



NATIONAL PACEMAKER and ICD DATABASE

Annual Report 2001

2001

Introduction

This report contains generic information about pacing and ICD practice in the United Kingdom and Republic of Ireland up to and including 2000. If you have any further queries, please contact:

National Pacemaker Database
PO Box 9205
Bridge of Weir
Strathclyde PA11 3DZ

Contact:
Morag Cunningham
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Mobile: 07850 117541
e-mail: mwc@btconnect.com

The Pacemaker and ICD databases will migrate in 2003 to join the Central Cardiac Audit Database. All data should still be sent to Morag Cunningham for now, but eventually you will be able to submit your data on line.

For further details look at

www.ccad.org.uk

or e-mail

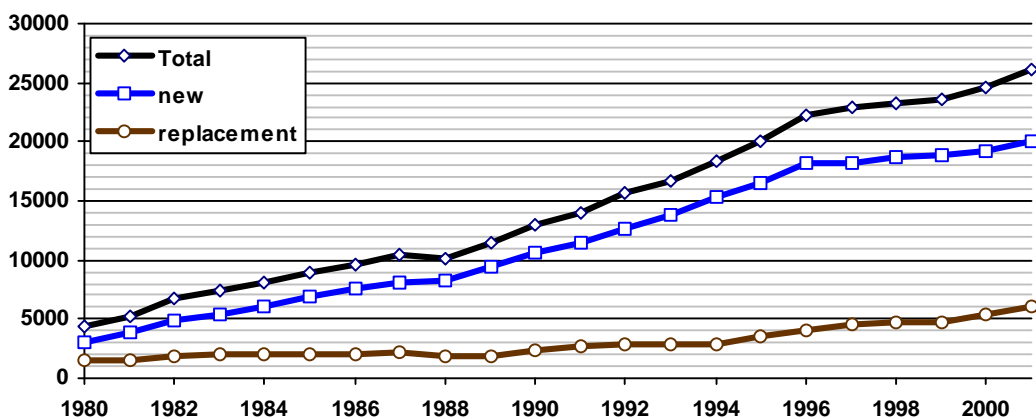
heldesk@ccad.org.uk.

PACEMAKER IMPLANTS

United Kingdom and Ireland

Year	Total	New	Replacement
1980	4,452	2,993	1,459
1981	5,245	3,805	1,440
1982	6,736	4,902	1,834
1983	7,443	5,393	2,050
1984	8,162	6,137	2,025
1985	9,007	6,966	2,041
1986	9,546	7,535	2,011
1987	10,381	8,128	2,253
1988	10,149	8,248	1,901
1989	11,380	9,442	1,938
1990	12,895	10,547	2,348
1991	14,066	11,442	2,624
1992	15,637	12,707	2,930
1993	16,692	13,877	2,815
1994	18,289	15,349	2,940
1995	20,046	16,459	3,587
1996	22,274	18,159	4,115
1997	22,902	18,277	4,625
1998	23,329	18,640	4,689
1999	23,619	18,841	4,778
2000	24,684	19,268	5,416
2001	26,151	20,064	6,087

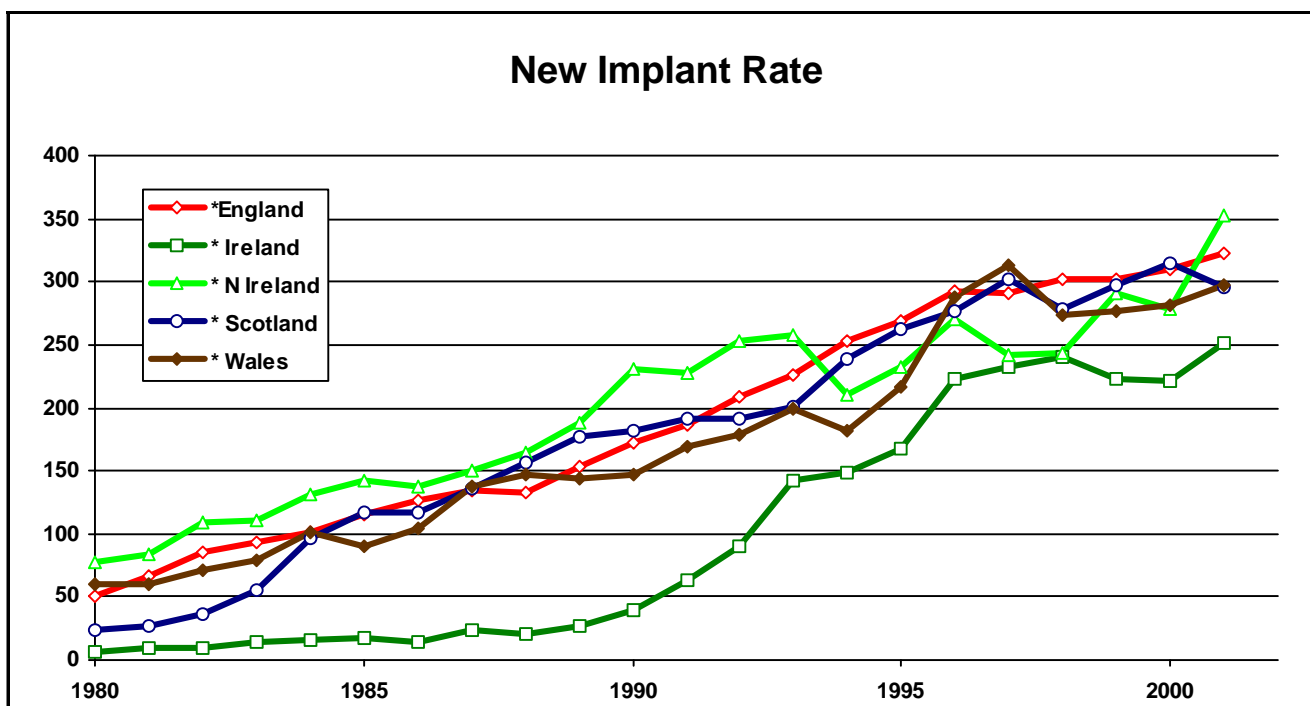
Pacemaker Generator Implants



NEW PACEMAKER IMPLANT RATE

United Kingdom and Ireland

Year	England	Scotland	Wales	N Ireland	Ireland
1980	50.9	23.3	59.7	77.1	5.5
1981	66.3	26.4	60.1	83.6	9.0
1982	85.7	37.0	70.6	109.0	9.0
1983	92.8	55.7	78.4	110.7	13.5
1984	101.3	96.4	101.8	131.3	15.1
1985	115.8	117.3	89.6	142.5	18.0
1986	126.8	117.5	104.9	137.2	13.5
1987	133.7	135.9	137.5	150.8	23.5
1988	133.1	156.6	147.6	164.3	20.9
1989	153.9	176.6	143.6	188.5	26.1
1990	172.8	181.1	147.6	231.4	39.6
1991	186.6	191.8	169.4	227.3	63.1
1992	208.5	191.6	179.2	253.2	90.8
1993	225.7	200.6	199.9	257.4	142.6
1994	253.5	238.1	181.9	210.8	148.1
1995	268.8	263.0	217.2	232.6	167.4
1996	291.8	276.9	287.5	270.9	223.1
1997	290.5	301.7	312.3	241.5	231.8
1998	301.6	277.8	273.2	243.8	240.6
1999	302.5	297.8	276.3	290.9	223.7
2000	310.3	314.8	281.7	278.6	220.7
2001	322.1	296.4	297.0	352.8	251.4



PACEMAKER CENTRES

United Kingdom and Ireland

Year	England	Scotland	Wales	N Ireland	U.K.	Republic of Ireland	U.K. and Ireland
1980	50	8	1	2	61	2	63
1981	65	8	1	2	76	3	79
1982	73	10	2	2	87	2	89
1983	76	9	3	2	90	4	94
1984	79	10	3	2	94	5	99
1985	86	10	4	2	102	5	107
1986	91	12	4	2	109	4	113
1987	96	13	4	2	115	7	122
1988	94	15	4	2	115	6	121
1989	93	19	4	2	118	8	126
1990	103	14	6	2	125	9	134
1991	102	19	6	2	129	9	138
1992	112	19	7	2	140	10	150
1993	124	20	7	2	153	10	163
1994	122	23	7	2	154	10	164
1995	130	21	7	2	160	11	171
1996	134	23	7	2	166	13	179
1997	138	26	7	2	173	13	186
1998	138	25	6	2	171	14	185
1999	132	24	6	2	164	12	176
2000	134	25	6	2	167	13	180
2001	125	26	6	2	159	12	171

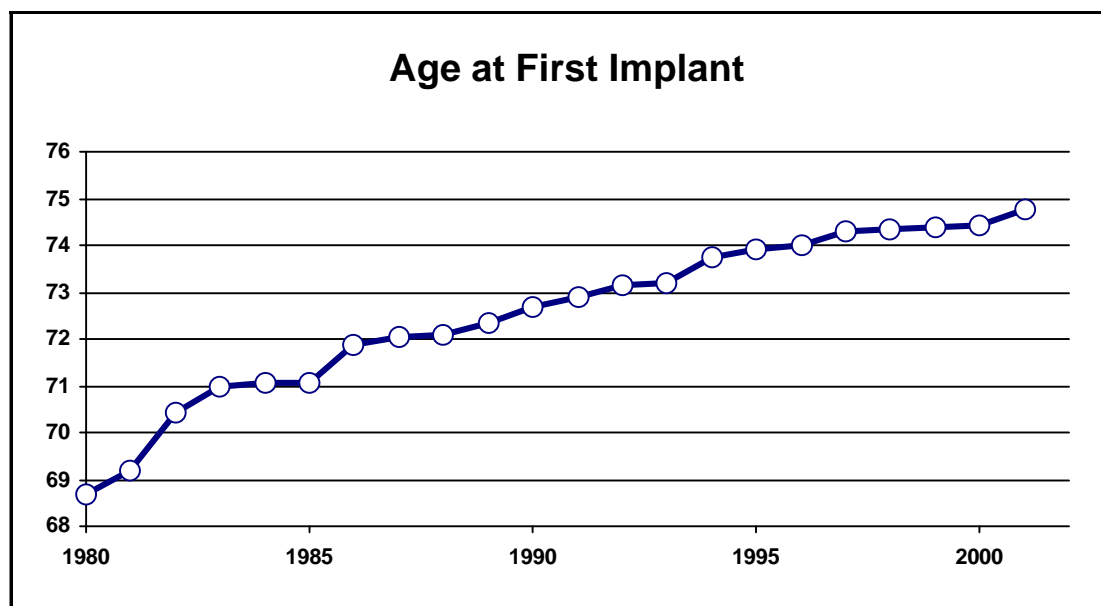
Due to consolidation within trusts, the number of pacemaker centres, particularly in England, appears to be decreasing.

NB: lists all pacemaker centres, including implant and follow-up. Figures differ from 1998-99 report, where number of implanting centres was over-estimated in places.

AGE AT FIRST IMPLANT

United Kingdom and Ireland

Year	Mean Age
1980	68.66
1981	69.18
1982	70.42
1983	70.97
1984	71.07
1985	71.04
1986	71.88
1987	72.04
1988	72.07
1989	72.36
1990	72.70
1991	72.90
1992	73.17
1993	73.21
1994	73.75
1995	73.91
1996	73.99
1997	74.29
1998	74.34
1999	74.40
2000	74.43
2001	74.75



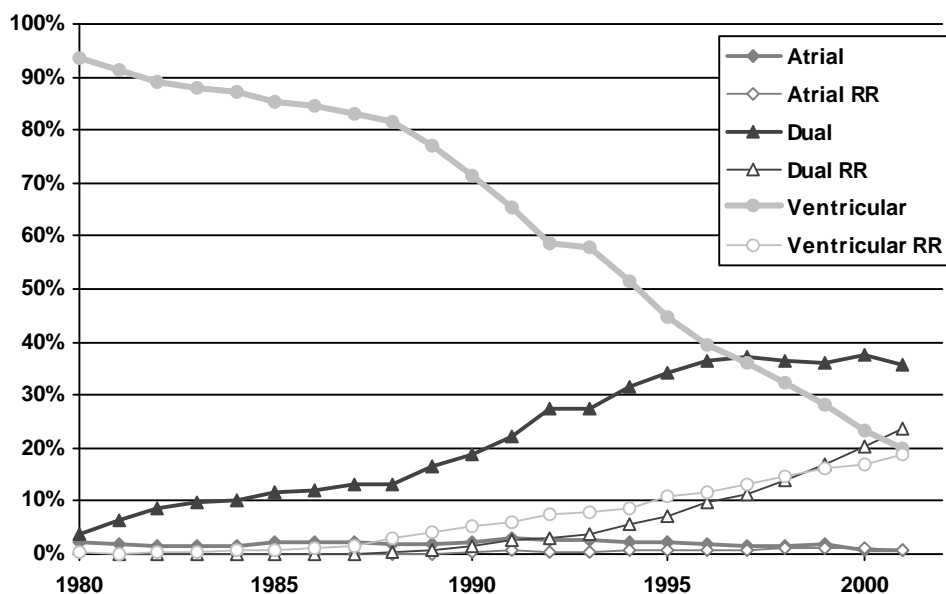
PACING MODE at first implant

United Kingdom and Ireland

NB: numbers of VDD/VDDR and DDI/DDIR are so small that they have been incorporated into DDD and DDDR

Year	AAI	AAIR	DDD	DDDR	VVI	VVIR
1980	2.1%		3.9%		93.6%	0.4%
1981	1.9%		6.5%	0.1%	91.2%	0.2%
1982	1.7%		8.8%	0.0%	89.3%	0.2%
1983	1.7%	0.0%	9.9%	0.0%	87.8%	0.5%
1984	1.6%	0.0%	10.2%	0.0%	87.3%	0.8%
1985	2.2%	0.0%	11.7%	0.1%	85.2%	0.9%
1986	2.2%	0.0%	12.1%	0.1%	84.5%	1.1%
1987	2.2%	0.1%	13.2%	0.1%	83.1%	1.4%
1988	1.8%	0.1%	13.3%	0.3%	81.5%	2.9%
1989	1.7%	0.1%	16.4%	0.9%	76.9%	4.0%
1990	2.2%	0.4%	18.9%	1.5%	71.6%	5.4%
1991	3.0%	0.7%	22.3%	2.4%	65.6%	6.0%
1992	2.6%	0.5%	27.6%	3.1%	58.8%	7.5%
1993	2.5%	0.4%	27.5%	3.9%	57.9%	7.9%
1994	2.4%	0.7%	31.5%	5.5%	51.4%	8.5%
1995	2.4%	0.6%	34.2%	7.3%	44.7%	10.8%
1996	2.0%	0.8%	36.6%	9.6%	39.5%	11.5%
1997	1.6%	0.7%	37.3%	11.1%	36.2%	13.0%
1998	1.7%	1.0%	36.4%	14.0%	32.4%	14.6%
1999	1.8%	1.1%	36.0%	16.8%	28.2%	16.2%
2000	0.9%	1.3%	37.6%	20.1%	23.3%	16.8%
2001	0.8%	0.9%	35.9%	23.6%	19.9%	18.8%

Pacing Mode at First Implant



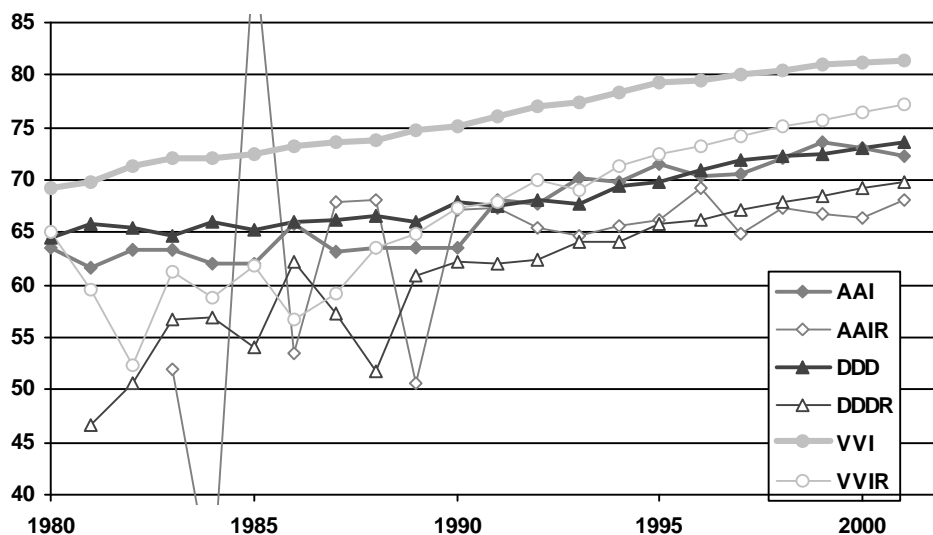
MEAN AGE AT FIRST IMPLANT and PACING MODE

United Kingdom and Ireland

NB: numbers of VDD/VDDR and DDI/DDIR are so small that they have been incorporated into DDD and DDDR

Year	AAI	AAIR	DDD	DDDR	VVI	VVIR
1980	63.6		64.5		69.2	65.1
1981	61.6		65.9	46.7	69.9	59.5
1982	63.4		65.5	50.6	71.3	52.4
1983	63.3	52.0	64.7	56.8	72.0	61.2
1984	62.1	30.9	66.0	56.8	72.1	58.7
1985	62.1	92.0	65.2	54.1	72.4	61.8
1986	65.9	53.5	66.1	62.2	73.3	56.7
1987	63.2	68.0	66.1	57.3	73.6	59.2
1988	63.5	68.1	66.6	51.7	73.8	63.5
1989	63.6	50.6	66.0	60.8	74.7	64.8
1990	63.5	67.2	68.0	62.2	75.1	67.3
1991	68.0	67.4	67.6	62.0	76.0	67.9
1992	67.8	65.5	68.1	62.4	77.1	70.1
1993	70.1	64.6	67.8	64.0	77.4	69.1
1994	69.8	65.6	69.5	64.1	78.4	71.3
1995	71.6	66.1	69.9	65.8	79.2	72.6
1996	70.3	69.3	71.0	66.2	79.5	73.2
1997	70.7	64.8	71.8	67.1	80.0	74.2
1998	72.0	67.3	72.4	67.9	80.4	75.2
1999	73.7	66.8	72.5	68.6	80.9	75.6
2000	73.0	66.3	73.0	69.3	81.2	76.4
2001	72.2	68.0	73.7	69.8	81.4	77.2

Age and Pacing Mode at First Implant



NB: for some modes year-on-year fluctuations were large in the 1980's due to small numbers of implants. These

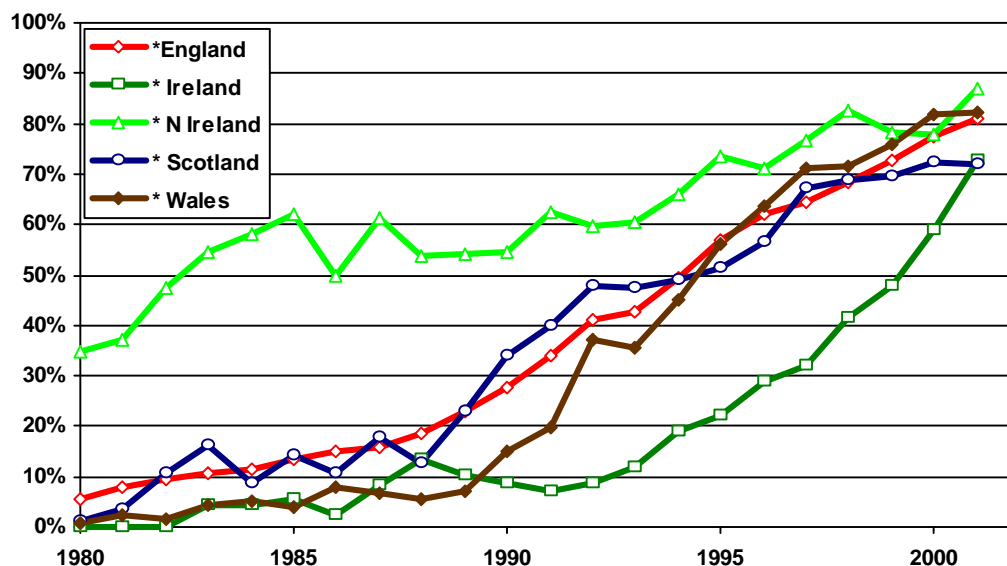
% PHYSIOLOGICAL PACING by COUNTRY

United Kingdom and Ireland

Year	England	Scotland	Wales	N Ireland	Republic of Ireland
1980	5.4%	1.0%	0.7%	34.6%	0.0%
1981	8.0%	3.6%	2.3%	37.3%	0.0%
1982	9.6%	10.7%	1.7%	47.6%	0.0%
1983	10.6%	16.4%	4.5%	54.5%	4.5%
1984	11.5%	8.5%	5.2%	57.9%	4.3%
1985	13.4%	14.2%	4.1%	62.0%	5.7%
1986	15.1%	10.5%	7.8%	49.8%	2.6%
1987	15.8%	18.0%	6.7%	61.3%	8.2%
1988	18.6%	12.6%	5.7%	53.6%	13.3%
1989	22.9%	22.9%	6.9%	54.1%	10.1%
1990	27.7%	34.2%	15.0%	54.5%	8.6%
1991	34.1%	39.9%	19.7%	62.3%	7.0%
1992	41.1%	47.7%	37.2%	59.7%	8.6%
1993	42.7%	47.4%	35.7%	60.4%	11.8%
1994	49.5%	49.0%	45.0%	65.8%	19.0%
1995	56.7%	51.5%	56.1%	73.4%	22.0%
1996	62.2%	56.3%	63.8%	71.0%	28.9%
1997	64.4%	67.2%	71.2%	76.7%	32.1%
1998	68.4%	68.7%	71.6%	82.5%	41.5%
1999	72.9%	69.4%	76.1%	78.4%	48.0%
2000	77.6%	72.2%	81.8%	78.0%	58.9%
2001	80.8%	71.9%	82.4%	86.9%	72.9%

NB: the figures for Physiological Pacing in the 1998-99 report were INCORRECT. Please disregard all previous reports and take this current report as correct.

% Physiological Pacing



PACING FOR COMPLETE HEART BLOCK

United Kingdom and Ireland

Year	Dual	Dual RR	Ventricular	Ventricular RR
1980	4.0%		95.9%	0.1%
1981	5.9%		94.0%	0.1%
1982	9.8%		90.0%	0.2%
1983	10.8%		88.4%	0.8%
1984	13.3%		85.8%	0.9%
1985	14.6%		84.3%	1.1%
1986	14.2%	0.0%	84.9%	0.9%
1987	16.4%	0.0%	82.2%	1.3%
1988	17.3%	0.3%	78.8%	3.6%
1989	20.6%	0.5%	73.9%	5.0%
1990	21.7%	0.8%	71.6%	5.8%
1991	25.6%	2.1%	65.2%	7.2%
1992	34.7%	2.2%	55.5%	7.6%
1993	35.3%	3.0%	54.3%	7.3%
1994	40.1%	4.7%	48.1%	7.1%
1995	46.0%	5.5%	39.6%	8.9%
1996	49.5%	7.3%	33.2%	10.1%
1997	49.1%	9.2%	30.5%	11.2%
1998	47.9%	12.0%	28.0%	12.1%
1999	49.7%	13.5%	24.0%	12.9%
2000	53.1%	15.1%	19.4%	12.4%
2001	50.3%	19.2%	17.4%	13.1%

by Country - latest year in list above

CENTRE LOCATION	Dual	Dual RR	Ventricular	Ventricular RR
England	47.9%	20.4%	17.5%	14.3%
Ireland	43.8%	31.3%	13.4%	11.6%
N Ireland	85.7%	3.0%	6.8%	4.5%
Scotland	56.0%	11.1%	24.4%	8.5%
Wales	60.0%	18.7%	12.6%	8.7%

PACING FOR SICK SINUS SYNDROME

United Kingdom and Ireland

Year	Dual	Dual RR	Ventricular	Ventricular RR	Atrial	Atrial RR
1980	2.2%		87.7%	0.5%	9.6%	
1981	7.7%	0.3%	84.4%	0.2%	7.4%	
1982	11.1%		82.5%	0.3%	6.1%	
1983	13.1%		80.6%	0.2%	6.0%	0.1%
1984	11.5%		82.6%	0.8%	5.1%	
1985	13.4%	0.1%	79.2%	0.8%	6.4%	0.1%
1986	11.5%	0.1%	78.9%	1.1%	8.3%	0.1%
1987	13.0%	0.1%	79.3%	1.2%	6.2%	0.2%
1988	14.1%	0.3%	76.5%	2.1%	6.5%	0.5%
1989	16.6%	2.1%	72.7%	3.1%	5.2%	0.3%
1990	18.2%	3.2%	67.3%	2.8%	7.2%	1.3%
1991	19.8%	4.1%	61.4%	2.5%	10.0%	2.2%
1992	25.8%	5.7%	53.9%	4.5%	8.4%	1.7%
1993	24.8%	6.6%	53.7%	4.7%	8.9%	1.2%
1994	32.4%	8.8%	43.1%	5.0%	8.4%	2.3%
1995	33.5%	11.7%	37.5%	6.7%	8.4%	2.2%
1996	36.7%	14.1%	32.7%	6.2%	7.5%	2.9%
1997	37.3%	19.0%	28.6%	6.9%	5.8%	2.5%
1998	38.9%	21.8%	22.6%	7.6%	5.6%	3.4%
1999	34.3%	28.5%	19.8%	8.3%	5.4%	3.7%
2000	36.9%	31.1%	17.5%	7.5%	2.9%	4.1%
2001	35.0%	36.8%	14.1%	9.2%	2.3%	2.6%

by Country - latest year in list above

CENTRE LOCATION	Dual	Dual RR	Ventricular	Ventricular RR	Atrial	Atrial RR
England	30.3%	41.6%	14.2%	9.8%	1.8%	2.3%
Ireland	24.1%	33.3%	21.8%	19.5%	1.1%	
N Ireland	81.8%	11.0%	5.3%	1.9%		
Scotland	48.1%	16.6%	16.6%	4.2%	7.7%	6.7%
Wales	45.1%	25.4%	13.1%	11.7%	1.9%	2.8%

PACING FOR ATRIAL FIBRILLATION

United Kingdom and Ireland

Year	Dual	Dual RR	Ventricular	Ventricular RR
1980	3.5%		96.5%	
1981	3.3%		96.2%	0.5%
1982	1.1%		98.6%	0.4%
1983	0.7%		98.7%	0.7%
1984	1.6%		96.0%	2.4%
1985	1.9%		95.8%	2.3%
1986	1.6%		96.5%	2.0%
1987	2.2%		94.0%	3.8%
1988	1.4%	0.2%	90.5%	7.9%
1989	1.2%	0.7%	86.6%	11.5%
1990	3.2%	0.4%	86.1%	10.3%
1991	3.3%	1.2%	83.1%	12.4%
1992	3.1%	1.1%	78.3%	17.5%
1993	2.5%	1.8%	78.6%	17.2%
1994	3.1%	1.8%	73.6%	21.5%
1995	4.2%	3.0%	66.7%	26.1%
1996	5.3%	4.2%	62.7%	27.8%
1997	6.5%	3.7%	58.7%	31.1%
1998	5.1%	5.2%	55.0%	34.7%
1999	4.9%	6.0%	47.0%	42.2%
2000	5.7%	6.8%	43.5%	44.0%
2001	5.5%	6.7%	39.5%	48.3%

by Country - latest year in list above

CENTRE LOCATION	Dual	Dual RR	Ventricular	Ventricular RR
England	5.5%	7.3%	37.1%	50.1%
Ireland	4.8%	4.8%	36.8%	53.6%
N Ireland	11.8%		60.5%	27.6%
Scotland	4.5%	2.5%	65.8%	27.1%
Wales	4.2%	5.5%	42.4%	47.9%

PACING FOR CONGESTIVE HEART FAILURE

United Kingdom and Ireland

Year	Dual	Dual RR	Ventricular	Ventricular RR
1980	13.1%		86.9%	
1981	11.3%		88.7%	
1982	16.2%		83.8%	
1983	14.2%		85.0%	0.8%
1984	10.7%		88.1%	1.1%
1985	18.2%		81.8%	
1986	15.9%		82.7%	1.5%
1987	19.7%		79.5%	0.8%
1988	20.5%	0.5%	72.6%	6.3%
1989	20.5%	0.8%	72.2%	6.6%
1990	24.9%	2.4%	63.6%	9.1%
1991	29.2%	3.3%	57.4%	10.1%
1992	41.6%	1.8%	44.8%	11.8%
1993	41.8%	4.5%	42.3%	11.4%
1994	40.2%	6.2%	38.1%	15.5%
1995	42.1%	7.3%	35.1%	15.6%
1996	45.9%	7.2%	31.1%	15.7%
1997	48.7%	10.3%	25.5%	15.5%
1998	43.5%	12.0%	26.0%	18.5%
1999	38.3%	14.0%	25.2%	22.5%
2000	44.5%	21.7%	15.9%	17.9%
2001	39.4%	23.4%	13.6%	23.6%

by Country - latest year in list above

CENTRE LOCATION	Dual	Dual RR	Ventricular	Ventricular RR
England	42.9%	20.9%	14.9%	20.4%
Ireland	20.0%	33.3%	26.7%	20.0%
N Ireland	72.4%		20.7%	6.9%
Scotland	54.0%	16.0%	24.0%	6.0%
Wales	40.0%	38.5%	12.3%	9.2%

PACING FOR CAROTID SINUS SYNDROME

United Kingdom and Ireland

Year	Dual	Dual RR	Ventricular	Ventricular RR	Atrial	Atrial RR
1980	2.7%		91.9%		5.4%	
1981	29.2%		66.7%		4.2%	
1982	43.4%		56.6%			
1983	57.6%		41.3%		1.1%	
1984	71.4%		27.5%		1.1%	
1985	58.1%		37.2%	1.2%	3.5%	
1986	61.0%		37.6%	0.7%	0.7%	
1987	64.4%		33.7%		1.9%	
1988	69.4%		29.2%		1.4%	
1989	53.9%	2.2%	39.3%	1.1%	3.4%	
1990	58.7%	1.9%	35.6%	1.0%	2.9%	
1991	62.9%	2.4%	29.8%	2.4%	2.4%	
1992	76.7%	4.3%	16.6%	1.2%	1.2%	
1993	68.6%	3.7%	25.7%		2.1%	
1994	74.8%	2.6%	20.4%	0.4%	1.7%	
1995	73.6%	5.3%	15.9%	4.0%	0.9%	0.4%
1996	57.4%	24.9%	13.7%	1.6%	1.3%	1.1%
1997	68.3%	12.5%	15.3%	3.1%	0.6%	0.3%
1998	58.4%	20.1%	15.1%	5.3%	1.1%	
1999	58.7%	20.1%	18.9%	2.3%		
2000	65.5%	19.3%	9.2%	4.1%	1.2%	0.7%
2001	64.0%	23.4%	8.2%	3.7%	0.5%	0.2%

by Country - latest year in list above

CENTRE LOCATION	Dual	Dual RR	Ventricular	Ventricular RR	Atrial	Atrial RR
England	58.6%	27.8%	9.4%	3.6%	0.6%	
N Ireland	80.4%	10.9%	4.3%	4.3%		
Scotland	83.9%	9.7%	3.2%			3.2%
Wales	85.0%		5.0%	10.0%		

AETIOLOGY FOR PACING

United Kingdom and Ireland

Year	COND TISS FIBR	CAR SINUS SYND	CARDIO- MYOPATHY	CATH ABL	CONGEN	ISCHAEM	POST MI	SURG COMP	SURG THER (ABL)	VALV HRT DIS	Other
1980	53.0%	2.4%	2.3%		4.1%	19.7%	4.8%	1.8%	3.9%	4.4%	3.7%
1981	53.3%	3.1%	2.0%	0.1%	3.3%	18.6%	6.0%	1.9%	4.4%	5.8%	1.5%
1982	52.0%	3.2%	2.3%	0.2%	4.0%	20.2%	6.0%	1.4%	4.8%	4.8%	1.2%
1983	47.1%	4.3%	3.0%	0.5%	4.1%	19.2%	7.0%	1.4%	5.6%	6.3%	1.5%
1984	45.6%	4.1%	2.7%	1.1%	4.6%	20.4%	5.9%	1.2%	6.0%	7.5%	1.0%
1985	48.1%	3.4%	2.4%	0.9%	4.5%	18.7%	5.7%	1.6%	6.6%	6.9%	1.4%
1986	46.6%	5.1%	2.3%	1.0%	4.0%	18.2%	5.9%	1.9%	6.3%	7.8%	1.0%
1987	49.2%	3.8%	2.5%	0.9%	4.6%	17.2%	5.8%	1.8%	5.5%	7.0%	1.7%
1988	50.1%	3.3%	2.3%	1.6%	4.7%	17.2%	5.5%	2.6%	4.9%	6.1%	1.7%
1989	46.6%	3.7%	3.1%	1.6%	5.0%	17.1%	5.8%	3.3%	4.8%	7.7%	1.3%
1990	51.0%	3.1%	3.0%	1.6%	4.1%	16.1%	5.6%	4.3%	3.4%	6.5%	1.3%
1991	49.9%	3.8%	2.4%	2.7%	4.7%	16.1%	5.6%	4.1%	4.0%	5.4%	1.4%
1992	49.9%	4.2%	2.4%	2.5%	4.1%	16.5%	4.6%	4.3%	3.8%	6.5%	1.2%
1993	47.1%	4.4%	2.8%	4.1%	3.7%	16.9%	4.9%	5.4%	4.2%	5.4%	1.2%
1994	48.6%	4.9%	3.5%	4.0%	3.4%	15.4%	4.7%	5.3%	3.3%	5.5%	1.3%
1995	49.8%	5.3%	3.2%	5.1%	3.7%	13.1%	4.6%	5.2%	3.4%	5.1%	1.6%
1996	47.0%	6.4%	2.7%	5.6%	4.0%	14.5%	4.5%	5.4%	3.1%	5.0%	1.7%
1997	46.3%	7.0%	2.2%	6.0%	4.0%	14.3%	3.9%	5.5%	2.9%	5.0%	3.0%
1998	46.9%	7.2%	1.8%	6.3%	3.6%	13.5%	3.9%	5.0%	2.9%	4.7%	4.2%
1999	48.1%	6.9%	1.9%	5.5%	3.4%	12.7%	3.6%	5.2%	2.0%	4.4%	6.3%
2000	52.2%	6.0%	1.9%	5.0%	3.1%	11.1%	2.7%	4.7%	1.9%	3.7%	7.5%
2001	54.4%	5.6%	1.4%	4.2%	2.4%	11.2%	3.0%	4.8%	1.7%	3.5%	7.8%

ECG INDICATION FOR PACING

United Kingdom and Ireland

Year	COMPLETE HEART BLOCK	1st/2nd DEGREE BLOCK	BUNDLE BRANCH BLOCK	NORMAL SINUS RHYTHM	SICK SINUS SYNDROME	AF	Other
1980	56.0%	9.0%	7.0%	2.4%	20.3%	4.5%	0.8%
1981	53.6%	9.2%	6.4%	3.1%	20.4%	5.9%	1.4%
1982	51.3%	11.2%	6.1%	3.3%	20.4%	6.7%	1.0%
1983	50.6%	10.5%	5.4%	3.4%	21.7%	7.2%	1.2%
1984	48.4%	11.1%	5.8%	2.4%	23.3%	7.7%	1.4%
1985	47.2%	11.7%	5.4%	3.1%	23.2%	8.1%	1.2%
1986	46.1%	10.8%	4.9%	3.2%	24.7%	9.0%	1.3%
1987	45.1%	11.4%	4.9%	3.8%	24.3%	9.2%	1.2%
1988	43.7%	11.9%	5.1%	3.0%	24.8%	10.0%	1.4%
1989	41.5%	12.1%	4.6%	3.4%	25.6%	11.2%	1.6%
1990	41.1%	12.2%	4.7%	3.6%	25.1%	12.1%	1.2%
1991	40.7%	13.2%	4.2%	3.2%	24.5%	13.1%	1.1%
1992	38.5%	13.1%	4.2%	4.0%	25.0%	14.0%	1.2%
1993	37.5%	13.6%	4.2%	4.4%	23.9%	15.5%	0.9%
1994	35.0%	13.1%	4.2%	5.3%	24.9%	16.6%	0.9%
1995	33.2%	13.5%	4.2%	5.0%	25.1%	18.0%	1.1%
1996	33.4%	13.4%	4.0%	5.3%	24.4%	18.3%	1.2%
1997	32.6%	14.1%	4.0%	5.0%	25.1%	18.1%	1.1%
1998	31.3%	13.8%	4.0%	5.5%	25.1%	18.9%	1.4%
1999	30.7%	14.1%	4.1%	5.1%	25.8%	19.1%	1.0%
2000	29.9%	13.8%	4.4%	5.7%	26.3%	18.6%	1.4%
2001	28.3%	13.9%	4.2%	5.5%	27.1%	19.6%	1.5%

PRESENTING SYMPTOM FOR PACING

United Kingdom and Ireland

Year	SYNCOPE	DIZZY SPELLS	BRADY-CARDIA	HEART FAILURE	TACHY-CARDIA	PROPHY-LACTIC	Other
1980	58.4%	24.2%	8.2%	5.0%	1.0%	2.6%	0.4%
1981	57.5%	25.0%	8.2%	5.0%	1.3%	2.3%	0.6%
1982	56.6%	25.6%	7.1%	6.1%	1.0%	3.0%	0.7%
1983	53.9%	26.1%	8.0%	6.5%	1.6%	3.2%	0.7%
1984	52.8%	27.1%	8.5%	6.1%	1.5%	3.1%	0.4%
1985	50.7%	29.0%	8.8%	5.6%	1.8%	3.1%	0.5%
1986	51.6%	29.3%	8.6%	5.2%	1.5%	3.1%	0.3%
1987	50.7%	29.7%	9.3%	4.6%	1.3%	3.2%	0.6%
1988	50.9%	28.8%	10.6%	4.5%	1.7%	2.4%	0.6%
1989	49.6%	30.3%	9.8%	4.9%	1.7%	2.7%	0.5%
1990	49.3%	30.6%	9.8%	4.1%	1.9%	3.3%	0.5%
1991	47.5%	32.0%	10.0%	4.6%	1.7%	3.3%	0.3%
1992	47.2%	32.4%	10.7%	4.0%	1.7%	3.1%	0.3%
1993	47.5%	32.3%	11.1%	3.9%	1.5%	2.8%	0.4%
1994	47.0%	33.6%	10.8%	3.5%	1.3%	3.2%	0.3%
1995	45.0%	33.6%	12.8%	3.0%	1.9%	3.0%	0.3%
1996	45.6%	32.5%	14.0%	2.6%	2.1%	2.7%	0.2%
1997	44.3%	32.4%	14.2%	3.4%	2.1%	2.9%	0.2%
1998	42.5%	32.6%	13.5%	4.5%	2.5%	3.3%	0.4%
1999	41.2%	33.5%	12.4%	5.6%	2.9%	3.4%	0.3%
2000	42.5%	32.2%	12.3%	5.4%	2.8%	3.6%	0.4%
2001	42.0%	32.2%	12.7%	5.7%	2.9%	3.3%	0.4%

REASON FOR PM GENERATOR EXPLANT

United Kingdom and Ireland

Total generator explants in 2001 **3,371**

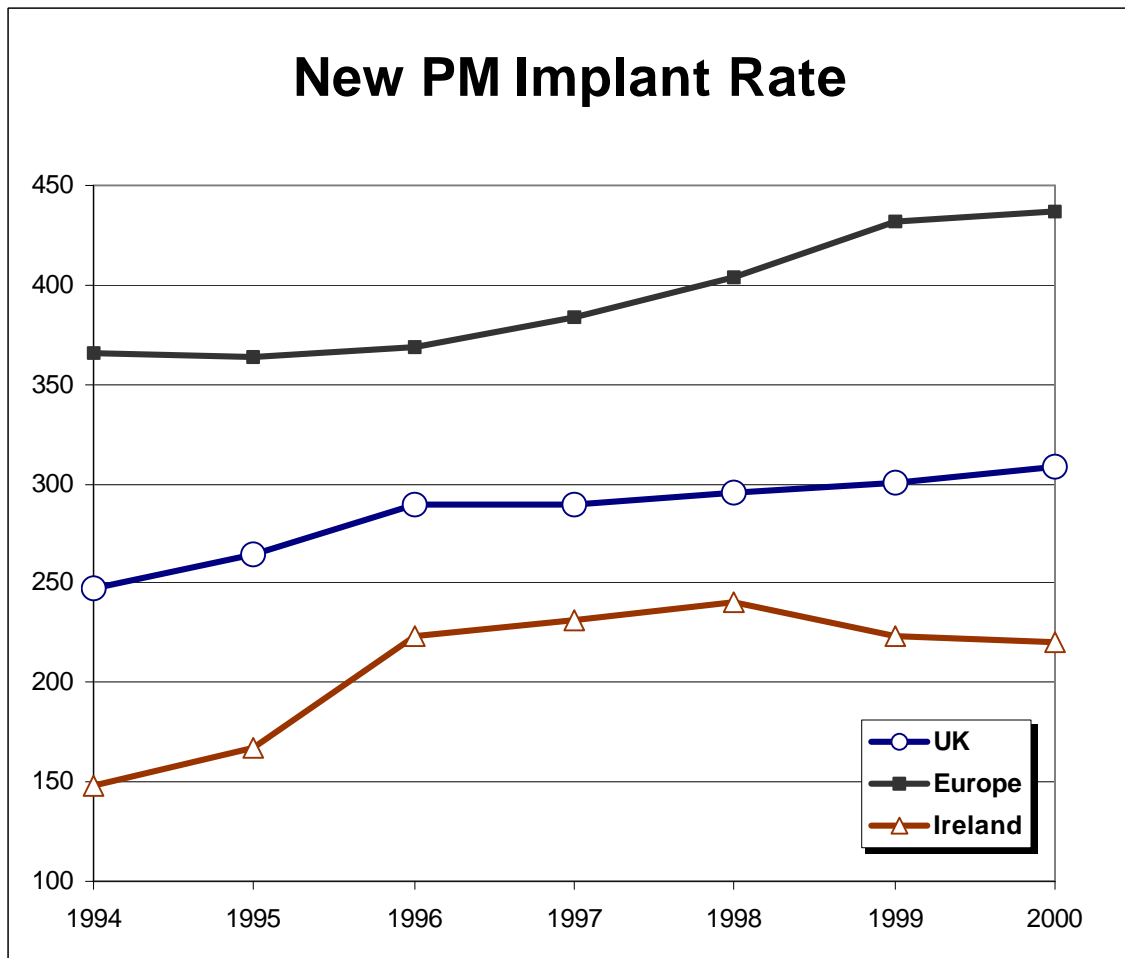
REASON FOR GENERATOR EXPLANT	N	%
BATTERY FAILURE - NORMAL EOL	1,861	55.21%
BATTERY FAILURE - PREMATURE EOL	74	2.20%
ELECTIVE	643	19.07%
EMG INHIBITION	6	0.18%
EROSION	68	2.02%
EXTRACARDIAC STIMULATION	5	0.15%
INFECTION	148	4.39%
MAJOR FAILURE - CONNECTOR	10	0.30%
MAJOR FAILURE - ENCAPSULATION	9	0.27%
MAJOR FAILURE - NO OUTPUT	14	0.42%
MAJOR FAILURE - UNSPECIFIED	18	0.53%
MECHANICAL PROTRUSION	17	0.50%
MINOR FAILURE - MAGNETIC SWITCH	1	0.03%
MINOR FAILURE - OVERSENSING	3	0.09%
MINOR FAILURE - PROGRAMMING	5	0.15%
MINOR FAILURE - UNDERSENSING	7	0.21%
MINOR FAILURE - UNSPECIFIED	16	0.47%
RECALL	240	7.12%
SYSTEM CHANGE - ELECTRODE PROBLEM	108	3.20%
SYSTEM CHANGE - HEMODYNAMIC	74	2.20%
SYSTEM CHANGE - PACER SYNDROME	23	0.68%
SYSTEM CHANGE - PALPITATIONS	11	0.33%
WOUND PAIN	10	0.30%

REASON FOR PM LEAD EXPLANT

United Kingdom and Ireland

	VENTRICULAR		ATRIAL	
Total explants in 2001	464		349	
REASON FOR LEAD EXPLANT	N	%	N	%
CONDUCTOR BREAK	29	6.25%	16	4.58%
CONNECTOR FAILURE	12	2.59%	2	0.57%
DISPLACEMENT	88	18.97%	59	16.91%
ELECTIVE	109	23.49%	116	33.24%
EXIT BLOCK	26	5.60%	16	4.58%
EXTRACARDIAC STIMULATION	4	0.86%	2	0.57%
INFECTION - ULCERATION	122	26.29%	100	28.65%
INSULATION BREAK	54	11.64%	27	7.74%
PERFORATION	4	0.86%	3	0.86%
RECALL	6	1.29%	3	0.86%
UNDERSENSING	8	1.72%	5	1.43%

The European Context: New Pacemaker Implants



'European' figures are an average of:
Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece,
Netherlands, Norway, Spain, Sweden and Switzerland.

U.K. lags behind Europe, and the gap has been INCREASING since 1996.

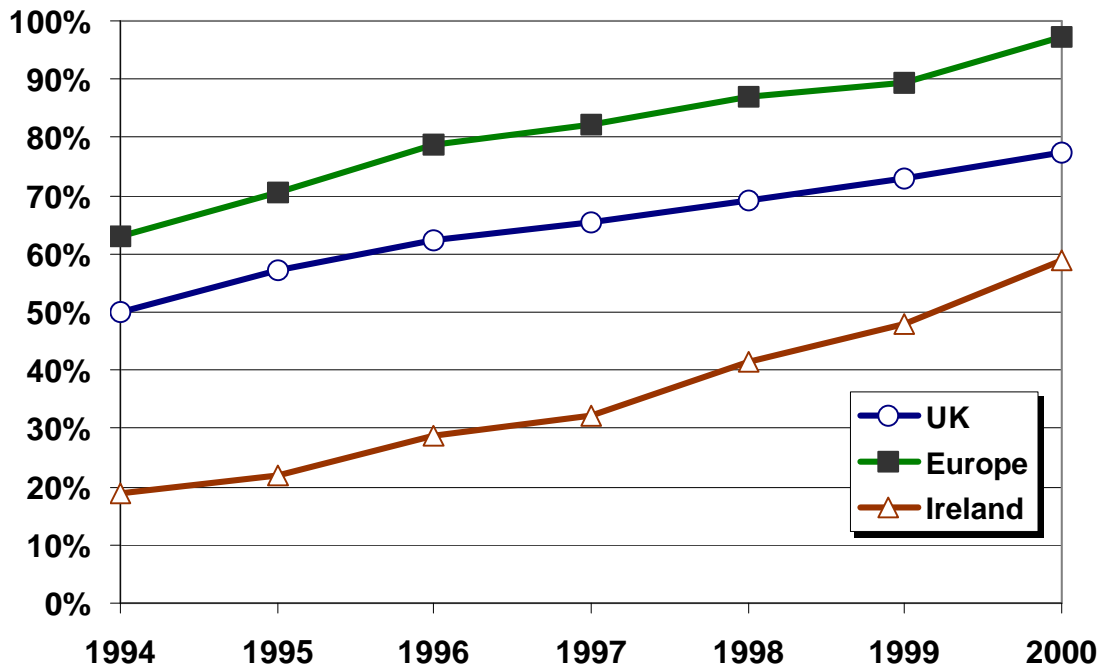
In 2000, BPEG persuaded the British Cardiac Society that a desirable new implant rate would be 450 per million population, in line with European and North American practice, but 50% higher than current U.K. rates.

The Republic of Ireland's new implant rate was 191 in 2000, so the deficit compared to European averages is therefore even greater than for the UK.

European data is currently only available up to 2000.

The European Context: % physiological pacing

% All Physiological Pacing



'European' figures are an average of:
Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece,
Netherlands, Norway, Spain, Sweden and Switzerland.

U.K. implants less physiological devices than the European average.

The Republic of Ireland implants implants much less devices than the average.

European data is currently available up to 2000.

ICD Implantation

ICD Implant Centres

Year	Centres
1989	9
1990	20
1991	22
1992	29
1993	34
1994	41
1995	41
1996	49
1997	52
1998	56
1999	61
2000	60
2001	64

ICD Implants

Year	New	Replacement	All
1989	24	2	26
1990	60	10	70
1991	121	10	131
1992	170	18	188
1993	143	22	165
1994	171	49	220
1995	240	77	317
1996	322	114	436
1997	487	98	585
1998	730	166	896
1999	883	207	1090
2000	1087	246	1333
2001	1275	295	1570

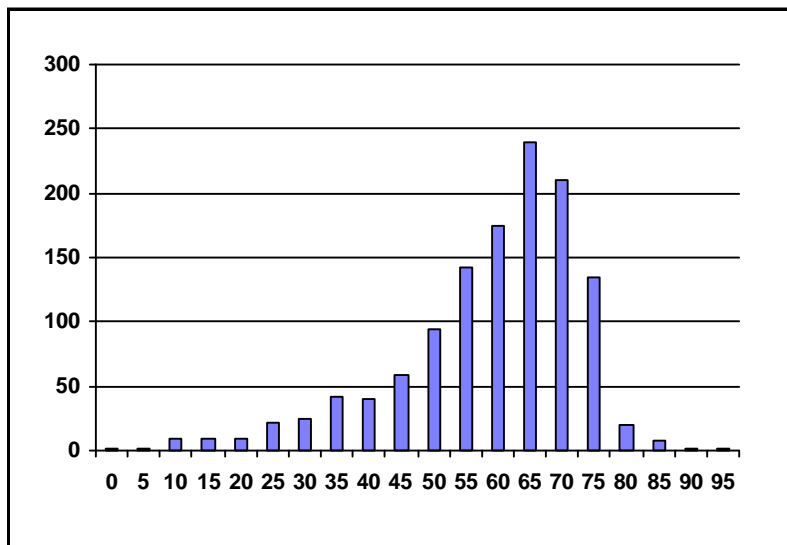
New Implant Rate by Country of Implant Centre

Year	England	Scotland	Wales	N Ireland	Republic of Ireland
1995	4.0	4.9	0.3	8.2	0.5
1996	5.2	7.0	1.7	10.6	1.1
1997	7.8	10.0	5.4	12.4	1.8
1998	12.3	12.5	3.1	14.1	4.2
1999	15.3	9.8	5.4	17.1	6.3
2000	17.5	14.1	8.1	33.0	15.6
2001	21.0	18.2	9.2	27.1	15.6

ICD Implantation: Age

Year	Mean age at first implant
1989	50.4
1990	53.9
1991	58.8
1992	52.2
1993	52.6
1994	55.6
1995	54.9
1996	56.9
1997	59.5
1998	57.7
1999	59.9
2000	60.0
2001	61.4

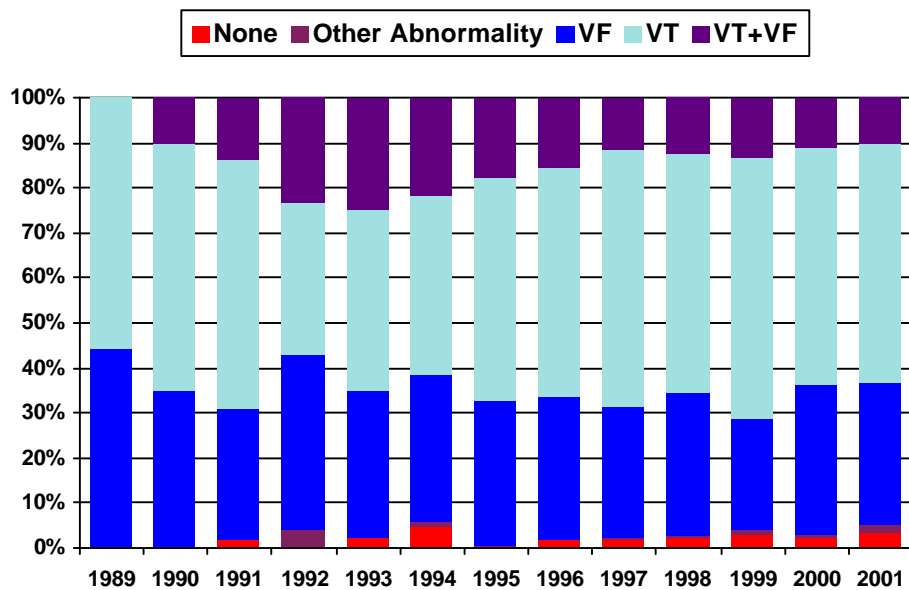
Age distribution of new ICD implants: 2001



ICD Implantation: ECG indication for new implants

Year	VF	VT	VT+VF	OTHER	NONE
1989	4	5			
1990	7	11	2		
1991	17	32	8		1
1992	30	26	18	3	
1993	32	39	24		2
1994	41	49	27	1	6
1995	54	84	30	1	
1996	76	122	37		4
1997	117	229	47	1	8
1998	170	285	66	2	12
1999	139	327	74	5	17
2000	219	351	73	8	14
2001	303	509	96	17	34

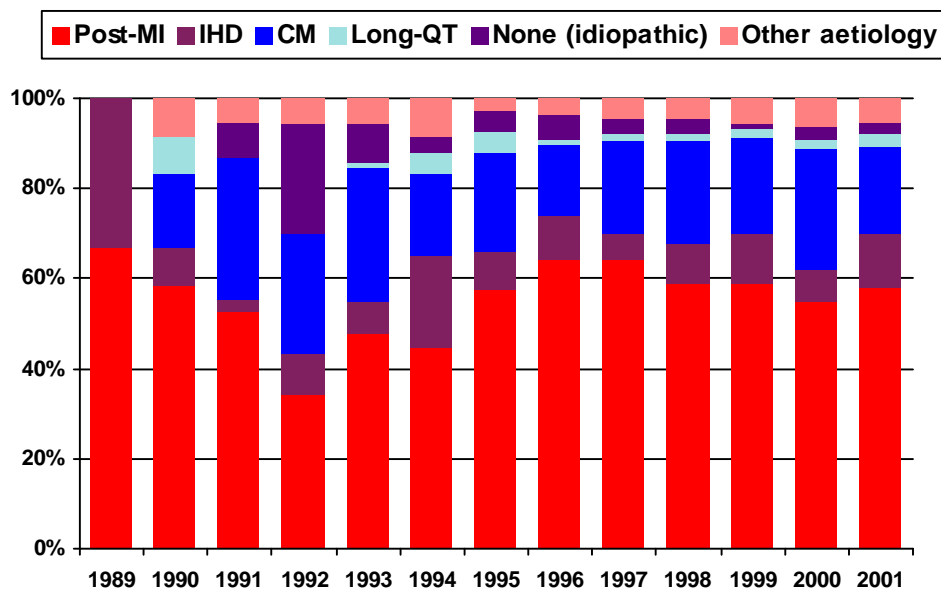
ECG indication for new ICD implants



ICD Implantation: aetiology for new implants

Year	Post MI	Ischaemic	Cardiomyopathy	Long QT	Other	Idiopathic
1989	2	1				
1990	7	1	2	1	1	
1991	20	1	12		2	3
1992	18	5	14		3	13
1993	34	5	21	1	4	6
1994	37	17	15	4	7	3
1995	68	10	26	5	3	6
1996	120	18	30	2	7	10
1997	188	17	61	4	13	10
1998	246	37	96	6	19	14
1999	261	48	94	9	25	5
2000	234	31	114	9	27	12
2001	397	79	133	19	35	20

Aetiology for new ICD implants



ICD Implantation for Secondary Prevention

Current ICD implantation guidelines

Secondary prevention guidelines

- * VT or VF causing syncope or significant haemodynamic compromise
- * sustained VT with EF < 35% and NYHA grade I to III

Aetiology of Secondary Prevention Implants

Year	Total Implants	Post MI	Ischaemic	Cardiomyopathy	Long QT	Idiopathic	Other
1995	112	59.8%	8.0%	20.5%	3.6%	5.4%	2.7%
1996	180	63.9%	10.0%	15.6%	1.1%	5.6%	3.9%
1997	280	65.7%	5.7%	19.6%	1.4%	3.6%	3.9%
1998	403	59.8%	9.2%	21.6%	1.2%	3.5%	4.7%
1999	415	61.9%	11.1%	19.8%	1.7%	1.0%	4.6%
2000	394	57.9%	7.6%	24.1%	1.8%	2.8%	5.8%
2001	634	60.4%	12.1%	17.8%	2.4%	2.4%	4.9%

ICD Implantation for Primary Prevention

Current ICD implantation guidelines

Primary Prevention guidelines - (a) post-MI

ALL OF:

- * history of myocardial infarction
- * NYHA dyspnoea grade I to III
- * LV ejection fraction < 35%
- * non-sustained VT (3 beats to 30 seconds at > 120 bpm on Holter tape)
- * sustained VT induced at EP study

Primary Prevention guidelines - (b) other

- * familial conditions with a high risk of sudden death (e.g. long QT syndrome, hypertrophic cardiomyopathy, Brugada syndrome, arrhythmogenic right ventricular dysplasia, repaired Tetralogy of Fallot)

Aetiology of Primary Prevention Implants

Year	Total Implants	Post MI	Ischaemic	Cardiomyopathy	Long QT	Idiopathic	Other
1995	1				100.0%		
1996	4	50.0%		50.0%			
1997	8	12.5%		75.0%			12.5%
1998	10			90.0%	10.0%		
1999	21	9.5%	9.5%	47.6%	9.5%		23.8%
2000	21	14.3%	4.8%	57.1%	4.8%	4.8%	14.3%
2001	39	20.5%	5.1%	46.2%	7.7%	10.3%	10.3%