.0	99.0	99.0	99.0	99.0	NaN	NaN
Boston Scientific	4480 Fineline II Sterox EZ MRI	95.8	95.8	95.2	94.5	94.5	94.5	94.5	94.5	94.5
Boston Scientific	4542 Easytrak	95.9	94.7	93.3	91.7	91.7	89.2	89.2	89.2	89.2
Boston Scientific	7732 Ingevity MRI	98.6	98.6	98.6	98.6	NaN	NaN	NaN	NaN	NaN
Boston Scientific	4474 Fineline II Sterox EZ MRI	99.5	99.0	98.6	98.3	98.0	97.9	97.7	97.3	97.3
Boston Scientific	4471 Fineline II Sterox EZ MRI	97.4	97.2	97.2	97.2	97.2	96.7	96.7	96.7	94.8
Boston Scientific	4457 Fineline II Sterox EZ MRI	99.4	99.3	99.2	99.1	99.1	99.1	99.1	99.1	99.1
Boston Scientific	4473 Fineline II Sterox EZ MRI	99.2	99.0	98.9	98.9	98.8	98.8	98.8	98.7	98.7
Boston Scientific	7741 Ingevity MRI	98.5	98.5	98.4	98.4	98.4	NaN	NaN	NaN	NaN
Boston Scientific	7742 Ingevity MRI	98.8	98.7	98.7	98.7	98.7	NaN	NaN	NaN	NaN
Boston Scientific	4470 Fineline II Sterox EZ MRI	99.4	99.3	99.3	99.2	99.2	99.2	99.2	99.1	98.8
Medtronic	4195 Attain StarFix	94.7	94.7	94.7	94.7	94.7	94.7	94.7	94.7	82.9
Medtronic	4073 CapSure Sense	99.4	99.4	99.4	99.4	99.4	99.4	99.4	99.4	99.4
Medtronic	4396 Attain Ability MRI	98.7	98.7	98.7	98.7	98.7	98.7	98.7	98.7	NaN
Medtronic	4965 CapSure Epi	98.6	98.6	98.6	97.6	96.4	93.7	93.7	93.7	93.7
Medtronic	4194 Attain OTW	94.7	94.2	94.2	92.9	92.9	92.9	91.3	91.3	91.3

Manufacturer	Model	Years								
		1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	8 (%)	9 (%)
Medtronic	4196 Attain Ability MRI	97.5	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8
Medtronic	4598 Attain Performa MRI	98.5	98.5	98.5	98.5	98.5	98.5	NaN	NaN	NaN
Medtronic	4798 Attain Stability Quad MRI	98.8	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Medtronic	4193 Attain OTW	94.5	93.6	93.0	92.7	91.8	91.2	90.5	89.1	89.1
Medtronic	5092 Capsure SP Novus	98.7	98.4	98.4	98.3	98.1	98.1	97.7	97.2	97.2
Medtronic	5086 CapSureFix MRI	99.0	99.0	99.0	99.0	99.0	98.8	98.8	98.8	98.8
Medtronic	4296 Attain Ability MRI	97.1	96.5	96.5	96.5	96.5	96.1	96.1	96.1	96.1
Medtronic	4796 Attain Stability MRI	99.1	98.4	98.1	98.1	98.1	98.1	98.1	NaN	NaN
Medtronic	4968 CapSure Epi	99.7	99.3	98.6	98.6	97.7	97.7	97.2	96.5	92.9
Medtronic	5054 CapSure Z Novus MRI	99.1	98.9	98.7	98.7	98.6	98.5	98.5	98.1	98.1
Medtronic	4074 Capsure Sense MRI	99.1	99.1	99.0	99.0	99.0	98.9	98.9	98.8	98.8
Medtronic	5076 CapSureFix MRI	99.0	98.9	98.8	98.7	98.7	98.6	98.5	98.3	97.9
Medtronic	4076 CapSureFix Novus MRI	99.4	99.4	99.3	99.3	99.2	99.2	99.1	99.1	99.0
N/A	N/A	99.5	99.4	99.4	99.1	98.9	98.4	97.5	96.7	96.7
Osypka	KY-5	93.1	88.2	86.0	82.3	80.5	80.5	77.6	77.6	77.6
St Jude Medical/ Abbott	1058T	96.7	96.7	96.7	96.7	96.7	96.7	96.7	96.7	96.7
St Jude Medical/ Abbott	1699T OptiSense	97.8	96.6	96.6	96.6	96.6	96.6	96.6	96.6	96.6
St Jude Medical/ Abbott	1056K QuickSite	96.9	96.2	95.5	94.5	94.5	94.5	90.6	90.6	90.6
St Jude Medical/ Abbott	1456Q Quartet MRI	94.7	94.7	94.7	94.7	94.7	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	1084T Myodex	99.2	99.2	99.2	99.2	99.2	99.2	99.2	99.2	99.2
St Jude Medical/ Abbott	1480T	98.8	98.2	98.1	98.1	97.9	97.7	97.5	97.5	97.5
St Jude Medical/ Abbott	1488T Tendril SDX	98.5	98.2	97.9	97.7	97.5	97.1	97.0	96.0	95.1
St Jude Medical/ Abbott	1156T Quickflex	97.1	96.5	95.9	95.9	95.4	95.4	95.4	95.4	94.3
St Jude Medical/ Abbott	1056T QuickSite	96.0	95.3	94.4	93.6	93.3	93.0	93.0	93.0	88.1

Manufacturer	Model	Years								
		1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	8 (%)	9 (%)
St Jude Medical/ Abbott	1699TC OptiSense	98.5	98.0	97.9	97.6	97.6	97.4	97.2	97.2	97.2
St Jude Medical/ Abbott	1636T Isoflex	97.7	97.5	97.1	97.1	96.9	96.5	96.5	96.1	95.4
St Jude Medical/ Abbott	LPA1200M52cm TendrilMRI	98.2	98.1	97.9	97.9	97.6	97.6	97.6	NaN	NaN
St Jude Medical/ Abbott	1788TC Tendril ST	96.6	96.4	96.4	96.3	96.0	96.0	96.0	96.0	95.6
St Jude Medical/ Abbott	LPA1200M58cm TendrilMRI	99.2	99.0	98.9	98.7	98.2	98.2	98.2	NaN	NaN
St Jude Medical/ Abbott	1788T Tendril ST	97.3	96.6	95.9	95.6	95.6	95.6	95.6	95.6	95.6
St Jude Medical/ Abbott	1888TC Tendril ST	98.6	98.5	98.5	98.5	98.5	98.4	98.2	98.2	98.2
St Jude Medical/ Abbott	1258T QuickFlex	98.2	97.9	97.7	97.6	97.4	97.0	96.8	96.6	96.6
St Jude Medical/ Abbott	1688T Tendril SDX	97.1	96.5	96.2	95.9	95.4	95.0	95.0	94.4	94.1
St Jude Medical/ Abbott	1458Q Quartet MRI	98.2	97.7	97.4	97.1	97.1	97.1	97.1	97.1	97.1
St Jude Medical/ Abbott	1646T Isoflex	98.3	98.1	97.8	97.8	97.7	97.7	97.6	97.4	97.2
St Jude Medical/ Abbott	1948 Isoflex MRI	98.9	98.9	98.8	98.7	98.7	98.6	98.5	98.5	98.5
St Jude Medical/ Abbott	1999 Optisense	99.2	99.0	98.9	98.8	98.8	98.7	98.6	98.6	98.6
St Jude Medical/ Abbott	2088TC Tendril STS MRI	99.4	99.3	99.2	99.1	99.1	99.0	99.0	99.0	99.0
Vitatron	ICM09JB Crystalline	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Vitatron	ICL08 Crystalline	97.3	96.8	96.8	96.8	96.8	95.9	94.6	94.6	94.6
Vitatron	ICF09 Crystalline	97.4	97.2	97.2	97.0	96.9	96.6	96.3	96.3	95.7
Vitatron	IHP09B	98.1	97.9	97.9	97.9	97.9	97.9	97.9	97.9	97.9
Vitatron	ICF09B Crystalline	98.4	98.2	98.2	98.2	98.2	98.2	98.2	98.2	98.2
Vitatron	ICM09B Crystalline	98.8	98.7	98.7	98.6	98.6	98.4	98.4	98.4	98.2
Vitatron	ICQ09B Crystalline	99.0	98.8	98.7	98.7	98.6	98.5	98.5	98.5	98.5

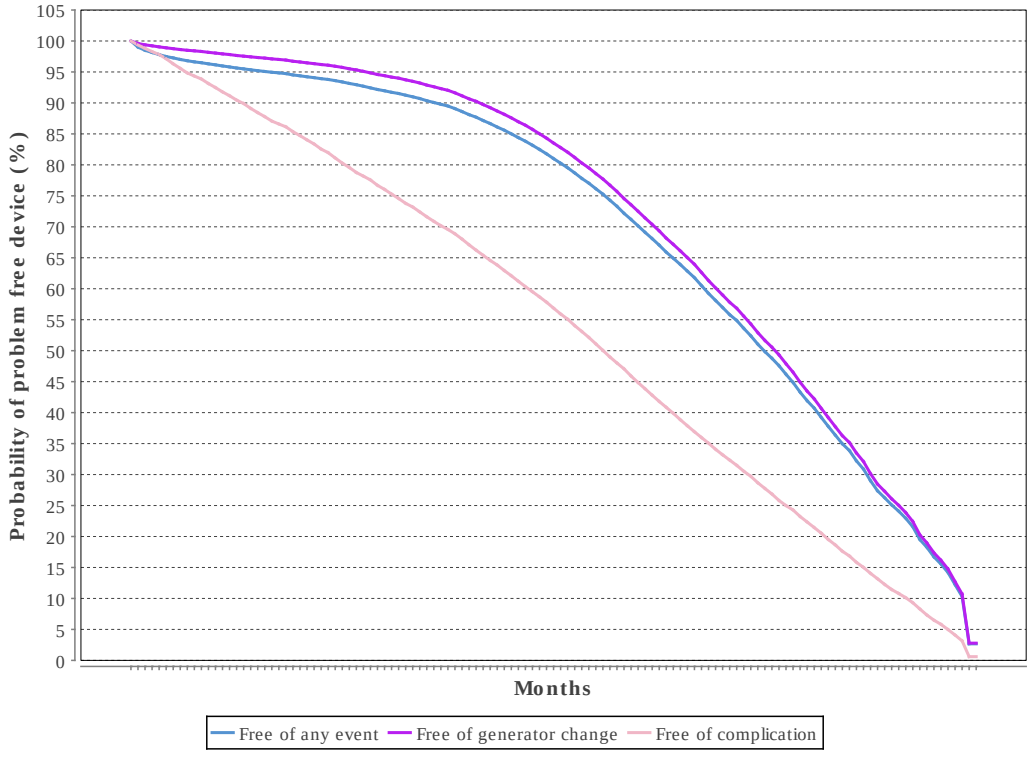
Based on all implants after 1990

Year	At risk	Survival probability %
1	116427	98.6
2	98357	90.6
3	81672	83.7
4	67044	76.9
5	54155	70.5
6	42851	64.5
7	32601	59.0
8	23014	53.7
9	14408	49.0
10	7932	45.1



Probablility of event free ICD-device

Year	At risk	Free of any event %	Free of generator change %	Free of complication %
1	29111	96.2	98.1	92.5
2	25147	94.4	96.6	84.7
3	21106	92.0	94.4	76.0
4	17236	88.1	90.7	67.1
5	12896	81.0	83.5	56.9
6	8455	70.2	72.5	44.9
7	4846	57.0	59.0	33.2
8	2327	41.9	43.5	22.3
9	693	25.1	26.1	11.4
10	27	2.7	2.8	0.6

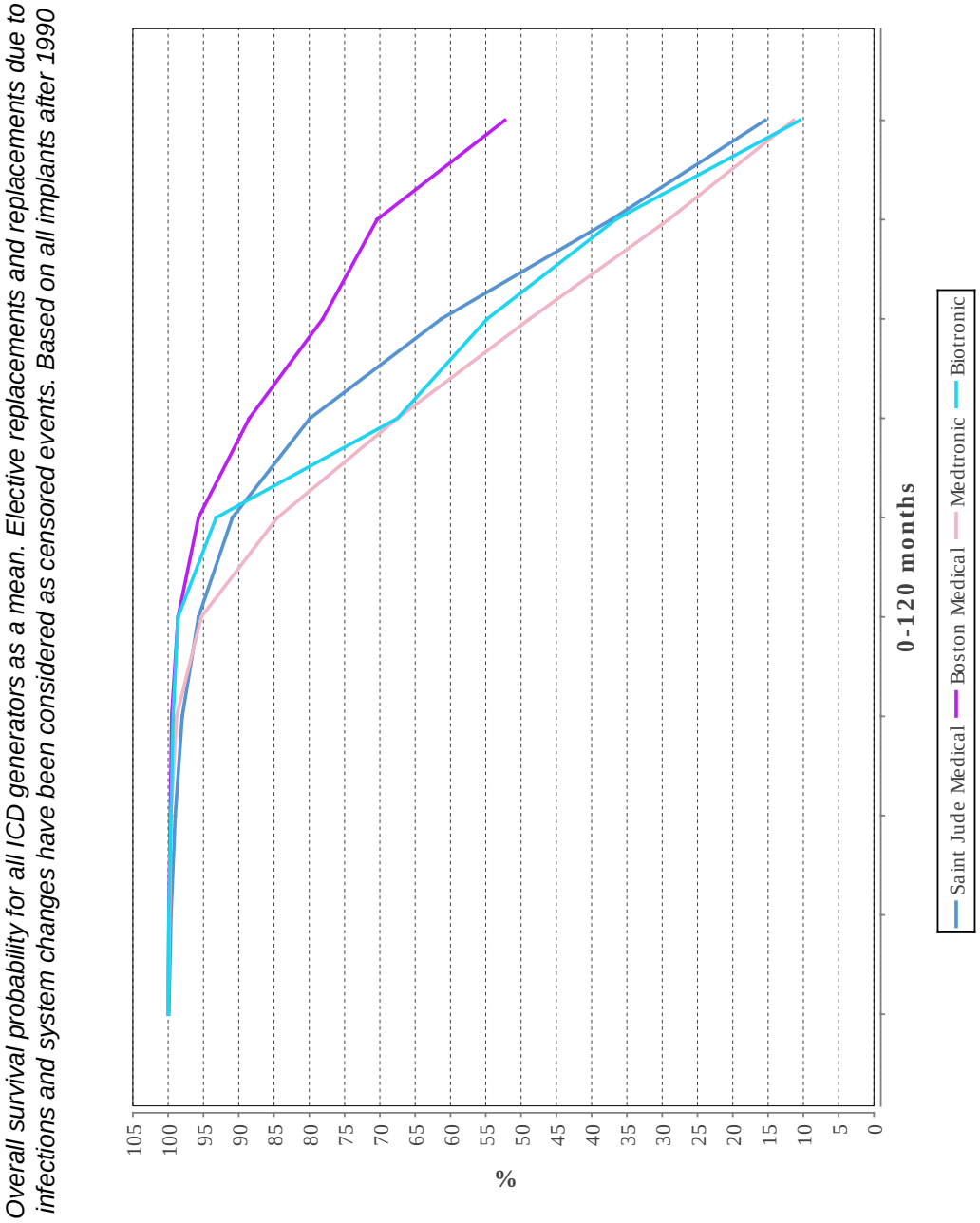


Year	At risk	Survival probability %
1	21541	99.9
2	18561	99.7
3	15330	99.4
4	12166	98.5
5	9320	96.0
6	6621	88.9
7	4049	75.3
8	2188	57.8
9	985	38.6
10	250	19.5

Overall survival probability for all ICD generators as a mean. Elective replacements and replacements due to infections and system changes have been considered as censored events. Based on all implants after 2006

Year	Total		Biotronic		Boston Scientific		Medtronic		St Jude Medical	
	At risk	Surv. prob. %	At risk	Surv. prob. %	At risk	Surv. prob. %	At risk	Surv. prob. %	At risk	Surv. prob. %
1	21471	133.3	907	100.0	2396	100.0	8944	100.0	9224	99.9
2	18497	133.1	807	99.9	2007	99.9	7735	99.8	7948	99.6
3	15271	132.6	661	99.6	1644	99.7	6478	99.6	6488	99.0
4	12114	131.9	530	99.3	1322	99.5	5166	98.8	5096	98.0
5	9293	129.4	404	98.6	1056	98.6	3907	95.3	3926	95.7
6	6605	121.4	304	93.2	867	95.7	2569	84.5	2865	90.9
7	4041	101.1	154	67.5	596	88.5	1517	67.5	1774	79.9
8	2186	81.0	89	54.8	388	78.1	783	48.8	926	61.3
9	985	57.8	28	36.6	292	70.4	315	29.1	350	37.2
10	250	29.9	4	10.5	112	52.3	73	11.4	61	15.4

Overall survival probability for all ICD generators as a mean. Elective replacements and replacements due to infections and system changes have been considered as censored events. Based on all implants after 1990



Models that have at least 50 implants and 10 explants

Manuf	Model	Year 1 %	Year 2 %	Year 3 %	Year 4 %	Year 5 %	Year 6 %	Year 7 %	Year 8 %	Year 9 %
Biotronik	Lumax 540 VR-T	100.0	100.0	100.0	100.0	97.4	97.4	97.4	97.4	37.0
Biotronik	Lumax 340 DR-T	100.0	100.0	98.3	96.6	79.3	8.3	3.3	NaN	NaN
Biotronik	Lumax 540 DR-T	100.0	98.8	98.8	97.6	97.6	96.0	90.6	39.3	NaN
Boston Scientific	F142 Energen	100.0	100.0	100.0	100.0	98.4	93.5	93.5	NaN	NaN
Boston Scientific	F102 Teligen	100.0	100.0	100.0	100.0	100.0	97.9	91.2	88.9	81.8
Boston Scientific	F111 Teligen	100.0	100.0	100.0	100.0	97.4	94.6	89.3	89.3	89.3
Boston Scientific	P108 Cognis CRT	100.0	100.0	100.0	96.1	93.2	91.8	87.6	77.3	77.3
Boston Scientific	H247 Livian	100.0	100.0	100.0	100.0	93.8	71.6	34.6	28.5	-Infinity
Boston Scientific	P107 Cognis CRT	98.9	98.9	98.9	98.9	95.8	94.1	83.6	83.6	64.3
Boston Scientific	T167 Vitality 2	100.0	100.0	98.8	97.6	95.1	81.9	77.4	62.8	14.6
Boston Scientific	D174 Autogen EL	99.5	99.5	99.5	99.5	NaN	NaN	NaN	NaN	NaN
Boston Scientific	F110 Teligen	100.0	99.5	99.5	98.9	97.6	94.1	89.4	86.8	85.4
Medtronic	D354VRM Protecta	100.0	100.0	98.0	98.0	93.4	93.4	93.4	NaN	NaN
Medtronic	D354VRG Protecta	100.0	98.2	98.2	98.2	98.2	98.2	98.2	NaN	NaN
Medtronic	D264VRM Maximo II	100.0	100.0	100.0	100.0	100.0	93.3	93.3	NaN	NaN
Medtronic	D364DRM Protecta	100.0	100.0	100.0	100.0	97.7	91.2	18.5	NaN	NaN
Medtronic	DTBA2D1 Viva XT	100.0	98.6	96.2	93.7	85.9	85.9	NaN	NaN	NaN
Medtronic	D264TRM Maximo II	100.0	100.0	100.0	91.9	51.3	0.0	NaN	NaN	NaN
Medtronic	D154ATG EnTrust	100.0	100.0	100.0	98.2	86.1	56.1	18.3	1.1	NaN
Medtronic	D164VWC Virtuoso	100.0	100.0	98.0	95.9	91.3	88.7	79.7	50.7	30.1
Medtronic	DTBA2D4 Viva XT	100.0	100.0	100.0	98.7	98.7	98.7	NaN	NaN	NaN
Medtronic	D354TRM Protecta	100.0	100.0	98.7	95.4	60.9	12.8	12.8	NaN	NaN
Medtronic	DTBC2D4 Brava	99.2	99.2	98.1	98.1	98.1	98.1	NaN	NaN	NaN
Medtronic	7278 Maximo	100.0	100.0	100.0	94.7	85.8	68.2	15.4	1.4	1.4
Medtronic	D354DRG Protecta	100.0	100.0	100.0	98.7	94.0	85.4	46.0	NaN	NaN
Medtronic	DTBA2QQ Viva XT	100.0	100.0	99.3	96.4	96.4	85.6	NaN	NaN	NaN
Medtronic	DVBC3D1 Evera S VR	100.0	100.0	98.7	98.7	98.7	NaN	NaN	NaN	NaN
Medtronic	7304 Maximo	100.0	98.8	97.4	74.6	34.6	7.5	5.0	-Infinity	NaN

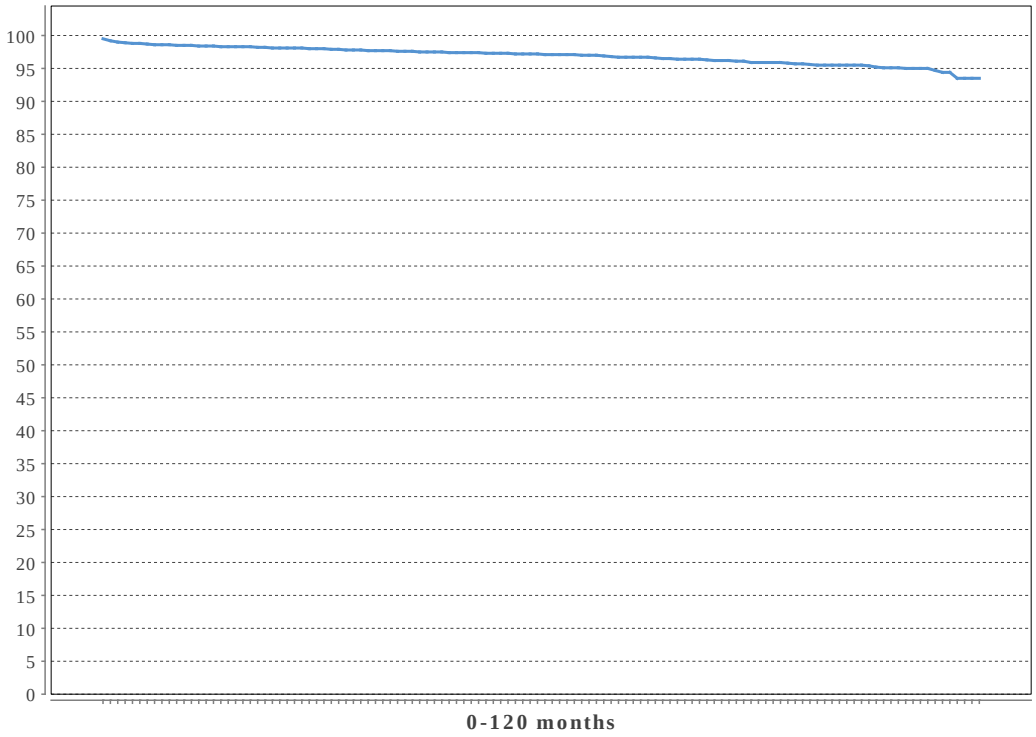
Manuf	Model	Year 1 %	Year 2 %	Year 3 %	Year 4 %	Year 5 %	Year 6 %	Year 7 %	Year 8 %	Year 9 %
Medtronic	D264DRM Maximo II	100.0	100.0	100.0	100.0	97.5	81.0	61.3	NaN	NaN
Medtronic	D354DRM Protecta	100.0	100.0	100.0	100.0	99.0	85.0	66.5	NaN	NaN
Medtronic	D354TRG Protecta	100.0	99.3	94.4	86.2	57.2	31.1	14.8	14.8	NaN
Medtronic	DVBC3D4 Evera S VR	100.0	100.0	100.0	100.0	100.0	100.0	NaN	NaN	NaN
Medtronic	D364VRG Protecta	99.6	99.6	99.6	98.3	97.0	97.0	94.8	93.5	NaN
Medtronic	DTBC2D1 Brava	100.0	100.0	97.9	97.9	90.9	90.9	NaN	NaN	NaN
Medtronic	7288 Intrinsic	100.0	98.9	97.6	97.6	88.8	61.2	17.2	NaN	NaN
Medtronic	7298 Sentry	100.0	99.1	93.9	68.8	31.7	4.9	0.8	NaN	NaN
Medtronic	C174AWK Concerto	99.5	98.9	97.7	91.0	64.5	38.9	20.1	9.7	0.0
Medtronic	DDBC3D1 Evera S DR DF1	100.0	99.2	98.3	98.3	98.3	98.3	NaN	NaN	NaN
Medtronic	D364TRG Protecta	100.0	99.5	96.8	86.1	60.8	27.9	12.7	10.9	NaN
Medtronic	DDBC3D4 Evera S DR DF4	99.5	99.5	99.5	99.0	99.0	94.7	NaN	NaN	NaN
Medtronic	D164AWG Virtuoso	100.0	98.7	98.7	96.6	88.3	76.0	61.6	29.1	2.1
Medtronic	7232Cx Maximo VR	100.0	100.0	98.9	98.4	97.1	95.8	87.2	53.9	15.7
Medtronic	D284VRC Maximo II	99.7	99.7	99.4	99.4	98.1	96.1	90.6	72.1	36.2
Medtronic	D364DRG Protecta	99.5	99.5	99.0	98.1	94.6	75.7	47.7	27.6	NaN
Medtronic	D284TRK Maximo II	99.8	99.8	98.9	87.2	54.2	13.1	7.9	4.7	3.8
Medtronic	DDMC3D4 Evera S MRI DR DF4	99.7	99.7	99.7	99.7	NaN	NaN	NaN	NaN	NaN
Medtronic	D284DRG Maximo II	99.8	99.8	99.4	98.8	94.1	78.7	44.1	14.8	4.3
St Jude Medical/ Abbott	1233-40 Fortify	100.0	100.0	97.7	97.7	97.7	94.9	94.9	87.0	NaN
St Jude Medical/ Abbott	3367-40C Quadra Assura	100.0	94.7	92.6	87.7	87.7	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	1211-36 Current VR	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	NaN
St Jude Medical/ Abbott	3251-40 Unify Quadra	98.6	98.6	97.0	93.0	82.1	73.0	52.5	NaN	NaN
St Jude Medical/ Abbott	2233-40 Fortify DR	100.0	100.0	100.0	97.3	94.4	89.6	85.3	78.8	NaN
St Jude Medical/ Abbott	1359-40C Fortify Assura	100.0	100.0	97.0	93.8	82.7	NaN	NaN	NaN	NaN

Manuf	Model	Year 1 %	Year 2 %	Year 3 %	Year 4 %	Year 5 %	Year 6 %	Year 7 %	Year 8 %	Year 9 %
St Jude Medical/ Abbott	V-341 Atlas + DR	98.5	98.5	98.5	88.1	65.0	39.8	35.8	10.6	0.0
St Jude Medical/ Abbott	V-193 Atlas + VR	98.0	98.0	98.0	95.6	95.6	95.6	89.6	75.7	17.8
St Jude Medical/ Abbott	3371- 40C Quadra Assura MP	99.2	99.2	96.6	96.6	NaN	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	1233-40Q Fortify	100.0	100.0	99.1	99.1	97.0	93.5	86.8	86.8	NaN
St Jude Medical/ Abbott	3239-40Q Promote	99.3	99.3	99.3	99.3	98.3	91.3	85.2	31.0	31.0
St Jude Medical/ Abbott	1211-36Q Current VR	99.2	99.2	99.2	99.2	98.1	96.7	93.5	93.5	NaN
St Jude Medical/ Abbott	3235-40Q Unify	100.0	100.0	100.0	98.8	93.8	82.3	69.3	52.3	NaN
St Jude Medical/ Abbott	2377-36C Ellipse DR	100.0	100.0	100.0	100.0	100.0	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	V-168 Atlas 2 VR	100.0	100.0	100.0	97.4	94.7	88.3	76.6	28.6	NaN
St Jude Medical/ Abbott	3215-36 Promote HF	99.3	98.4	98.4	94.4	91.1	68.3	18.2	8.3	7.2
St Jude Medical/ Abbott	2211-36 Current + DR	99.3	99.3	98.4	98.4	98.4	86.9	68.9	18.9	NaN
St Jude Medical/ Abbott	3211-36 Promote	99.3	99.3	97.5	96.3	88.1	36.3	0.0	NaN	NaN
St Jude Medical/ Abbott	1359-40QC Fortify Assura	100.0	98.6	98.6	98.6	96.3	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	3211-36Q Promote	99.4	99.4	99.4	96.9	90.3	61.8	20.0	NaN	NaN
St Jude Medical/ Abbott	V-243 Atlas + DR	100.0	100.0	100.0	98.7	97.2	92.6	73.6	42.1	0.0
St Jude Medical/ Abbott	1207-36 Current VR	100.0	100.0	99.2	96.7	95.0	94.0	92.9	83.0	58.9
St Jude Medical/ Abbott	2359-40C Fortify Assura	98.2	95.4	92.7	91.2	89.1	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	3235-40 Unify	100.0	100.0	98.6	94.2	84.0	71.1	61.3	18.9	NaN
St Jude Medical/ Abbott	3367-40QC Quadra Assura	100.0	98.2	94.3	92.8	92.8	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	2233-40Q Fortify DR	99.6	99.1	98.6	95.6	93.4	87.2	84.9	82.6	NaN
St Jude Medical/ Abbott	3361-40QC Unify Assura	99.2	97.5	96.1	88.1	88.1	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	V-367 Atlas II	99.5	98.2	94.8	83.2	54.0	29.9	14.2	0.5	0.5
St Jude Medical/ Abbott	3251-40Q Unify Quadra	99.7	97.5	96.3	94.5	90.3	86.7	74.5	NaN	NaN
St Jude Medical/ Abbott	3361-40C Unify Assura	99.4	96.0	92.2	85.2	77.3	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	V-268 Atlas II	100.0	100.0	99.1	98.1	87.2	64.8	16.1	0.0	0.0

Manuf	Model	Year 1 %	Year 2 %	Year 3 %	Year 4 %	Year 5 %	Year 6 %	Year 7 %	Year 8 %	Year 9 %
St Jude Medical/ Abbott	3213-36 Promote HF	99.6	99.3	98.0	96.6	86.2	57.4	19.2	7.5	1.3
St Jude Medical/ Abbott	2207-36 Current DR	99.6	99.6	99.6	96.7	94.9	90.6	79.3	34.2	2.1
St Jude Medical/ Abbott	2359-40QC Fortify Assura	99.8	99.5	97.8	92.7	91.1	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	2211-36Q Current + DR	100.0	100.0	99.7	99.7	98.3	94.5	86.2	46.8	NaN
St Jude Medical/ Abbott	1377-36QC Ellipse VR	100.0	100.0	99.4	99.4	99.4	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	2377-36QC Ellipse DR	99.6	99.4	99.4	98.7	98.7	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	3371-40QC Quadra Assura MP	99.7	99.3	98.7	94.1	NaN	NaN	NaN	NaN	NaN

Overall survival probability for all ICD leads as a mean. Elective replacements and replacements due to infections and system changes have been considered as censored events. Based on all implants after 1990

Year	At risk	Survival probabilty %
1	15567	99.5
2	13461	98.5
3	11342	98.1
4	9247	97.7
5	7287	97.4
6	5524	97.1
7	3993	96.7
8	2712	96.2
9	1642	95.6
10	725	95.1

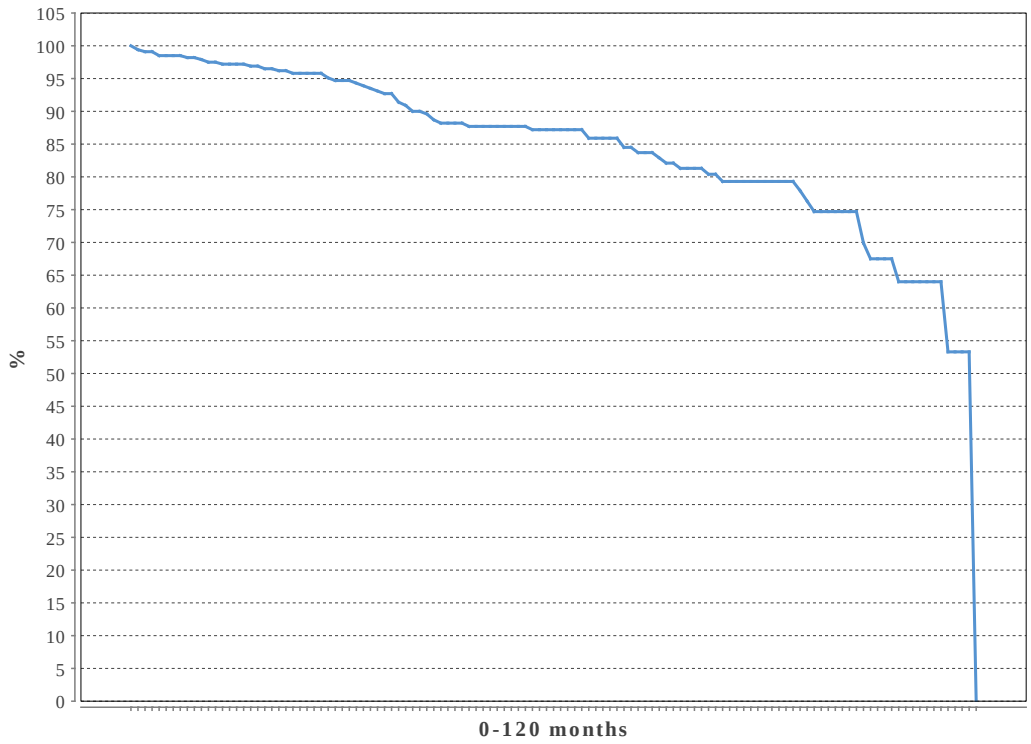


Models that have at least 50 implants and 20 explants

Manufacturer	Model	Years								
		1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	8 (%)	9 (%)
Biotronik	Linox Smart ProMRI S65	99.5	99.5	97.6	97.6	97.6	97.6	97.6	97.6	NaN
Biotronik	Linox Smart SD 65/18	97.5	96.9	95.2	95.2	93.9	93.9	92.9	92.9	92.9
Biotronik	Linox Smart S75	98.5	98.2	98.2	98.2	98.2	97.9	97.5	96.9	96.9
Boston Scientific	0174 Reliance	95.7	95.7	95.7	95.7	95.7	95.7	95.7	95.7	95.7
Boston Scientific	0292 Reliance	99.6	99.2	98.7	98.7	98.7	98.7	98.7	98.7	98.7
Boston Scientific	0692 Reliance	98.2	97.8	97.8	97.4	97.4	97.4	NaN	NaN	NaN
Medtronic	6948 Sprint Fidelis DF1	98.1	98.1	94.5	90.4	90.4	88.3	82.8	74.1	66.7
Medtronic	6944 Sprint DF1	98.3	97.8	97.3	97.3	95.5	94.1	93.4	93.4	93.4
Medtronic	6949 Sprint Fidelis DF1	97.0	94.7	92.0	85.9	84.9	81.3	76.8	76.8	68.3
Medtronic	6935 Sprint Quattro S MRI DF1	99.5	99.5	99.5	99.2	98.9	98.6	98.2	98.2	98.2
Medtronic	6947M Sprint Quattro S MRI DF4	99.2	99.0	99.0	99.0	98.7	98.7	98.7	98.7	98.7
Medtronic	6947 Sprint Quattro S MRI DF1	99.1	99.1	98.8	98.6	98.4	98.4	98.1	97.7	97.7
Medtronic	6935M Sprint Quattro S MRI DF4	99.5	99.5	99.1	99.1	99.1	99.1	NaN	NaN	NaN
St Jude Medical/ Abbott	7041 Riata ST	97.6	97.6	97.6	97.6	86.1	86.1	86.1	68.9	68.9
St Jude Medical/ Abbott	1581 Riata	95.9	95.9	95.9	93.1	90.1	86.5	86.5	73.6	55.2
St Jude Medical/ Abbott	1571 Riata	96.7	96.7	96.7	91.8	91.8	91.8	91.8	91.8	91.8
St Jude Medical/ Abbott	7172Q Durata	99.3	97.8	96.2	96.2	96.2	94.3	94.3	94.3	NaN
St Jude Medical/ Abbott	7001 Riata ST	94.5	94.5	94.5	94.5	94.5	91.1	86.3	86.3	86.3
St Jude Medical/ Abbott	7170 Durata	97.8	96.8	96.3	95.1	95.1	95.1	95.1	95.1	95.1
St Jude Medical/ Abbott	7122 Durata	99.2	99.1	98.3	98.3	98.3	98.0	97.6	96.6	96.6
St Jude Medical/ Abbott	7120Q Durata	98.4	97.9	97.7	97.6	97.4	96.7	96.2	96.2	96.2
St Jude Medical/ Abbott	7120 Durata	97.7	97.3	97.2	96.9	96.9	96.7	96.5	96.3	96.3
St Jude Medical/ Abbott	LDA210Q Optisure DF4	98.3	98.3	98.1	97.8	NaN	NaN	NaN	NaN	NaN
St Jude Medical/ Abbott	7122Q Durata	98.2	97.8	97.5	97.4	97.4	97.3	97.1	97.1	97.1

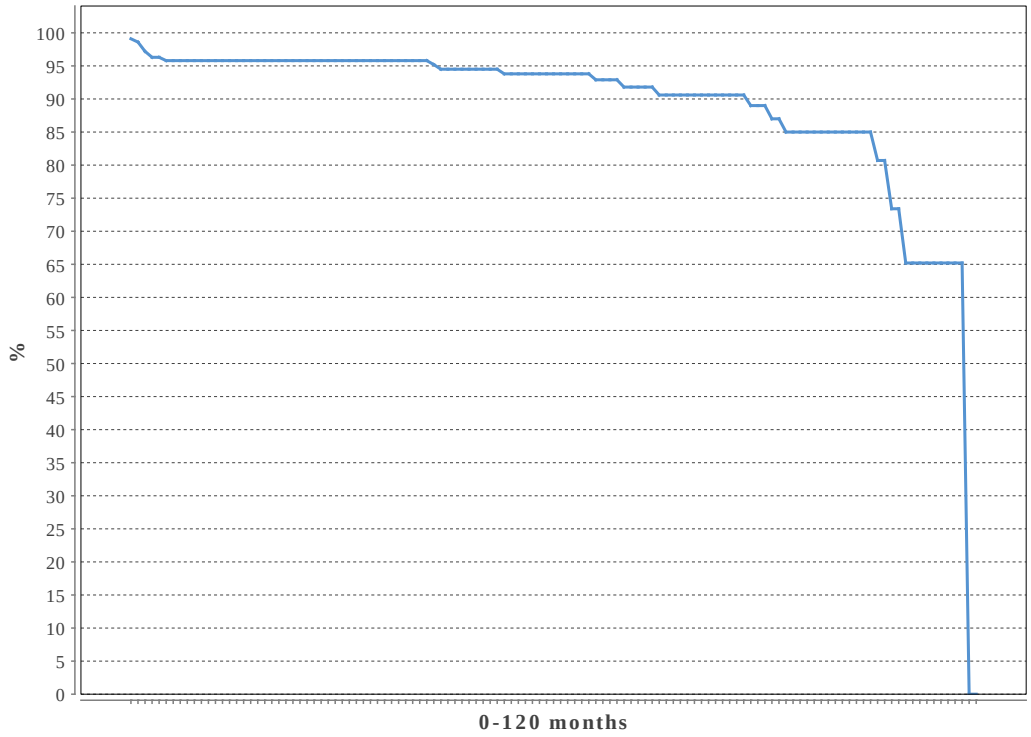
Survival probability for ICD lead Medtronic Sprint Fidelis. Elective replacement and replacements due to infections and system changes have been considered as censored events.

Year	At risk	Survival probability %
1	344	100.0
2	300	97.5
3	268	95.8
4	220	92.7
5	180	87.7
6	151	87.2
7	115	83.7
8	80	79.3
9	49	76.3
10	23	67.5



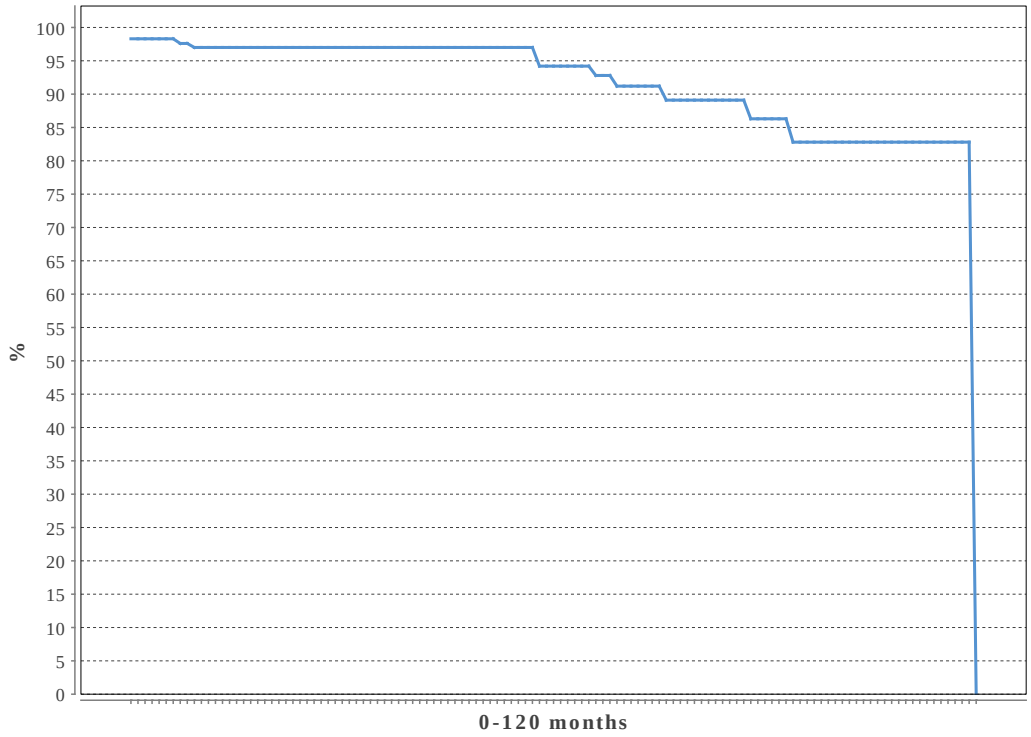
Survival probability for SJM lead type 1561,1570,1571,1572,1580,1581,1582,1591. Elective replacement and replacements due to infections and system changes have been considered as censored events.

Year	At risk	Survival probability %
1	219	99.1
2	193	95.8
3	176	95.8
4	158	95.8
5	138	94.5
6	114	93.8
7	80	91.8
8	60	90.6
9	39	85.0
10	11	73.4



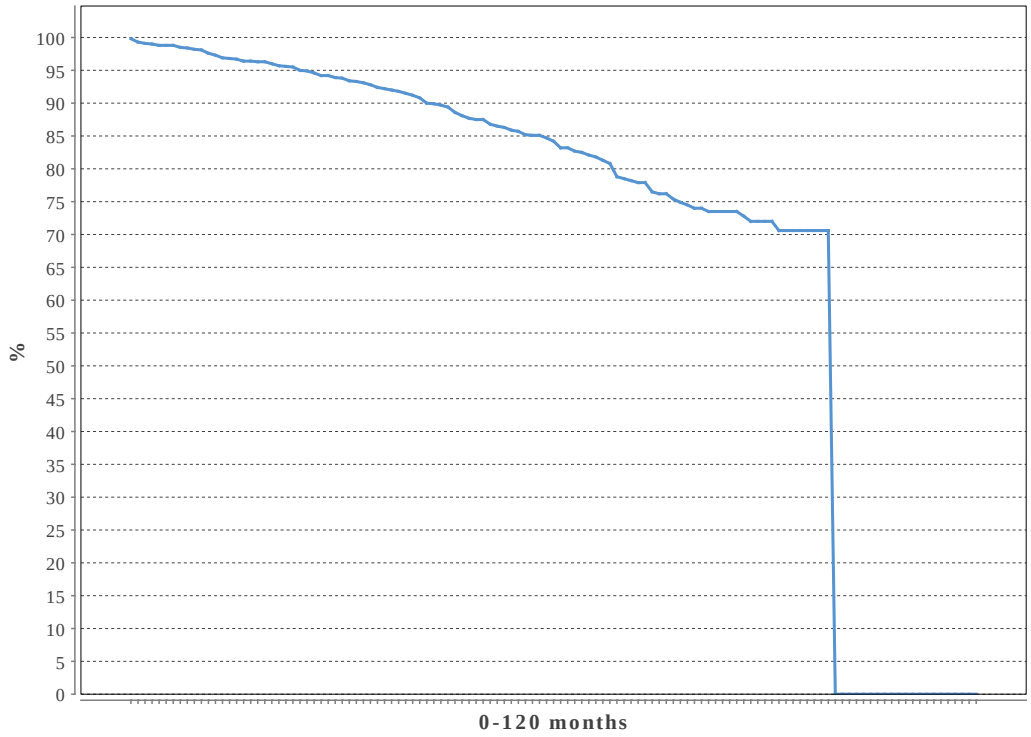
Survival probability for SJM lead type 7000,7001,7002,7040,7041,7042. Elective replacement and replacements due to infections and system changes have been considered as censored events.

Year	At risk	Survival probability %
1	175	98.3
2	139	97.0
3	127	97.0
4	113	97.0
5	91	97.0
6	69	94.2
7	53	91.2
8	38	89.1
9	22	82.8
10	12	82.8



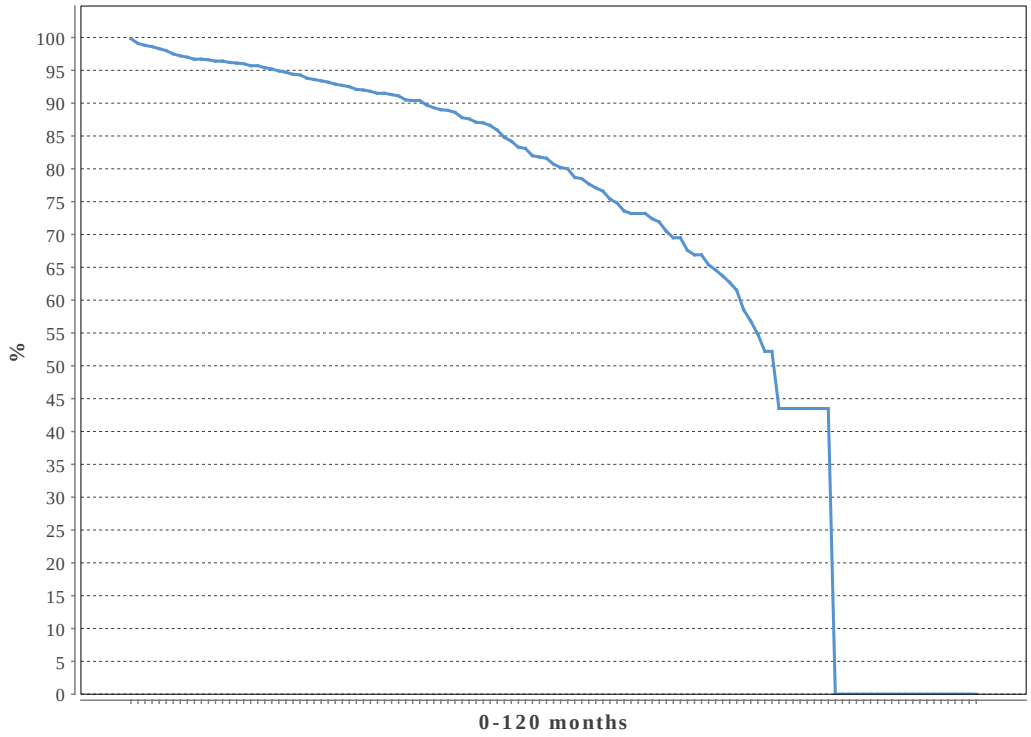
Survival probability for SJM ICD Fortify. Elective replacement and replacements due to infections and system changes have been considered as censored events.

Year	At risk	Survival probability %
1	1749	99.8
2	1559	97.3
3	1295	95.0
4	1016	92.2
5	700	87.7
6	457	84.2
7	248	77.9
8	130	73.5
9	32	70.6
10	0	0.0



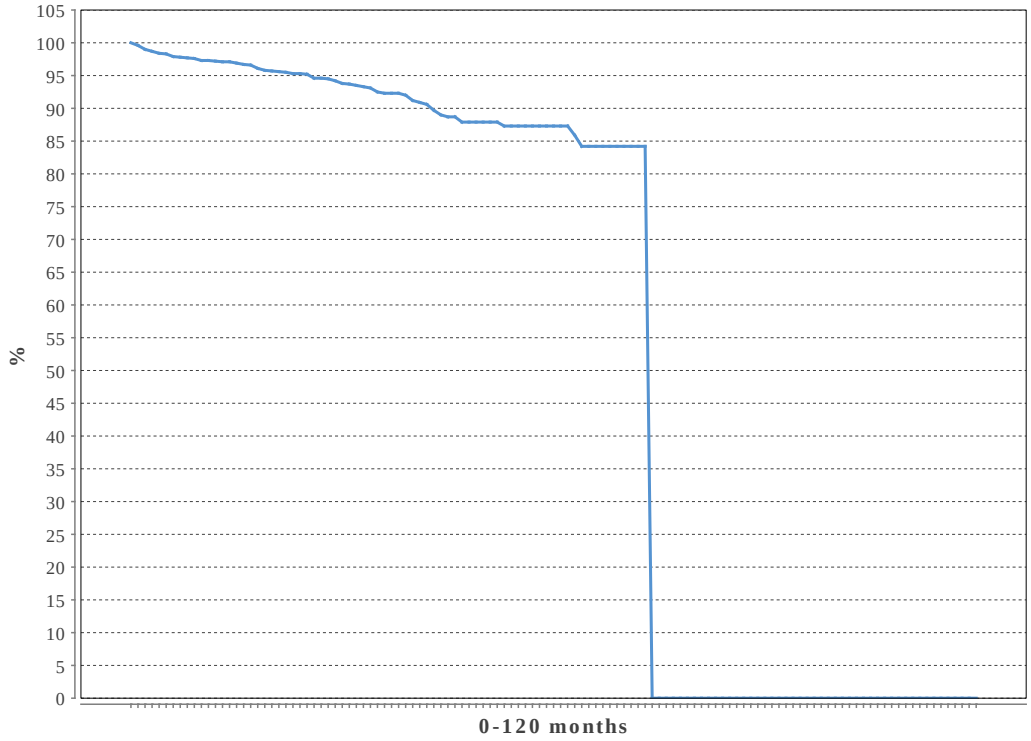
Survival probability for SJM ICD Unify. Elective replacement and replacements due to infections and system changes have been considered as censored events.

Year	At risk	Survival probability %
1	1540	99.8
2	1301	96.4
3	1075	94.3
4	794	91.5
5	560	87.6
6	356	80.7
7	213	73.2
8	71	63.7
9	4	43.5
10	0	0.0



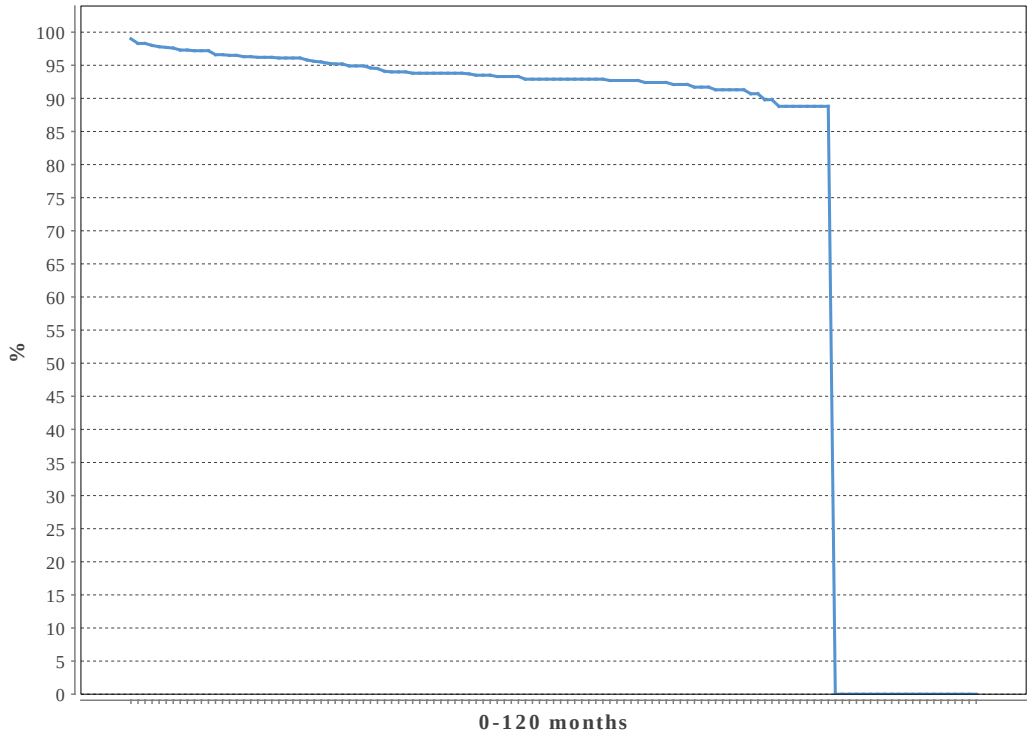
Survival probability for SJM ICD Quadra. Elective replacement and replacements due to infections and system changes have been considered as censored events.

Year	At risk	Survival probability %
1	1392	100.0
2	1082	97.2
3	747	95.3
4	426	92.3
5	219	87.9
6	88	87.3
7	4	84.2
8	0	0.0
9	0	0.0
10	0	0.0



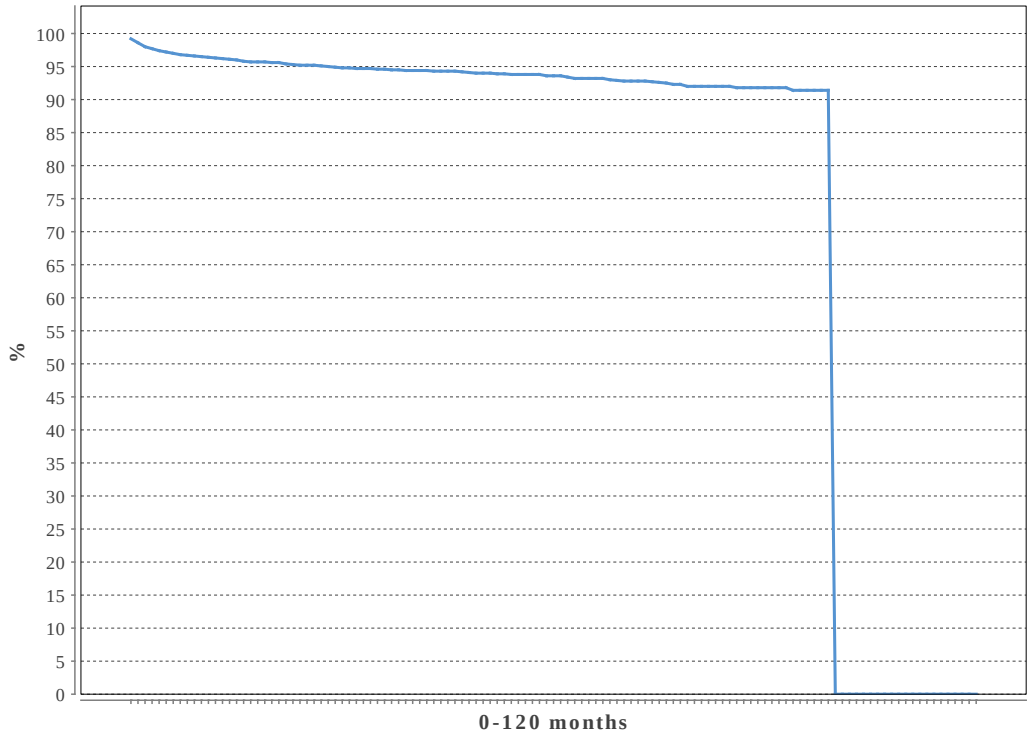
Survival probability for BIO ICD Linox. Elective replacement and replacements due to infections and system changes have been considered as censored events.

Year	At risk	Survival probability %
1	784	99.0
2	716	96.6
3	678	96.1
4	611	94.1
5	553	93.7
6	478	92.9
7	355	92.7
8	193	91.3
9	48	88.8
10	0	0.0



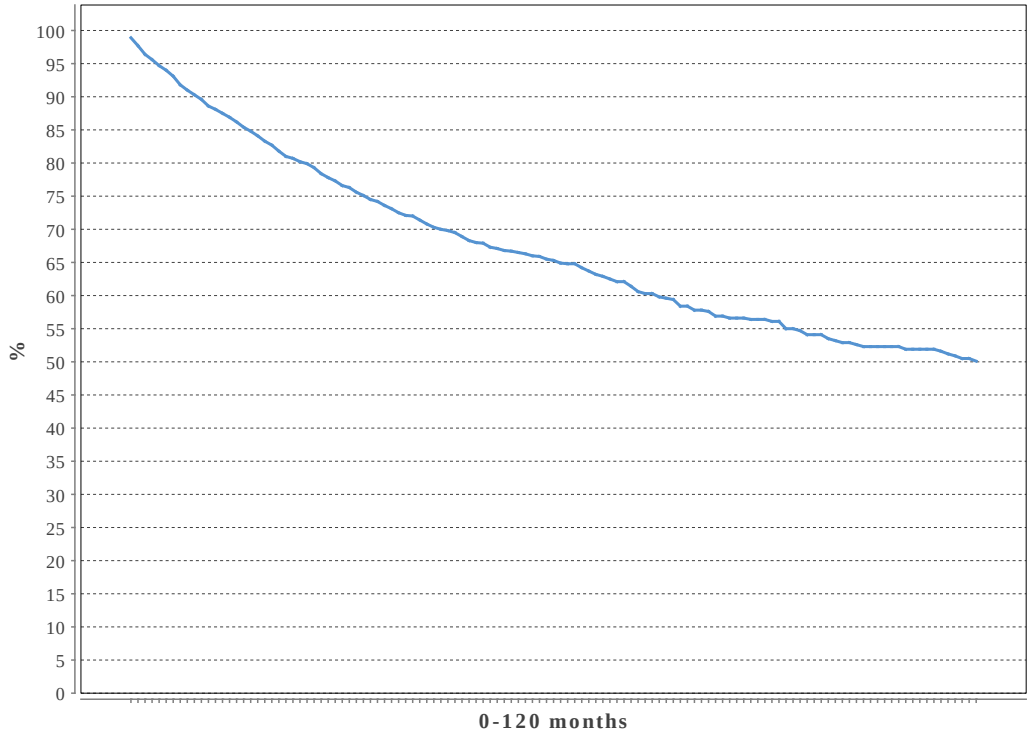
Survival probability for SJM ICDLEAD Durata. Elective replacement and replacements due to infections and system changes have been considered as censored events.

Year	At risk	Survival probability %
1	5328	99.2
2	4627	96.3
3	3953	95.2
4	3307	94.6
5	2501	94.1
6	1818	93.6
7	1080	92.8
8	574	92.0
9	128	91.4
10	0	0.0



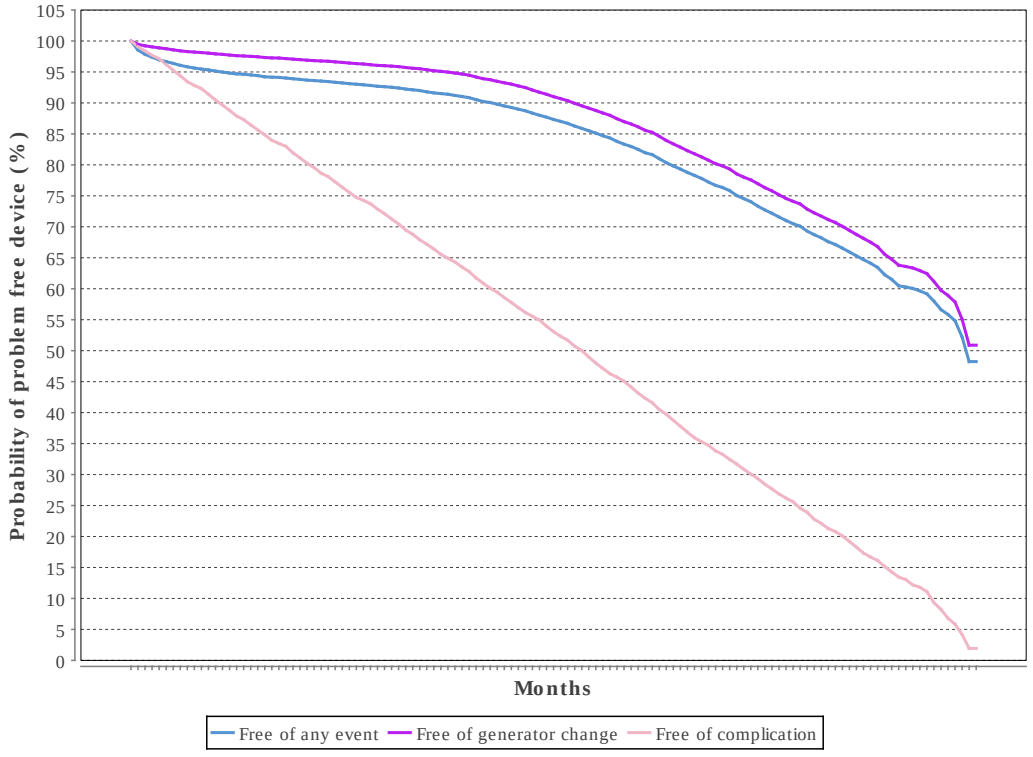
Based on all implants after 1990

Year	At risk	Survival probability %
1	1995	98.9
2	1692	88.1
3	1475	80.2
4	1190	73.6
5	876	68.3
6	587	65.3
7	379	60.6
8	246	56.9
9	188	54.1
10	159	52.3



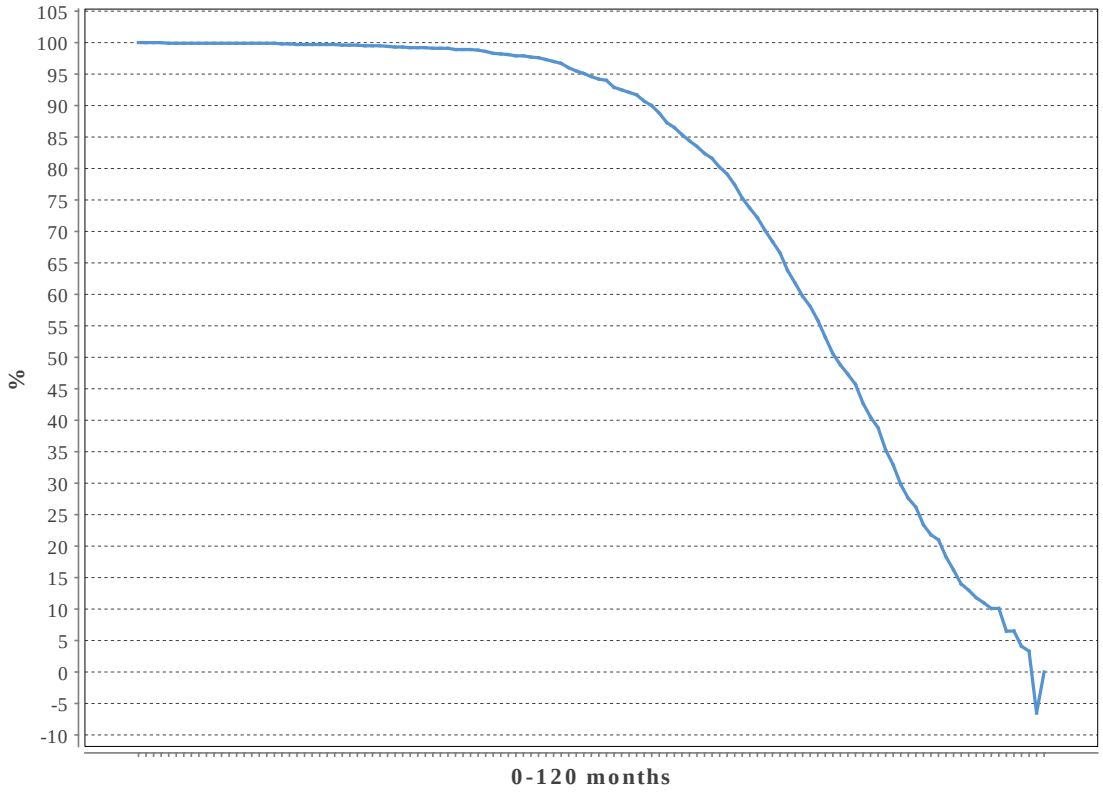
Probablility of event free CRT-device

Year	At risk	Free of any event %	Free of generator change %	Free of complication %
1	40378	95.1	97.9	90.5
2	32696	93.8	97.0	81.1
3	26191	92.6	96.0	72.1
4	20238	90.9	94.5	62.8
5	14769	87.3	91.0	53.1
6	10035	82.5	86.1	43.2
7	5967	76.3	79.8	33.3
8	3183	69.3	72.9	23.9
9	1256	61.5	64.8	14.3
10	79	48.2	50.9	1.9



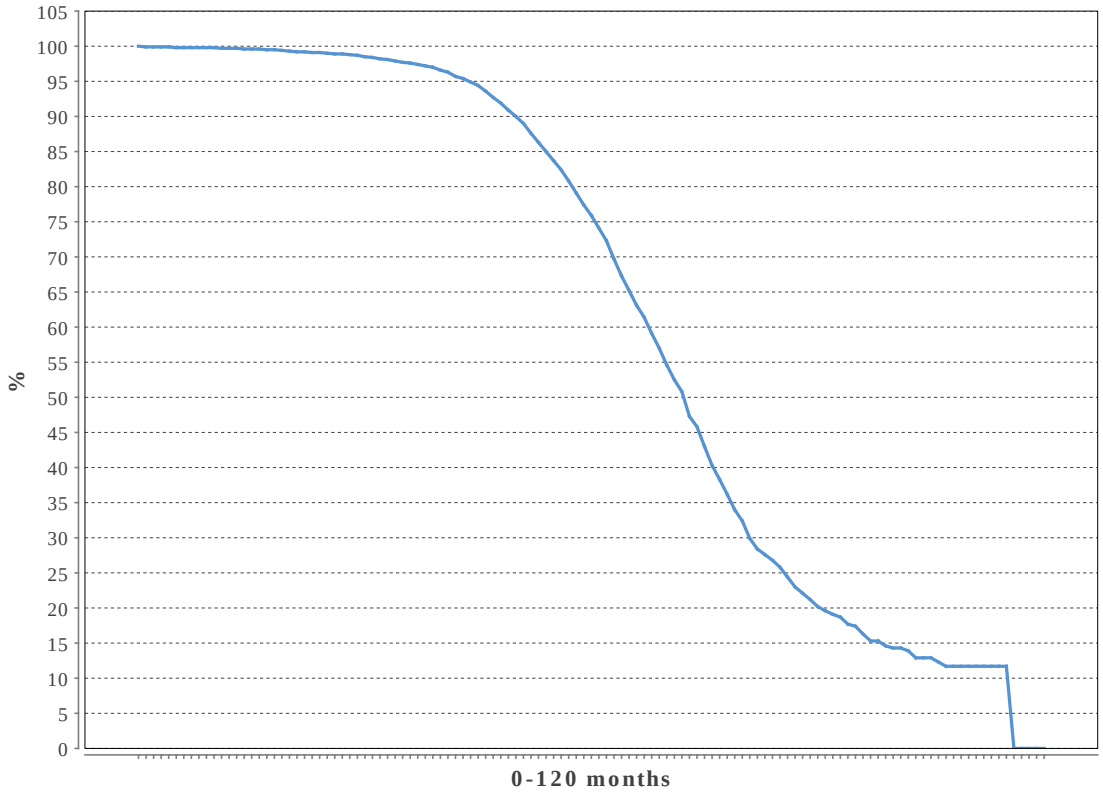
Overall CRT-P generator survival as a mean. Elective replacements and replacements due to infections and system changes have been considered as censored events. Based on all implants after 2006

Year	At risk	Survival probability %
1	6503	100.0
2	5267	99.9
3	4116	99.7
4	3177	99.2
5	2371	98.2
6	1712	94.6
7	1110	85.4
8	609	68.4
9	240	42.7
10	53	16.2



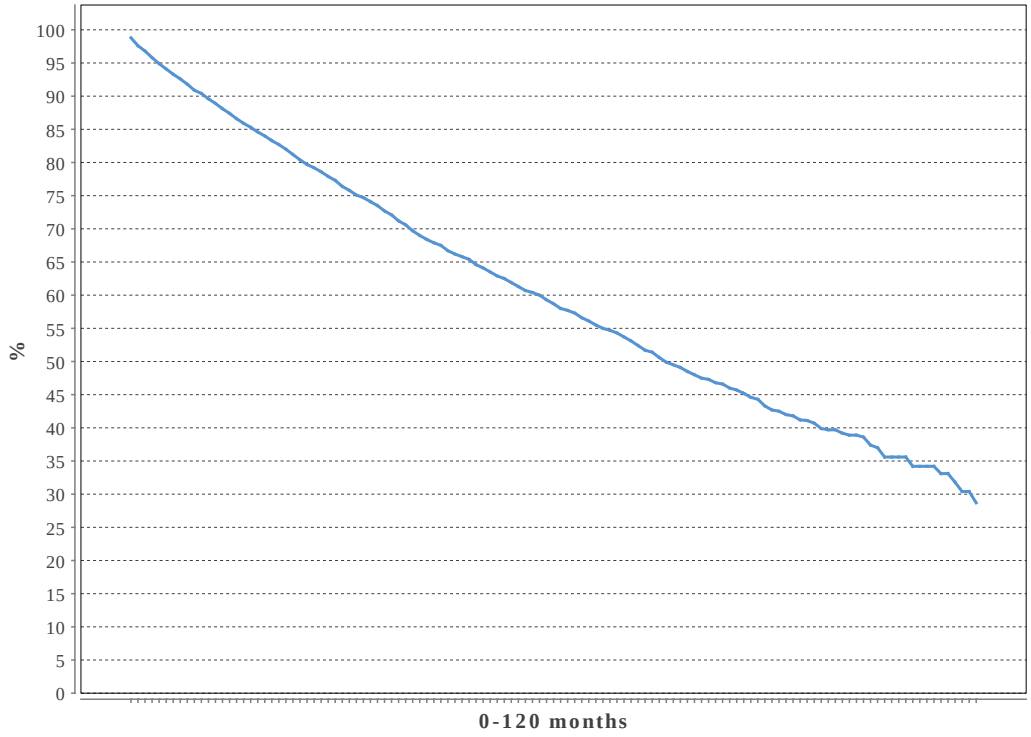
Overall CRT-D generator survival as a mean. Elective replacements and replacements due to infections and system changes have been considered as censored events. Based on all implants after 2006

Year	At risk	Survival probability %
1	7374	100.0
2	6229	99.7
3	4992	99.1
4	3742	97.6
5	2640	91.9
6	1572	75.9
7	668	50.8
8	193	26.8
9	60	16.3
10	18	11.7



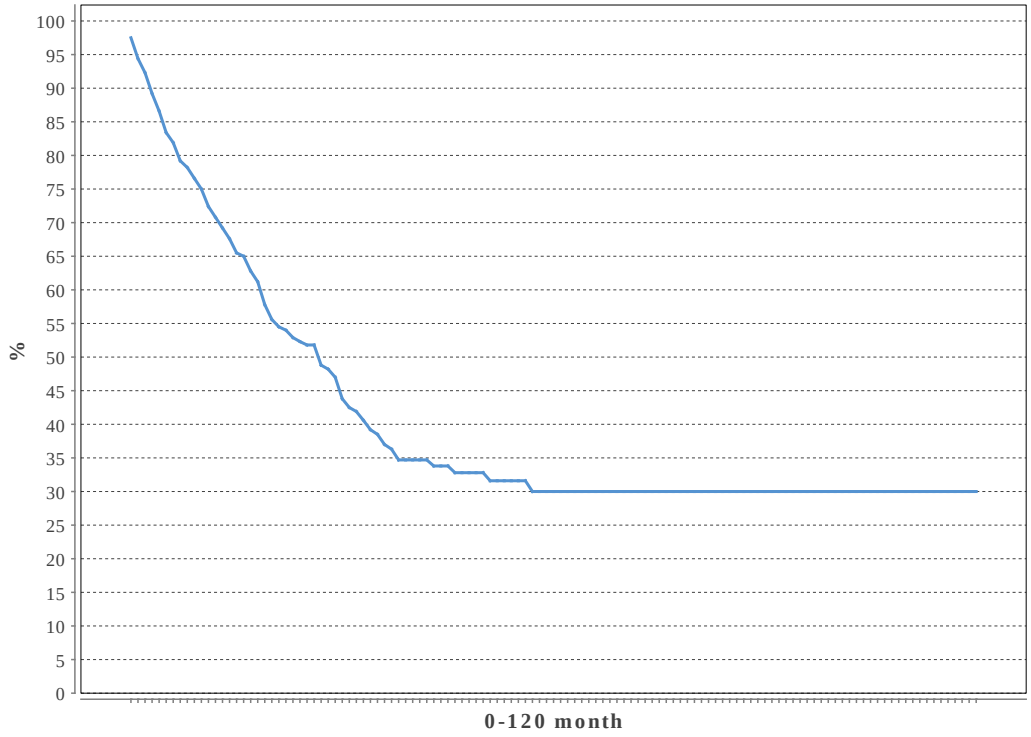
Overall patient survival probability for patients receiving CRT-P therapy. Based on all implants after 2006

Year	At risk	Survival probability %
1	6579	98.8
2	5269	88.9
3	4112	80.4
4	3186	72.7
5	2375	65.4
6	1726	58.7
7	1114	52.4
8	625	46.6
9	248	41.1
10	69	35.6



Overall patient survival probability for patients receiving CRT-D therapy. Based on all implants after 1990

Year	At risk	Survival probability %
1	200	97.5
2	138	70.8
3	97	52.3
4	54	37.0
5	32	32.8
6	18	30.0
7	15	30.0
8	14	30.0
9	13	30.0
10	13	30.0



QUALITY – DEAD WITHIN ONE YEAR FROM IMPLANT

Ratio of patients being dead one year after implantation

Type	Implants in 2018	Death within year	%
PM	9629	730	7.6
ICD	2397	93	3.9
CRT-P	573	43	7.5
CRT-D	649	32	4.9

Intervention ratio (primary/correction)

Region	Hospital	Type	Count
Norra Sverige	Norrlands Universitetssjukhus	PFE	238
	Norrlands Universitetssjukhus	PFG	80
	Örnsköldsviks sjukhus	PFE	72
	Örnsköldsviks sjukhus	PFG	16
	Östersunds sjukhus	PFE	217
	Östersunds sjukhus	PFG	41
	Skellefteå lasarett	PFE	67
	Skellefteå lasarett	PFG	12
	Sollefteå sjukhus	PFE	28
	Sunderby sjukhus	PFE	340
	Sunderby sjukhus	PFG	70
	Sundsvalls sjukhus	PFE	242
	Sundsvalls sjukhus	PFG	79
Södra Sverige	Blekingesjukhuset	PFE	202
	Blekingesjukhuset	PFG	61
	Centrallasarettet Växjö	PFE	179
	Centrallasarettet Växjö	PFG	50
	Centralsjukhuset Kristianstad	PFE	314
	Helsingborgs lasarett	PFE	279
	Länssjukhuset Halmstad	PFE	134
	Länssjukhuset Halmstad	PFG	3
	Skånes universitetssjukhus, Lund	PFE	519
	Skånes universitetssjukhus, Lund	PFG	383
	Skånes universitetssjukhus, Malmö	PFE	329
	Varbergs sjukhus	PFE	160
	Varbergs sjukhus	PFG	58
Stockholm/Gotland	Danderyds sjukhus	PFE	573
	Danderyds sjukhus	PFG	90
	Karolinska Huddinge	PFE	303
	Karolinska Huddinge	PFG	75
	Karolinska Solna	PFE	339
	Karolinska Solna	PFG	145
	Södersjukhuset	PFE	444
	Södersjukhuset	PFG	82
	St Görans sjukhus	PFE	353
	St Görans sjukhus	PFG	96
	Visby lasarett	PFE	41
	Visby lasarett	PFG	12
Sydöstra Sverige	Länssjukhuset Kalmar	PFE	132
	Länssjukhuset Kalmar	PFG	61
	Länssjukhuset Ryhov	PFE	268
	Länssjukhuset Ryhov	PFG	48
	Linköpings universitetssjukhus	PFE	488
	Linköpings universitetssjukhus	PFG	117
	Oskarshamns sjukhus	PFE	10
	Västerviks sjukhus	PFE	55
Uppsala/Örebro	Akademiska sjukhuset	PFE	428
	Akademiska sjukhuset	PFG	118
	Arvika sjukhus	PFE	10
	Centralsjukhuset Karlstad	PFE	204

Region	Hospital	Type	Count
	Centralsjukhuset Karlstad	PFG	49
	Centralsjukhuset Västerås	PFE	176
	Centralsjukhuset Västerås	PFG	49
	Falu lasarett	PFE	320
	Falu lasarett	PFG	73
	Gävle sjukhus	PFE	301
	Gävle sjukhus	PFG	94
	Hudiksvalls sjukhus	PFE	88
	Hudiksvalls sjukhus	PFG	15
	Mälarsjukhuset	PFE	210
	Mälarsjukhuset	PFG	43
	Torsby sjukhus	PFE	40
	Universitetssjukhuset Örebro	PFE	267
	Universitetssjukhuset Örebro	PFG	79
Utland	Ålands centralsjukhus	PFE	24
	Ålands centralsjukhus	PFG	11
	Utland	PFE	24
	Utland	PFG	13
Västra Sverige	Alingsås lasarett	PFE	83
	Drottning Silvias Bus	PFE	22
	Drottning Silvias Bus	PFG	1
	Kungälvs sjukhus	PFE	108
	Sahlgrenska universitetssjukhuset	PFE	573
	Sahlgrenska universitetssjukhuset	PFG	131
	Sahlgrenska universitetssjukhuset /Östra	PFE	105
	Skaraborgs sjukhus Skövde	PFE	297
	Skaraborgs sjukhus Skövde	PFG	53
	Södra Älvsborgs sjukhus	PFE	270
	Södra Älvsborgs sjukhus	PFG	36
	Trollhättan, NÄL	PFE	334
	Trollhättan, NÄL	PFG	75