

National Pacemaker Database

United Kingdom and the Republic of Ireland

National ICD Database

United Kingdom and the Republic of Ireland



annual report

1998 - 1999

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This report can be downloaded from the National Pacemaker Database web site (in Word or Acrobat format) at:

<http://www.coronarycare.net/bpeg>
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The National Pacemaker and ICD Databases are closely affiliated to the British Pacing and Electrophysiology Group.



Contents

PACEMAKER IMPLANTS	3
NEW IMPLANT RATE.....	4
MAJOR IMPLANTING CENTRES - UK and Ireland	5
IMPLANTING CENTRES BY COUNTRY	5
REGISTERED NEW IMPLANTS BY COUNTRY.....	6
AGE AT FIRST IMPLANT.....	7
PACING MODE.....	8
% PHYSIOLOGICAL PACING by Country.....	9
PACING MODE AND SELECTED INDICATIONS Complete Heart Block	10
PACING MODE AND SELECTED INDICATIONS Sick Sinus Syndrome	11
PACING MODE AND SELECTED INDICATIONS Atrial fibrillation.....	12
PACING MODE AND SELECTED INDICATIONS Carotid Sinus Hypersensitivity	13
PACING MODE AND SELECTED INDICATIONS Heart Failure	14
The European Context - How are we doing?.....	15
How much do we spend on cardiac pacemakers in the U.K. and Ireland?.....	16
ICD IMPLANTATION	17
Implant Centres.....	17
Implants	17
New Implant Rates by Country	17
Age at First ICD Implant	18
Survival after ICD Implantation: All Cause Mortality	18
Survival vs. Age at First Implant	19
Device Longevity	20
Appendix A: Report to European Working Group on Cardiac Pacing 1998.....	21
Appendix B: Report to European Working Group on Cardiac Pacing 1999.....	25

Pacemaker Implants

This report contains generic information about pacing practice in the United Kingdom and Republic of Ireland up to and including 1999. If you have any further queries, or you wish to receive a confidential report on your local practice in comparison with the national average, please contact:

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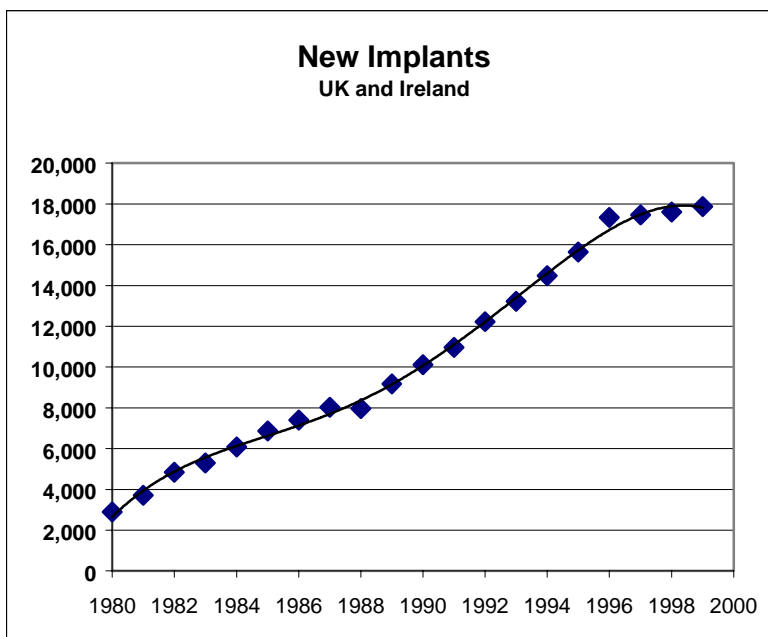
Do you want a personalised report for your own hospital?

We can supply a report on your own hospital's pacing practice compared to the national trends and averages. If you want this report to be prepared for you, contact Morag Cunningham.

NEW IMPLANT RATE

United Kingdom and Republic of Ireland

Year	New Implants	New Rate (per 10 ⁶ population)
1980	2,892	46.2
1981	3,709	59.2
1982	4,837	77.3
1983	5,301	84.7
1984	6,083	97.2
1985	6,870	109.7
1986	7,392	118.1
1987	8,020	128.1
1988	7,967	127.3
1989	9,167	146.4
1990	10,112	161.5
1991	10,951	174.9
1992	12,218	195.2
1993	13,234	211.4
1994	14,477	231.3
1995	15,637	249.8
1996	17,342	277.0
1997	17,465	279.0
1998	17,601	281.2
1999	17,864	285.4



There has been a **significant** reduction in the growth of cardiac pacing in the UK and Ireland. The figures over the last 4 years suggest little or no growth. The reasons for this are not clear - the new implant rate still lags far behind our European counterparts - and may involve:

- block at the primary care referral stage,
- lack of specialist resources for pacing,
- the ever increasing burden of following up more and more patients,
- a financial compromise between number of new implants and complexity of implanted hardware (i.e. more VVI units for the same price as fewer DDDRs)
- Leeching of pacing budgets to pay for the rapidly increasing number of ICD implants,
- or other factors not listed here.

Whatever the reasons, the trend is alarming, because UK and Ireland are certainly not implanting enough pacemakers yet.

MAJOR IMPLANTING CENTRES - UK and Ireland

Centres implanting 50 or more pacemakers per annum

Year	Centres
1990	59
1991	63
1992	70
1993	82
1994	83
1995	91
1996	108
1997	115
1998	117
1999	125

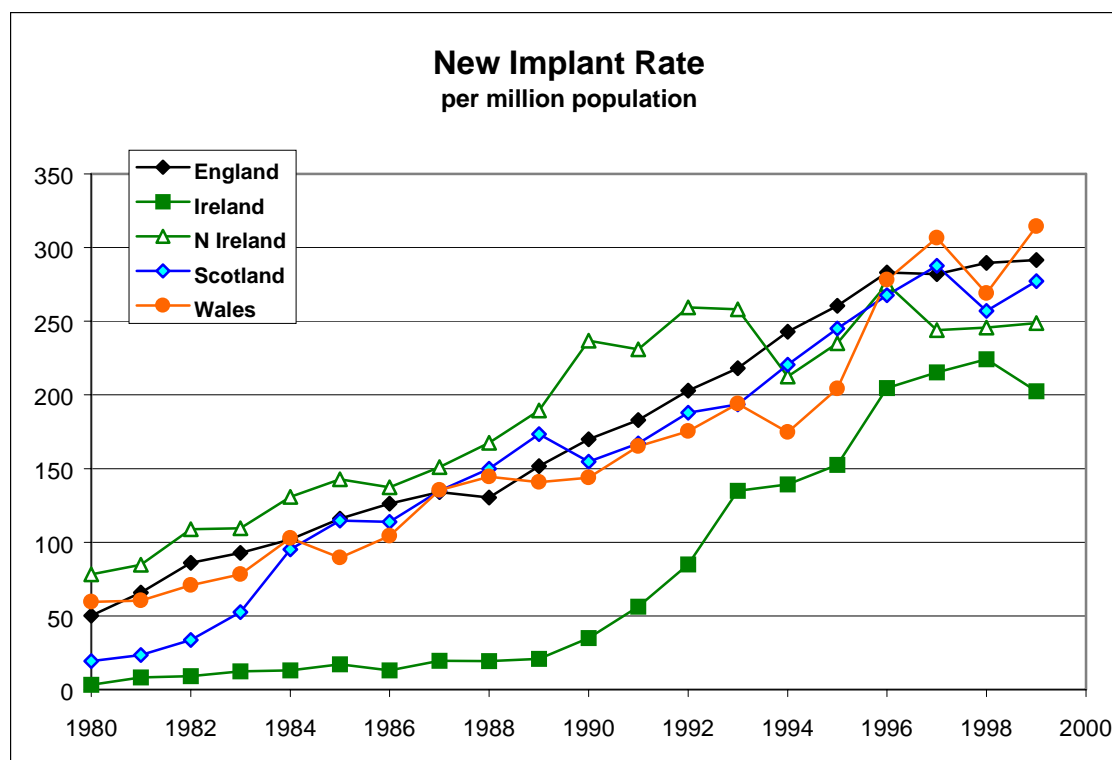
IMPLANTING CENTRES BY COUNTRY

Centres implanting 5 or more pacemakers per annum

	England	N Ireland	Scotland	Wales	United Kingdom	Republic of Ireland	UK and Ireland
1990	95	2	12	5	114	6	120
1991	98	2	16	5	121	6	127
1992	102	2	16	6	126	6	132
1993	110	2	16	6	134	7	141
1994	111	2	18	6	137	8	145
1995	122	2	16	6	146	9	155
1996	129	2	22	7	160	10	170
1997	135	2	25	7	169	11	180
1998	135	2	23	6	166	12	178
1999	139	2	26	7	174	13	187

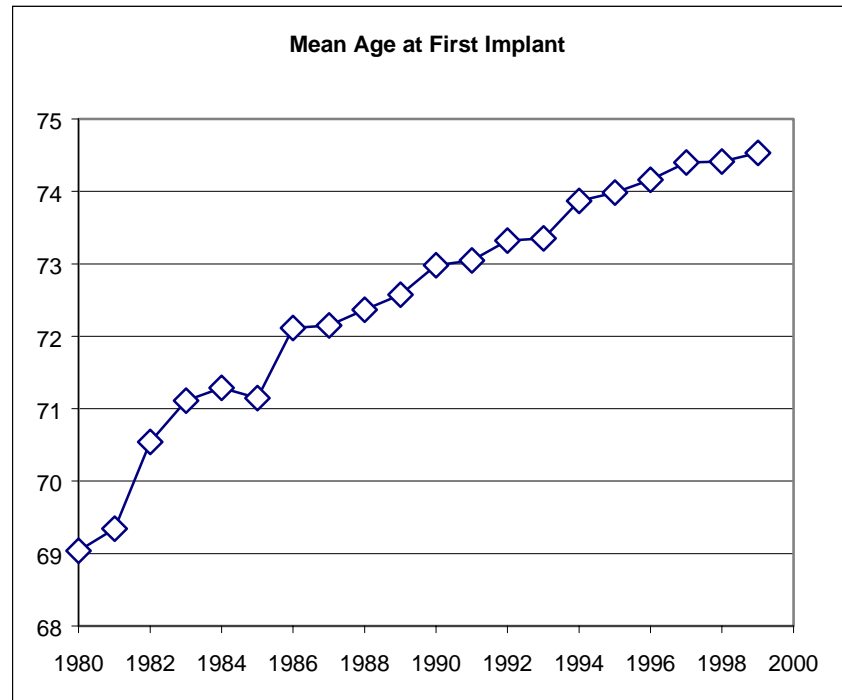
REGISTERED NEW IMPLANTS BY COUNTRY

Year	England	N Ireland	Scotland	Wales	UK	Republic of Ireland	UK and Ireland
Population (millions)	49.284	1.689	5.123	2.927	59.023	3.626	62.649
1980	2,475	132	99	174	2,880	12	2,892
1981	3,239	143	120	177	3,679	30	3,709
1982	4,241	184	172	207	4,804	33	4,837
1983	4,573	185	269	229	5,256	45	5,301
1984	5,027	221	487	301	6,036	47	6,083
1985	5,717	241	588	262	6,808	62	6,870
1986	6,225	232	583	305	7,345	47	7,392
1987	6,607	255	691	396	7,949	71	8,020
1988	6,423	283	768	423	7,897	70	7,967
1989	7,471	320	888	412	9,091	76	9,167
1990	8,371	400	793	421	9,985	127	10,112
1991	9,018	390	856	483	10,747	204	10,951
1992	9,996	438	963	513	11,910	308	12,218
1993	10,749	436	992	568	12,745	489	13,234
1994	11,972	359	1,130	511	13,972	505	14,477
1995	12,834	397	1,255	598	15,084	553	15,637
1996	13,950	465	1,371	814	16,600	742	17,342
1997	13,901	412	1,474	897	16,684	781	17,465
1998	14,269	415	1,317	787	16,788	813	17,601
1999	14,369	420	1,420	920	17,129	735	17,864



AGE AT FIRST IMPLANT

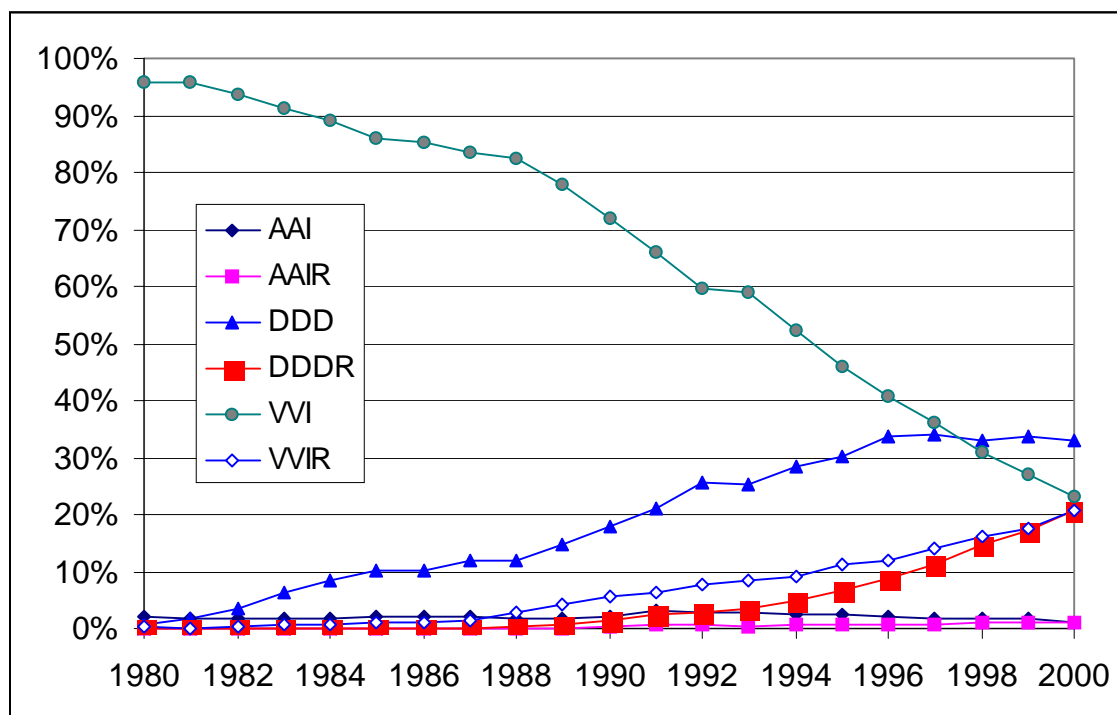
Year	Mean Age
1980	69.04
1981	69.34
1982	70.54
1983	71.11
1984	71.28
1985	71.15
1986	72.12
1987	72.15
1988	72.37
1989	72.57
1990	72.98
1991	73.05
1992	73.32
1993	73.35
1994	73.87
1995	73.98
1996	74.16
1997	74.40
1998	74.41
1999	74.53



PACING MODE

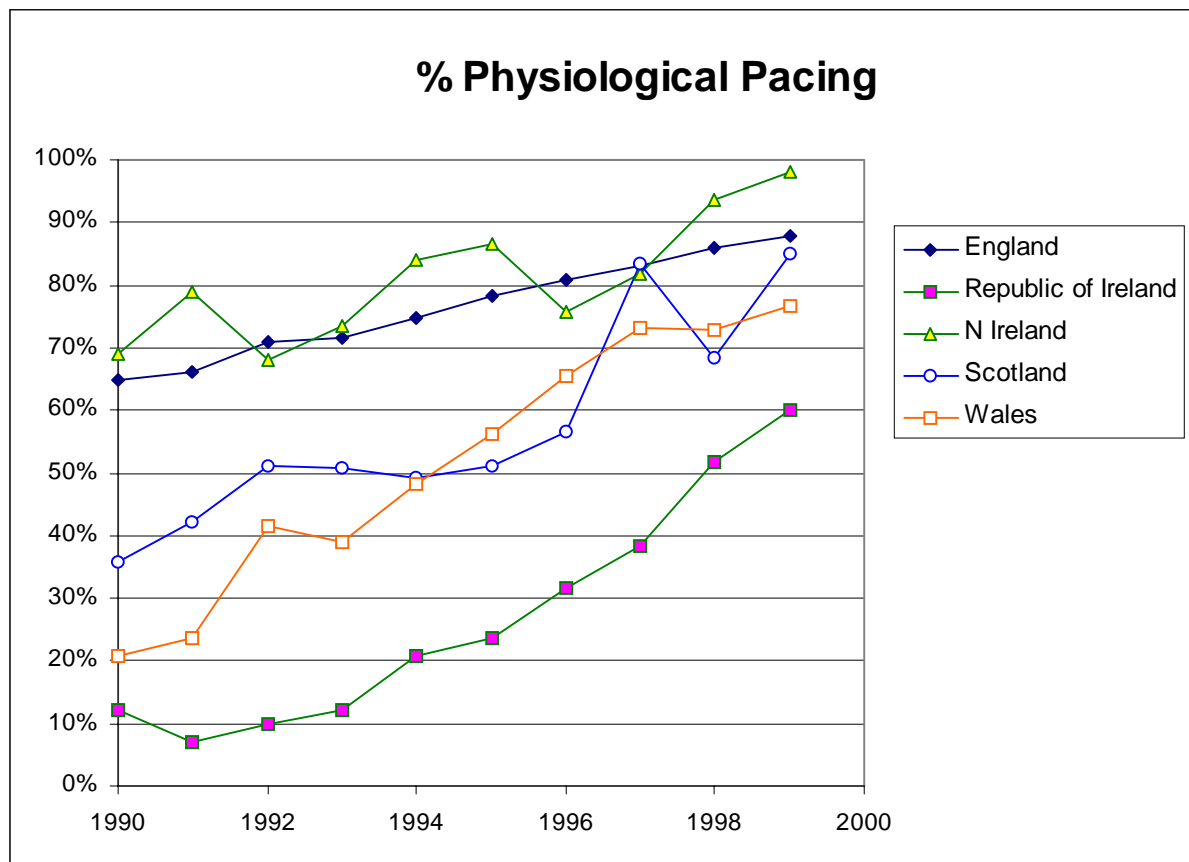
NEW IMPLANTS

Year	AAI	AAIR	DDD	DDDR	VDD	VDDR	VVI	VVIR
1980	2.2%	0.0%	0.7%	0.0%	0.8%	0.0%	95.8%	0.5%
1981	1.9%	0.0%	1.7%	0.1%	0.5%	0.0%	95.7%	0.1%
1982	1.7%	0.0%	3.6%	0.0%	0.7%	0.0%	93.7%	0.2%
1983	1.6%	0.0%	6.3%	0.1%	0.3%	0.0%	91.2%	0.6%
1984	1.6%	0.0%	8.3%	0.0%	0.3%	0.0%	89.0%	0.7%
1985	2.1%	0.0%	10.2%	0.1%	0.6%	0.0%	86.1%	0.9%
1986	2.2%	0.0%	10.1%	0.0%	1.1%	0.0%	85.4%	1.1%
1987	2.1%	0.0%	11.9%	0.1%	0.8%	0.0%	83.7%	1.5%
1988	1.8%	0.1%	11.9%	0.3%	0.5%	0.0%	82.4%	3.0%
1989	1.8%	0.1%	14.8%	0.8%	0.5%	0.0%	77.9%	4.1%
1990	2.2%	0.4%	17.7%	1.5%	0.5%	0.0%	72.0%	5.6%
1991	3.1%	0.7%	20.9%	2.4%	0.6%	0.0%	66.0%	6.3%
1992	2.7%	0.5%	25.7%	2.8%	0.5%	0.1%	59.8%	7.9%
1993	2.7%	0.4%	25.4%	3.6%	0.5%	0.2%	58.8%	8.4%
1994	2.5%	0.7%	28.3%	5.0%	1.7%	0.4%	52.4%	9.0%
1995	2.4%	0.6%	30.3%	6.8%	2.4%	0.4%	45.8%	11.2%
1996	2.1%	0.8%	33.6%	8.7%	1.8%	0.5%	40.5%	12.0%
1997	1.8%	0.7%	34.1%	11.1%	1.6%	0.6%	36.2%	14.0%
1998	1.9%	1.1%	33.1%	14.7%	1.3%	0.8%	31.0%	16.2%
1999	1.8%	1.2%	33.8%	17.2%	0.9%	0.6%	26.9%	17.5%
2000	1.0%	1.0%	32.9%	20.8%	0.4%	0.1%	23.1%	20.8%



% PHYSIOLOGICAL PACING by Country

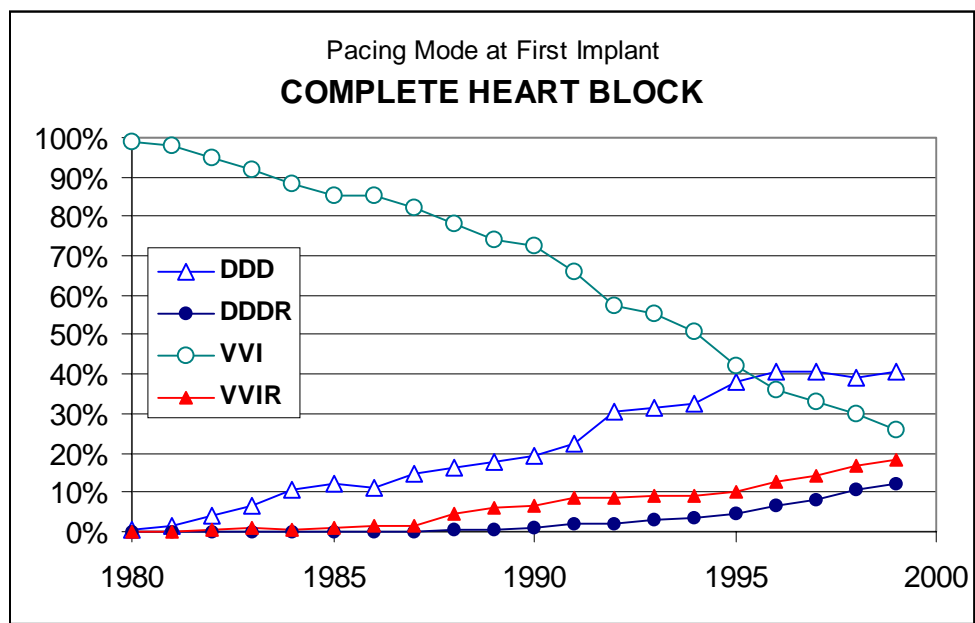
Year	England	N Ireland	Scotland	Wales	Republic of Ireland
1990	64.76%	69.16%	35.79%	20.92%	12.07%
1991	66.12%	79.04%	42.18%	23.58%	7.09%
1992	70.95%	68.04%	51.22%	41.55%	9.78%
1993	71.56%	73.42%	50.68%	38.92%	12.12%
1994	74.83%	84.12%	49.26%	48.20%	20.70%
1995	78.42%	86.54%	50.96%	56.09%	23.66%
1996	80.94%	75.68%	56.66%	65.39%	31.59%
1997	82.96%	81.68%	83.28%	73.15%	38.19%
1998	85.99%	93.51%	68.43%	72.71%	51.60%
1999	87.73%	98.17%	84.89%	76.67%	60.12%



PACING MODE AND SELECTED INDICATIONS

Complete Heart Block

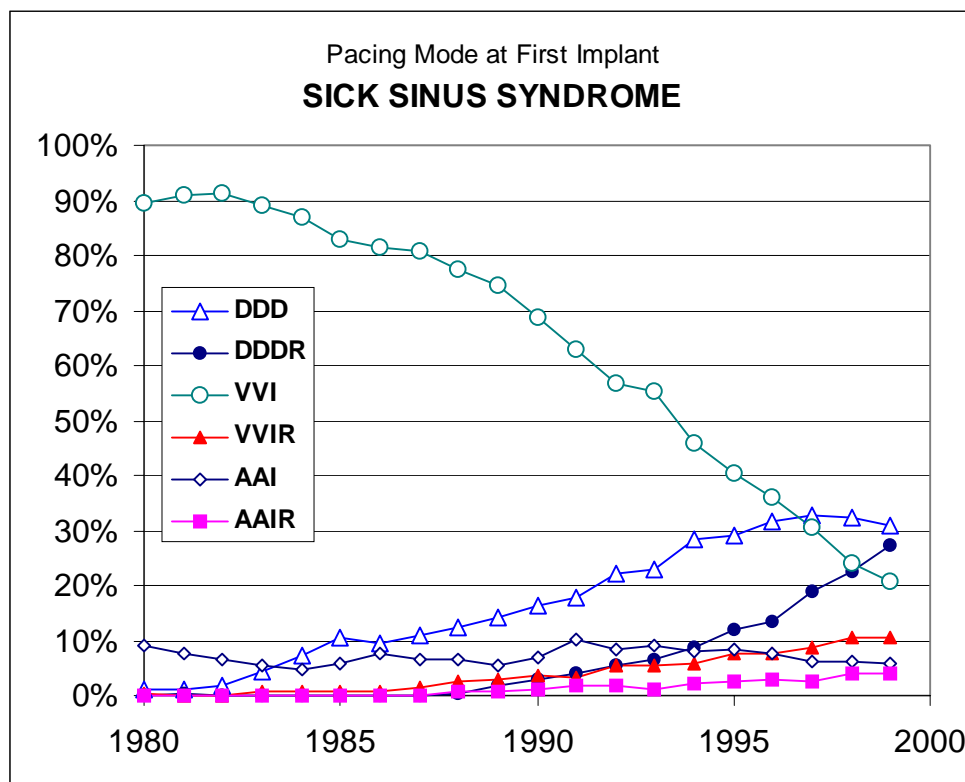
Year	DDD	DDDR	VDD	VDDR	VVI	VVIR
1980	0.3%	0.0%	0.7%	0.0%	98.9%	0.1%
1981	1.4%	0.0%	0.6%	0.0%	98.0%	0.0%
1982	4.0%	0.0%	0.8%	0.0%	94.7%	0.3%
1983	6.8%	0.0%	0.2%	0.0%	91.7%	1.2%
1984	10.6%	0.0%	0.4%	0.0%	88.2%	0.7%
1985	12.4%	0.0%	1.2%	0.0%	85.2%	1.1%
1986	11.3%	0.0%	1.8%	0.0%	85.5%	1.4%
1987	14.7%	0.0%	1.2%	0.0%	82.3%	1.7%
1988	16.3%	0.3%	0.9%	0.0%	77.9%	4.5%
1989	17.9%	0.4%	1.0%	0.0%	74.3%	6.3%
1990	19.1%	0.8%	0.7%	0.0%	72.6%	6.6%
1991	22.3%	1.8%	1.2%	0.0%	66.0%	8.5%
1992	30.6%	2.3%	0.9%	0.2%	57.3%	8.8%
1993	31.6%	2.8%	0.8%	0.4%	55.4%	9.0%
1994	32.7%	3.6%	3.2%	0.7%	50.7%	8.9%
1995	38.2%	4.6%	4.2%	0.7%	42.0%	10.1%
1996	40.7%	6.6%	3.2%	0.9%	35.9%	12.6%
1997	40.7%	8.0%	2.8%	1.1%	33.1%	14.3%
1998	39.3%	10.5%	2.1%	1.5%	29.9%	16.5%
1999	40.4%	12.0%	1.8%	1.3%	25.8%	18.3%



PACING MODE AND SELECTED INDICATIONS

Sick Sinus Syndrome

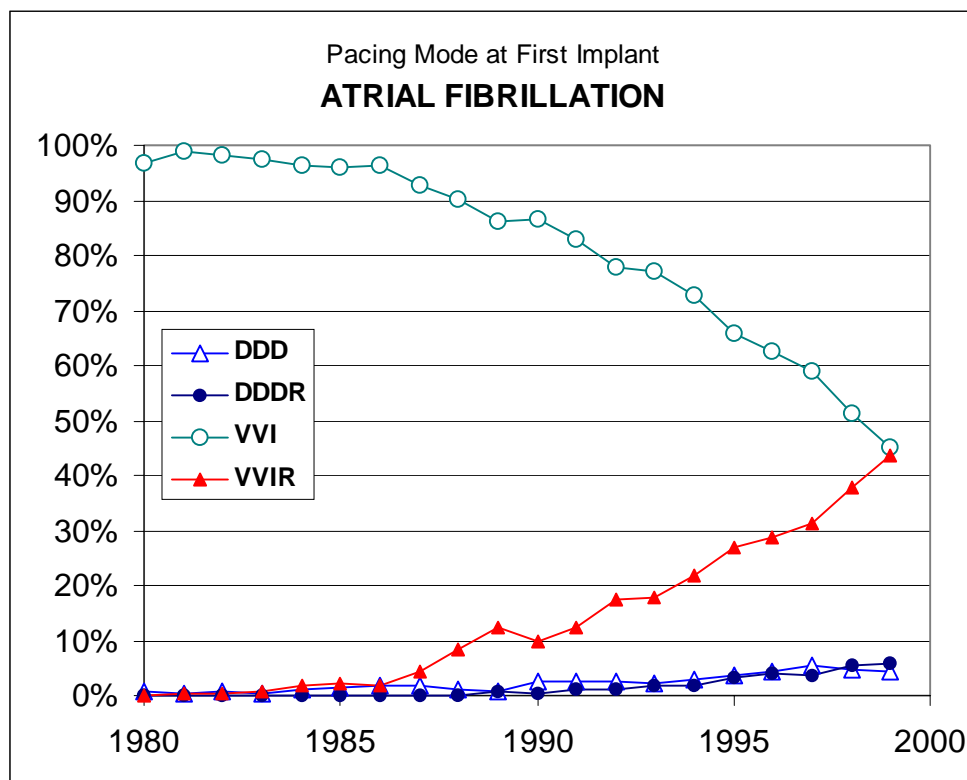
Year	AAI	AAIR	DDD	DDDR	VDD	VDDR	VVI	VVIR
1980	9.2%	0.0%	1.1%	0.0%	0.0%	0.0%	89.4%	0.4%
1981	7.5%	0.0%	1.2%	0.3%	0.0%	0.0%	90.9%	0.1%
1982	6.5%	0.0%	2.0%	0.0%	0.1%	0.0%	91.3%	0.1%
1983	5.6%	0.1%	4.5%	0.1%	0.0%	0.0%	89.1%	0.7%
1984	4.7%	0.0%	7.4%	0.0%	0.1%	0.0%	87.0%	0.8%
1985	5.8%	0.1%	10.6%	0.1%	0.1%	0.0%	82.8%	0.6%
1986	7.8%	0.1%	9.5%	0.0%	0.2%	0.0%	81.5%	0.9%
1987	6.7%	0.2%	10.9%	0.1%	0.0%	0.0%	80.9%	1.3%
1988	6.6%	0.6%	12.4%	0.5%	0.0%	0.0%	77.6%	2.4%
1989	5.5%	0.6%	14.3%	1.8%	0.2%	0.0%	74.6%	3.1%
1990	7.0%	1.2%	16.5%	3.1%	0.0%	0.0%	68.8%	3.5%
1991	10.1%	2.0%	18.0%	4.1%	0.0%	0.0%	62.7%	3.1%
1992	8.4%	1.7%	22.2%	5.5%	0.0%	0.0%	56.6%	5.5%
1993	8.9%	1.1%	22.8%	6.5%	0.0%	0.0%	55.4%	5.3%
1994	8.2%	2.2%	28.5%	8.9%	0.5%	0.1%	45.7%	6.0%
1995	8.2%	2.4%	29.0%	11.9%	0.3%	0.1%	40.5%	7.7%
1996	7.5%	3.1%	31.6%	13.4%	0.4%	0.2%	36.0%	7.7%
1997	6.2%	2.6%	32.6%	18.9%	0.2%	0.0%	30.7%	8.7%
1998	6.3%	3.9%	32.3%	22.6%	0.3%	0.1%	24.1%	10.4%
1999	6.0%	4.1%	31.1%	27.3%	0.0%	0.1%	20.9%	10.5%



PACING MODE AND SELECTED INDICATIONS

Atrial fibrillation

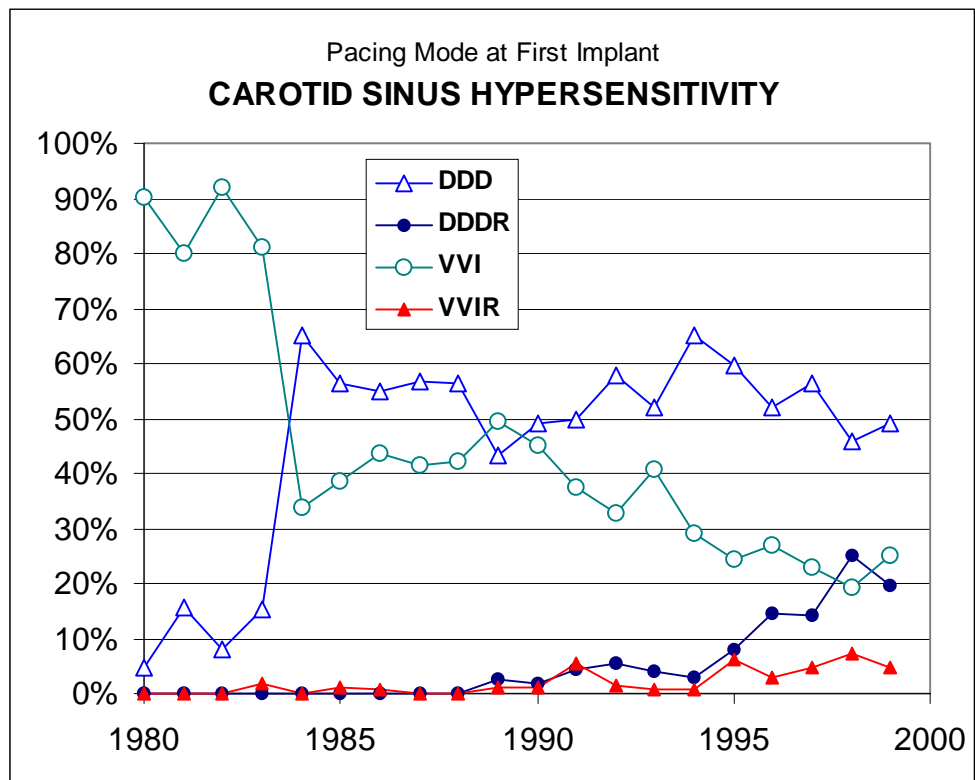
Year	DDD	DDDR	VVI	VVIR
1980	0.8%	0.0%	96.9%	0.0%
1981	0.5%	0.0%	99.1%	0.5%
1982	0.9%	0.0%	98.2%	0.3%
1983	0.3%	0.0%	97.6%	0.8%
1984	1.2%	0.0%	96.5%	1.9%
1985	1.5%	0.0%	95.9%	2.1%
1986	1.6%	0.0%	96.2%	1.8%
1987	1.9%	0.0%	92.7%	4.2%
1988	1.2%	0.0%	90.3%	8.3%
1989	0.8%	0.7%	86.2%	12.2%
1990	2.5%	0.3%	86.6%	9.9%
1991	2.6%	1.0%	82.7%	12.5%
1992	2.5%	1.0%	77.9%	17.5%
1993	2.2%	1.7%	77.0%	17.9%
1994	2.8%	1.7%	72.9%	21.9%
1995	3.6%	3.3%	65.6%	26.8%
1996	4.4%	3.8%	62.5%	28.7%
1997	5.6%	3.5%	59.1%	31.4%
1998	4.7%	5.5%	51.3%	37.7%
1999	4.5%	5.8%	45.2%	43.8%



PACING MODE AND SELECTED INDICATIONS

Carotid Sinus Hypersensitivity

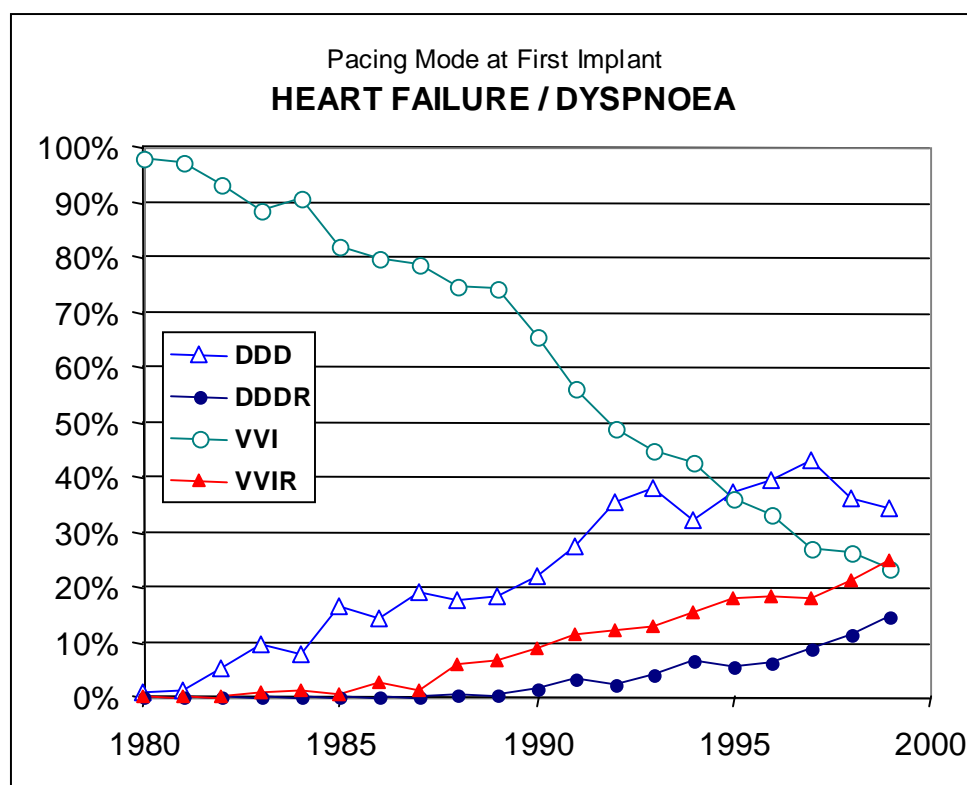
Year	DDD	DDDR	VVI	VVIR
1980	4.9%	0.0%	90.2%	0.0%
1981	15.6%	0.0%	80.0%	0.0%
1982	8.2%	0.0%	91.8%	0.0%
1983	15.1%	0.0%	81.1%	1.9%
1984	65.1%	0.0%	33.7%	0.0%
1985	56.3%	0.0%	38.5%	1.0%
1986	55.0%	0.0%	43.6%	0.7%
1987	56.6%	0.0%	41.5%	0.0%
1988	56.5%	0.0%	42.0%	0.0%
1989	43.4%	2.4%	49.4%	1.2%
1990	49.0%	2.0%	45.0%	1.0%
1991	50.0%	4.5%	37.5%	5.4%
1992	57.8%	5.5%	32.8%	1.6%
1993	52.0%	4.1%	40.7%	0.8%
1994	65.1%	2.9%	29.1%	0.6%
1995	59.8%	7.9%	24.4%	6.1%
1996	51.9%	14.7%	26.8%	3.0%
1997	56.3%	14.1%	23.0%	4.8%
1998	45.8%	25.1%	19.3%	7.3%
1999	49.1%	19.5%	25.2%	4.9%



PACING MODE AND SELECTED INDICATIONS

Heart Failure

Year	DDD	DDDR	VVI	VVIR
1980	0.8%	0.0%	97.7%	0.0%
1981	1.2%	0.0%	97.0%	0.0%
1982	4.9%	0.0%	93.2%	0.0%
1983	9.5%	0.0%	88.2%	0.7%
1984	7.6%	0.0%	90.5%	1.2%
1985	16.4%	0.0%	81.8%	0.3%
1986	14.1%	0.0%	79.5%	2.6%
1987	18.8%	0.0%	78.5%	1.2%
1988	17.5%	0.4%	74.4%	5.7%
1989	18.2%	0.3%	74.2%	6.5%
1990	21.7%	1.6%	65.5%	8.6%
1991	27.3%	3.1%	56.2%	11.3%
1992	35.3%	2.1%	48.6%	11.9%
1993	37.7%	4.1%	44.7%	12.6%
1994	32.0%	6.5%	42.4%	15.2%
1995	37.1%	5.5%	35.9%	18.0%
1996	39.4%	6.0%	33.0%	18.1%
1997	42.7%	8.7%	27.1%	17.7%
1998	36.2%	11.4%	26.3%	21.2%
1999	34.2%	14.5%	23.1%	24.7%



The European Context - How are we doing?

For many years UK and Ireland have lagged behind Europe in both volume and complexity of pacing. Have we made any progress? The table below shows the latest available data on new implant rates and % of physiological pacing for our European neighbours.

European New Implant Rates - latest available data

Country	Year	New Implants (per 10 ⁶ population)
Belgium	1997	585
France	1998	525
Germany	1998	465
Austria	1997	435
Denmark	1999	413
Sweden	1997	411
Switzerland	1997	348
Greece	1997	313
U.K.	1999	297
Spain	1997	289
Slovak Rep	1997	286
Netherlands	1997	277
Norway	1997	247
Ireland	1999	202

- Average of all countries (excluding UK and Ireland) = 383 /million.
- U.K. deficit based on this figure = **29%**
- Republic of Ireland deficit = **89%**

European % Physiological Pacing - latest available data

Country	Year	% physiological
Belgium	1997	93.2%
Switzerland	1997	87.6%
Sweden	1997	86.7%
Netherlands	1997	84.8%
Austria	1997	82.7%
Denmark	1999	80.4%
France	1997	79.8%
UK	1999	78.0%
Slovenia	1997	69.7%
Czech Rep	1996	67.6%
Spain	1997	62.8%
Greece	1997	62.7%
Italy	1997	61.8%
Ireland	1999	60.1%
Germany	1998	59.8%

- The European average (excluding UK and Ireland) is **75.4%**.

- The U.K. implants slightly more physiological pacemakers than average.
- The Republic of Ireland has a **25%** deficit compared to the average.

Sadly, the UK and Ireland have made little real progress in "closing the gap" between ourselves and Europe, at least in terms of pacemaker implant volume. Moreover, it is unlikely that we will ever do so unless our provision of pacing services is widened, and that will require more funding.

How much do we spend on cardiac pacemakers in the U.K. and Ireland?

Consider these facts:

1. The UK new implant rate is 29% lower than the average of our comparable European neighbours.
2. The UK proportion of physiological pacing is slightly higher than the Europe average.
3. The UK pays on average 53% less than the European average for pacemakers¹.

The U.K. therefore invests² only **38% of the European average per capita expenditure on cardiac pacing.**

The per capita spend in the Republic of Ireland is likely to be even lower, but average generator costs were not available so an estimate cannot be made at this time. If generator costs are the same as in the U.K. the Republic of Ireland per capita spending would be **20%** of the European average.

¹ Based on data from EWGCP annual surveys 1994-1997 (mean cost VVI = \$2,441, mean cost DDD = \$4,089) and data from Scottish Commodity Advisory Panel on pacemakers.

² based on a relative cost of 1.67:1 for physiological vs. VVI pacing (from EWGCP annual surveys 1994-1997)

ICD Implantation

Implant Centres

Year	Centres
1989	8
1990	17
1991	20
1992	26
1993	32
1994	33
1995	35
1996	40
1997	48
1998	52
1999	52

Implants

Year	New	Replacement	All
1989	26	1	27
1990	70	9	79
1991	102	9	111
1992	143	14	157
1993	122	17	139
1994	137	41	178
1995	207	70	277
1996	278	94	372
1997	364	73	437
1998	590	142	732
1999	675	334	1,009

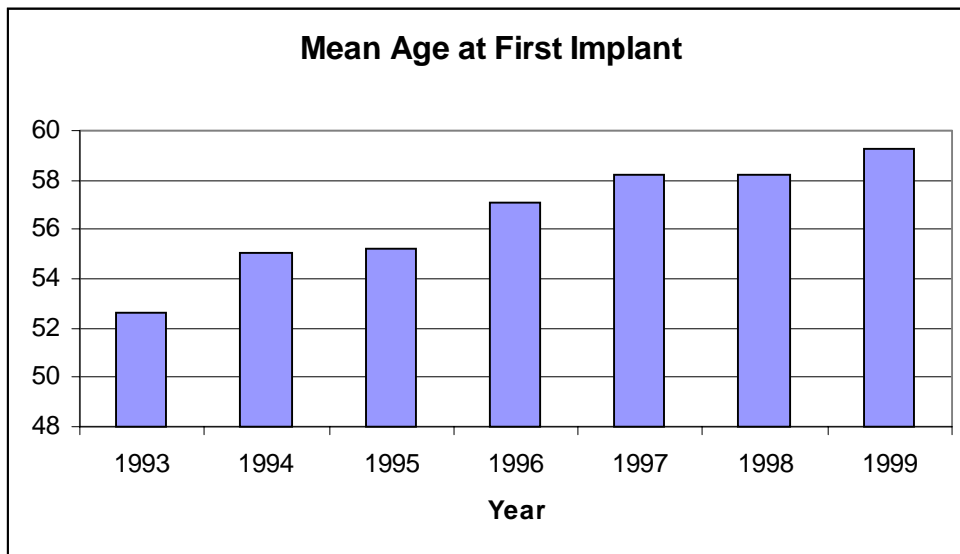
There has been a huge increase in ICD implant rates in 1998 and again in 1999

New Implant Rates by Country

Year	England	N Ireland	Scotland	Wales	Republic of Ireland
1995	3.8	9.5	4.7	0.34	
1996	4.8	12.4	6.8	1.02	0.8
1997	6.8	12.4	9.6	4.8	1.4
1998	10.1	12.4	12.9	2.7	2.2
1999	11.6	10.2	7.8	3.6	8.7

Age at First ICD Implant

ICDs were initially implanted in young patients at risk of sudden cardiac death, but have progressively been implanted in older patients as the benefit to these age groups has become apparent (see next section - mortality analysis).



Survival after ICD Implantation: All Cause Mortality

Mortality tracking has been performed on over 700 UK ICD implants. Kaplan-Meier survival curves are shown below. Statistics, where given, were derived using the logrank test. Note that patients who could not be traced are excluded from the analysis - only known mortalities and positively identified survivors are included.



1-year survival is 94%, 2-year survival is 89.5% and 5-year survival is 76%.

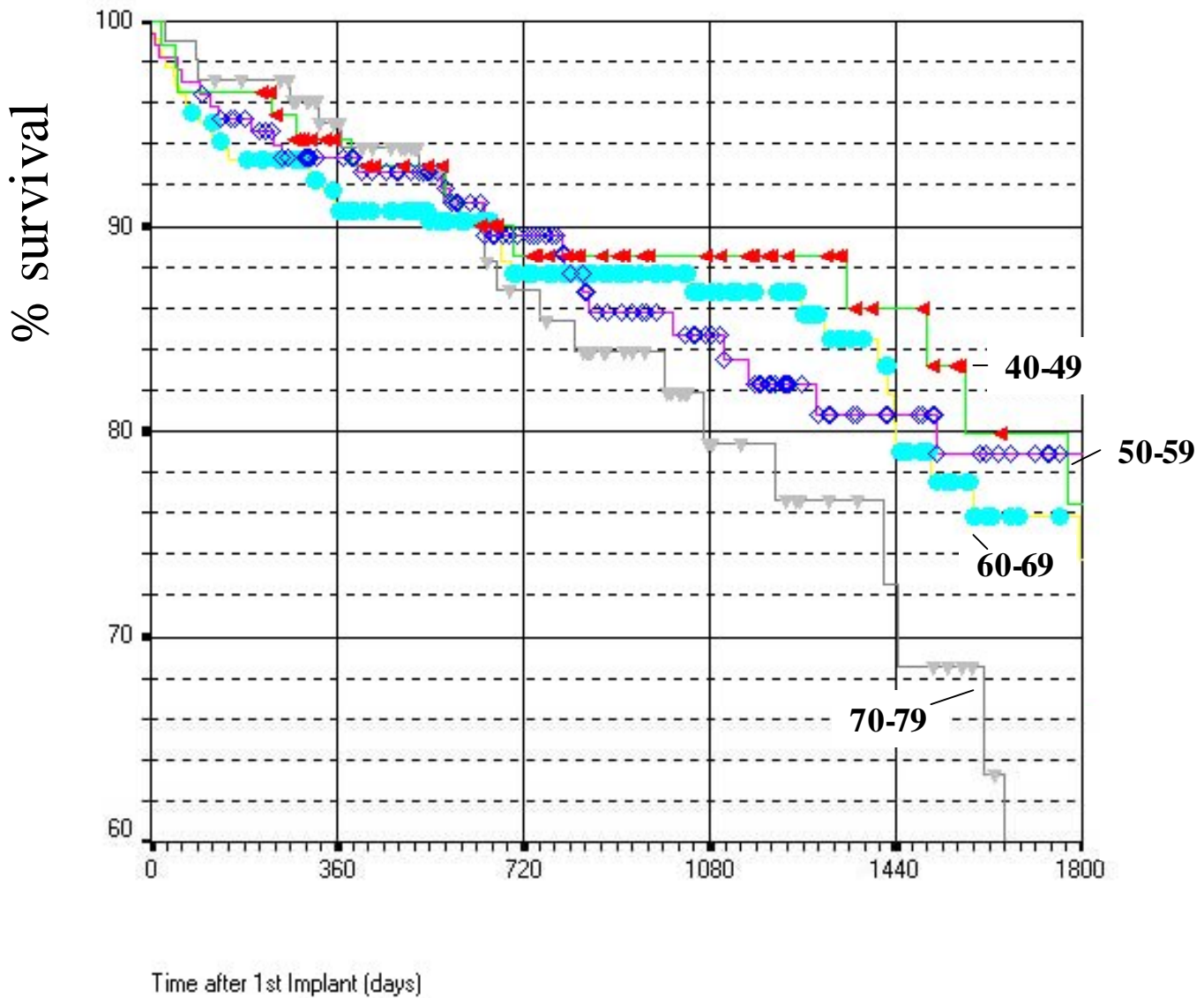
Survival vs. Age at First Implant

The analysis is shown by decade of age in the groups: 40-49, 50-59, 60-69, 70-79. (younger and older groups contained too few patients for useful analysis).

There was *no significant difference* seen in 5-year survival in these age groups.

SURVIVAL AFTER FIRST ICD IMPLANT

in patients aged 40-79 at time of first implant

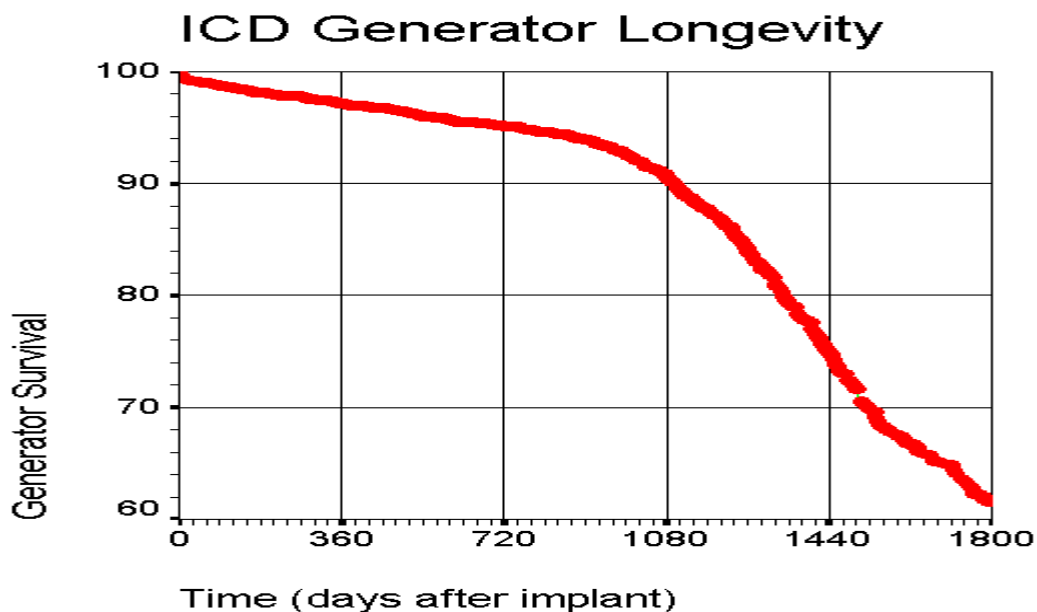


Device Longevity

The length of time between generator replacements is obviously of paramount importance in any economic analysis of ICDs. The data presented here represents registered implants and replacements, and obviously devices implanted more recently will mostly not have reached end of life yet.

For that reason a Kaplan-Meier analysis has been employed to look at ICD generator longevity.

ICD Generator Longevity - All Years




The graph above shows generator longevity for all years. For the first 3 years there is around a 3% generator explant rate per annum, rising sharply thereafter to 15% per annum.

ICD Generator Longevity - by Year of Implant

Year of Implant	1 year replacement	3 year replacement	5 year replacement
1991	2.8%	12.2%	46.1%
1992	3.2%	11.8%	42.3%
1993	1.4%	15.6%	54.4%
1994	6.2%	16.7%	48.9%
1995	7.2%	12.8%	39.2%
1996	1.9%	8.4%	
1997	2.1%	3.2%	
1998	0.8%		

There appears to be a significant trend towards greater 3-year and 5-year generator survival from 1991 to date.

Appendix A: Report to European Working Group on Cardiac Pacing 1998

Coverage	United Kingdom	
Total pacemakers implanted	21,800	
New pacemakers implanted	17,000	Mean age: 74.7
New implants (Male)	63.97%	Mean age: 73.9
New implants (Females)	36.03%	Mean age: 75.9
Replacement generators	4,800	
Implanting centres	175	
Implants in database	250,999	
Patients in follow-up	192,587	
New implants/million	290.0	

NB: These data in this Appendix does NOT include the Republic of Ireland so the totals are different from the totals in the preceding pages. For a report on Republic of Ireland data only, please contact NPDB on 01505 612829.

Symptom at First Implant

Symptom	N
A1 UNSPECIFIED	974
B1 SYNCOPE	5639
B2 DIZZY SPELLS	4241
B3 BRADYCARDIA	1732
C1 TACHYCARDIA	306
D1 NONE/PROPHYLACTIC	417
D2 HEART FAILURE/DYSPNOEA	612
D3 CEREBRAL DYSFUNCTION	59
D4 CHEST PAIN	101
D5 ABORTED SUDDEN DEATH	14

ECG at First Implant

ECG	N
A1-2 unspecified/uncoded	391
B1 Normal sinus rhythm	821
B2 NSR + abnormal EPS	26
C1-C4 1st/2nd degree AV block	2081
C5-C8 3rd degree AV block	4752
D1-D12 Bundle branch block	614
E1-E5 Sick sinus syndrome	3677
E6 Chronic AF/flutter + bradycardia	2713
E7 Interatrial block	10
E8 Chronotropic incompetence	14
F1-F3 Supraventricular tachycardia	110
G1 Ventricular extrasystoles	11
G2-G3 Ventricular tachycardia	53
G4 Torsades de pointes	13

Pacing Mode at First Implant

Mode	N
AAI	262
AAIR	157
DDD	4,653
DDDR	2,054
VDD	154
VDDR	108
VVI	4,181
VVIR	2,243

Pacing Mode vs. ECG at First Implant

ECG	AAI	DDD	VDD	VVI
C1-C8 AV Block	0.05%	56.02%	4.39%	39.55%
D1-D12 Bundle Branch Block	0.20%	56.10%	2.36%	41.34%
E1-E5 Sick Sinus Syndrome	8.94%	57.34%	0.19%	33.53%
E6 AF/Afl + bradycardia	0.41%	9.35%	0.12%	90.12%

Aetiology at First Implant

Aetiology	N
A1 UNSPECIFIED	2986
B1 UNKNOWN	6312
B2 CONDUCTION TISSUE FIBROSIS	2772
B3 APPARENTLY NORMAL HEART	28
C1 ISCHAEMIC	769
C1A TRANSIENT ISCHAEMIA	2
C2 POST INFARCTION	226
D1 CONGENITAL UNSPECIFIED	140
D1A CONGENITAL CONDUCTION DEFECT ONLY	1
D1B CONGENITAL STRUCTURAL AND CONDUCTION DEFECT	7
E1 SURGICAL COMPLICATION	270
E2 SURGICAL THERAPEUTIC (ABLATION)	129
E3 CATHETER ABLATION UNSPECIFIED	384
E3A COMPLICATION OF CATHETER ABLATION	3
E3B CATHETER ABLATION (THERAPEUTIC)	77
E4 DRUG INDUCED	30
F1 CAROTID SINUS SYNDROME	484
F2 VASOVAGAL SYNDROME	62
F3 ORTHOSTATIC HYPOTENSION	6
G1 CARDIOMYOPATHY UNSPECIFIED	102
G1A HYPERTROPHIC CARDIOMYOPATHY	26
G1B DILATED CARDIOMYOPATHY	12
G2 MYOCARDITIS	6
G3 VALVULAR HEART DISEASE	267
G6 ENDOCARDITIS	1
G7 HEART TRANSPLANT	3
G8 IONISING RADIATION	2

Reason for File Closure

Closure	N
A1 UNSPECIFIED	100
B1 DEATH UNRELATED TO PACEMAKER	1246
B2 DEATH RELATED TO PACEMAKER	25
B3 DEATH - SUDDEN	21
B4 DEATH - CAUSE UNKNOWN	1646
C1 LOST TO FOLLOW-UP	64
C2 HOSPITAL TRANSFER	815
C3 PACEMAKER REMOVED	26

Reason for Generator Explant

Reason	N
A1 UNSPECIFIED	671
B1 ELECTIVE	345
B2 RECALL	7
B3 SYSTEM CHANGE - HEMODYNAMIC	37
B4 SYSTEM CHANGE - PACER SYNDROME	17
B5 SYSTEM CHANGE - PALPITATIONS	6
B6 SYSTEM CHANGE - ELECTRODE PROBLEM	99
B7 EMG INHIBITION	3
B8 EXTRACARDIAC STIMULATION	2
C1 MECHANICAL PROTRUSION	6
C2 EROSION	35
C3 INFECTION	80
C4 WOUND PAIN	4
D2 MINOR FAILURE - UNDERSENSING	6
D3 MINOR FAILURE - OVERSENSING	2
D4 MINOR FAILURE - MAGNETIC SWITCH	1
D5 MINOR FAILURE - PROGRAMMING	3
E1 MAJOR FAILURE - UNSPECIFIED	5
E2 MAJOR FAILURE - NO OUTPUT	9
E3 MAJOR FAILURE - LOW OUTPUT	1
E6 MAJOR FAILURE - CONNECTOR	4
E7 MAJOR FAILURE - ENCAPSULATION	1
F1 BATTERY FAILURE - NORMAL EOL	591
F2 BATTERY FAILURE - PREMATURE EOL	37

Reason for Lead Explant

Reason	A	V
A1 UNSPECIFIED	6.11%	6.60%
B1 ELECTIVE	23.89%	23.96%
B2 DISPLACEMENT	13.89%	14.93%
B3 EXIT BLOCK	3.89%	4.17%
B4 EMG INHIBITION		0.69%
B5 EXTRACARDIAC STIMULATION	0.56%	0.35%
B6 PERFORATION	1.11%	1.74%
B7 UNDERSENSING	3.33%	1.04%
B8 RECALL	1.67%	2.78%
C1 INFECTION - ULCERATION	28.33%	21.88%
D1 CONNECTOR FAILURE		1.39%
D2 INSULATION BREAK	14.44%	16.32%
D3 CONDUCTOR BREAK	2.78%	4.17%


Patient Age at First Implant

Age Group	N
<13	102
13-40	392
41-60	1,574
61-80	9,316
81-100	5,834

ICD

Total implants	732
New implants	592
Replacement implants	140
New implants/million	10.2
% thoracotomy	0.26%
% transvenous single lead	95.25%
% single lead & subcutaneous patch	4.49%

Appendix B: Report to European Working Group on Cardiac Pacing 1999

Coverage	United Kingdom	
Total pacemakers implanted	22,099	
New pacemakers implanted	17,160	Mean age: 74.9
New implants (Male)	61.18%	Mean age: 734.1
New implants (Females)	38.82%	Mean age: 76.1
Replacement generators	4,939	
Implanting centres	176	
Implants in database	273,949	
Patients in follow-up	205,000	
New implants/million	297.4	

NB: These data in this Appendix does NOT include the Republic of Ireland so the totals are different from the totals in the preceding pages. For a report on Republic of Ireland data only, please contact NPDB on 01505 612829.

Symptom at First Implant

Symptom	N
A1 UNSPECIFIED	612
B1 SYNCOPÉ	4501
B2 DIZZY SPELLS	3602
B3 BRADYCARDIA	1325
C1 TACHYCARDIA	314
D1 NONE/PROPHYLACTIC	352
D2 HEART FAILURE/DYSPNOEA	638
D3 CEREBRAL DYSFUNCTION	41
D4 CHEST PAIN	67
D5 ABORTED SUDDEN DEATH	5

ECG at First Implant

ECG	N
A1-2 unspecified/uncoded	167
B1 Normal sinus rhythm	585
B2 NSR + abnormal EPS	31
C1-C4 1st/2nd degree AV block	1701
C5-C8 3rd degree AV block	3806
D1-D12 Bundle branch block	473
E1-E5 Sick sinus syndrome	3125
E6 Chronic AF/flutter + bradycardia	2215
E7 Interatrial block	3
E8 Chronotropic incompetence	5
F1-F3 Supraventricular tachycardia	60
G1 Ventricular extrasystoles	2
G2-G3 Ventricular tachycardia	29
G4 Torsades de pointes	7

Pacing Mode at First Implant

Mode	N
AAI	207
AAIR	132
DDD	3768
DDDR	1934
VDD	95
VDDR	66
VVI	2928
VVIR	1938

Pacing Mode vs. ECG at First Implant

ECG	AAI	DDD	VDD	VVI
C1-C8 AV Block	0.30%	60.66%	3.04%	36.01%
D1-D12 Bundle Branch Block		63.17%	0.73%	36.10%
E1-E5 Sick Sinus Syndrome	10.08%	62.87%	0.04%	27.01%
E6 AF/AFI + bradycardia	0.46%	10.92%	0.15%	88.46%

Aetiology at First Implant

Aetiology	N
A1 UNSPECIFIED	2001
B1 UNKNOWN	4908
B2 CONDUCTION TISSUE FIBROSIS	2485
B3 APPARENTLY NORMAL HEART	22
C1 ISCHAEMIC	600
C1A TRANSIENT ISCHAEMIA	3
C2 POST INFARCTION	174
D1 CONGENITAL UNSPECIFIED	101
D1A CONGENITAL CONDUCTION DEFECT ONLY	10
D1B CONGENITAL STRUCTURAL AND CONDUCTION DEFECT	16
E1 SURGICAL COMPLICATION	223
E2 SURGICAL THERAPEUTIC (ABLATION)	52
E3 CATHETER ABLATION UNSPECIFIED	287
E3A COMPLICATION OF CATHETER ABLATION	1
E3B CATHETER ABLATION (THERAPEUTIC)	69
E4 DRUG INDUCED	24
F1 CAROTID SINUS SYNDROME	379
F2 VASOVAGAL SYNDROME	90
F3 ORTHOSTATIC HYPOTENSION	5
G1 CARDIOMYOPATHY UNSPECIFIED	70
G1A HYPERTROPHIC CARDIOMYOPATHY	32
G1B DILATED CARDIOMYOPATHY	57
G2 MYOCARDITIS	3
G3 VALVULAR HEART DISEASE	219
G7 HEART TRANSPLANT	2
G8 IONISING RADIATION	1

Reason for File Closure

Closure	N
A1 UNSPECIFIED	288
B1 DEATH UNRELATED TO PACEMAKER	83
B2 DEATH RELATED TO PACEMAKER	2
B4 DEATH - CAUSE UNKNOWN	104
C2 HOSPITAL TRANSFER	47

Reason for Generator Explant

Reason	N
A1 UNSPECIFIED	510
B1 ELECTIVE	286
B2 RECALL	39
B3 SYSTEM CHANGE - HEMODYNAMIC	52
B4 SYSTEM CHANGE - PACER SYNDROME	18
B5 SYSTEM CHANGE - PALPITATIONS	1
B6 SYSTEM CHANGE - ELECTRODE PROBLEM	64
B7 EMG INHIBITION	5
C1 MECHANICAL PROTRUSION	8
C2 EROSION	36
C3 INFECTION	87
C4 WOUND PAIN	6
D1 MINOR FAILURE - UNSPECIFIED	11
D2 MINOR FAILURE - UNDERSENSING	4
D3 MINOR FAILURE - OVERSENSING	2
D4 MINOR FAILURE - MAGNETIC SWITCH	1
D5 MINOR FAILURE - PROGRAMMING	2
E1 MAJOR FAILURE - UNSPECIFIED	12
E2 MAJOR FAILURE - NO OUTPUT	11
E3 MAJOR FAILURE - LOW OUTPUT	3
E4 MAJOR FAILURE - SLOW RATE	1
E5 MAJOR FAILURE - FAST RATE	2
E6 MAJOR FAILURE - CONNECTOR	2
E7 MAJOR FAILURE - ENCAPSULATION	1
F1 BATTERY FAILURE - NORMAL EOL	763
F2 BATTERY FAILURE - PREMATURE EOL	45

Reason for Lead Explant

Reason	A	V
A1 UNSPECIFIED	3.14%	7.27%
B1 ELECTIVE	36.86%	29.65%
B2 DISPLACEMENT	10.59%	10.76%
B3 EXIT BLOCK	4.31%	4.94%
B4 EMG INHIBITION	0.39%	0.87%
B5 EXTRACARDIAC STIMULATION	0.78%	0.58%
B6 PERFORATION	0.78%	0.58%
B7 UNDERSENSING	3.14%	4.65%
B8 RECALL	1.57%	2.33%
C1 INFECTION - ULCERATION	21.18%	19.77%
D1 CONNECTOR FAILURE		
D2 INSULATION BREAK	11.76%	13.08%
D3 CONDUCTOR BREAK	5.49%	5.52%

Patient Age at First Implant

Age Group	N
<13	93
13-40	310
41-60	1283
61-80	7479
81-100	4562

ICD

Total implants	1,009
New implants	675
Replacement implants	334
New implants/million	11.7
% thoracotomy	0.26%
% transvenous single lead	95.25%
% single lead & subcutaneous patch	4.49%