ANNUAL REPORT 2002

The Swedish National Hip Arthroplasty Register

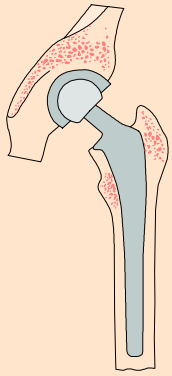
216 226
PRIMARY THR
1979-2002

36 366
REOPERATIONS
1979-2002

19 620
REVISIONS
1979-2002

www.jru.orthop.gu.se

Alingsås
Arvika
Axess Elisabeth-sjukhuset AB
Bollnäs
Borås
Carlanderska
Danderyd
Eksjö
Enköping
Eskilstuna
Falköping
Falun
Frölunda Specialist-sjukhus
Gällivare
Gävle
Halmstad
Helsingborg
Huddinge
Hudiksvall
Hässleholm-Kristianstad
Jönköping
Kalix
Kalmar
Karlshamn
Karlskoga
Karlskrona
Karlstad
Karolinska
Katrineholm
Kungälv
Köping
Landskrona
Lidköping
Lindesberg
Linköping
Linköping Medical Center
Ljungby
Lund
Lycksele
Löwenströmska
Malmö
Mora
Motala
Norrköping
Norrtälje
Nyköping
Ortopediska Huset
Oskarshamn
Piteå
S:t Göran
Sabbatsberg Närsjukhuset
Simrishamn
Skellefteå
Skene
Skövde
Sollefteå
Sophiahemmet
SU/Mölndal
SU/Sahlgrenska
SU/Östra
Sunderby
Sundsvall
Säffle
Södersjukhuset
Södertälje
Torsby
Trelleborg
Uddevalla
Umeå
Uppsala
Varberg
Visby
Värnamo
Västervik
Västerås
Växjö
Ystad
Ängelholm
Örebro
Örnsköldsvik
Östersund



Department of Orthopaedics
Sahlgrenska University Hospital
April 2003

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Foreword

The great news this year is an agreement between the Federation of County Councils and the National Board of Health and Welfare to provide a subsidy for a centre of competence for national orthopaedic registers of quality. Contributions have been given for two years in order to establish this centre. There is great awareness of the national registers' importance for monitoring the quality of care and of the fact that they are of increasing significance for the development of orthopaedic care. However, a continued positive development of national quality registers requires organisational development and regeneration. This centre will support the creation of new registers through information, practical advice and technological IT support, and develop common routines for annual reports. These will be carefully analysed and presented so that they can be used by different types of decision-makers and also by patients. Co-operation with interdisciplinary researchers such as biostatisticians, epidemiologists and health economists can be developed. The registers that have currently agreed to be included in this development are the National Hip Arthroplasty Register, the Swedish Knee Arthroplasty Register (SKR) and Rikshöft-SAHFE (Standardised Audit of Hip Fractures in Europe).

In the National Hip Arthroplasty Register, the definition of failure is as previous revision, i.e. replacement or removal of the prosthesis. This year we have included to report all the re-operations, and thereby want to increase the information. It has also proved possible to register health outcome for the individual patient (EuroQol) via a national register, and to further increase the sensitivity in our evaluation of prosthetic surgery.

Receiving reports

Reporting has been taking place via the Internet for four years. For primary replacements, the reporting takes place rapidly and completely on-line (in 90% of cases). Re-operations and revisions are also reported briefly via internet, but copies of records continue to be sent in order to permit collection of the essential information required for further scientific studies.

Reporting

All publications, scientific exhibitions and annual reports are shown on our web-site www.jru.orthop.gu.se. This year, the confidential information for individual units has been supplemented by information about revision due to deep infection, periprosthetic fractures and dislocation, prior to the aseptic loosening. This will allow local improvement, and hopefully result in increased quality. The number of revisions continues to be the key figure in comparisons. In addition, as a result of the project carried out in Western Götaland, this year we are reporting more sensitive outcomes such as patient satisfaction, disease-specific and general health. Similar activity is now being built up in Norrland and also in the Stockholm region. There is a requirement from the National Board of Health and Welfare and the Federation of County Councils for individual-based health effects to be reported from all quality registers.

As previously, the main part of the annual report presents the results achieved during the last year. We report data distributed according to age and now increasingly also according to gender, which is a requirement from the authorities. It is also our task to try to show and analyse changes over time, and identify important trends. In order to achieve this goal, it is essential to increase the sensitivity in our analyses and obtain a more balanced evaluation of all the surgical interventions.

The national quality registers should strive to present open and generally accessible reports of quality and results. Hitherto we have compared the units' results with conventionally cemented hip prosthesis operations during the last ten years. We in the register management will continue to present suggestions to increased public awareness of our results at the annual register meeting and at the annual meeting of the Swedish association. This may involve reporting all re-operations or including quality of patient health after the operation.

On an international level, several countries have been inspired to start their own registers. They have noted that the improvement in knowledge that the register has created in Sweden offers patients safe and equally good treatment. Within EFORT they are working on a European register, and from the Swedish side we are involved in co-operating in the process in a meaningful way. The key to our success is that the register is owned by the profession, and that it is thus perceived to be meaningful for everyday development. This is difficult to achieve in many countries.

Many thanks for your work during the last year.

Göteborg, April 2003

Peter Herberts Henrik Malchau Göran Garellick

Primary THR

The register shows operations for primary hip arthroplasties from 1979 onwards. Until 1991 the following information per clinic and year was collected: number of primary operations, number and type of implants at the clinics in question. From 1992 there is detailed and individual-based information about the primary operation. The patient's social security number automatically indicates sex and age, and the diagnosis is shown with the ICD-9 code and since 1997 with the ICD-10 code. The type of prosthesis is indicated separately for cup and stem, and also for fixation method. Since January 1999 this information has been recorded via the Internet, and product numbers are used in order to obtain absolutely correct identification of implant parts and cement. 76 out of 81 clinics report via the Internet and 90% are on-line within a week.

In total, during the period 1979-2002 216 226 primary hip arthroplasties have been registered. The 15 most common implants during the last five years are shown in table form. The total number and the number in each year differ from previous annual reports on account of continuous correction of wrong classifications and an occasional addition of newly reported older operations. This year, for example, about 100 hemi-arthroplasty from two hospitals have been identified from the previous year and have been excluded. Four uncemented systems with well-documented function in the mid-term have almost the whole market (CLS, ABG and Trilogy with varying stems). The concentration of systems used is appropriate and desirable before longer-follow-up is available. Hybrid implants are almost unchanged, and here two well documented hybrid systems predominate. A relatively large group of other prostheses indicates greater variation, however, and suggests that reverse hybrids (cemented cups and uncemented stems) are now beginning to be more widely used.

The number of primary arthroplasties is increasing insignificantly this year, and in 2002, 12 651 operations were carried out. University hospitals are continuing to reduce the number of operations, especially Lund and Umeå, and the greatest increase is in the central hospitals and the small rural hospitals, where more than ten are markedly increasing their operations. This is an effect of the concentration on elective surgery in certain central hospitals. The quality at these units must be closely monitored in the coming year.

The number of primary arthroplasties and revisions per year for the three fixation principles is given on page 10. There was a small reduction in the number of revisions last year for cemented and uncemented implants, and a slight increase for hybrids. However, the total revision burden has increased by 0.2%, in total and for cemented implants, which is explained by few revisions being carried out at the beginning of the study period.

Overall, quality in Sweden is very satisfactory, with only 8.3% (=revision burden) of all hip replacements being carried out as re-operations with change or removal of prosthetic parts. If we look just at 2002, the revision burden is 10%. The unfortunate development for uncemented implants is continuing, with an increased revision burden of 19.5% for the whole period. An analysis of which implants that function satisfactorily is given later in the report under Implants. There is a worrying trend with a clear increase in the revision rate of hybrid implants during the last year, and there is every reason to follow this development very closely. It indicates a problem with wear and osteolysis as a result of unsatisfactory material quality and design of joint cups from the 1990s. A special investigation of some components is being carried out for better understanding of the background to these figures.

The distribution of diagnoses shows that primary arthrosis as a cause of hip replacement is continuing to increase and that rheumatoid arthritis is decreasing. It is surprising that the number of primary hip fractures has not increased more in view of the recommendations in the central care programme. For the younger patients, more operations are being carried out for conditions following childhood disease, a probable shift in indication. This year we have introduced new age groups in the tables on pages 11 and 12 in order to give more information. It is interesting that we operated on 2 557 patients under 50 years of age with cemented techniques, 1 251 with hybrid techniques, and 1 320 with uncemented techniques. This even distribution means that in a few years' time we shall be able to carry a very interesting comparison of how these principles are reflected in the younger, more demanding patients. We also have a new and interesting group of 216 young people who were operated on with reversed hybrid, and in total this method has now been used in 794 cases in the country.

The average age for women is generally higher than for men in all diagnostic groups without conditions resulting from childhood disease. Why women undergo surgery later for the same diagnosis is not clear, but may be due to different pain thresholds and tolerance of functional impairment, different natural histories of disease in men and women, or different access to care for the sexes with regard to hip replacement surgery, which in such cases must be noted. The age for primary hip arthroplasty is going down slightly, but there is no real difference from previous years, as a different mathematical calculation, (in which we previously took the half-year as the basis, but now take the exact date), has some effect on the numerical value for age in this year's report. However, there has been no dramatic shift in indications in recent years. The university and regional hospitals operate on the younger patients, and this reflects the need for clinical research and development of better methods for these patients who have the highest failure rate. The rate for primary arthroplasties in this country is still too low to eliminate queues, and there is still varying access to the operation between regions, which is unsatisfactory. The slight increase in performance that has taken place is confined to certain units and areas in the country.

15 Most Common Implants

1992-2002

Cup	Stem	1979-1997	1998	1999	2000	2001	2002	Total
Lubinus All-Poly	Lubinus SP II	21 921	3 313	3 156	3 526	4 199	4 554	40 669
Charnley	Charnley	47 095	1 914	1 771	1 617	1 602	928	54 927
Exeter All-Poly	Exeter Polished	4 683	1 211	415	136	24	23	6 492
Exeter Duration	Exeter Polished	0	0	835	1 394	1 508	1 546	5 283
Reflection	Spectron EF Primary	586	320	533	585	672	691	3 387
Scan Hip Cup	Scan Hip Collar	6 365	105	18	13	0	0	6 501
Charnley Elite	Exeter Polished	64	56	278	429	599	891	2 317
OPTICUP	Scan Hip II Collar	245	251	294	389	381	279	1 839
Charnley	Charnley Elite Plus	506	433	295	159	105	12	1 510
Biomet Müller	RX90-S	883	173	190	197	7	0	1 450
Müller All-Poly	Müller Straight	3 962	97	58	48	71	60	4 296
FAL	Lubinus SP II	0	0	21	212	348	799	1 380
Cenator	Cenator	776	174	133	134	0	0	1 217
Charnley Elite	Charnley Elite Plus	375	106	270	255	151	10	1 167
Reflection	Spectron EF	1 345	69	0	0	0	0	1 414
Others (totally 811)		69 824	2 549	2 316	2 268	2 562	2 858	82 377
Total		158 630	10 771	10 583	11 362	12 229	12 651	216 226

15 Most Common Uncemented Implants

1992-2002

Cup	Stem	1979-1997	1998	1999	2000	2001	2002	Total
CLS Spotorno	CLS Spotorno	285	31	39	42	37	56	490
Omnifit	Omnifit	357	0	0	0	0	0	357
ABG HA	ABG (uncem.)	275	29	0	0	0	0	304
Romanus	Bi-Metric (uncem.)	569	0	0	0	0	0	569
Romanus HA	Bi-Metric HA (uncem.)	106	52	36	27	18	4	243
Romanus	Bi-Metric HA (uncem.)	146	0	1	0	0	0	147
ABGII HA	ABG (uncem.)	2	2	20	35	31	53	143
Allofit	CLS Spotorno	0	0	0	0	35	90	125
PCA	PCA	1 231	0	0	0	0	0	1 231
Secur-Fit	Omnifit	78	22	3	0	0	0	103
Trilogy	Cone (uncem.)	0	15	23	15	18	15	86
Trilogy	CLS Spotorno	0	18	15	4	15	24	76
Trilogy HA	Versys stem (uncem.)	0	0	2	9	16	41	68
ABGII HA	Meridian	0	1	8	9	18	31	67
SLS	CLS Spotorno	56	10	0	0	0	0	66
Others (totally 139)		2 231	87	98	128	125	105	2 774
Total		5 336	267	245	269	313	419	6 849

15 Most Common Hybrid Implants

1992-2002

Cup (uncemented)	Stem (cemented)	1979-1997	1998	1999	2000	2001	2002	Total
Trilogy HA	Spectron EF Primary	115	54	81	152	177	168	747
Trilogy HA	Lubinus SP II	88	67	48	115	139	129	586
Romanus	Bi-Metric (cem.)	535	29	0	0	0	0	564
ABG HA	Lubinus SP II	278	55	0	0	0	0	333
Harris-Galante II	Lubinus SP II	273	0	0	0	0	0	273
ABG HA	ABG (cem.)	252	3	0	0	0	0	255
ABGII HA	Lubinus SP II	27	10	59	52	31	13	192
Romanus	RX90-S	151	11	14	7	0	0	183
Omnifit	Lubinus SP II	172	0	0	0	0	0	172
Harris-Galante II	Spectron EF	162	0	0	0	0	0	162
Harris-Galante II	Charnley	155	0	0	0	0	0	155
Reflection HA	Lubinus SP II	50	24	12	19	12	19	136
Duralock (uncem.)	Spectron EF Primary	50	32	20	10	0	0	112
Romanus	Lubinus SP II	139	0	0	0	0	0	139
Trilogy HA	Optima	61	26	10	0	0	0	97
Others (totally 197)		2 481	167	238	184	171	246	3 487
Total		4 989	478	482	539	530	575	7 593

15 Most Common Cup Components

1992-2002

Cup	1979-1997	1998	1999	2000	2001	2002	Total
Lubinus All-Poly	43 931	3 378	3 179	3 543	4 229	4 580	62 840
Charnley	49 087	2 540	2 150	1 828	1 865	1 188	58 658
Exeter All-Poly	4 831	1 279	422	139	24	25	6 720
Exeter Duration	0	1	905	1 443	1 587	1 630	5 566
Charnley Elite	1 141	255	702	958	1 072	1 229	5 357
Reflection	2 000	401	547	606	703	716	4 973
Scan Hip Cup	8 140	205	80	42	13	2	8 482
Biomet Müller	2 967	233	349	440	287	258	4 534
OPTICUP	1 289	514	487	426	421	312	3 449
Cenator	1 063	573	431	373	195	3	2 638
Trilogy HA	435	186	149	294	390	435	1 889
Müller All-Poly	4 612	131	158	102	117	72	5 192
FAL	0	0	21	213	349	809	1 392
Romanus	1 677	45	15	7	0	0	1 744
ABG HA	930	117	0	0	0	0	1 047
Others (totally 143)	36 527	913	988	948	977	1 392	41 745
Total	158 630	10 771	10 583	11 362	12 229	12 651	216 226

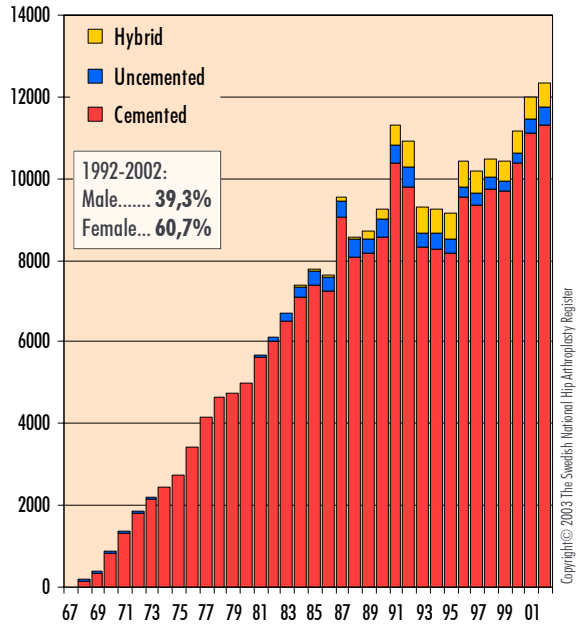
15 Most Common Stem Components

1992-2002

Stem	1979-1997	1998	1999	2000	2001	2002	Total
Lubinus SP II	24 912	3 992	3 820	4 222	4 967	5 784	47 697
Charnley	48 178	1 937	1 781	1 624	1 607	929	56 056
Exeter Polished	14 817	1 601	1 824	2 241	2 514	2 940	25 937
Spectron EF Primary	805	487	737	840	940	961	4 770
Charnley Elite Plus	892	723	701	445	284	28	3 073
Scan Hip Collar	6 552	107	18	14	0	0	6 691
Scan Hip II Collar	431	291	301	409	427	280	2 139
Bi-Metric (cem.)	3 008	96	8	0	0	0	3 112
Spectron EF	2 384	142	1	0	3	6	2 536
RX90-S	1 093	184	209	207	7	2	1 702
Müller Straight	4 089	100	77	77	109	103	4 555
Optima	1 087	182	128	41	1	0	1 439
Cenator	798	175	133	134	0	0	1 240
CPT	202	76	147	237	292	279	1 233
Lubinus IP	17 699	19	1	0	0	0	17 719
Others (totally 148)	31 683	659	697	871	1 078	1 339	36 327
Total	158 630	10 771	10 583	11 362	12 229	12 651	216 226

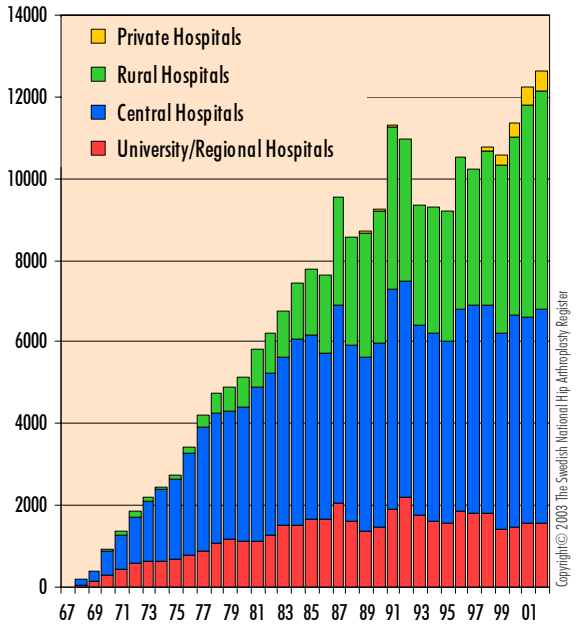
Number of Primary THR

Per Type of Fixation, 1967-2002



Number of Primary THR

Per Type of Hospital, 1967-2002



Number of Primary THR per Hospital and Year

Hospital	1979-1997	1998	1999	2000	2001	2002	Total
Alingsås	738	71	86	98	119	114	1 226
Arvika	707	27	52	41	20	20	867
Axess Elisabethsjukhuset AB	0	0	21	44	35	30	130
Bollnäs	614	107	92	99	106	108	1 126
Borås	3 478	181	197	148	169	127	4 300
Carlanderska	737	29	43	66	83	73	1 031
Danderyd	3 779	275	341	392	331	329	5 447
Eksjö	2 629	173	171	163	162	177	3 475
Enköping	489	31	74	103	105	134	936
Eskilstuna	2 996	154	149	145	113	75	3 632
Falköping	769	29	67	83	252	260	1 460
Falun	3 218	323	261	206	207	180	4 395
Frölunda sjukhus	0	0	0	0	0	1	1
Gällivare	1 356	85	74	92	111	87	1 805
Gävle	3 354	202	215	233	195	218	4 417
Halmstad	2 025	159	192	220	221	201	3 018
Helsingborg	2 627	111	117	179	152	176	3 362
Huddinge	3 502	173	124	171	148	202	4 320
Hudiksvall	1 480	122	86	129	139	164	2 120
Hässleholm-Kristianstad	3 312	226	258	306	333	483	4 918
Jönköping	2 392	141	152	175	196	165	3 221
Kalix	320	42	132	62	61	82	699
Kalmar	2 434	166	178	189	161	189	3 317
Karlshamn	771	79	61	94	132	122	1 259
Karlskoga	1 264	103	99	121	127	136	1 850
Karlskrona	1 776	124	83	90	42	50	2 165
Karlstad	2 788	105	119	85	92	161	3 350
Karolinska	2 225	113	122	178	342	293	3 273
Katrineholm	528	114	96	124	133	207	1 202
Kungälv	630	244	206	139	191	199	1 609
Köping	424	170	201	187	228	190	1 400
Landskrona	1 585	135	203	323	302	300	2 848
Lidköping	821	128	133	101	152	110	1 445
Lindesberg	929	84	106	107	83	132	1 441
Linköping	3 758	254	207	152	136	237	4 744

(continues on the next page)

Number of Primary THR per Hospital and Year (cont.)

Hospital	1979-1997	1998	1999	2000	2001	2002	Total
Linköping Medical Center	15	0	0	3	19	5	42
Ljungby	1 085	103	102	98	138	138	1 664
Lund	3 310	187	144	98	104	73	3 916
Lycksele	891	131	74	107	155	199	1 557
Löwenströmska	729	0	0	6	70	99	904
Malmö	4 425	246	192	202	176	100	5 341
Mora	1 442	127	143	134	169	132	2 147
Motala	864	116	140	127	123	148	1 518
Norrköping	3 056	222	232	206	214	219	4 149
Norrtälje	469	90	97	88	101	106	951
Nyköping	1 496	109	92	86	127	126	2 036
Ortopediska Huset	1	0	99	116	119	142	477
Oskarshamn	846	79	77	85	113	112	1 312
Piteå	345	80	64	62	72	98	721
S:t Göran	4 880	464	408	506	549	463	7 270
Sabbatsberg Närsjukhuset	0	96	138	207	238	336	1 015
Simrishamn	662	0	0	0	29	153	844
Skellefteå	1 166	135	102	116	147	160	1 826
Skene	362	54	51	64	90	83	704
Skövde	3 920	155	142	141	137	143	4 638
Sollefteå	781	70	61	57	104	130	1 203
Sophiahemmet	2 872	121	219	252	247	177	3 888
SU/Mölndal	1 588	138	118	160	150	123	2 277
SU/Sahlgrenska	3 152	255	189	177	192	200	4 165
SU/Östra	3 042	189	136	151	129	173	3 820
Sunderby (inclusive Boden)	3 541	175	103	95	151	127	4 192
Sundsvall	3 692	220	177	151	200	198	4 638
Säffle	694	119	147	115	181	43	1 299
Södersjukhuset	4 192	303	329	311	238	279	5 652
Södertälje	64	77	101	119	135	126	622
Torsby	655	32	90	100	132	74	1 083
Trelleborg	1 401	159	189	157	193	166	2 265
Uddevalla	2 731	186	134	301	202	290	3 844
Umeå	3 357	113	113	97	72	44	3 796
Uppsala	3 513	292	200	254	255	259	4 773

(continues on the next page)

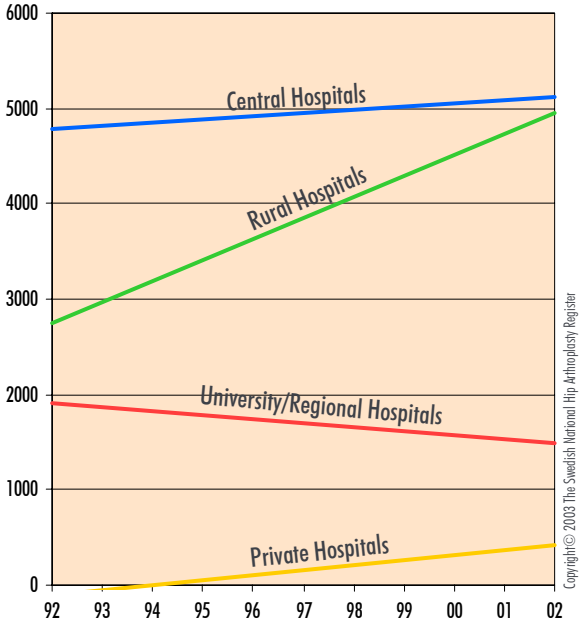
Number of Primary THR per Hospital and Year (cont.)

Hospital	1979-1997	1998	1999	2000	2001	2002	Total
Varberg	2 238	153	148	174	220	219	3 152
Visby	1 279	78	85	81	85	83	1 691
Värnamo	1 324	90	110	115	98	92	1 829
Västervik	1 557	100	113	118	92	114	2 094
Västerås	2 295	98	77	105	121	121	2 817
Växjö	2 258	89	88	93	106	106	2 740
Ystad	1 572	146	94	130	121	108	2 171
Ängelholm	1 727	161	116	149	184	187	2 524
Örebro	3 356	170	160	141	134	191	4 152
Örnsköldsvik	1 367	100	79	86	90	126	1 848
Östersund	2 547	193	136	130	113	128	3 247
Others [1)]	10 398	70	56	46	15	0	10 585
Total	158 630	10 771	10 583	11 362	12 229	12 651	216 226

1) The table contains even hospitals that in the past have performed THR.

Trends in Primary THR

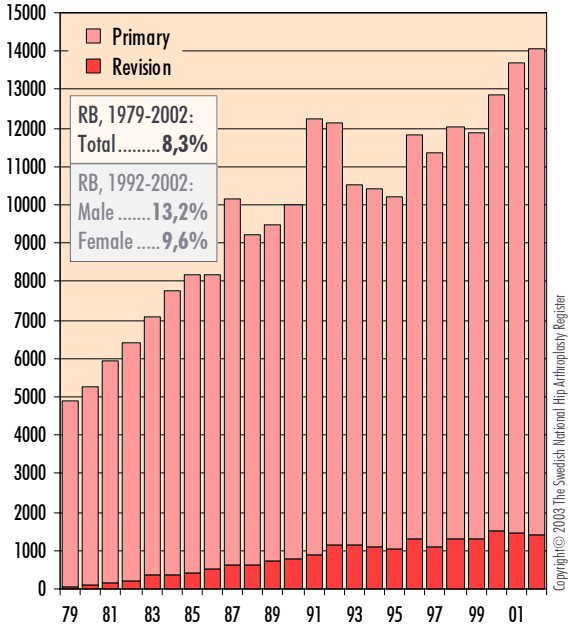
Per Type of Hospital, 1992-2002



Years				
1992	2 217	5 280	3 446	5
1993	1 746	4 681	2 917	13
1994	1 637	4 587	3 062	19
1995	1 546	4 471	3 163	0
1996	1 864	4 963	3 682	0
1997	1 795	5 085	3 338	1
1998	1 822	5 085	3 766	96
1999	1 427	4 779	4 116	258
2000	1 480	5 175	4 337	370
2001	1 554	5 030	5 234	411
2002	1 581	5 246	5 311	513

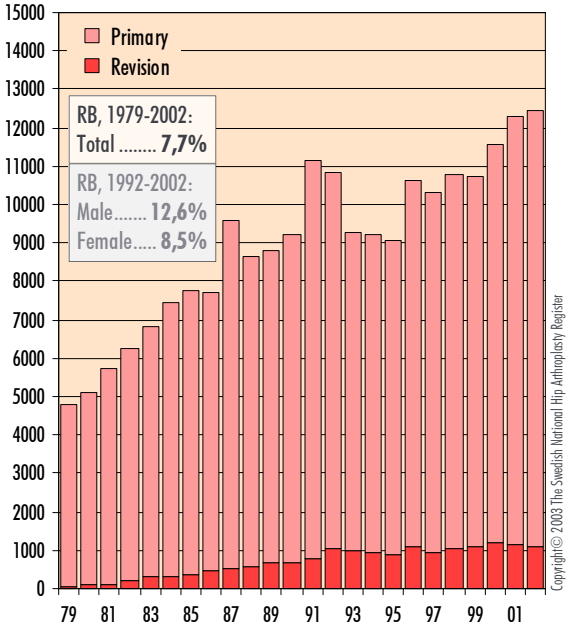
Number of THR per Year

216 226 Primary THR, 19 620 Revisions, 1979-2002



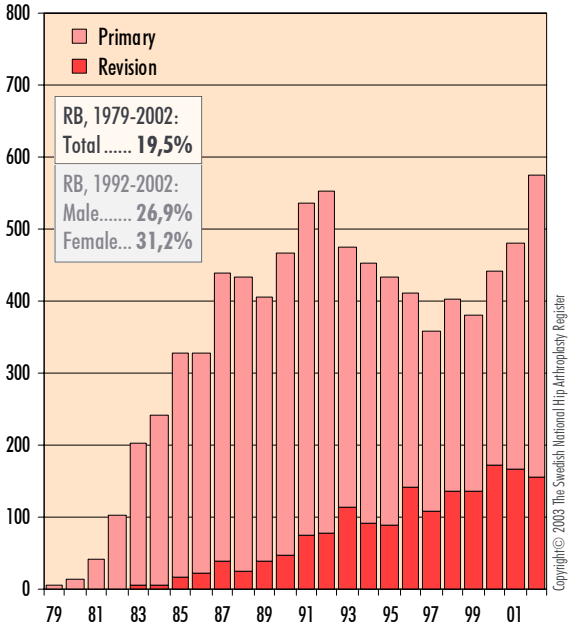
THR with Cemented Implants

199 624 Primary THR, 16 537 Revisions, 1979-2002



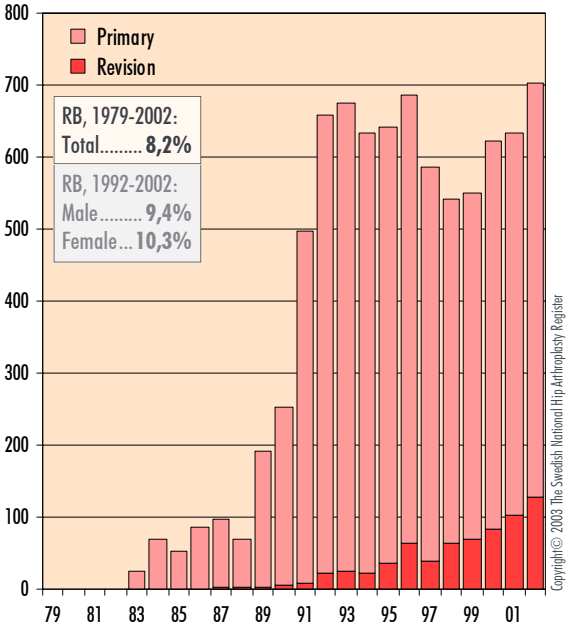
THR with Uncemented Implants

6 849 Primary THR, 1 660 Revisions, 1979-2002



THR with Hybrid Implants

7 593 Primary THR, 679 Revisions, 1979-2002



Number of Primary THRs per Diagnosis and Year

Diagnosis	1992-1997	1998	1999	2000	2001	2002	Total
Primary osteoarthritis	40 510	8 153	8 117	8 806	9 577	10 182	85 345
Fracture	5 933	1 408	1 394	1 492	1 521	1 411	13 159
Inflammatory arthritis	3 341	542	427	399	424	360	5 493
Idiopathic femoral head necrosis	1 611	337	350	359	363	328	3 348
Childhood disease	609	142	199	225	255	290	1 720
Secondary osteoarthritis	1 286	3	0	1	0	1	1 291
Tumor	141	72	66	71	72	69	491
Secondary arthritis after trauma	212	27	20	9	17	10	295
(missing)	4 325	57	10	0	0	0	4 392
Total	57 968	10 741	10 583	11 362	12 229	12 651	115 534

Number of Primary THRs per Diagnosis and Age

1992-2002

Diagnosis	< 50 years	50-59 years	60-75 years	> 75 years	Total
Primary osteoarthritis	2 777	11 447	46 295	24 826	85 345
Fracture	188	596	4 522	7 853	13 159
Inflammatory arthritis	971	1 065	2 592	865	5 493
Idiopathic femoral head necrosis	328	397	1 167	1 456	3 348
Childhood disease	660	546	411	103	1 720
Secondary osteoarthritis	94	110	468	619	1 291
Tumor	63	116	207	105	491
Secondary arthritis after trauma	46	45	109	95	295
(missing)	276	443	2 112	1 561	4 392
Total	5 403	14 765	57 883	37 483	115 534

Number of Primary Uncemented Implants per Diagnosis and Age

1992-2002

Diagnosis	< 50 years	50-59 years	60-75 years	> 75 years	Total
Primary osteoarthritis	722	1 307	453	8	2 490
Fracture	21	18	6	1	46
Inflammatory arthritis	167	43	10	1	221
Idiopathic femoral head necrosis	60	38	4	1	103
Childhood disease	194	100	23	0	317
Secondary osteoarthritis	31	7	4	1	43
Tumor	1	3	0	0	4
Secondary arthritis after trauma	16	2	0	0	18
(missing)	108	103	49	3	263
Total	1 320	1 621	549	15	3 505

Number of Primary THR per Type of Fixation and Age

1992-2002

Type of Fixation	< 50 years	50-59 years	60-75 years	> 75 years	Total
Cemented	2 557	10 097	54 787	36 879	104 320
Hybrid	1 251	2 577	2 093	262	6 183
Uncemented	1 320	1 621	549	15	3 505
Reversed hybrid	216	382	170	26	794
(missing)	59	88	284	301	732
Total	5 403	14 765	57 883	37 483	115 534

Number of Primary THR per Type of Fixation and Year

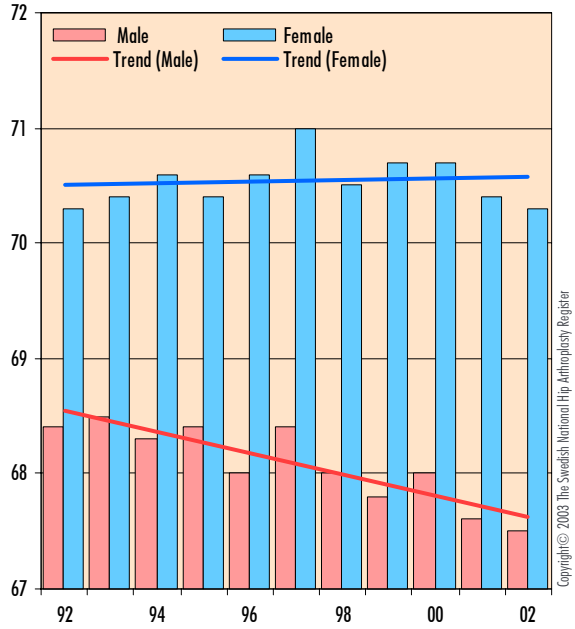
Type of Fixation	1992-1997	1998	1999	2000	2001	2002	Total
Cemented	52 088	9 714	9 682	10 369	11 135	11 332	104 320
Hybrid	3 579	478	482	539	530	575	6 183
Uncemented	1 992	267	245	269	313	419	3 505
Reversed hybrid	178	53	79	119	159	206	794
(missing)	131	229	95	66	92	119	732
Total	57 968	10 741	10 583	11 362	12 229	12 651	115 534

Number of Primary THR per Brand of Cement and Year

Cement brand	1992-1997	1998	1999	2000	2001	2002	Total
Palacos with Gentamycin	37 287	8 193	8 961	9 866	10 948	9 515	84 770
Palacos	7 022	605	277	136	7	5	8 052
Refobacin-Palacos R	0	0	0	0	91	1 673	1 764
CMW	1 467	158	0	2	0	2	1 629
Simplex	1 409	15	0	0	0	0	1 424
Palacos low viscosity with Gentamycin	880	77	0	0	0	0	957
CMW with Gentamycin	1	30	424	257	33	13	758
Palacos low viscosity	170	210	0	0	0	0	380
Sulfix	250	0	0	0	0	0	250
Simplex with Tobramycin	0	0	0	26	15	1	42
Cemex with Gentamycin	0	5	3	11	2	0	21
Osteobond	18	1	0	0	0	0	19
Boneloc	14	0	0	0	0	0	14
Copal	0	0	0	2	6	4	12
DuraCem 1 with Gentamycin	0	0	1	5	3	1	10
Cemex	2	1	4	2	0	0	9
CMW2 (low viscosity)	2	0	0	0	0	0	2
(partly cementless)	6 991	914	813	942	991	1215	11 866
(missing)	2 455	532	100	113	133	222	3 569
Total	57 968	10 741	10 583	11 362	12 229	12 651	115 534

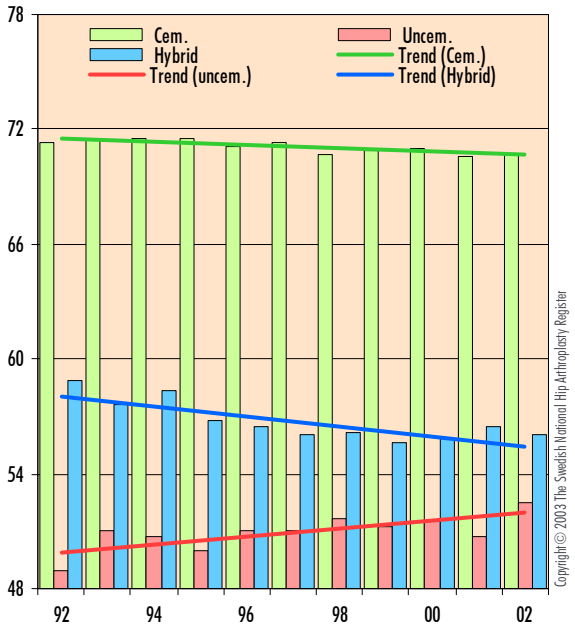
Average Age

per Gender, 1992-2002



Average Age

per Type of Fixation, 1992-2002



Average Age per Diagnosis and Gender

1992-2002

Diagnosis	Male	Female	Total
Fracture	73,9	76,9	76,3
Secondary osteoarthritis	67,9	73,2	71,6
Idiopathic femoral head necrosis	62,7	73,2	70,1
Primary osteoarthritis	68,2	70,1	69,3
Secondary osteoarthritis after trauma	61,5	68,1	66,2
Tumor	68,5	61,4	64,1
Inflammatory arthritis	60,6	62,6	62,1
Childhood disease	55,2	52,7	53,4
Total	68,0	70,5	69,6

Average Age per Type of Hospital and Gender

1992-2002

Type of Hospital	Male	Female	Total
Rural Hospitals	68,8	71,1	70,2
Central Hospitals	68,0	70,7	69,7
Private Hospitals	68,5	68,7	68,6
University/Regional Hospitals	65,9	69,0	68,0
Total	68,0	70,5	69,6

Follow-up model for patient-related outcomes

Hip follow-up in Region West

On January 1, 2002, after two years of preparation, a pilot project started in Region West. All 11 orthopaedic clinics are participating. The main objective of the study is to include patient-related outcome and some radiographic variables in the register database. In this way, the quality and sensitivity of the register analysis should be increased. The measure also fulfils the requirement of the medical quality register by the National Board of Health and Welfare and the Federation of County Councils a few years ago – namely that health outcome for individual patients should be reported. Apart from the register's increased sensitivity, a number of positive clinical and health-economic "spin-off" effects can be achieved. With early detection of asymptomatic changes revealed only by radiography, technically demanding revisions can probably be avoided and the number of late periprosthetic fractures reduced. From the health economics aspect, an effective instrument for analysis of cost effectiveness and allocation of resources can be obtained.

This follow-up system aims to become a standardised and nationwide routine after total hip replacement surgery. Today, follow-up routines vary greatly between different hospitals in the country.

Clinical outcome measurements can be carried out with disease-specific and/or generic instruments (quality of life) – the optimum is to use both. If a generic instrument is used prospectively, and the cost of the measure is known, the cost-utility of the intervention can be calculated.

In the hip arthroplasty register, results are reported by, among other things, "survival" technique with revision or removal of prosthesis components as the definition of failure. However, with this technique there are disadvantages in the form of delayed and late reporting of failure on account of waiting times and absence of a precise indication for revision. There are also unrevealed numbers due to contraindications for further surgery and patient dissatisfaction that are not implant-related.

Loosening and wear of the prosthesis, with or without periprosthetic bone loss (osteolysis), is generally a progressive and clinically silent process, and therefore patients come for consultation only at a late stage. Surgical intervention at an earlier stage may lead to a safer and less expensive revision procedure with better long-term results and with lower patient morbidity.

Method

All patients who undergo primary total hip arthroplasty complete a specially designed form (validity and reliability tested on 280 patients) pre-operatively and after 1, 6 and 10 years. Radiographic control is carried out post-operatively and after 6 and 10 years. The clinical form, contains 10 questions (11 post-operatively), is self-administered, and consists of demographic variables, EuroQol (EQ-5D, generic part), and VAS for pain and satisfaction (disease-specific part). The radiographic analysis consists of 5 simple questions addressed to the surgeon or radiologist. Patients who have had an operation with an undocumented prosthesis, such as in trials and/or are judged to be a high-risk patient, are followed-up by the responsible surgeon, but are also included in the routine at 1, 6 and 10 years.

In order to be able to estimate the frequency of "silent complications" without waiting for 6 years, a retrospective part has also been started in the project. The entire cohort of patients who underwent primary hip arthroplasty between 1996 – and May 1997 in all the region's hospitals (approx. 2400 patients) have been checked with the questionnaires and radiography as described above. A method CD has been produced and distributed to all the units involved.

The follow-up will not involve visit in the orthopaedic clinics, but will be done through the forms and visits for radiographic examination. Patients with symptoms are recommended to contact their orthopaedic surgeon, and if clear radiographic findings are found requiring action or closer follow-up, the patient is informed. Patients are informed of this routine in a standardised follow-up letter.

Preliminary results

Patient-related outcomes – prospective part

The pre-operative database includes 1 650 patients (March 20, 2003) and 300 of them have undergone 1-year follow-up up. The average age when surgery was performed was 70 years (25-99 years). The patients classified themselves in the following demographic groups (Charnley category): A 49% (unilateral hip disease), B 12% (bilateral hip disease) and C 39% (multiple joint disease or intercurrent disease that affects walking). As expected, in this age group there is a large proportion of patients in group C, and this should be taken into account in all forms of analysis of results. For obvious reasons, the patients with multiple diseases do not obtain the same improvement after surgery as A- and B-patients. This applies particularly to effect on health measured with generic instruments, which in turn can affect any cost-utility analysis. If such an analysis is used for comparison between different medical interventions, it is necessary to indicate the patients' demographic profiles – "case mix"!

In the following tables, the results (mean values) found up to now are given for all patients in the prospective part of the project, and also divided into patients belonging to Charnley categories A+B and C.

All patients	Preop. n=1650	1 year n=300
VAS – pain	65	9
VAS – satisfaction	–	10
EQ-5D health index	0,38	0,74
EQ-5D health VAS	51	80

Charnley category A+B	Preop. n=1006	1 year n=162
VAS – pain	59	3
VAS – satisfaction	–	9
EQ-5D health index	0,41	0,84
EQ-5D health VAS	54	85

Charnley category C	Preop. n=644	1 year n=138
VAS – pain	69	21
VAS – satisfaction	–	25
EQ-5D health index	0,33	0,60
EQ-5D health VAS	48	70

All patients	Preop.	6 years n=1401
VAS – pain	–	17
VAS – satisfaction	–	20
EQ-5D health index	–	0,73
EQ-5D health VAS	–	70

Charnley category A+B	Preop.	6 years n= 650
VAS – pain	–	11
VAS – satisfaction	–	15
EQ-5D health index	–	0,87
EQ-5D health VAS	–	81

Charnley category C	Preop.	6 years n=751
VAS – pain	–	23
VAS – satisfaction	–	26
EQ-5D health index	–	0,60
EQ-5D health VAS	–	60

VAS–pain: 0–100 (none-intolerable), VAS–satisfaction: 0–100 (satisfied-dissatisfied). The EQ-5D health index is a weighted total value for health (5 questions) with the lowest value –0.594 and the best 1.0. The EQ-5D health VAS for total health, assessed by the patient with 0 as the poorest health and 100 as the maximum health.

The 1-year results up to now show on average very good pain relief and a high degree of satisfaction with, as expected, rather lower results in the group with multiple joint disease or co-morbidity.

The incidence of dissatisfied (VAS ≥ 80) patients in the whole group was 4%, in the A+B group 2%, and in the C-group 6%. The improvement values of EQ-5D can be used as the denominator for calculating the cost-utility effect:

cost/quality of life obtained x duration = quality adjusted life (**QALY**).

Patient related outcomes – retrospective part
Up to now, 1401 patients have been checked in the retrospective 6-year cohort. The average age when surgery was performed was 71 years (19-95 years). Charnley classification: A 35%, B 11% and C 54%. Response rate after 1 reminder was 92%. Of those who did not reply, relatives reported that 4% were too old or demented to be able to answer the question and 4% were not heeded. The results can be seen from the following tables:

The frequency of dissatisfied (VAS ≥ 80) patients was 3% in the whole group, 2% in the A+B group and 4% in the C group.

The results 6 years after operation are on average marginally poorer than the 1-year results; this is probably due for the most part to advanced age.

Radiographic results
The retrospective part of the project will continue until May 31, 2003. Radiographic analyses and evaluation of these is in progress. Up to now, 1 039 patients have been followed up with radiography. The analyses are being carried out by the local orthopaedic surgeon or radiologist, and preliminary results are shown in the table below:

Radiographic results (n=1 039)	**Share**
Cup loosening	7%
Pelvic osteolysis	2%
Poly wear	6%
Stem loosening	2%
Femur osteolysis	4%

Radiographic changes were thus found in 12% (125 pa-

Concluding evaluation	**Share**
No loosening and/or osteolysis	88%
Waiting list for revision	1%
Expectance — control after 1 year	10%
Medical contraindications for revision surgery	1%

tients), and 1% (12 patients) were scheduled for revision.

It should be pointed out that the above results are not the definitive X-ray department outcomes for the entire cohort that underwent surgery between 1996 and May 31, 1997. According to the register, 83 patients have already undergone revision. Added to these are approx. 17% who have died and approx. 6% who have refused radiographic examination. Also, the radiographic examinations are not entirely in phase with the clinical examinations on due to waiting times in the radiography departments.

A 10-year check in the same way would have been of great value but has not been included in the pilot project in Region West. However, it is desirable for a 10-year check to be carried out, perhaps in another region before the routine is introduced nationwide. Another not insignificant factor is that the Region West is greatly dominated by the Lubinus prosthesis, and the outcome may be different if a different prosthesis design is predominant.

Interpretation of the result
The results so far must be evaluated with great caution and considered to be preliminary. Only approx. 20% of the prospectively collected patients have undergone the 1-year follow-up, and the radiographical questionnaire must be tested for basic methodological requirements. An inter- and intra-observer analysis of 220 radiological examinations has just begun. This is part of a validation and reliability process of the radiological instrument.

As expected, the analysis shows a number of cases with hitherto unknown radiological changes (whose value we cannot yet entirely decide) and a number of patients who are dissatisfied with the result after hip arthroplasty. Survival analysis with revision as a failure definition in an observational study is an accurate and statistically powerful instrument, but at the same time rather blunted by the risk of over-optimistic interpretation of the result after hip prosthesis surgery (*Söderman, P. On the validity of the results from the Swedish National Total Hip Arthroplasty Register. Thesis, Gothenburg University, Gothenburg, Sweden 2000., Garellick G, Malchau H, Herberts P. Survival of total hip replacements: A comparison of a randomized trial and a registry. Clin Orthop 2000;375:157-167*).

Further development
As stated, the overall aim is to have the routine introduced nationwide. However, we consider a stepwise introduction to be more optimal method. Logistics, instruments and cost-effectiveness should be tested and evaluated within limited regions before possible national implementation. The next region to use the follow-up routine is Norrland, probably starting in autumn 2003.

The clinical form is designed so that it can be used not only for hip surgery, but also for the majority of all surgical and medical interventions. If this becomes a reality in the future, we can for the first time create an instrument for a methodologically adequate comparison of the cost-utility ratio (cost-effectiveness) of different medical interventions.

One of the long-term aims is that the routine will be "paperless", i.e. all entering of data will be done digitally. The self-administered form that is made to the patient is difficult to computerise, but can perhaps in the future be completed by many patients via the Internet (via a temporary password that is connected to the ID number). The entire follow-up function is already on the register's homepage. The clinical form is developed for touch-screen use. In addition to being time-saving, this technology is also methodologically attractive, as the patient is "forced" to answer all questions in order to proceed in the questionnaire.

If and when the digitalisation is carried out in all X-ray departments in the country, the radiography routine can possibly be radically simplified with the aid of teleradiology and possible digital and automatic interpretation of the X-ray images.

Our intention is that the orthopaedic unit as with the revision results can compare their patient and radiographic results with the country or rest of the region. In addition, each individual unit can download its own database in Excel or Access format from the register's website.

We are convinced that well-functioning, simple and time-saving registration of patient health data and simple radiographic parameters can further raise the quality and sensitivity in the Total Hip Arthroplasty Register. As a result, improvements can be developed locally, and the quality of management of patients with hip conditions raised throughout Sweden.

Appendix – measurement instruments

Clinical:

Do you have any pain from the other hip? .....yes no

Do you have any reason for having difficulty in walking? (e.g. pain from other joints, backache, vascular ischemia other diseases, that affects your ability to walk).....yes no

VAS–pain: 0–100 (none – intolerable)

VAS–satisfaction: 0–100 (satisfied-dissatisfied).
(The second VAS only in the follow-up form.)

EuroQol (http://www.euroqol.org):

Mobility:
I have no problems in walking about..... ☐
I have some problems in walking about..... ☐
I am confined to bed ..... ☐

Self-Care:
I have no problems with self-care..... ☐
I have some problems washing and dressing myself ..... ☐
I am unable to wash or dress myself ..... ☐

Usual activities (e.g. work, study, housework, family or leisure activities):
I have no problems with performing my usual activities ..... ☐
I have some problems with performing my usual activities ..... ☐
I am unable to perform my usual activities ..... ☐

Pain/discomfort:
I have no pain or discomfort..... ☐
I have moderate pain or discomfort ..... ☐
I have extreme pain or discomfort ..... ☐

Anxiety/Depression:
I am not anxious or depressed..... ☐
I am moderately anxious or depressed ..... ☐
I am extremely anxious or depressed ..... ☐

Compared with my general state of health in the last twelve months, my health today is:
Better..... ☐
Unchanged..... ☐
Worse ..... ☐

VAS–state of health: 0–100 (worst possible state – best possible state)

Radiography:

Cup*:*
1. Definitive loosening .....yes no
2. Pelvic osteolysis.....yes no
3. Poly wear.....yes no

Stem*:*
4. Definitive loosening .....yes no
5. Femoral osteolysis .....yes no

Concluding evaluation*:*
No loosening and/or osteolysis ..... ☐
Waiting list for revision ..... ☐
Expectance – control after 1-2 year..... ☐
Medical contraindications for revision surgery..... ☐

The radiographic assessment takes place only with visual assessment of the last X-ray image without measurement with ruler, angle-measurer, etc. Loosening of the cup is defined as demarcation around the cup according to Hodgkinson et al. Loosening of the stem is defined as visible cement-stem separation, 100% demarcation ("radiolucent line") and/or cement fracture (Harris et al). The standardisation of interpretation of X-rays including the definitions of loosening are described well in the distributed method CDs.

Reoperation

Since it was started in 1979, the register has recorded all reoperations after primary hip arthroplasty. Initially, the closed reductions following dislocated prosthesis that were reported were also registered, but these interventions have not been registered since the middle of 2000. Three categories of reoperations are analysed: revision with change or extraction of a prosthetic component, major reoperation, and minor surgical procedure. Revision is the predominant procedure, accounting for approx. 85% of reoperations, major surgical procedures make up about 10%, and minor procedures approx. 5%. The reasons for reoperation in recent years have remained the same. For the first time, in this year's report we report survival curves with reoperation as failure definition. From the patient's point of view, all repeated operative procedures are obviously of interest, and the difference between cemented and hybrid implants becomes more marked when all reoperations are included. For the cemented implants, the survival curve in the last 10 years has fallen from 94 to 92% if all reoperations are included and the analysis is performed for all diagnoses. For hybrid implants the difference is greater (survival with revision as the definition of failure 85.8% but with reoperation 79.6%).

A more in-depth analysis is to be carried out in order to identify the causes leading to many reoperations with uncemented implants and to explain this problem. For example, are these patients investigated more frequently for pain, technical faults or ectopic new bone formation?

Number of Reoperations per Procedure and Year

Primary THR 1979-2002

Procedure at reoperation	1979-1997	1998	1999	2000	2001	2002	Totalt
Exchange of cup and/or stem or extraction	13 285	1 342	1 388	1 571	1 536	1 497	20 619
Major surgical intervention	1 517	123	183	133	139	136	2 231
Minor surgical intervention	787	58	46	50	86	76	1 103
Closed reduction of dislocated joint	9 655	1 089	1 170	484	0	0	12 398
(missing)	4	0	3	3	3	2	15
Total	25 248	2 612	2 790	2 241	1 764	1 711	36 366

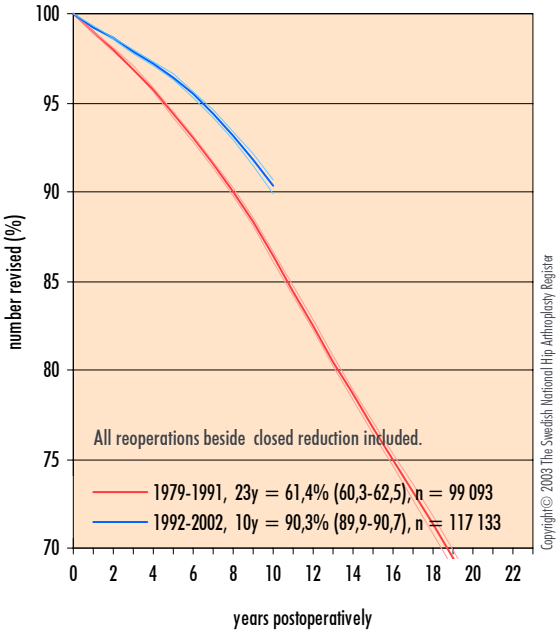
Number of Reoperations per Reason and Year

Primary THR 1979-2002

Reason for reoperation	1979-1997	1998	1999	2000	2001	2002	Total
Dislocation	11 025	1 270	1 378	711	224	219	14 827
Aseptic loosening	9 481	988	954	1 064	1 072	1 056	14 615
Deep infection	1 349	128	103	118	117	130	1 945
Fracture only	848	100	181	173	153	132	1 587
2-stage procedure	621	57	68	68	74	71	959
Miscellaneous	674	40	55	37	73	56	935
Technical error	747	9	13	22	16	24	831
Implant fracture	227	9	21	27	29	14	327
Pain only	230	6	5	6	5	8	260
(missing)	46	5	12	15	1	1	80
Total	25 248	2 612	2 790	2 241	1 764	1 711	36 366

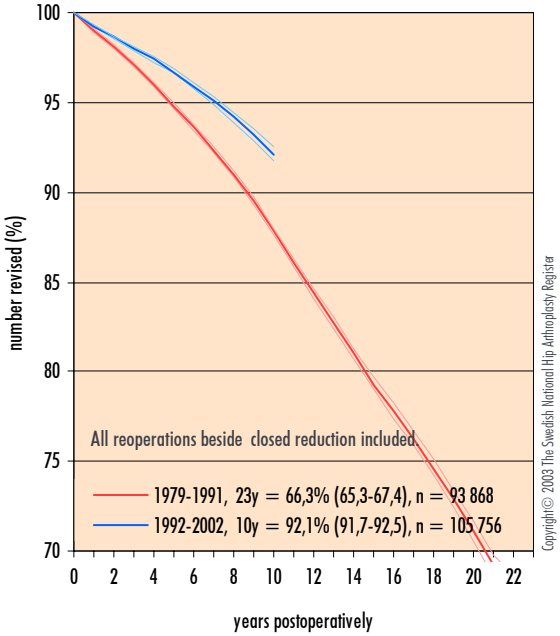
All Implants

All Diagnoses and All Reasons



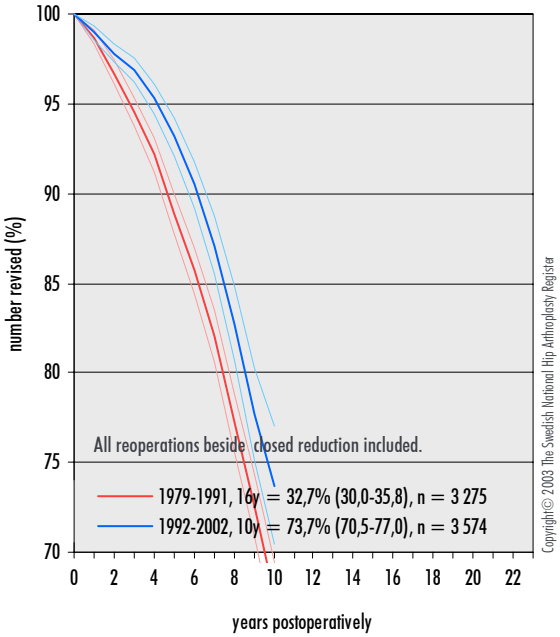
All Cemented Implants

All Diagnoses and All Reasons



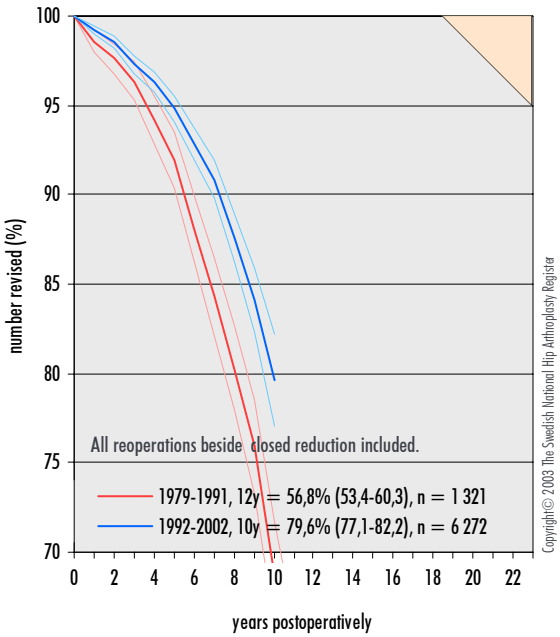
All Uncemented Implants

All Diagnoses and All Reasons



All Hybrid Implants

All Diagnoses and All Reasonss



Revision

The main analysis is based on revision as a measure of failure after primary hip arthroplasty. Revision involves exchange or extraction of one or both components of the prosthesis or part of the prosthetic joint such as polyethylene insert or head component. In the tables on the right the number of revisions per cause and per year and number of previous prosthetic replacements are shown. Only revisions in which the primary operation was carried out in 1979-2002 are included, and the primary operation has to have been included in the register. We are happy to see a reduction in the total number of revisions in 2002, as this indicates a continued improvement in quality as the number of patients with prostheses in the population is constantly increasing. The number of patients with multiple revisions is also decreasing somewhat. In contrast, as mentioned previously, we see that patients who undergo revision for deep infection and recurrent dislocation are over-represented among those who undergo repeated (re-revision), which indicates that this problem is recurrent and difficult to solve. This fact has given rise to our special studies in the area of infection and femoral fracture within the register work.

The total number of revisions between 1979-2002 is 19,620, of which 16,484 are first-time revisions. The revision burden (RB) over the entire period is 8.3% and for 2002 it is 10% of all hip arthroplasties. We use the revision burden as a key figure in international comparisons (crude revision rate). The revision burden in 2002 for cemented implants is 7.8%, for uncemented implants 23%, and for hybrid implants 14%. There is a worrying trend of the revision burden for hybrid implants having constantly increased in the last three years, as can be seen from page 10, while the uncemented implants show an improved quality during the same period, with decreasing revision burdens. Our explanation is that the hybrid implants were introduced later in large numbers but with the same unsatisfactory cup design, giving higher revision rates for uncemented implants.

Women have a lower risk of revision in total and with cemented implants (RB 1992-2002, men 12.6%, women 8.5%). This is expected, but why women have a rather higher revision burden with uncemented and hybrid implants is not clear.

Index diagnoses such as inflammatory joint disease and conditions resulting from childhood disease are over-represented among re-revisions, indicating that these are often younger patients who should be treated at centres with knowledge in the management of these risk factors. The reasons for revision, like the reasons for reoperation, have remained the same in recent years. In the case of first revision, aseptic loosening with or without osteolysis accounts for 884 cases out of a total of 1 145 revisions in 2002 (77%). In 10% dislocation was the reason for revision during the last year. This figure is too high, and should be noted and give rise to action at the units that experience a dislocation problem.

The cumulative revision rate with a minimum of 10 years' follow-up is reported for a limited number of years, from 1979 to 1992. The diagram shows the revision rate for all diagnoses and all reasons for revision, and for revision on account of aseptic loosening. In addition, cumulative revision rates for deep infection and dislocation are illustrated on page 23. The dramatic improvement in quality over the years, especially for mechanical stability and reduced risk of infection, is well documented as before. However, the problem of dislocation persists at a relatively constant rate in recent years, and it illustrates the great need for improvement in this area.

Survival functions for all implants and all diagnoses and all causes are given on page 24 and separately for cemented, uncemented and hybrid implants. The period of time covered has as usual been displayed, and the first period covers the years 1979-1991 and the last period covers the 10-year period from 1992. In addition, the survival reported for the different fixation principles is restricted to the diagnoses arthrosis and aseptic loosening as the reason for revision. The difference in the 10-year survival if we restrict the selection (to OA and loosening) is only 1% for cemented implants and 1.5% for all implants, a difference that we have often indicated earlier. For the uncemented implants, however, the difference becomes much greater, 6%. The uncemented implants therefore have to be revised in greater numbers on account of pain, technical faults or specific cup problems. Note that the uncemented and hybrid implants have been used in younger patients, and a fairer comparison is made by means of regression analysis, as seen from the previous annual report. For reasons of cost we are unable to perform regression analysis every year.

The survival function for cemented implants shows that the Lubinus SP II is still clearly the best, and the difference from the Charnley prosthesis has been accentuated. The second best functioning prosthesis systems are the Exeter polished and the Spectron prosthesis. The risk of revision on account of aseptic loosening within 10 years should be less than 5%, and this goal is not met with the Charnley prosthesis, the Scan Hip with collar, and is far from being met with the Cenator, which has an 8-year survival of only 88%. Some uncemented prosthetic systems function excellently in the mid-term, but some are entirely unsatisfactory on account of cup problems. For the hybrid combinations with uncemented joint cups, we see a worrying trend with an increasing number of revisions for some of the modern systems, which also indicates cup problems from the middle of the nineties. How much the improved sterilisation techniques, quality of plastic and form of liner that were introduced between 1994-1997 will provide a more reliable quality

remains to be seen. On pages 31-34 the survival function for different age groups is reported, and we have now changed the groups to younger than 50 years, 50-59 years, 60-75 years, and over 75 years. For younger patients the hybrid principle has a better outcome, but between 50-59 years the result is similar between the different fixation principles. For the older patients, the cemented principle is excellent as before. Poisson regression analysis will be carried out every other year in order to demonstrate more scientifically which technique and implant functions best, irrespective of gender, age and diagnosis. The developmental work on solving the problem of wear, with subsequent osteolysis and prosthetic loosening in younger patients, (especially younger women) must continue, with the focus on alternative bearing surfaces that are more resistant to wear, but in controlled trials. Other factors that may influence the difference between the sexes must also be studied.

Implant survival per prosthesis type over the whole study period is reported in tabular form. Implant survival per clinic for cemented implants with the diagnosis of primary arthrosis and aseptic loosening as the reason for revision is reported for the last 10-year period. It is clear that most university hospitals have a poorer outcome, which we know to be due to a case-mix problem and responsibility for more serious reconstructions, especially in younger patients with RA and sequelae of hip fractures. The choice of implant has also played a role (e.g. Scan Hip and Cenator). The figures should stimulate local discussions in the units that fall short of the very good average of approx. 95-96% in Sweden.

Number of Revisions per Reason and Number of Previous Revisions

Primary THR 1979-2002

Reason for reoperation	(missing)	0	1	2	> 2	Total
Aseptic loosening	2	12 569	1 664	275	55	14 565
Deep infection	0	1 197	282	56	24	1 559
Dislocation	6	1 031	284	63	17	1 401
Fracture only	1	861	202	33	1	1 098
Technical error	0	441	68	16	2	527
Implant fracture	0	254	35	6	2	297
Miscellaneous	0	78	21	5	5	109
Pain only	0	53	9	1	1	64
Total	9	16 484	2 565	455	107	19 620

Number of Revisions per Year and Number of Previous Revisions

Primary THR 1979-2002

Year of Revision	(missing)	0	1	2	> 2	Total
1979-1997	3	10 891	1 488	223	43	12 648
1998	3	1 032	193	50	3	1 281
1999	2	1 091	179	29	8	1 309
2000	1	1 188	243	48	13	1 493
2001	0	1 137	250	53	23	1 463
2002	0	1 145	212	52	17	1 426
Total	9	16 484	2 565	455	107	19 620

Number of Revisions per Diagnosis and Number of Previous Revisions

Primary THR 1979-2002

Diagnosis at primary THR	(missing)	0	1	2	> 2	Total
Primary osteoarthritis	7	12 256	1 841	319	72	14 495
Fracture	1	1 557	218	31	5	1 812
Inflammatory arthritis	0	1 338	240	52	11	1 641
Childhood disease	0	751	159	32	11	953
Idiopathic femoral head necrosis	0	237	42	8	2	289
Secondary osteoarthritis after trauma	0	142	39	8	6	195
Secondary osteoarthritis	0	43	5	0	0	48
Tumor	0	21	4	2	0	27
(missing)	1	139	17	3	0	160
Total	9	16 484	2 565	455	107	19 620

Number of Revisions per Reason and Years of Revisions

Only the First Revision, Primary THR 1979-2002

Reason for revision	1979-1997	1998	1999	2000	2001	2002	Total
Aseptic loosening	8 316	813	810	885	861	884	12 569
Deep infection	907	67	63	53	52	55	1 197
Dislocation	519	83	103	113	102	111	1 031
Fracture only	495	50	80	95	79	62	861
Technical error	400	5	9	12	7	8	441
Implant fracture	177	8	15	19	24	11	254
Miscellaneous	39	3	9	8	10	9	78
Pain only	38	3	2	3	2	5	53
Total	10 891	1 032	1 091	1 188	1 137	1 145	16 484

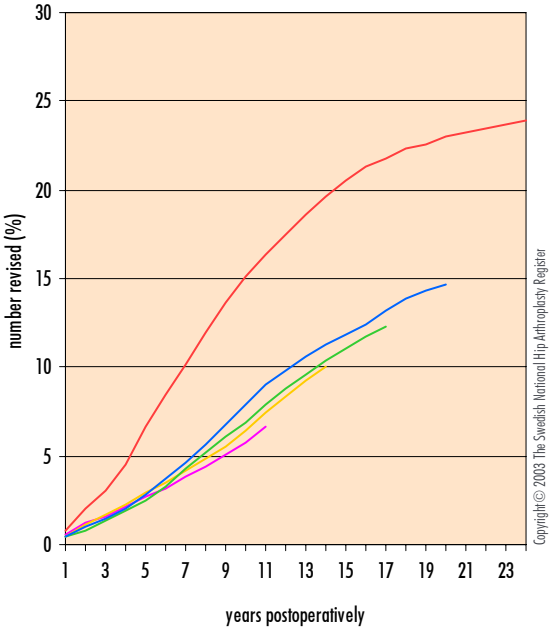
Number of Revisions per Type of Fixation at Primary THR and Year of Revision

Only the First Revision, Primary THR 1979-2002

Type of Fixation at Primary THR	1979-1997	1998	1999	2000	2001	2002	Total
Cemented	9 490	844	897	962	913	895	14 001
Uncemented	761	107	111	132	121	126	1 358
Hybrid	200	56	61	71	79	96	563
Reversed hybrid	50	8	5	8	4	7	82
(missing)	390	17	17	15	20	21	480
Total	10 891	1 032	1 091	1 188	1 137	1 145	16 484

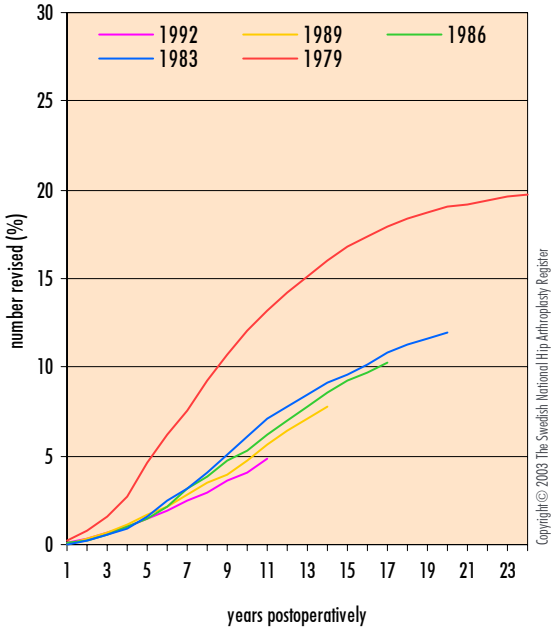
Cumulative Frequency of Revision

All Diagnoses and All Reasons



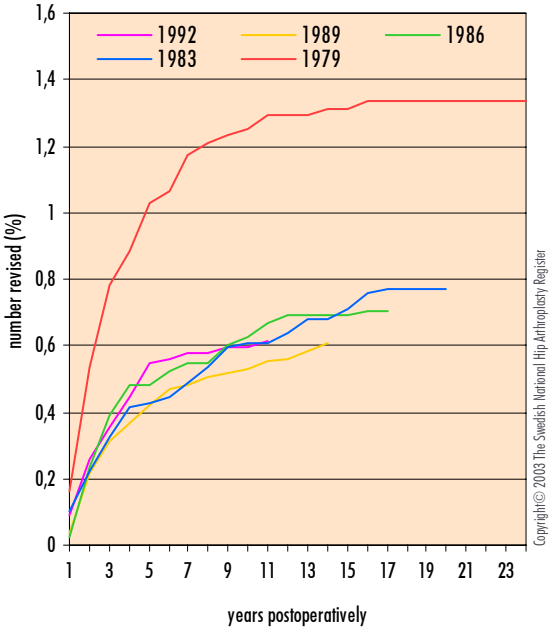
Cumulative Frequency of Revision

Revision due to Aseptic Loosening



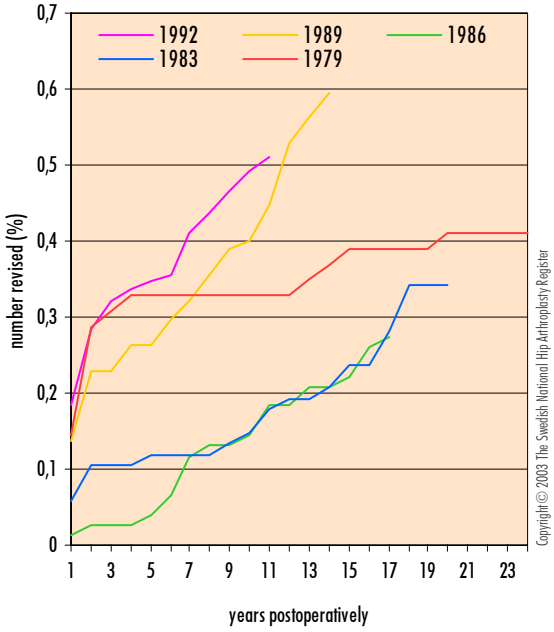
Cumulative Frequency of Revision

Revision due to Deep Infection



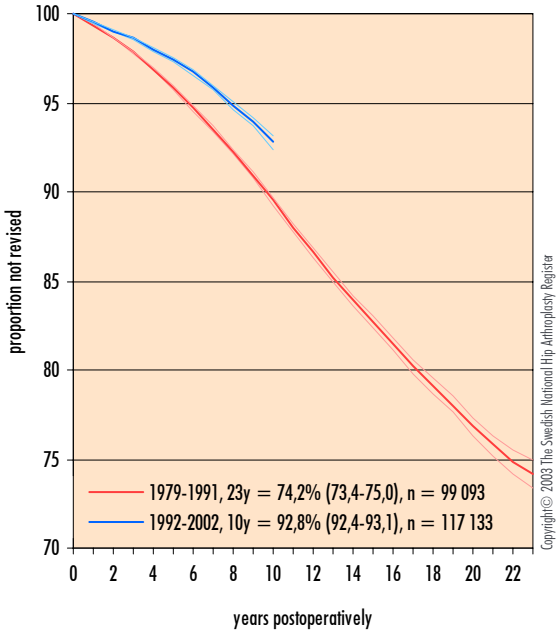
Cumulative Frequency of Revision

Revision due to Dislocation



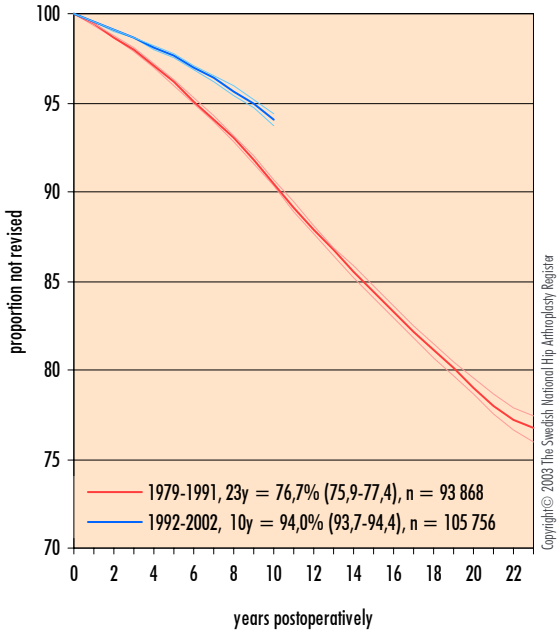
All Implants

All Diagnoses and All Reasons



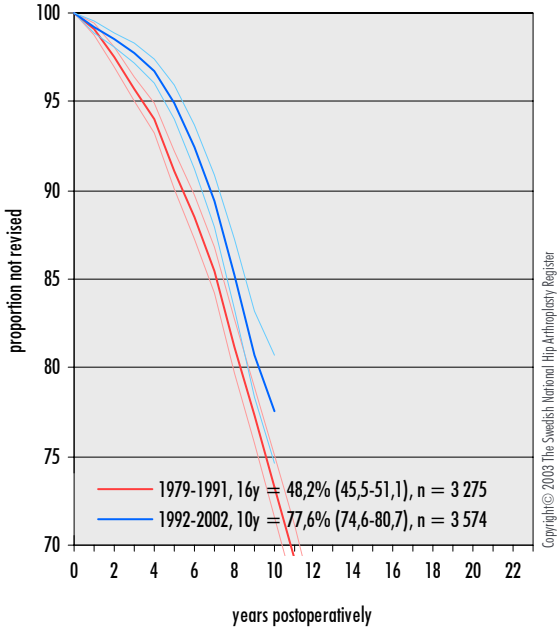
All Cemented Implants

All Diagnoses and All Reasons



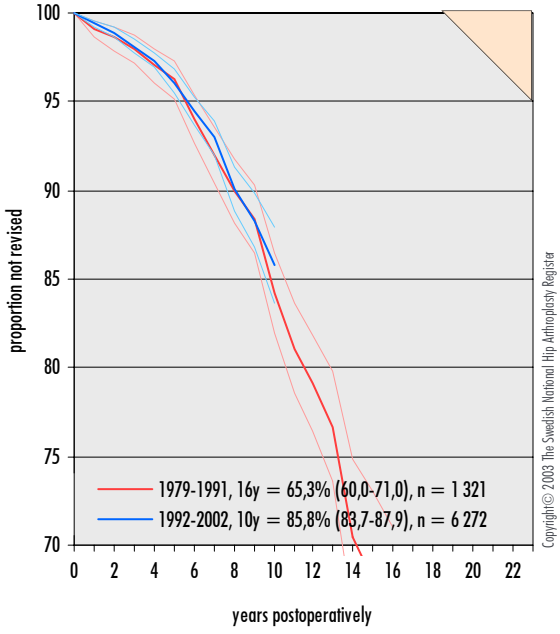
All Uncemented Implants

All Diagnoses and All Reasons



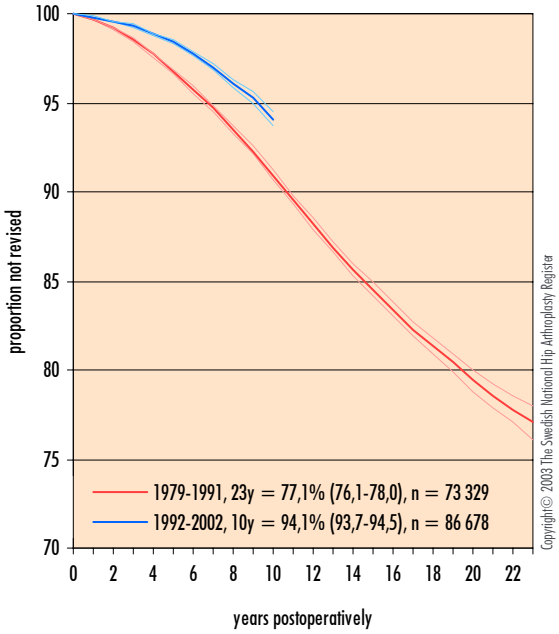
All Hybrid Implants

All Diagnoses and All Reasons



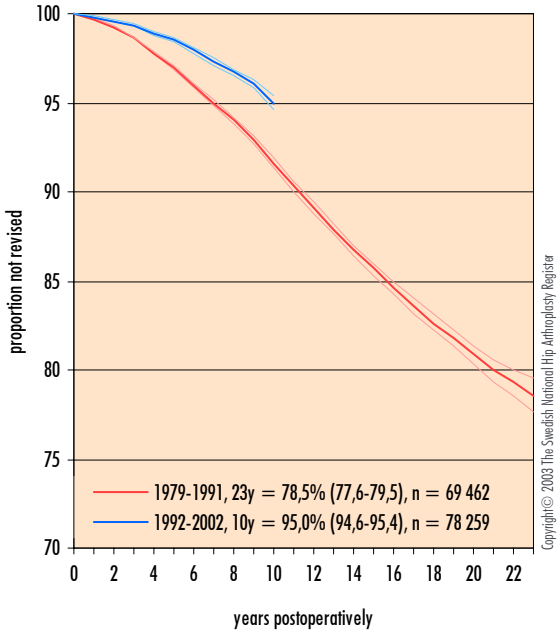
All Implants

Osteoarthritis and Aseptic Loosening



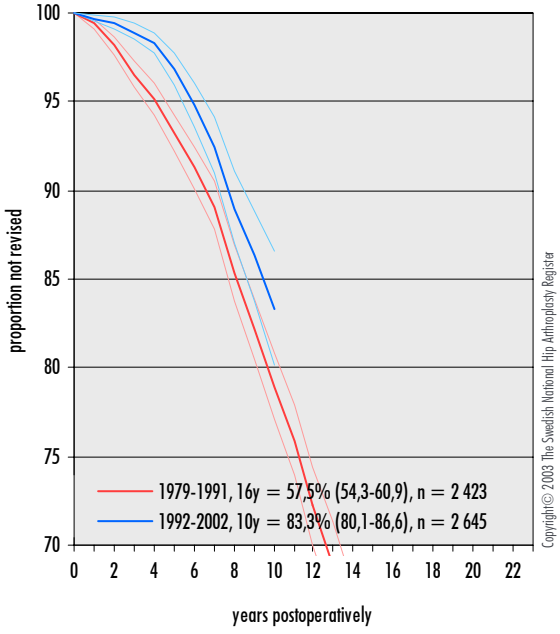
All Cemented Implants

Osteoarthritis and Aseptic Loosening



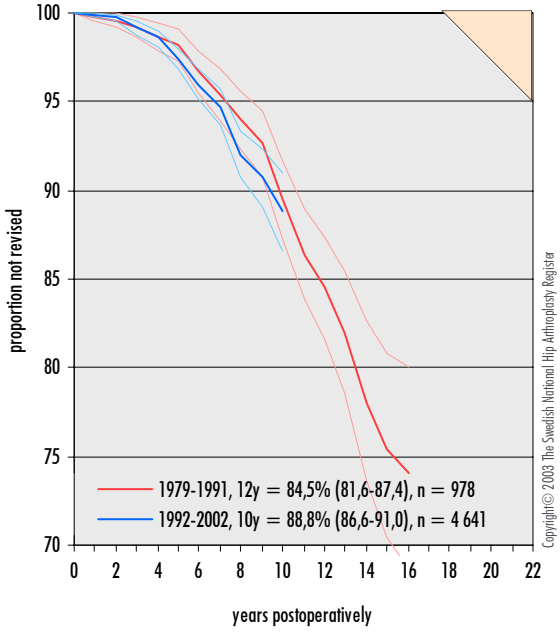
All Uncemented Implants

Osteoarthritis and Aseptic Loosening



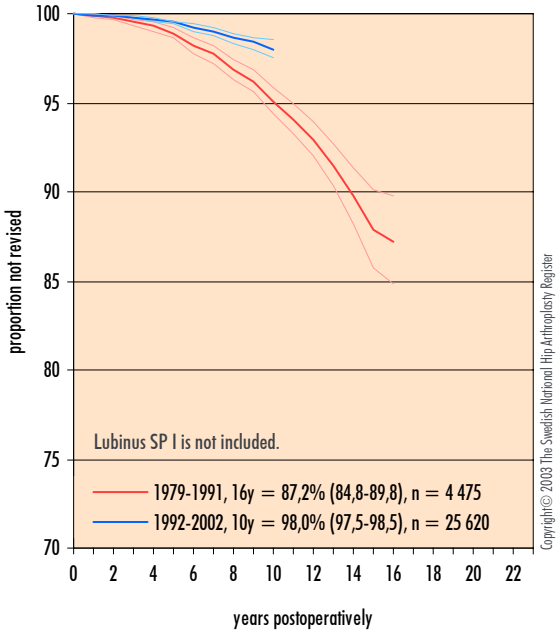
All Hybrid Implants

Osteoarthritis and Aseptic Loosening



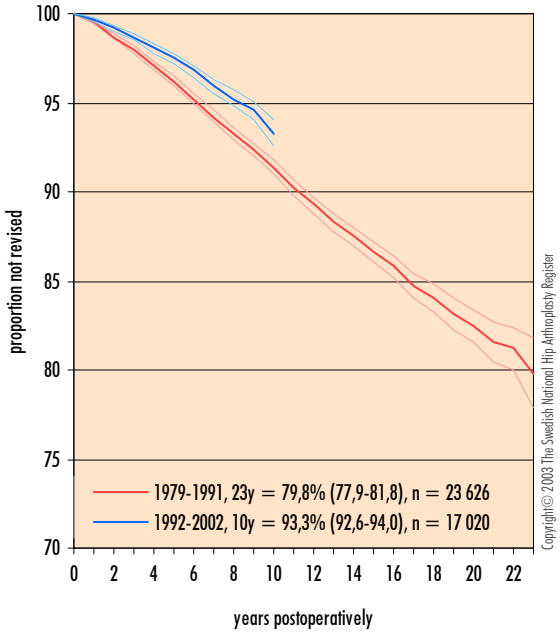
Lubinus SP II

Osteoarthritis and Aseptic Loosening



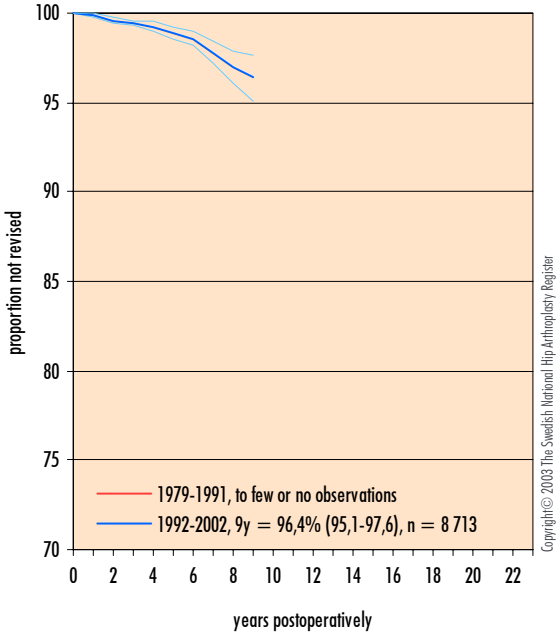
Charnley

Osteoarthritis and Aseptic Loosening



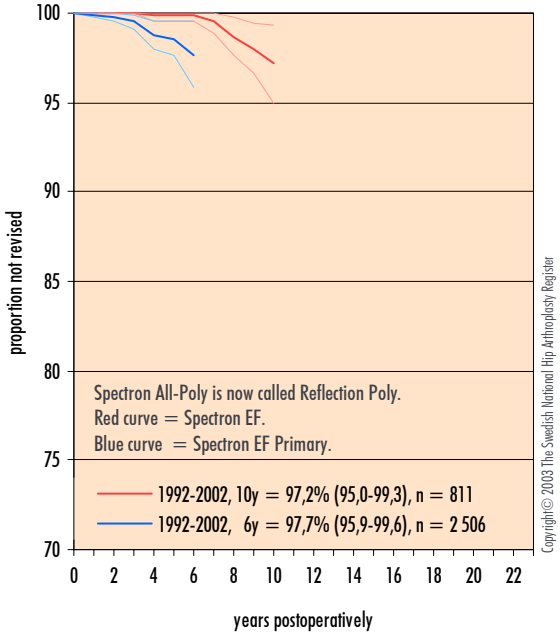
Exeter Poly + Duration (Polished)

Osteoarthritis and Aseptic Loosening



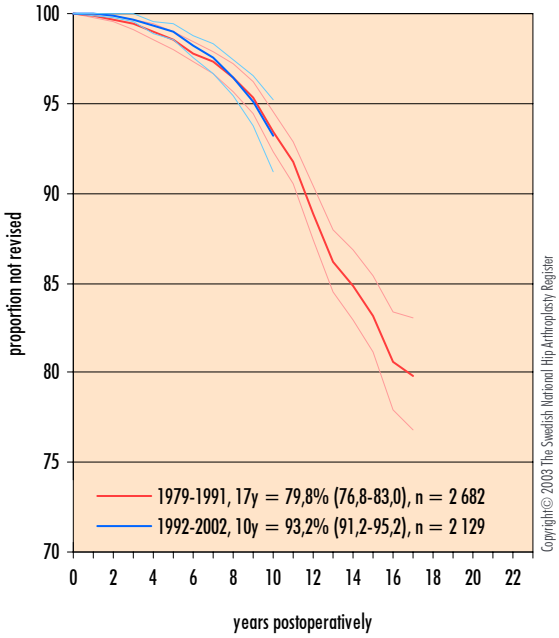
Reflection All-Poly (Spectron)

Osteoarthritis and Aseptic Loosening



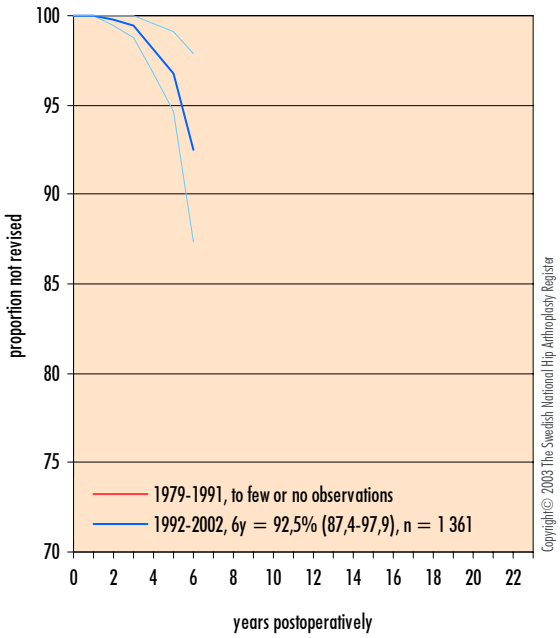
Scan Hip All-Poly (Scan Hip Collar)

Osteoarthritis and Aseptic Loosening



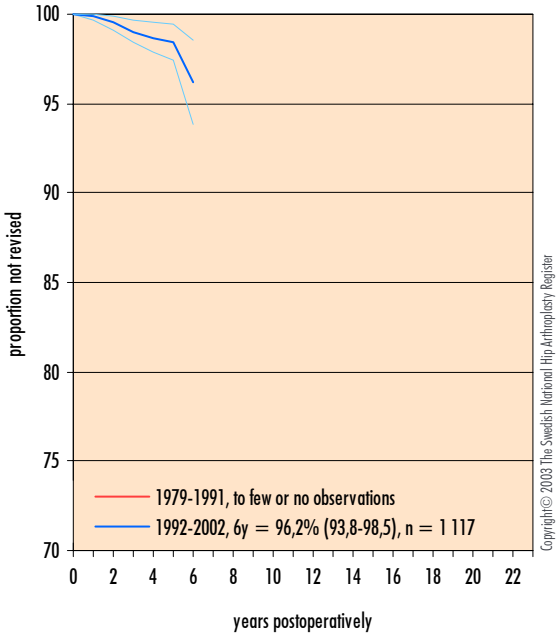
OPTICUP (Scan Hip II Collar)

Osteoarthritis and Aseptic Loosening



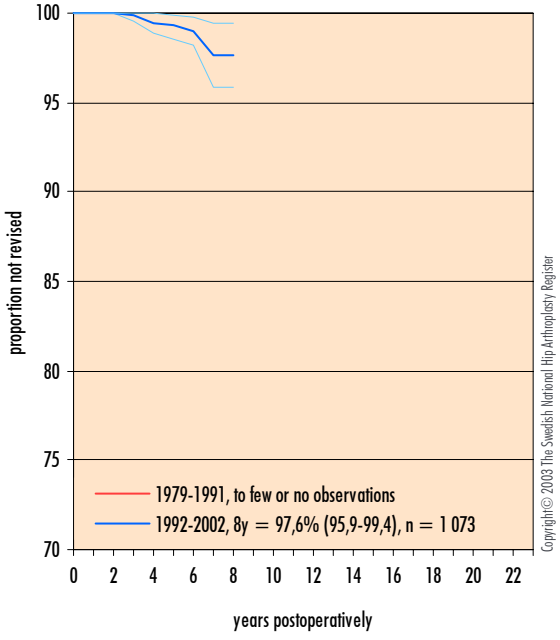
Charnley (Charnley Elite Plus)

Osteoarthritis and Aseptic Loosening



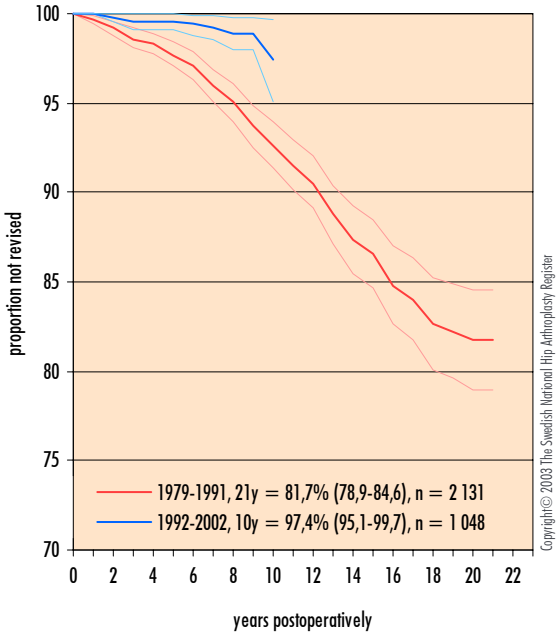
Biomet Müller (RX90-S)

Osteoarthritis and Aseptic Loosening



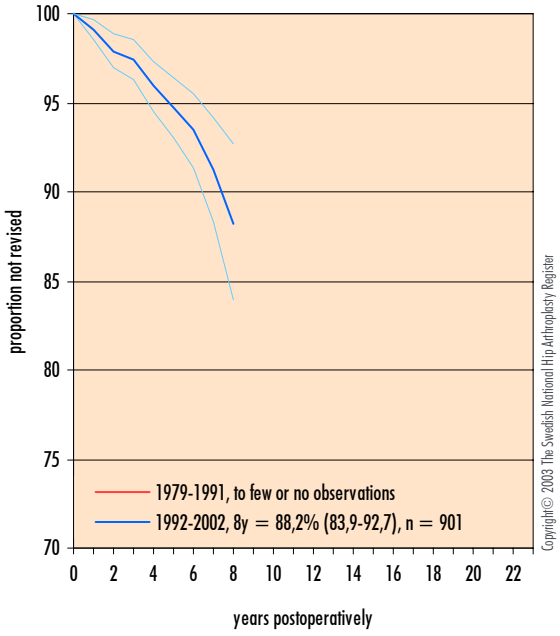
Müller All-Poly (Straight)

Osteoarthritis and Aseptic Loosening



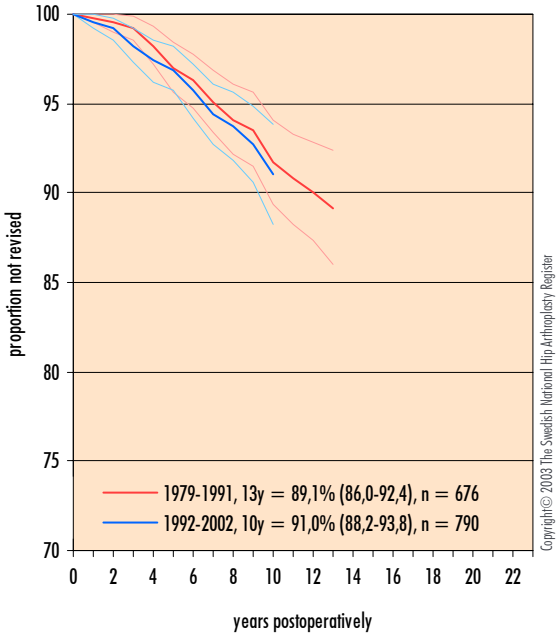
Cenator

Osteoarthritis and Aseptic Loosening



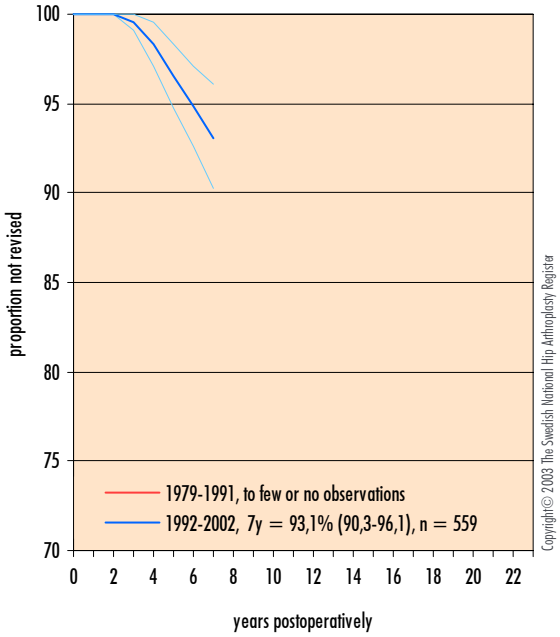
Biomet Müller (Bi-Metric cem.)

Osteoarthritis and Aseptic Loosening



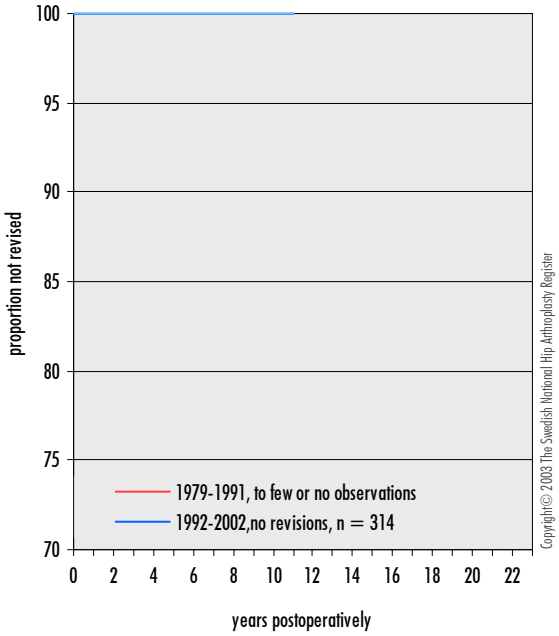
OPTICUP (Optima)

Osteoarthritis and Aseptic Loosening



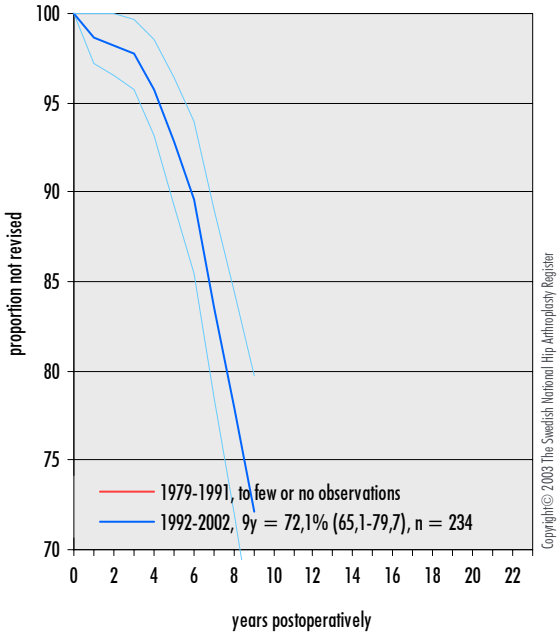
CLS Spotorno

Osteoarthritis and Aseptic Loosening



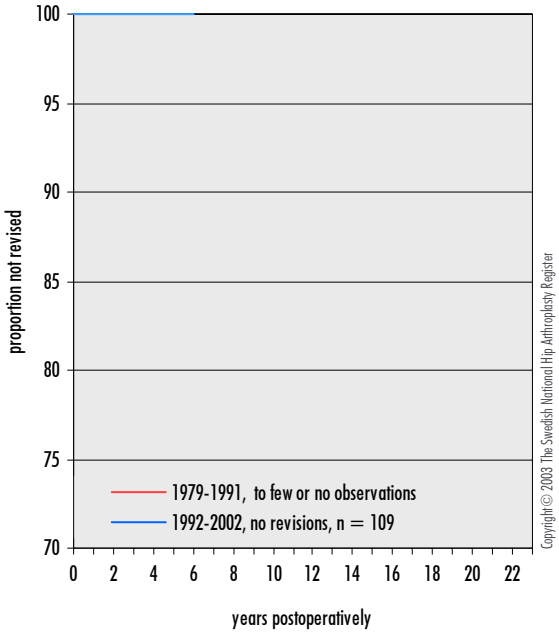
Omnifit

Osteoarthritis and Aseptic Loosening



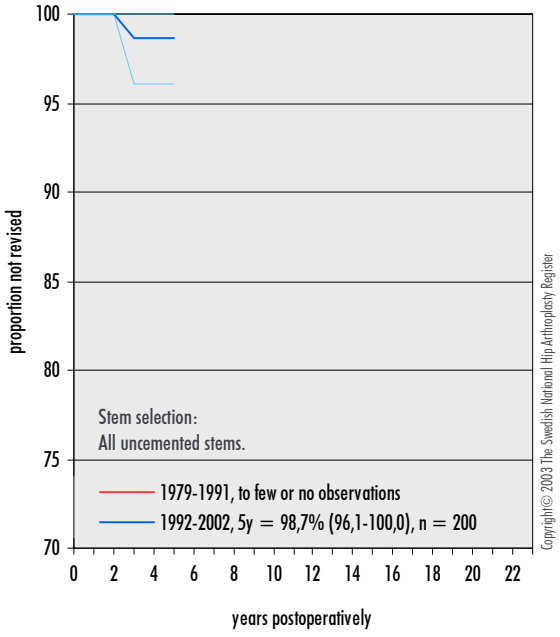
ABG II HA (ABG)

Osteoarthritis and Aseptic Loosening



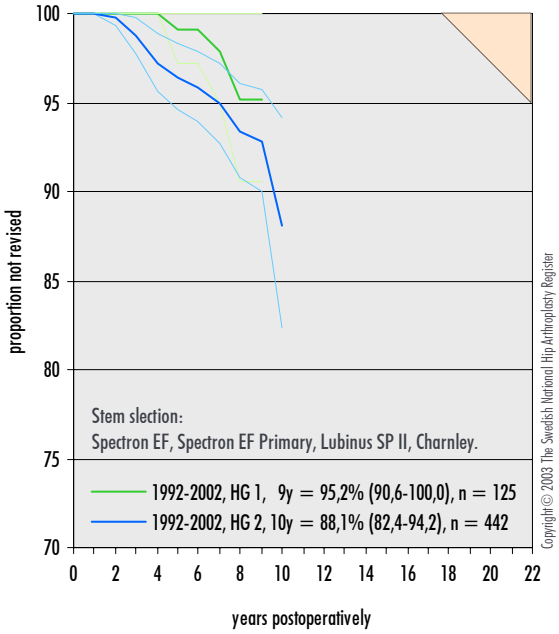
Trilogy HA

Osteoarthritis and Aseptic Loosening



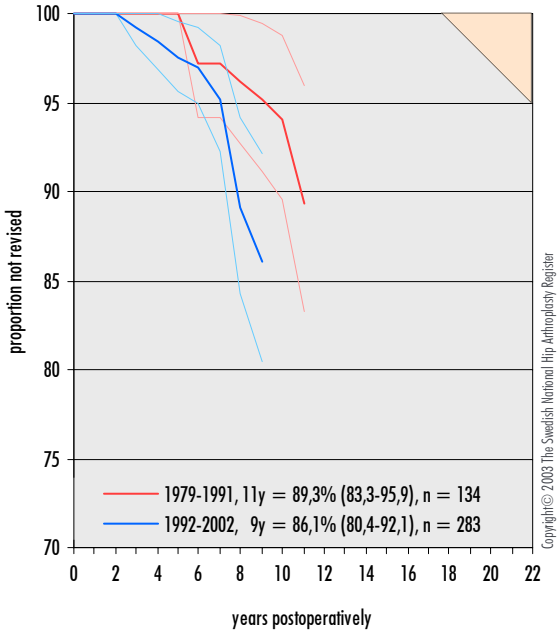
Harris-Galante

Osteoarthritis and Aseptic Loosening



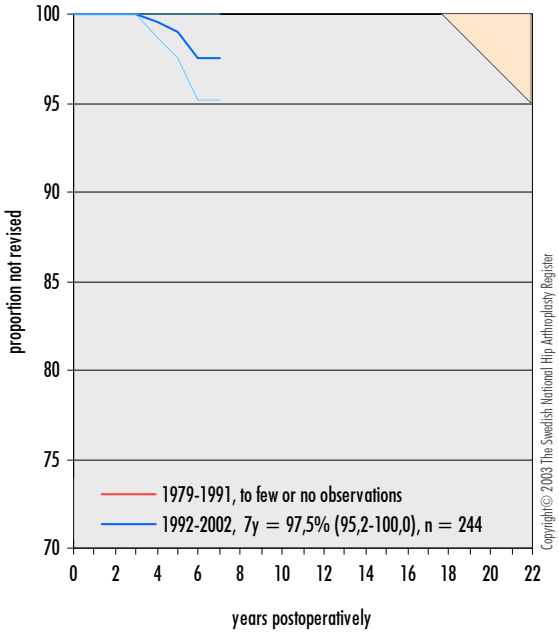
Romanus (Bi-Metric cem.)

Osteoarthritis and Aseptic Loosening



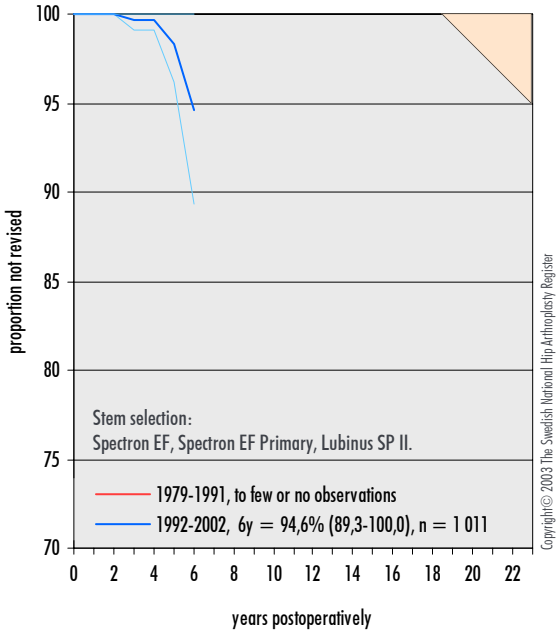
ABG HA (Lubinus SP II)

Osteoarthritis and Aseptic Loosening



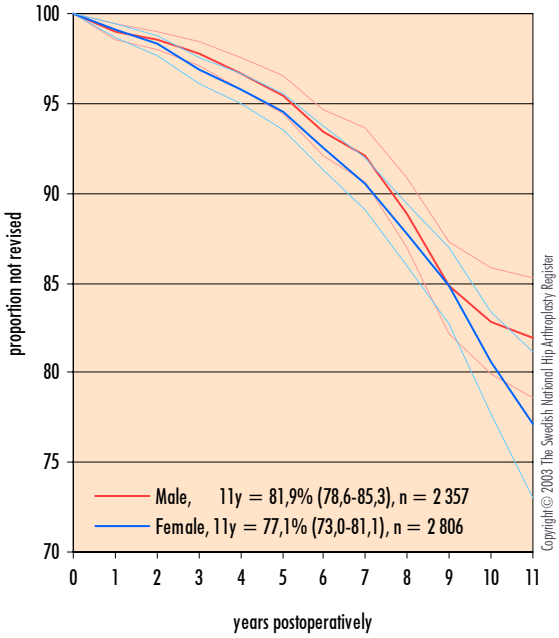
Trilogy HA

Osteoarthritis and Aseptic Loosening



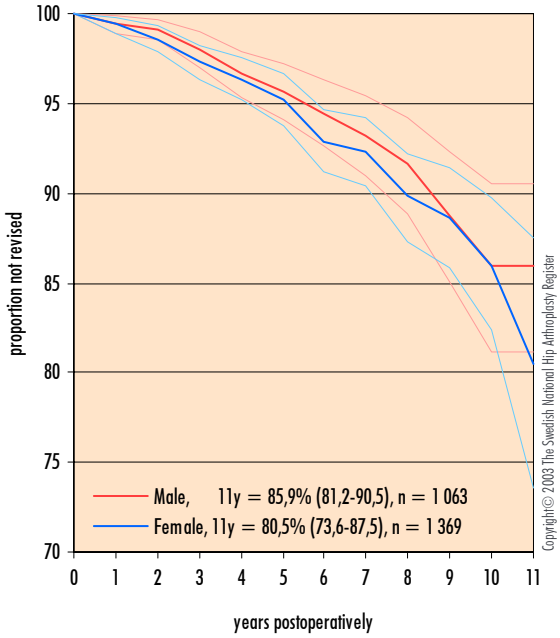
Younger than 50 years

All Implants, 1992-2002



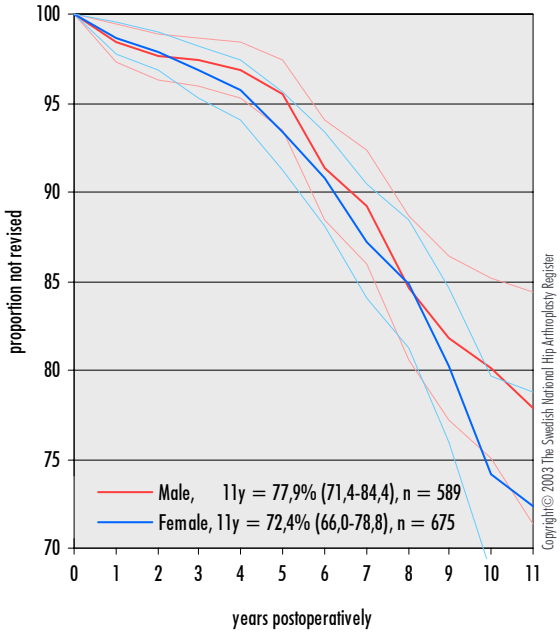
Younger than 50 years

Cemented Implants, 1992-2002



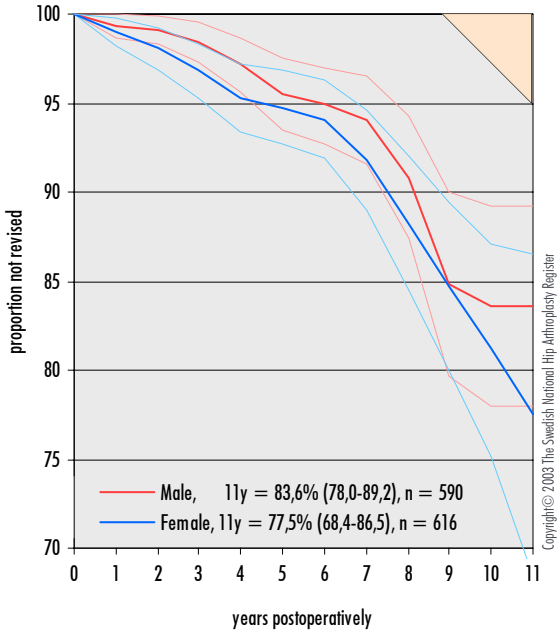
Younger than 50 years

Uncemented Implants, 1992-2002



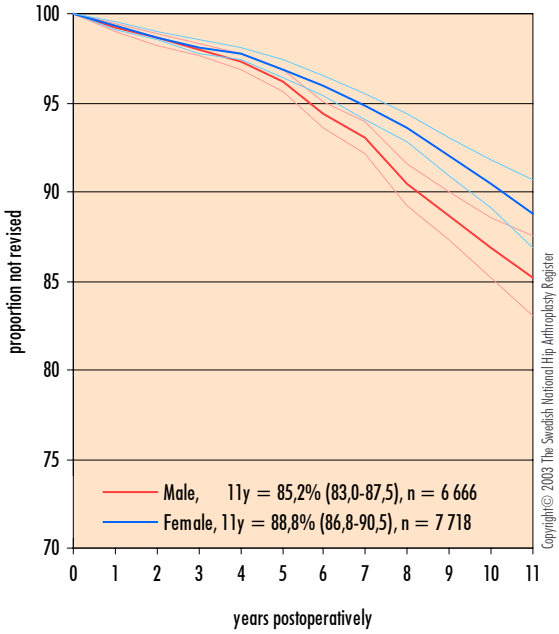
Younger than 50 years

Hybrid Implants, 1992-2002



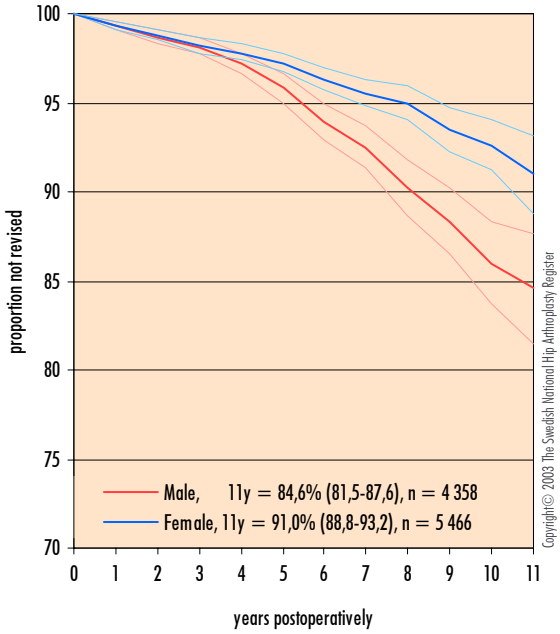
Between 50 and 59 years

All Implants, 1992-2002



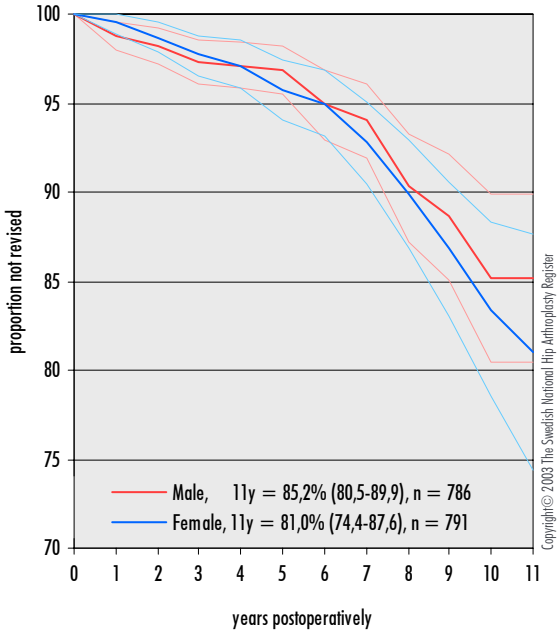
Between 50 and 59 years

Cemented Implants, 1992-2002



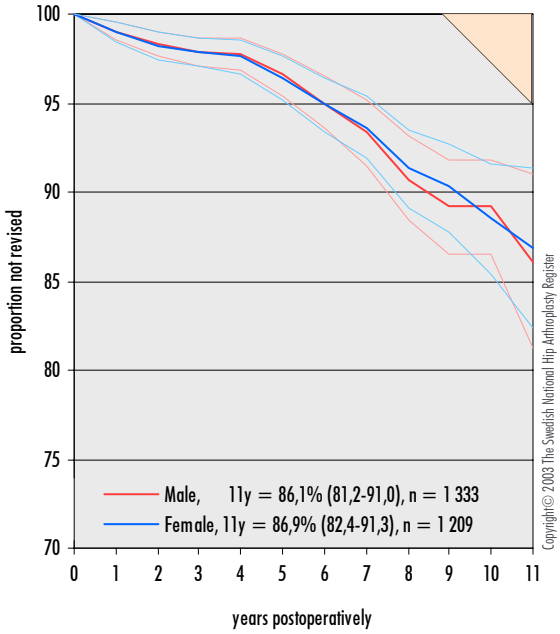
Between 50 and 59 years

Uncemented Implants, 1992-2002



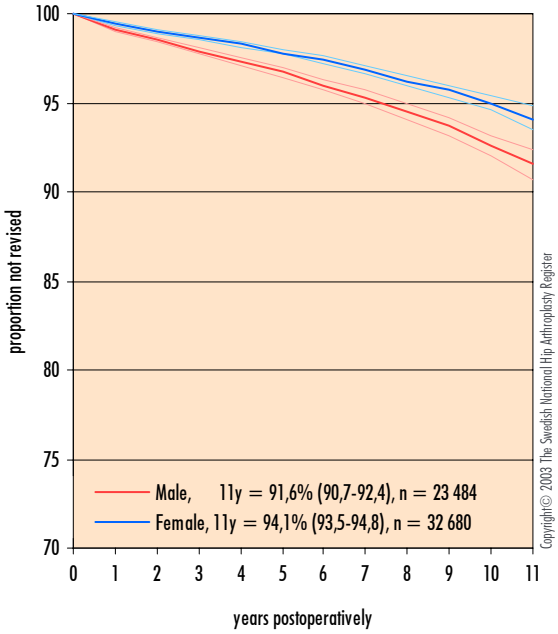
Between 50 and 59 years

Hybrid Implants, 1992-2002



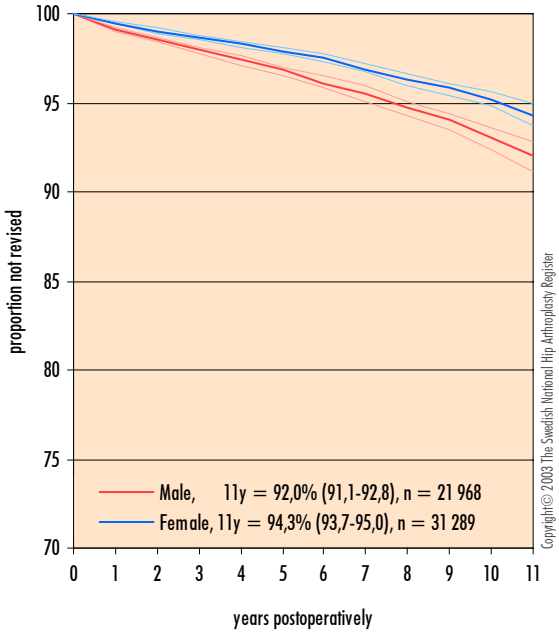
Between 60 and 75 years

All Implants, 1992-2002



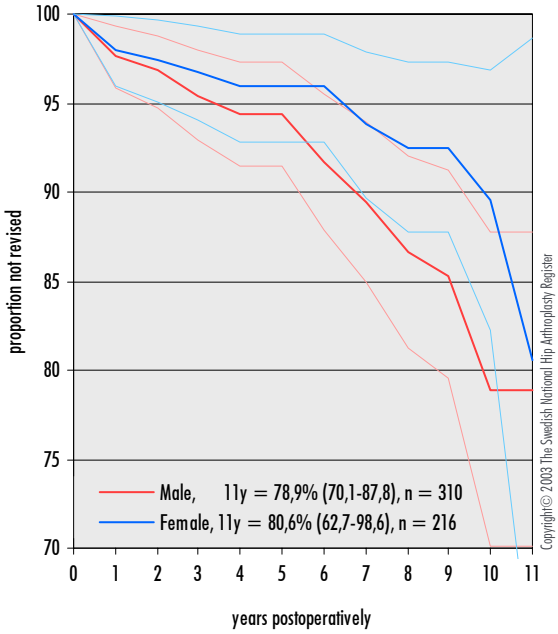
Between 60 and 75 years

Cemented Implants, 1992-2002



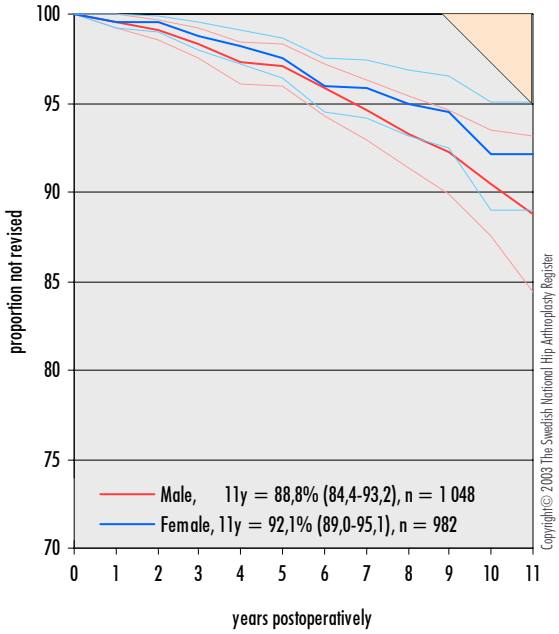
Between 60 and 75 years

Uncemented Implants, 1992-2002



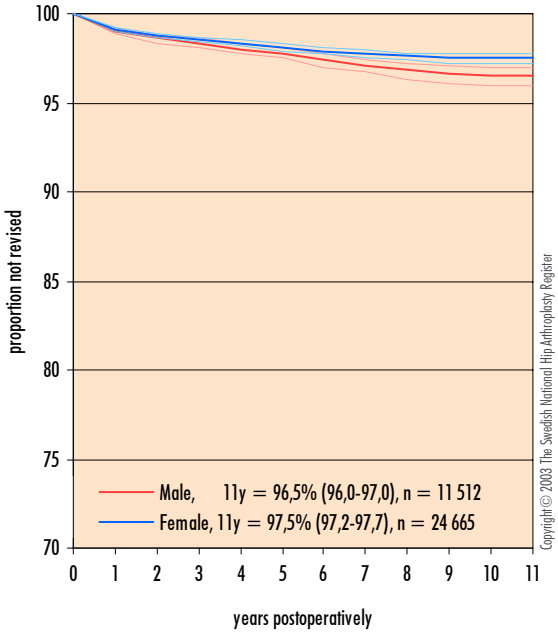
Between 60 and 75 years

Hybrid Implants, 1992-2002



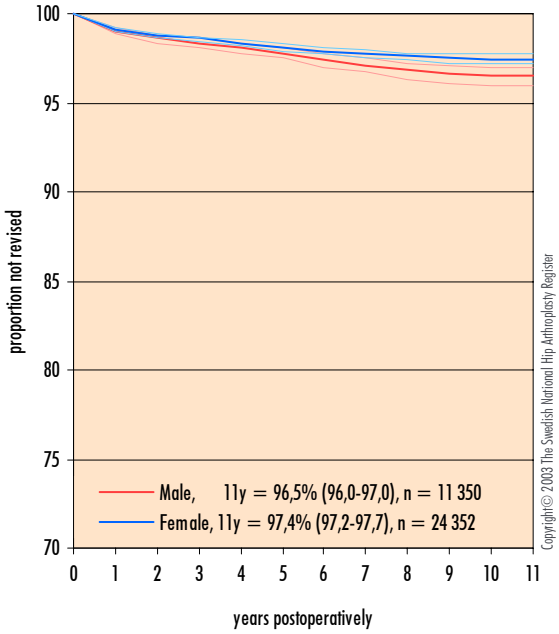
Older than 75 years

All Implants, 1992-2002



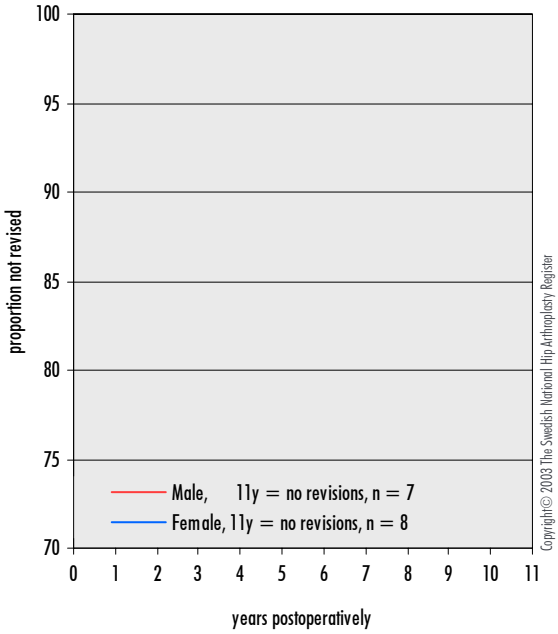
Older than 75 years

Cemented Implants, 1992-2002



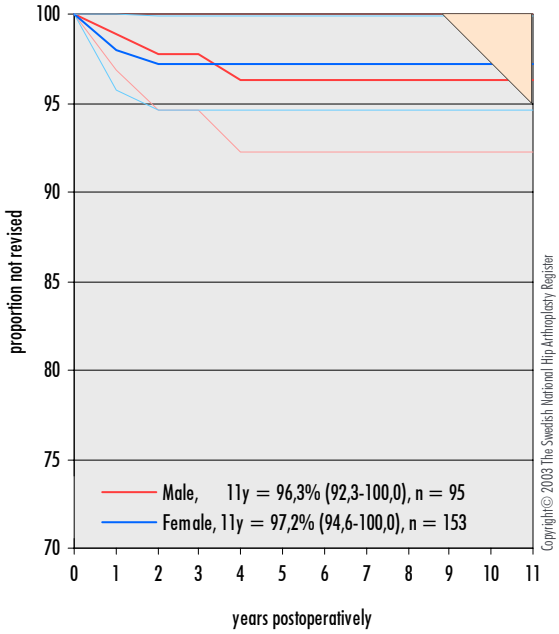
Older than 75 years

Uncemented Implants, 1992-2002



Older than 75 years

Hybrid Implants, 1992-2002



Implant Survival per Type

Osteoarthritis and Aseptic Loosening, 1979-2002

Cup (Stem)	Period [1]	Number [2]	7 years	95% CL	10 years	95% CL
ABG HA (ABG cem.)	1990–1998	189	99,4	98,1–100,0		
ABG HA (ABG uncem.)	1991–1998	225	89,6	84,6–94,8		
ABG HA (Lubinus SP II)	1991–1998	246	97,6	95,2–100,0		
Biomet Müller (Bi-Metric cem.)	1987–1996	1 466	94,7	93,5–96,0	91,3	89,6–93,1
Biomet Müller (RX90-S)	1994–2001	1 073	97,6	95,9–99,4		
Brunswik	1979–1991	1 639	94,5	93,3–95,7	90,1	88,5–91,8
CAD	1979–1997	1 415	96,2	95,1–97,3	93,5	92,1–95,0
Cenator (Bi-Metric cem.)	1993–1999	216	98,7	97,0–100,0		
Cenator	1993–2000	901	91,2	88,3–94,2		
Charnley	1979–2002	40 646	94,8	94,6–95,1	92,1	91,7–92,4
Charnley (CAD)	1991–1996	241	97,2	95,0–99,4	95,6	92,6–98,8
Charnley (Exeter Polished)	1990–2002	593	100,0	100,0–100,0	97,3	94,4–100,0
Charnley (Lubinus SP II)	1990–2002	256	96,4	92,6–100,0		
Charnley (Müller Straight)	1992–1998	77	98,5	95,7–100,0		
Charnley (PCA E-series Textured)	1992–1996	95	87,9	80,8–95,7		
Charnley Elite (Charnley)	1992–2001	249	92,5	89,1–96,1		
Charnley Elite (PCA E-series Textured)	1992–1997	158	91,4	86,7–96,4		
Charnley-Müller	1979–1989	793	86,6	84,0–89,2	77,3	74,1–80,7
Christiansen	1979–1989	1 436	68,9	66,3–71,6	59,1	56,3–62,0
CLS Spotorno	1987–2002	363	99,6	98,8–100,0		
Contemporary (Exeter Polished)	1994–2002	300	97,5	95,2–99,9		
Exeter Matte	1980–1986	2 623	92,1	91,0–93,2	86,1	84,6–87,6
Exeter Metal-backed (Exeter Polished)	1989–1997	3 008	98,3	97,8–98,8	96,4	95,7–97,2
Exeter All-Poly (Exeter Polished)	1992–2002	4 804	97,8	97,1–98,4		
Exeter Polished	1980–1995	3 758	97,0	96,4–97,6	95,0	94,2–95,8
Harris-Galante I	1985–1991	167	94,4	90,6–98,3	89,3	84,2–94,8
Harris-Galante I (Charnley)	1986–1996	164	98,5	96,4–100,0	96,5	93,2–100,0
Harris-Galante I (Lubinus SP II)	1986–1997	200	99,5	98,4–100,0	97,0	94,0–100,0
Harris-Galante I (Spectron EF)	1991–1992	91	100,0	100,0–100,0	98,5	95,7–100,0
Harris-Galante II (Charnley)	1990–1996	115	94,0	89,4–98,8		
Harris-Galante II (Lubinus SP II)	1992–1997	202	90,4	86,0–95,0		
Harris-Galante II (Spectron EF)	1992–1996	120	100,0	100,0–100,0		
HD II	1980–1991	855	97,8	96,7–98,9	95,8	94,3–97,4
HGPII/HATCP (Spectron EF)	1992–1995	69	98,1	94,6–100,0		
ITH	1986–1997	733	97,2	95,9–98,5	96,0	94,4–97,6
Lord	1979–1987	230	95,3	92,4–98,4	81,2	75,4–87,3
Lubinus IP	1979–1998	12 943	96,6	96,3–97,0	93,0	92,5–93,5
Lubinus SP I	1982–1999	3 209	98,5	98,0–98,9	96,8	96,1–97,5
Lubinus SP II	1984–2002	30 095	98,6	98,4–98,8	96,7	96,2–97,1
Mecron (Lubinus-type)	1982–1984	164	96,5	93,5–99,6	94,7	91,0–98,6
Mecron-ring (Charnley)	1983–1987	101	97,7	94,6–100,0	96,2	92,1–100,0
Müller All-Poly (Bi-Metric cem.)	1992–1995	70	100,0	100,0–100,0		
Müller All-Poly (Müller Curved)	1979–1991	310	94,7	92,1–97,5	94,3	91,5–97,1
Müller All-Poly (Müller Straight)	1979–2002	3 179	96,9	96,2–97,5	93,7	92,7–94,8
Omnifit (Lubinus SP II)	1992–1995	127	87,9	81,9–94,3		

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Implant Survival per Type (cont.)

Osteoarthritis and Aseptic Loosening, 1979-2002

Cup (Stem)	Period [1]	Number [2]	7 years	95% CL	10 years	95% CL
Omnifit	1990–1995	264	84,1	79,4–89,1	67,0	59,4–75,5
OPTICUP (Optima)	1993–2000	559	93,1	90,3–96,1		
PCA	1984–1994	911	92,9	91,2–94,8	86,1	83,6–88,7
Reflection (Spectron EF)	1991–1998	1 046	99,6	99,2–100,0	97,7	96,3–99,1
Richard serie II	1979–1993	457	87,5	84,2–90,8	77,8	73,6–82,3
Romanus (Bi-Metric cem.)	1988–1998	417	95,9	93,7–98,1	88,5	84,4–92,8
Romanus (Bi-Metric uncem.)	1988–1996	421	97,2	95,5–98,9	92,1	88,9–95,5
Romanus (Bi-Metric HA uncem.)	1992–1999	109	95,4	91,1–99,9		
Romanus (Lubinus SP II)	1989–1996	103	97,5	94,2–100,0		
Romanus (RX90-S)	1994–2000	135	89,5	82,7–96,9		
Scan Hip (Lubinus SP I)	1985–1989	130	99,1	97,4–100,0	99,1	97,4–100,0
Scan Hip (Lubinus SP II)	1987–2002	111	94,2	89,4–99,3		
Scan Hip (Optima)	1993–2001	374	99,1	97,8–100,0		
Scan Hip (Scan Hip Collar)	1983–2000	4 811	97,4	96,9–97,9	93,4	92,5–94,3
Scan Hip (Scan Hip Collarless)	1985–1999	577	96,1	94,4–97,8	93,1	90,7–95,5
SHP (Lubinus SP II)	1994–2002	448	100,0	100,0–100,0		
SHP	1983–1996	132	94,1	89,9–98,4	93,0	88,3–97,8
Spectron Metal-backed (Spectron EF)	1991–1993	258	98,7	97,3–100,0	96,9	94,5–99,4
Spectron Metal-backed (Spectron)	1984–1990	1 069	96,4	95,2–97,7	93,1	91,3–94,8
Spectron	1981–1990	181	100,0	100,0–100,0	98,4	96,3–100,0
Stanmore	1979–1998	1 547	96,1	95,1–97,2	91,7	90,1–93,3
Taperloc	1983–1987	134	98,3	95,9–100,0	92,0	86,8–97,5
TTAP (LMPCH Ritter)	1983–1989	113	96,8	93,4–100,0	90,7	84,7–97,1
Wagner dubbelcup	1979–1986	194	63,9	56,9–71,6	55,8	48,5–64,2
Zweymuller	1985–1996	72	95,0	89,7–100,0		

Implant Survival per Hospital

Osteoarthritis and Aseptic Loosening, Cemented Implants, 1992-2002

Hospital	Period [1]	Number [2]	7 years	95% CL	10 years	95% CL
Alingsås	1992–2002	693	98,6	96,8–100,0		
Arvika	1992–2002	277	91,9	87,6–96,3		
Axess Elisabethsjukhuset AB						
Bollnäs	1992–2002	643	99,8	99,5–100,0		
Borås	1992–2002	1 300	98,7	97,8–99,7	97,5	95,8–99,2
Carlanderska						
Danderyd	1992–2002	1 840	97,8	96,7–98,9	96,0	93,9–98,1
Eksjö	1992–2002	1 401	96,6	95,0–98,2	94,6	92,1–97,1
Enköping	1992–2002	453	92,6	87,7–97,9		
Eskilstuna	1992–2002	937	97,7	96,2–99,1	93,8	89,5–98,3
Falköping	1992–2002	790	94,7	91,7–97,9		
Falun	1992–2002	1 433	94,7	92,5–97,0	90,4	86,3–94,8

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Implant Survival per Hospital (cont.)

Osteoarthritis and Aseptic Loosening, Cemented Implants, 1992-2002

Hospital	Period [1]	Number [2]	7 years	95% CL	10 years	95% CL
Frölunda sjukhus						
Gällivare	1992–2002	659	100,0	100,0–100,0	99,3	97,8–100,0
Gävle	1992–2002	1 300	99,1	98,3–99,9	99,1	98,3–99,9
Halmstad	1992–2002	961	99,2	98,4–100,0	99,2	98,4–100,0
Helsingborg	1992–2002	1 223	96,2	94,6–97,8	93,2	90,5–96,0
Huddinge	1992–2002	1 461	92,3	90,4–94,2	87,5	84,0–91,1
Hudiksvall	1992–2002	881	99,6	99,0–100,0		
Hässleholm-Kristianstad	1992–2002	2 164	97,5	96,5–98,6	96,7	95,2–98,1
Jönköping	1992–2002	1 257	98,3	97,1–99,5	97,9	96,5–99,3
Kalix	1992–2002	455	98,9	96,9–100,0		
Kalmar	1992–2002	1 376	98,6	97,5–99,7	97,1	95,2–99,2
Karlshamn	1992–2002	620	97,4	94,9–99,9		
Karlskoga	1992–2002	743	98,8	97,1–100,0		
Karlskrona	1992–2002	726	95,5	93,6–97,6		
Karlstad	1992–2002	838	98,6	97,5–99,8		
Karolinska	1992–2002	1 210	96,1	94,2–98,0	89,7	84,7–95,0
Katrineholm	1992–2002	650	100,0	100,0–100,0		
Kungälv	1992–2002	926	98,7	97,1–100,0		
Köping	1992–2002	844	96,1	93,0–99,4		
Landskrona	1992–2002	1 393	96,7	94,6–98,8		
Lidköping	1992–2002	818	98,9	97,9–100,0		
Lindesberg	1992–2002	634	100,0	100,0–100,0		
Linköping	1992–2002	1 402	99,4	98,8–99,9	96,9	94,3–99,7
Linköping Medical Center						
Ljungby	1992–2002	784	99,2	98,3–100,0		
Lund	1992–2002	1 209	96,8	95,5–98,2	91,2	87,3–95,4
Lycksele	1992–2002	852	98,7	97,4–100,0		
Löwenströmska	1992–2002	529	91,8	88,6–95,2		
Malmö	1992–2002	1 699	96,9	95,8–98,1	96,0	94,4–97,6
Mora	1992–2002	1 002	93,7	91,3–96,2	89,9	85,5–94,6
Motala	1992–2002	887	98,9	97,7–100,0		
Norrköping	1992–2002	1 465	98,6	97,7–99,6	96,8	94,1–99,7
Norrtälje	1992–2002	613	98,2	96,6–99,8		
Nyköping	1992–2002	736	99,1	98,0–100,0	99,1	98,0–100,0
Ortopediska Huset						
Oskarshamn	1992–2002	603	100,0	100,0–100,0		
Piteå	1992–2002	482	100,0	100,0–100,0		
S:t Göran	1992–2002	3 007	95,3	94,2–96,5	92,7	90,3–95,2
Sabbatsberg Närsjukhuset						
Simrishamn	1992–2002	346	97,3	94,9–99,7		

(continues on the next page)

Implant Survival per Hospital (cont.)

Osteoarthritis and Aseptic Loosening, Cemented Implants, 1992-2002

Hospital	Period [1]	Number [2]	7 years	95% CL	10 years	95% CL
Skellefteå	1992–2002	885	99,4	98,6–100,0		
Skene	1992–2002	410	97,9	95,5–100,0		
Skövde	1992–2002	1 153	96,1	94,3–97,8	91,8	87,3–96,5
Sollefteå	1992–2002	620	97,2	95,1–99,3		
Sophiahemmet	1992–2002	1 110	89,6	85,8–93,6		
SU/Mölndal	1992–2002	738	99,3	98,3–100,0		
SU/Sahlgrenska	1992–2002	936	98,6	97,5–99,7	95,4	92,4–98,4
SU/Östra	1992–2002	951	96,5	94,8–98,3	95,3	92,9–97,8
Sunderby (Boden inclusive)	1992–2002	1 105	99,3	98,7–99,9	98,3	96,9–99,8
Sundsvall	1992–2002	1 249	99,0	98,2–99,8	98,5	97,4–99,7
Säffle	1992–2002	782	98,8	97,6–100,0		
Södersjukhuset	1992–2002	2 042	98,2	97,2–99,2	97,1	95,2–99,0
Södertälje						
Torsby	1992–2002	508	97,2	94,6–99,8		
Trelleborg	1992–2002	1 092	94,7	92,3–97,1		
Uddevalla	1992–2002	1 242	99,6	98,9–100,0	96,9	93,3–100,0
Umeå	1992–2002	929	98,1	96,8–99,3	98,1	96,8–99,3
Uppsala	1992–2002	1 772	93,5	91,8–95,1	89,3	86,0–92,8
Varberg	1992–2002	988	95,5	93,3–97,7		
Visby	1992–2002	607	92,3	89,5–95,1		
Värnamo	1992–2002	619	98,6	97,1–100,0		
Västervik	1992–2002	765	97,1	95,1–99,1		
Västerås	1992–2002	883	98,4	97,2–99,6		
Växjö	1992–2002	840	97,6	96,2–99,1	90,7	85,2–96,6
Ystad	1992–2002	853	99,2	98,0–100,0		
Ängelholm	1992–2002	1 103	97,4	95,7–99,1	94,9	92,1–97,9
Örebro	1992–2002	1 359	99,0	98,4–99,7	98,1	96,2–100,0
Örnsköldsvik	1992–2002	834	99,8	99,3–100,0	99,8	99,3–100,0
Östersund	1992–2002	1 097	97,5	96,1–99,0	95,9	93,7–98,1

[1] *First and last observed year of primary THR*

[2] *Number of primary THR during the period with the conditions given in the table headline.*
Some units do not have enough primary THR during the period to give a 10-year value of implant survival. One condition that consequently has been used in the survival statistics from the Register is that values are given only when at least 50 patients "at-risk" remain. Units with smaller productions will for this reason not be shown in the table. To be able to count a 10-year value the longest observed time between the primary and the revision must at least be 10 years. Therefore, we have chosen to also indicate 7-year survival.

Environmental profile

In the environmental profile the clinics' surgical techniques and cementing techniques are reported annually. It continues to be important to be aware that clinics that do not actively update their environmental profiles via the web-site, are assumed to be unchanged from the previous year.

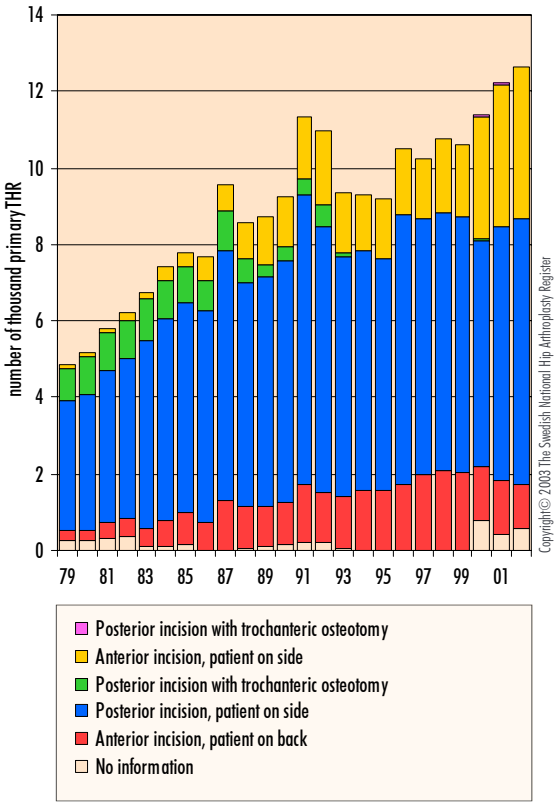
Variations continue to diminish, which means that most operations are now carried out with very similar techniques. In the long run this constitutes a threat to continued analysis possibilities, but so far there are still variations that make the analysis meaningful.

We note a continued increase in cementing pressure techniques both in acetabulum and femur. The proportion who do not use proximal femur sealing has now fallen to 15%. Regression analysis reveals clear advantages of pressure cementing on the femur side, and is associated with a significantly reduced risk of revision for aseptic loosening in arthrosis patients. The reason why some clinics hesitate to use the technique is no doubt an increased risk of thromboembolic complications. However, this risk can be reduced by careful cleansing of the bone bed (high-pressure lavage) prior to the cementing. It is interesting to note that some clinics have now ceased cleaning with a brush. This is fully consistent with the information from the register, as we cannot prove any significant effect of this method of cleansing.

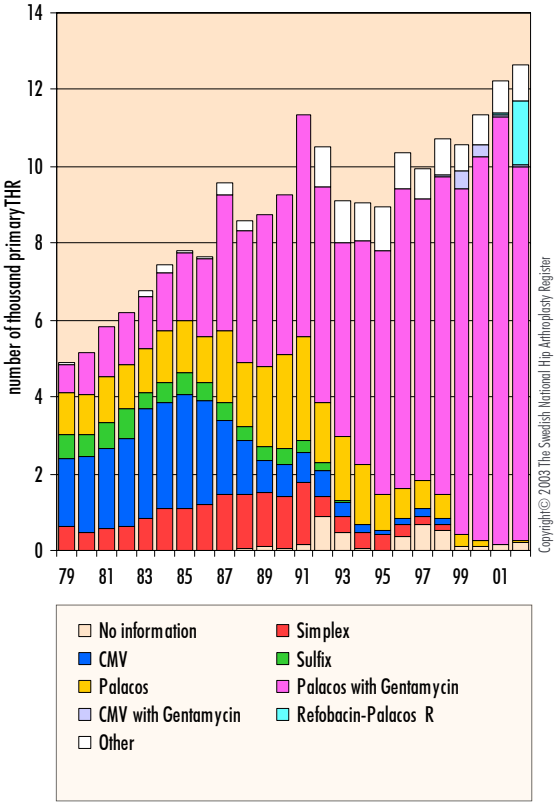
Not quite 50% of the patients are operated via posterior incisions. We also note a reduction in anterior lateral incisions in supine position and that anterior lateral incisions in lateral position are increasing.

Palacos cement is used in the majority of patients. We are seeing a quite rapid increase in the use of Refobacin-Palacos R at the cost of Palacos Gentamycin. According to the information we have received, the products are identical, but we are nevertheless documenting them, and in time we shall analyse the effect of the "new" Palacos cement.

Type of Incision
1979-2002

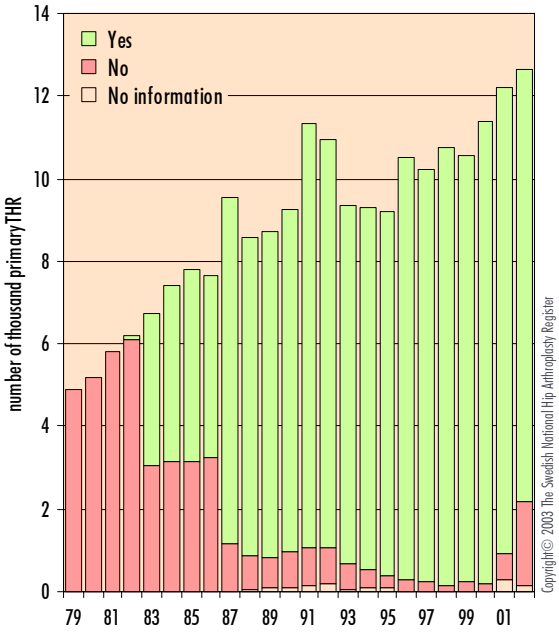


Brand of Cement
1979-2002



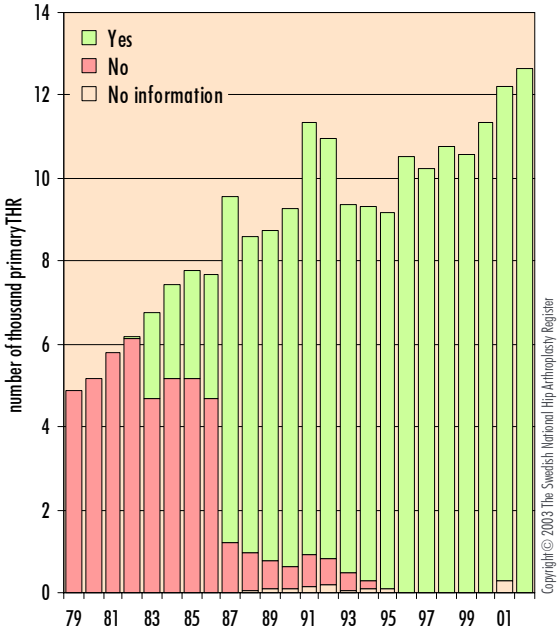
Cleaning by Brush

1979-2002



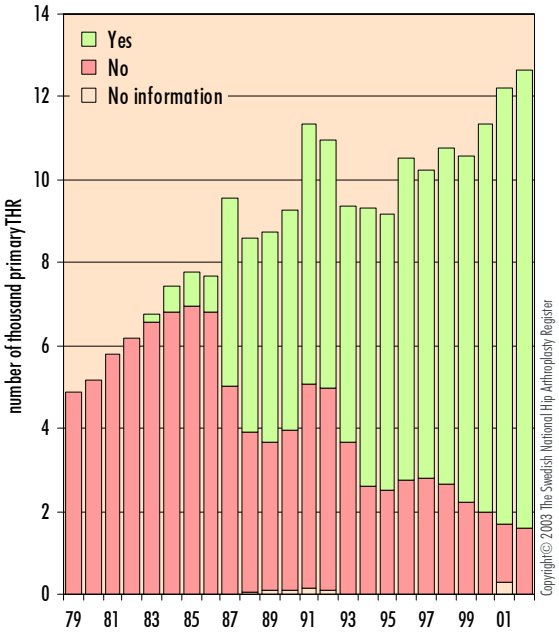
Pulsatile Lavage

1979-2002



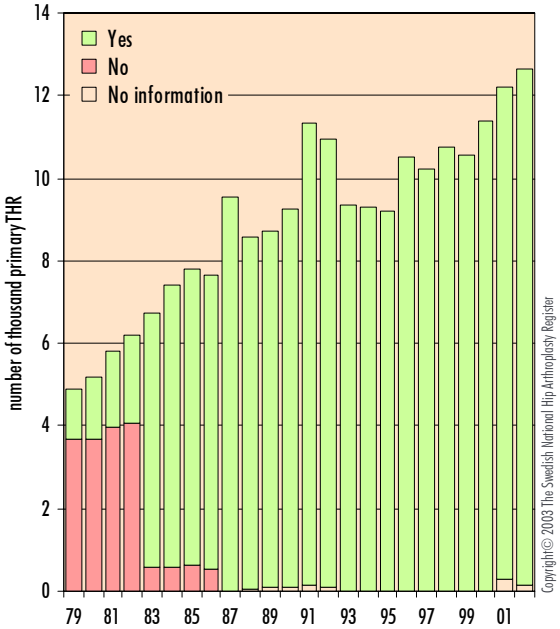
Proximal Femoral Seal

1979-2002



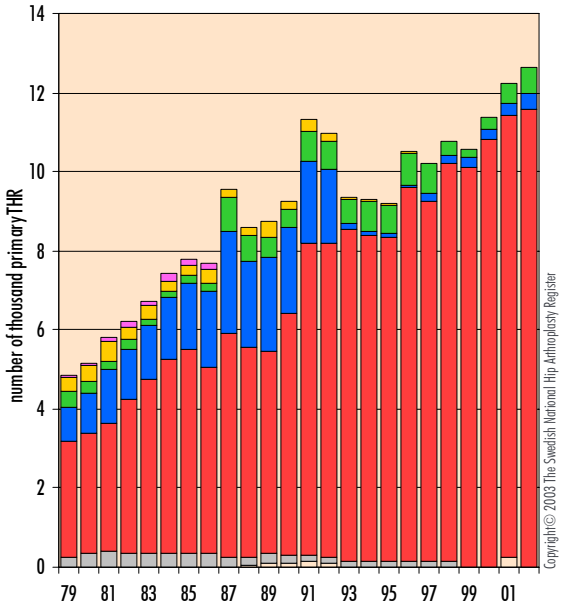
Distal Femoral Plug

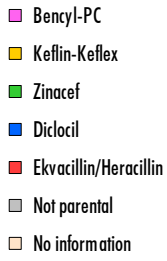
1979-2002



Parenteral Brand of Antibiotics

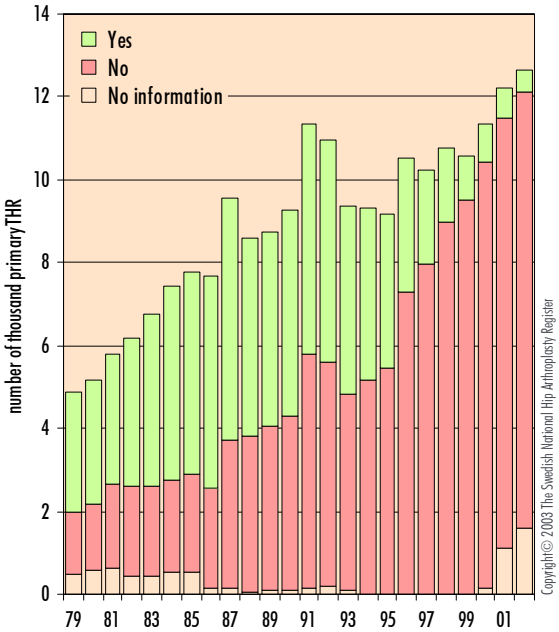
1979-2002





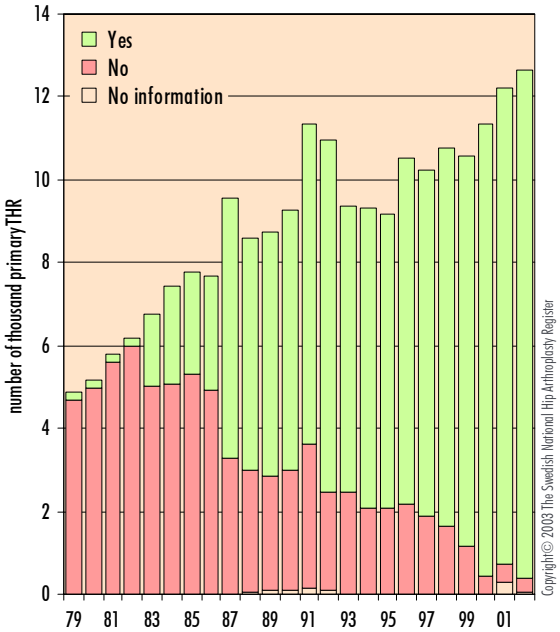
Per oral Antibiotics

1979-2002



Acetabular Compression

1979-2002



Implant survival as a quality indicator

Implant survival rates for the individual clinics are shown on the right. All activities are shown, i.e. all fixation principles in all patients and all reasons for revision. On the x-axis each mark represents a clinic. Note that the clinics in the two time periods are different on account of mergers and closures, although it so happens that for 7-year survival there are 85 clinics in both periods. Only clinics that have achieved a statistically evaluable 7-year result (over 50 patients with a risk of revision at 7 years) are shown. On the y-axis the clinics' result and 95% confidence interval are indicated. For each period of time the national average and 95% confidence interval are shown (as a broad line).

The purpose of this analysis is to illustrate in a clear manner the changes in the country over time, based on the individual clinics' results. The analysis does not take into account differences in case-mix, and the clinic result is based on Kaplan-Meier survival statistics with the inherent limitations of this technique.

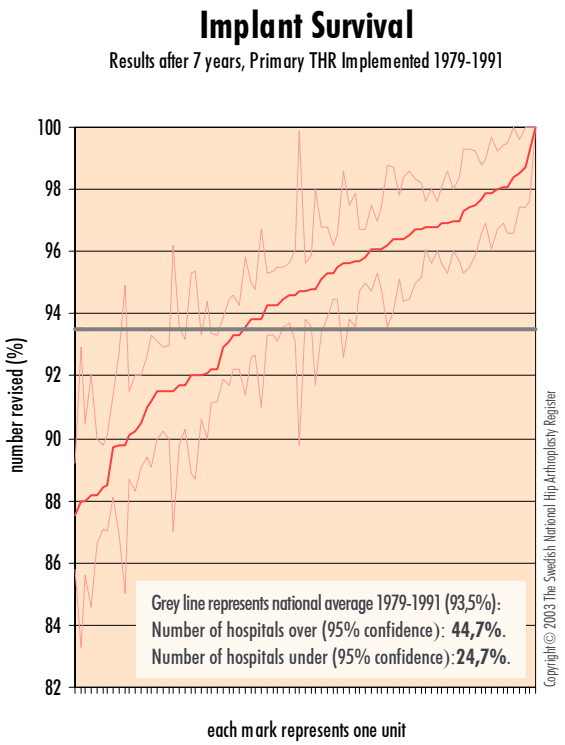
The national average for 7-year survival has improved from 93.5% (±0.15) to 95.8% (±0.15) in the periods observed, 1979-1991 and 1992-2002.

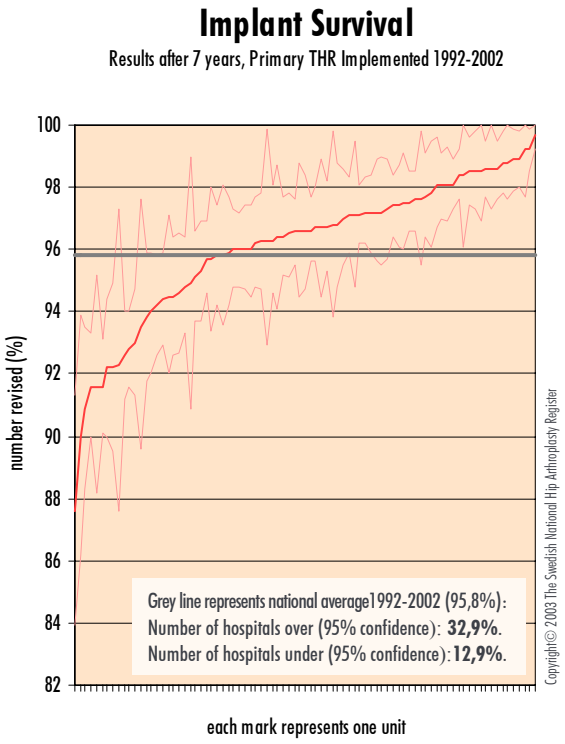
85 clinics are represented in both periods.

Between 1979-1991 30.6% of the clinics are not significantly different from the national average, 24.7% are below, and 44.7% are above. Between 1992-2002 the results show that 54.1% are not different from the national average, only 12.9% below, and 32.9% above.

A clear improvement can be observed generally in the country. Moreover, the proportion of clinics with a result significantly below the national average has decreased from 24.7% to 12.9% - a very positive development that reflects improved implants in combination with developments in cementing and surgical techniques. Above all, the result must be viewed on a national level, and comparison between individual clinics is less relevant until it becomes possible by means of regression analysis to compensate for differences in the individual clinics' case-mix.

An advanced regression analysis with the possibility of feedback on-line via the web application will only be technically possible when there has been sufficient follow-up of the cohort that was operated on at the start of the Internet-based reporting (1999). We expect that the first results will be presented in the 2005 annual report.





Regions

The procedure frequencies per 100 000 inhabitants for patients aged 50 years or older and with the diagnosis of primary arthrosis are given for the period 1992-2001. The national average is indicated for comparison between the individual regions (see diagram this page). The variation in the procedure frequency (72-98/100 000 inhabitants) can partly be explained by a real difference in the incidence of arthroses requiring treatment, but also reflects a problem of resources.

For all six regions the 15 most common implants during the period 1979-2002 are indicated, with annual information for the last five years. In addition, the number of primary operations per fixation type is illustrated. Aggregate survival curves for all implants are shown for two periods. The number of primary operations in the regions and the revisions to which these gave rise, the total revision burden (RB) 1979-2002, and the RB for women and men in the period 1992-2002 are shown. Finally, the range of diagnoses and the average age per gender annually for the last 10 years are shown.

The number of procedures still clearly vary between regions, but with new variations. The positive developments in the Stockholm region are continuing, albeit at a slower rate, and apart from the western region most regions match the national average. However, a continued increase in the number of operations in the western region also can be noted.

With regard to the choice of fixation method, the difference due to some regions being responsible for developments in the field of prostheses and using more uncemented and hybrid techniques still persists. In contrast to previous annual reports, survival is not reported separately for cemented and uncemented implants. The regions that have used larger proportions of uncemented prosthesis components have a poorer result. This is the consequence of the clinical development work with new fixation methods. The difference is obvious, and may be a real difference in quality, but may also reflect the fact that patients included in prospective longitudinal clinical and radiographic studies are treated earlier with revision of osteolysis, changes that are often clinically silent. The register data cannot answer these questions, but hopefully the radiographic follow-up via the follow-up model will provide the answer within a few years.

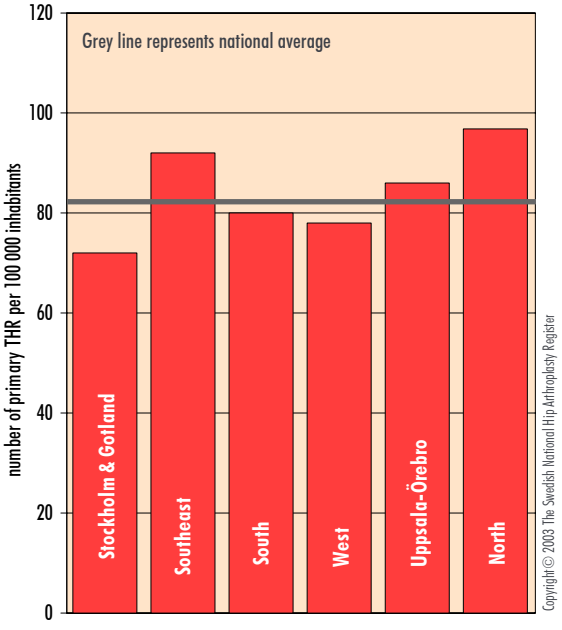
The revision burden varies between 7.2% and 8.7%. The lowest RB is noted in the northern region, where some clinics used well-documented cemented implants and very few used uncemented implants. For men a clearly higher revision burden than for women is noted. This difference is accentuated interregionally, with a variation for men between 14.7% in the Stockholm/Gotland region and 10.2% in the North region. The variation in RB for women is less between the regions. The dominance in revision burden for men may be in part due to greater bodyweight and activity, with increasing implant wear, and subsequent osteolysis and loosening. Differences in seeking treatment and a different response to pain are other possible explanations. The increased allocation of resources to the Stockholm region, with reduced queues, may also contribute to variations in RB between the regions.

The indication for total joint replacement as a result of fracture of the hip varies between the regions. In the south eastern region 13.8% of the primary operations are carried out on account of hip fractures, in the northern region the corresponding frequency is 8.7%. Two recent Ph.D. theses have discussed the problem of hip fracture patients, and in both it is concluded that the increased frequencies of primary arthroplasty have major advantages for the patients and for society.

The regional differences that exist are a reflection of differences in individual clinics, and the register managers encourage regional meetings and discussions in order to evaluate, explain and learn about earlier activity. During the last year, the register representatives have taken part in such discussions in the Stockholm region and the western region. In these discussions, a problem that has long been known arose, namely that central hospitals with training burdens for doctors have a poorer outcome. The introduction of hip arthroplasty surgery varies greatly between the units, and there is good reason to heed the guidelines issued by the Swedish Orthopaedic Association on how younger colleagues should be introduced to independent surgery.

Average Frequency of Procedure

1992-2001, Osteoarthritis, 50 years or Older



Region: Stockholm & Gotland

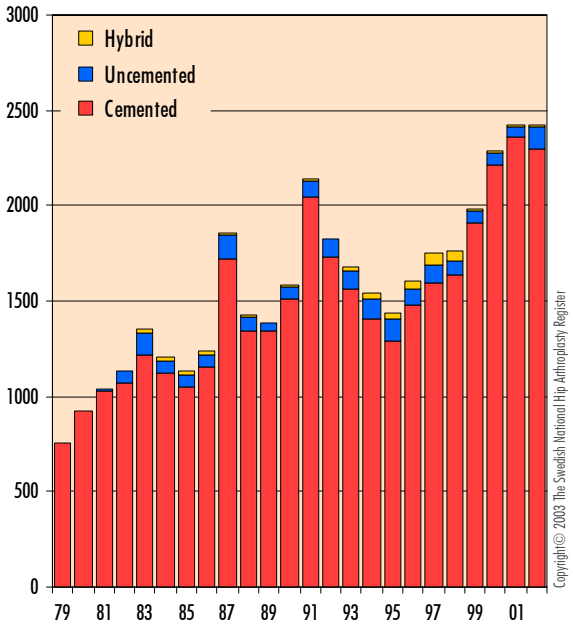
15 Most Common Implants

1992-2002

Cup	Stem	1979-1997	1998	1999	2000	2001	2002	Total
Charnley	Charnley	17 432	1 117	1 030	1 059	1 000	631	22 269
Charnley Elite	Exeter Polished	0	0	219	365	455	703	1 742
Biomet Müller	CPT	37	48	116	189	214	212	816
Lubinus All-poly	Lubinus SP II	353	2	59	125	135	136	810
Reflection	Spectron EF Primary	0	0	79	105	145	190	519
Exeter All-Poly	Exeter Polished	255	98	9	1	1	1	365
Weber All-poly	Straight-stem standard	0	0	26	99	100	113	338
Charnley Elite	Charnley	319	0	1	0	1	0	321
Charnley Elite	Charnley Elite Plus	68	95	63	57	13	1	297
Charnley	Charnley Elite Plus	22	45	53	30	68	12	230
Romanus HA	Bi-Metric HA (uncem.)	104	50	31	26	15	2	228
Charnley	CAD	326	0	0	0	0	0	326
Charnley	Exeter Polished	28	64	15	8	23	86	224
Charnley Elite	ABG (uncem.)	1	0	9	48	71	94	223
Biomet Müller	Bi-Metric (cem.)	343	0	0	0	0	0	343
Others (240)		7 991	271	353	315	362	454	9 746
Total		27 279	1 790	2 063	2 427	2 603	2 635	38 797

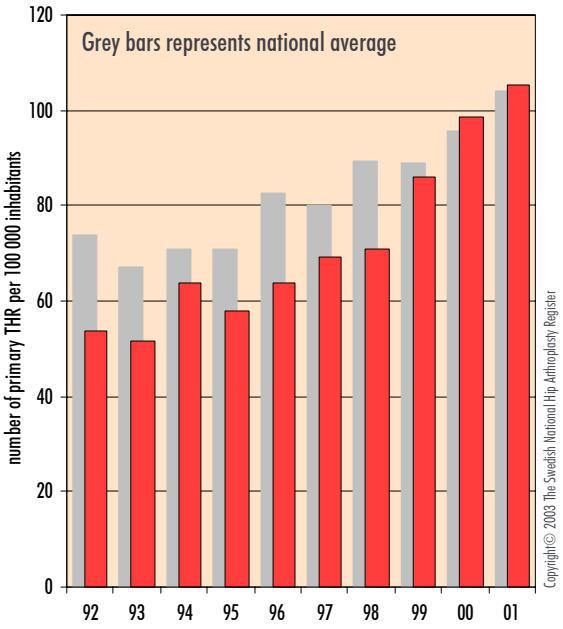
Number of Osteoarthritis

Per Type of Fixation



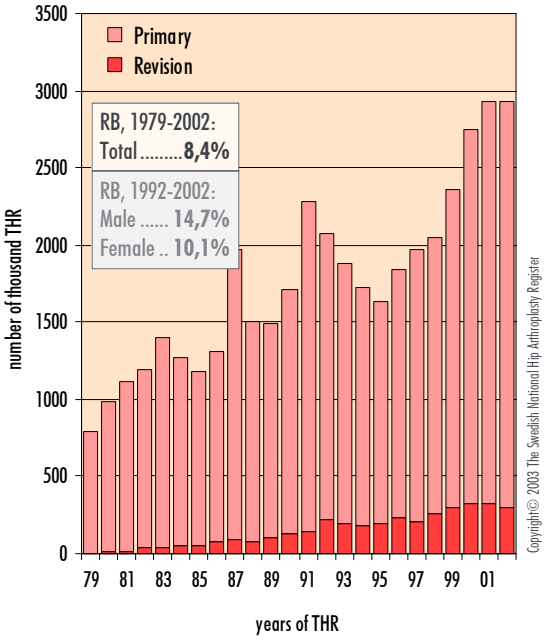
Frequency of Procedure

Osteoarthritis, 50 years or Older



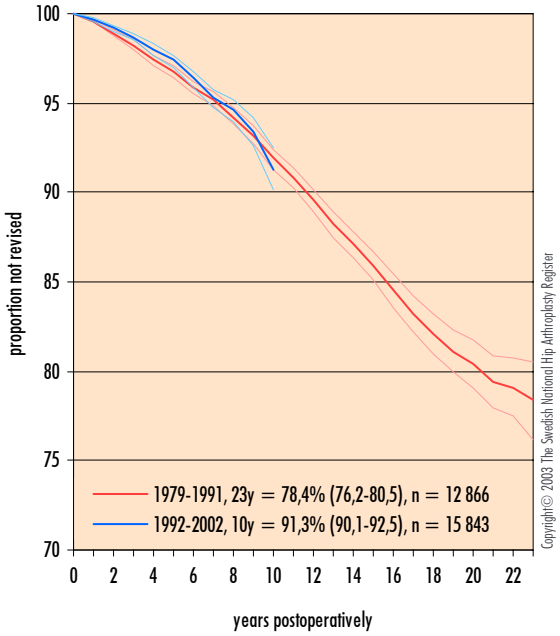
Number of THR per Year

38 797 Primary THR, 3 556 Revisions, 1979-2002



Implant Survival

Osteoarthritis and Aseptic Loosening



Number of Primary THR per Diagnosis and Year

Diagnosis	1992-1997	1998	1999	2000	2001	2002	Total
Primary osteoarthritis	6 656	1 357	1 658	1 912	2 060	2 145	15 788
Fracture	1 131	239	252	311	283	265	2 481
Inflammatory arthritis	481	81	41	51	65	46	765
Idiopathic femoral head necrosis	307	67	59	63	82	74	652
Childhood disease	50	21	31	64	83	85	334
Secondary osteoarthritis	151	0	0	0	0	1	152
Tumor	26	14	9	25	22	15	111
Secondary arthritis after trauma	25	5	10	1	8	4	53
(missing)	1065	6	3	0	0	0	1 074
Total	9 892	1 790	2 063	2 427	2 603	2 635	21 410

Average Age per Gender and Year

Gender	1992-1997	1998	1999	2000	2001	2002	Totalt
Male	67,9	67,7	67,9	67,7	66,8	67,5	67,7
Female	70,7	70,1	71,2	71,1	70,1	69,9	70,6
Total	69,7	69,3	70,0	69,9	69,0	69,0	69,6

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Region: Southeast

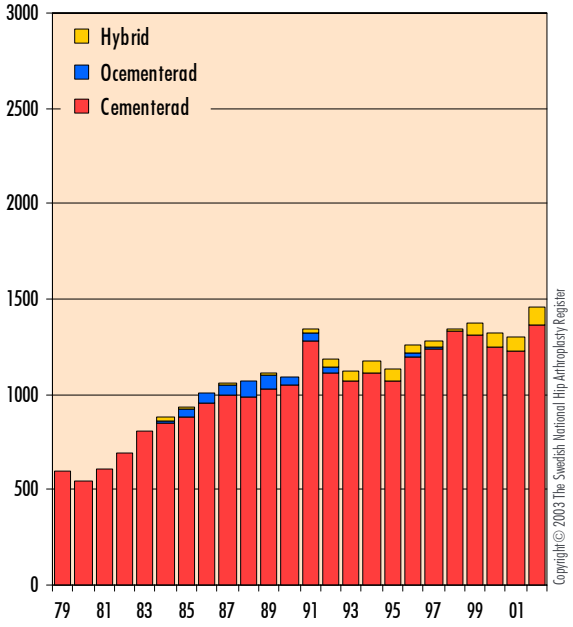
15 most common implants

1992-2002

Cup	Stam	1979-1997	1998	1999	2000	2001	2002	Total
Lubinus All-Poly	Lubinus SP II	5 128	791	815	786	743	817	9 080
Exeter All-Poly	Exeter Polished	758	170	9	8	1	2	948
FAL	Lubinus SP II	0	0	20	211	283	315	829
Charnley	Charnley	3 798	5	0	0	0	0	3 803
SHP	Lubinus SP II	289	108	140	20	0	5	562
Exeter Duration	Exeter Polished	0	0	153	141	140	107	541
Charnley Elite	Exeter Polished	64	55	42	38	24	26	249
Charnley Elite	Lubinus SP II	125	33	19	30	11	16	234
Lubinus All-Poly	Lubinus IP	3 281	15	0	0	0	0	3 296
OPTICUP	Lubinus SP II	43	100	87	0	0	0	230
ITH	ITH	687	0	0	0	0	0	687
Scan Hip Cup	Scan Hip Collar	212	0	0	0	0	0	212
Charnley Elite	PCA E-series Textured	129	0	0	0	0	0	129
Exeter Polished	Exeter Polished	595	0	0	0	0	0	595
Omnifit	Lubinus SP II	97	0	0	0	0	0	97
Others (127)		3 735	64	95	99	112	170	4 275
Total		18 941	1 341	1 380	1 333	1 314	1 458	25 767

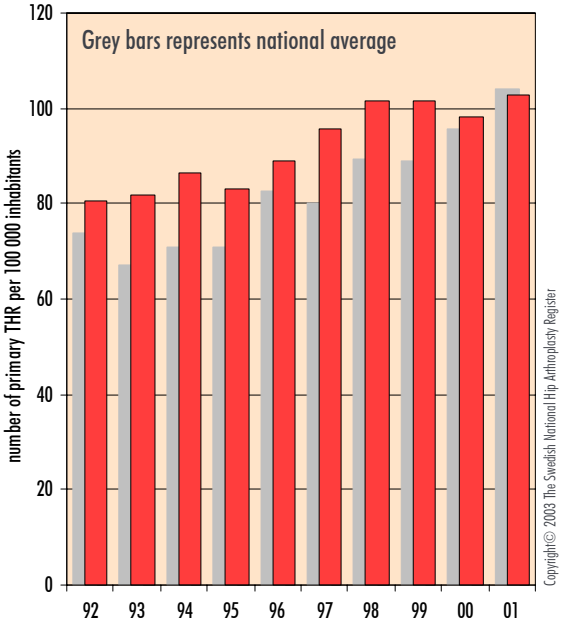
Number of Osteoarthritis

Per Type of Fixation



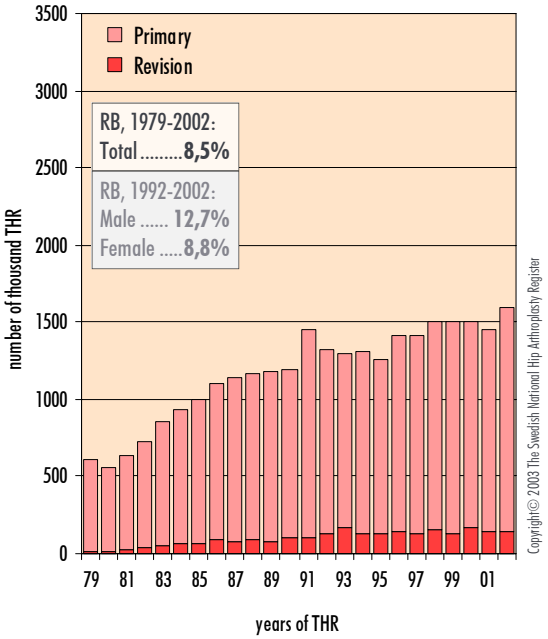
Frequency of Procedure

Osteoarthritis, 50 years or Older



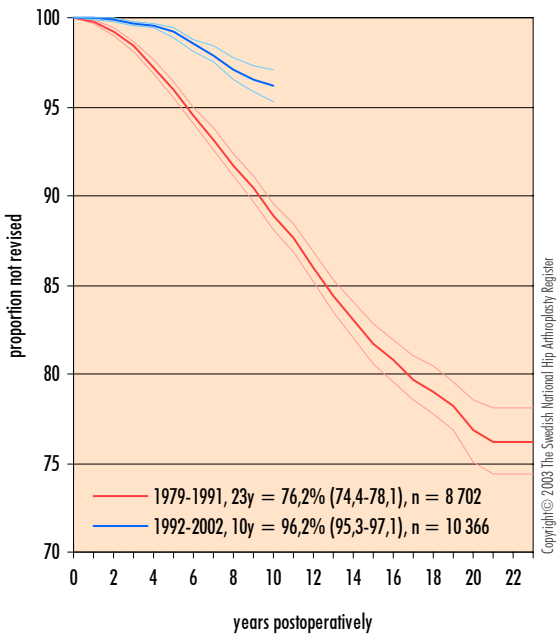
Number of THR per Year

25 767 Primary THR, 2 393 Revisions, 1979-2002



Implant Survival

Osteoarthritis and Aseptic Loosening



Number of Primary THR per Diagnosis and Year

Diagnosis	1992-1997	1998	1999	2000	2001	2002	Total
Primary osteoarthritis	5 108	992	1 014	980	1 033	1 149	10 276
Fracture	877	204	245	239	172	200	1 937
Inflammatory arthritis	473	65	63	45	46	37	729
Idiopathic femoral head necrosis	258	40	29	41	35	30	433
Childhood disease	271	1	0	0	0	0	272
Secondary osteoarthritis	44	13	26	24	23	31	161
Tumor	11	3	2	4	4	11	35
Secondary arthritis after trauma	25	8	0	0	1	0	34
(missing)	115	15	1	0	0	0	131
Total	7 182	1 341	1 380	1 333	1 314	1 458	14 008

Average Age per Gender and Years

Gender	1992-1997	1998	1999	2000	2001	2002	Total
Men	69,2	68,3	69,1	69,2	68,1	68,0	68,9
Women	71,4	71,6	71,8	72,0	70,9	71,0	71,4
Total	70,5	70,2	70,7	70,9	69,7	69,7	70,4

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Region: South

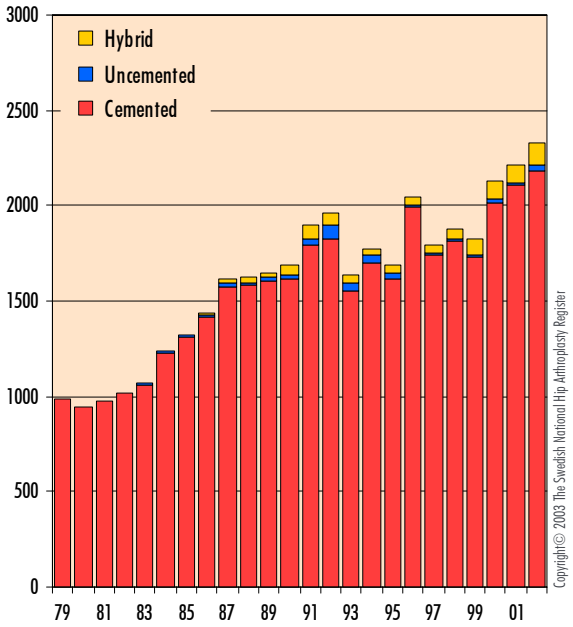
15 Most Common Implants

1992-2002

Cup	Stem	1979-1997	1998	1999	2000	2001	2002	Total
Lubinus All-Poly	Lubinus SP II	2 968	460	481	523	627	691	5 750
Exeter All-Poly	Exeter Polished	1 892	470	224	95	9	13	2 703
Exeter Duration	Exeter Polished	0	0	264	681	771	932	2 648
Charnley	Charnley	5 894	117	55	34	20	9	6 129
Scan Hip Cup	Scan Hip Collar	5 242	87	18	12	0	0	5 359
OPTICUP	Scan Hip II Collar	245	251	293	387	363	279	1 818
Charnley	Charnley Elite Plus	281	336	184	119	31	0	951
Exeter Polished	Exeter Polished	1 256	0	0	0	0	0	1 256
Charnley Elite	Charnley Elite Plus	18	0	148	109	44	0	319
Trilogy HA	Lubinus SP II	42	43	41	66	69	52	313
OPTICUP	Optima	270	10	9	0	0	0	289
Scan Hip Cup	Scan Hip II Collar	160	25	1	0	0	0	186
Charnley Elite	Exeter Polished	0	0	3	2	86	83	174
Omnifit	Omnifit	165	0	0	0	0	0	165
Charnley	Exeter Polished	8	0	1	2	65	36	112
Others (203)		10 095	126	117	109	148	268	10 863
Total		28 536	1 925	1 839	2 139	2 233	2 363	39 035

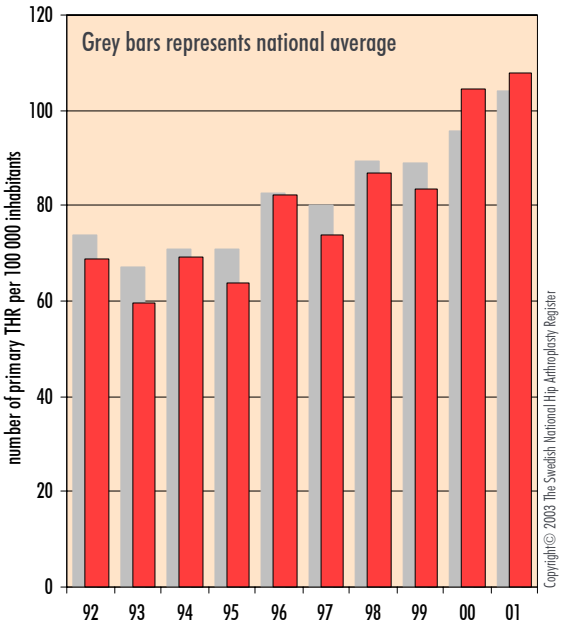
Number of Osteoarthritis

Per Type of Fixation



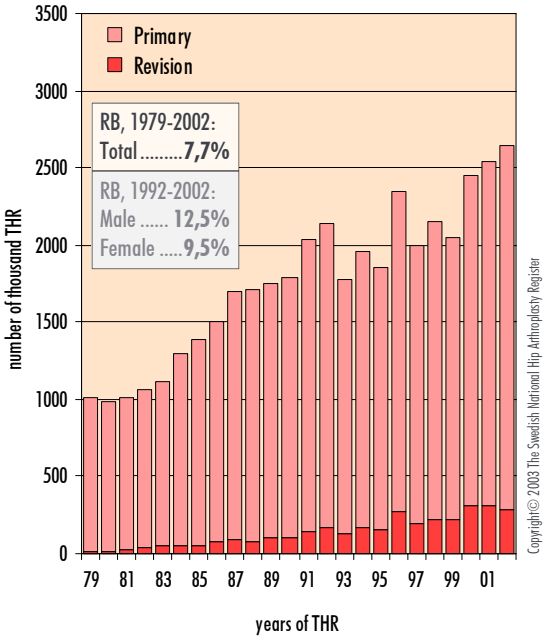
Frequency of Procedure

Osteoarthritis, 50 years or Older



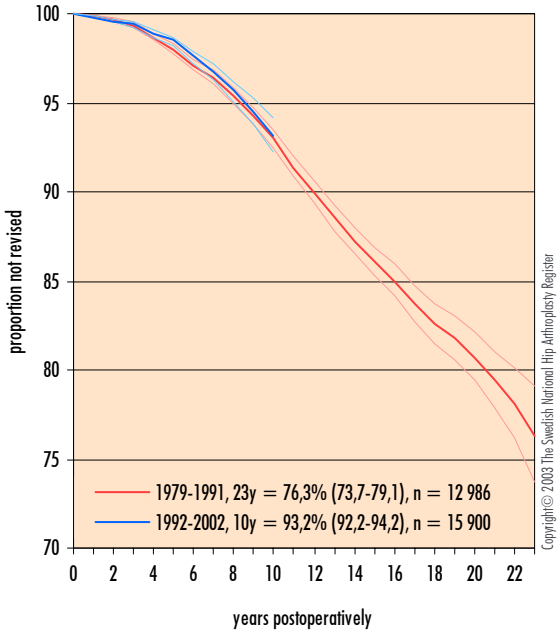
Number of THR per Year

39 035 Primary THR, 3 260 Revisions, 1979-2002



Implant survival

Osteoarthritis and Aseptic Loosening



Number of Primary THR per Diagnosis and Year

Diagnosis	1992-1997	1998	1999	2000	2001	2002	Totalt
Primary osteoarthritis	6 684	1 403	1 370	1 699	1 765	1 954	14 875
Fracture	1 138	275	230	223	233	208	2 307
Inflammatory arthritis	545	122	107	99	106	65	1 044
Idiopathic femoral head necrosis	272	64	74	73	69	75	627
Childhood disease	68	28	32	30	44	49	251
Secondary osteoarthritis	134	1	0	1	0	0	136
Tumor	40	28	19	13	13	9	122
Secondary arthritis after trauma	21	2	5	1	3	3	35
(missing)	2 086	2	2	0	0	0	2 090
Total	10 988	1 925	1 839	2 139	2 233	2 363	21 487

Average Age per Gender and Year

Gender	1992-1997	1998	1999	2000	2001	2002	Totalt
Male	68,6	69,4	67,4	68,1	68,2	67,0	68,3
Female	71,0	71,0	70,0	70,6	70,0	70,1	70,6
Total	70,1	70,4	68,9	69,5	69,3	68,8	69,7

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Region: West

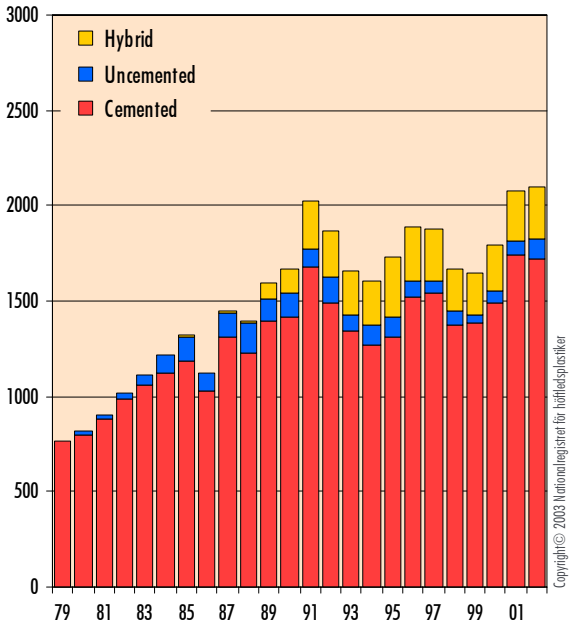
15 Most Common Implants

1992-2002

Cup	Stem	1979-1997	1998	1999	2000	2001	2002	Total
Lubinus All-Poly	Lubinus SP II	3 246	657	660	728	1 154	1 177	7 622
Reflection	Spectron EF Primary	585	289	315	385	441	398	2 413
Biomet Müller	RX90-S	796	173	190	197	7	0	1 363
Charnley	Charnley	4 645	23	2	3	0	0	4 673
Reflection	Spectron EF	1 222	0	0	0	0	0	1 222
Trilogy HA	Spectron EF Primary	115	54	81	147	176	168	741
Biomet Müller	Bi-Metric (cem.)	1 257	0	0	0	0	0	1 257
Lubinus All-Poly	Lubinus IP	3 693	2	0	0	0	0	3 695
OPTICUP	Optima	346	64	39	0	0	0	449
Contemporary	Exeter Polished	227	79	43	7	2	2	360
ABG HA	Lubinus SP II	220	47	0	0	0	0	267
Romanus	Bi-Metric (cem.)	349	0	0	0	0	0	349
Romanus	RX90-S	150	11	14	7	0	0	182
Spectron Metal	Spectron EF	323	0	0	0	0	0	323
Harris-Galante II	Spectron EF	157	0	0	0	0	0	157
Others (244)		9 830	446	306	329	306	370	11 587
Total		27 161	1 845	1 650	1 803	2 086	2 115	36 660

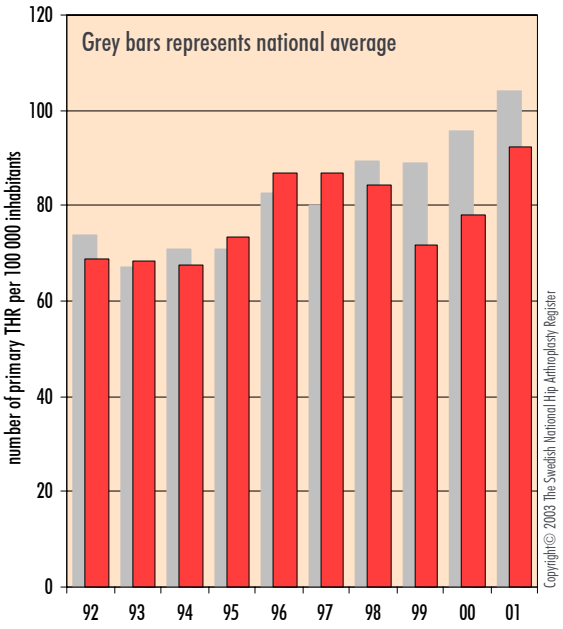
Number of Osteoarthritis

Per Type of Fixation



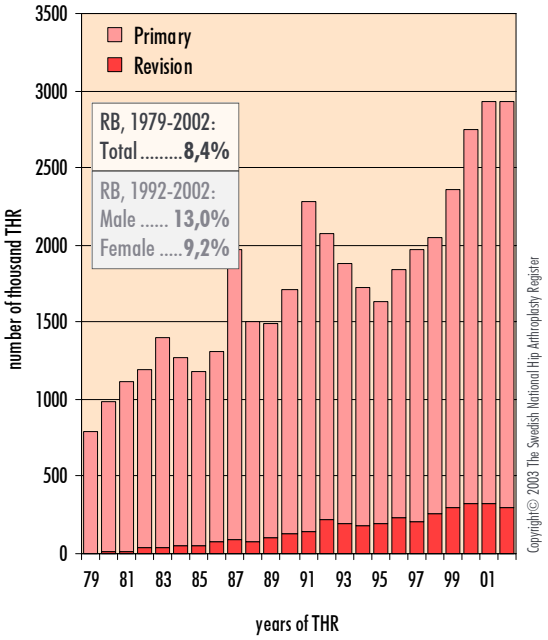
Frequency of Procedure

Osteoarthritis, 50 years or Older



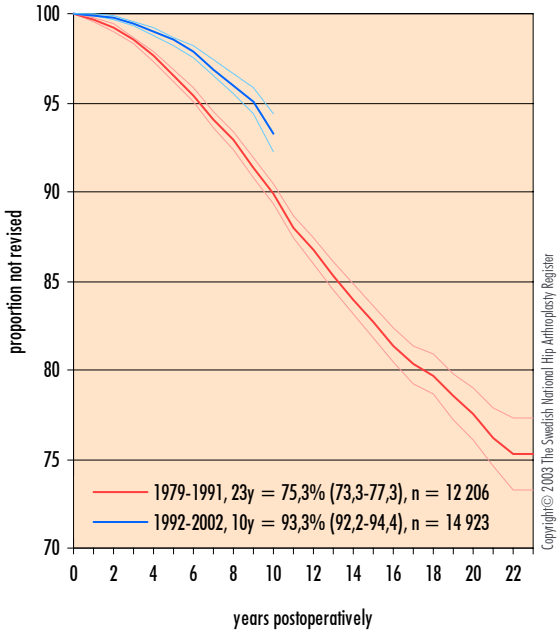
Number of THR per Year

36 660 Primary THR, 3 345 Revisions, 1979-2002



Implant Survival

Osteoarthritis and Aseptic Loosening



Number of Primary THR per Diagnosis and Year

Diagnosis	1992-1997	1998	1999	2000	2001	2002	Totalt
Primary osteoarthritis	7 737	1 449	1 227	1 349	1 612	1 646	15 020
Fracture	876	242	266	292	323	287	2 286
Inflammatory arthritis	613	64	57	57	61	75	927
Idiopathic femoral head necrosis	197	34	38	53	39	44	405
Childhood disease	179	28	45	38	37	51	378
Secondary osteoarthritis	270	0	0	0	0	0	270
Tumor	14	10	12	11	14	11	72
Secondary arthritis after trauma	17	2	4	3	0	1	27
(missing)	407	16	1	0	0	0	424
Total	10 310	1 845	1 650	1 803	2 086	2 115	19 809

Average Age per Gender and Year

Gender	1992-1997	1998	1999	2000	2001	2002	Totalt
Male	68,0	68,0	67,2	67,4	67,3	67,2	67,7
Female	69,8	70,9	70,8	70,1	70,9	70,4	70,2
Total	69,1	69,7	69,3	69,0	69,4	69,1	69,2

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Region: Uppsala-Örebro

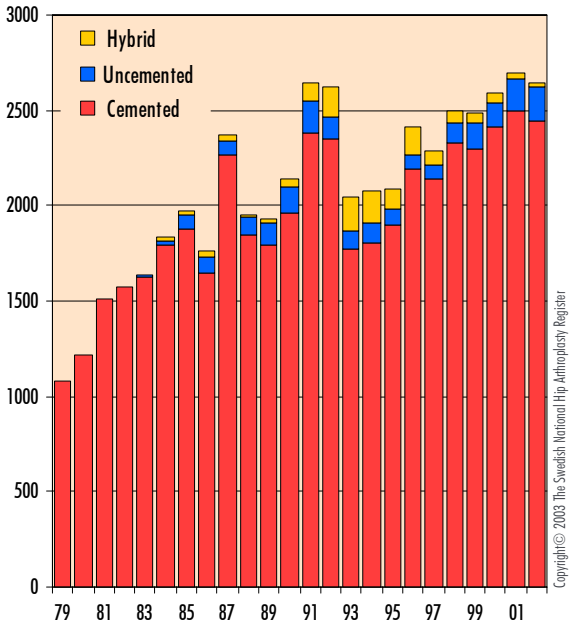
15 Most Common Implants

1992-2002

Cup	Stem	1979-1997	1998	1999	2000	2001	2002	Total
Charnley	Charnley	13 006	583	652	508	581	287	15 617
Lubinus All-Poly	Lubinus SP II	3 272	626	567	716	677	758	6 616
Müller All-Poly	Müller Straight	3 758	97	58	48	71	60	4 092
Exeter All-Poly	Exeter Polished	977	234	35	15	5	3	1 269
Exeter Duration	Exeter Polished	0	0	243	324	334	303	1 204
Cenator	Cenator	709	174	133	134	0	0	1 150
Cenator	Exeter Polished	0	142	132	187	195	3	659
Charnley Elite	Charnley Elite Plus	288	11	59	89	94	9	550
Stanmore	Stanmore mod	0	0	0	71	211	183	465
Exeter Metal-backed	Exeter Polished	1 407	0	0	0	0	0	1 407
CLS Spotorno	CLS Spotorno	270	31	38	42	37	33	451
Reflection	Spectron EF Primary	0	30	58	69	84	103	344
Charnley	Exeter Polished	363	20	23	17	14	21	458
Charnley	Charnley Elite Plus	200	52	58	10	6	0	326
Cenator	Charnley Elite Plus	1	177	126	14	0	0	318
Others (269)		13 044	347	351	361	408	938	15 449
Total		37 295	2 524	2 533	2 605	2 717	2 701	50 375

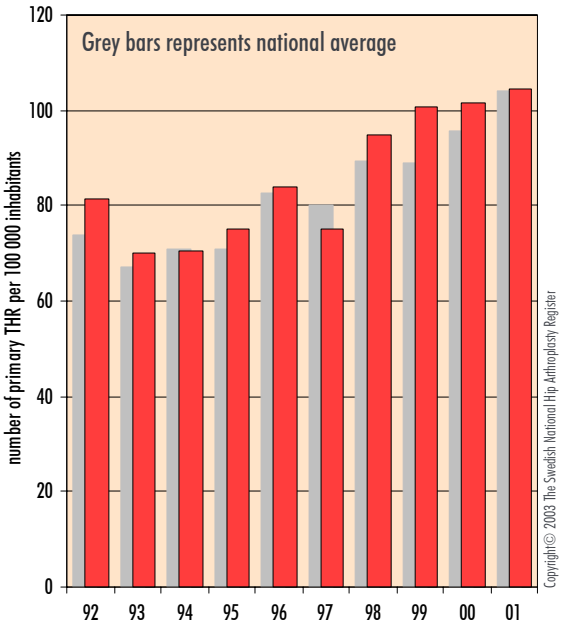
Number of Osteoarthritis

Per Type of Fixation



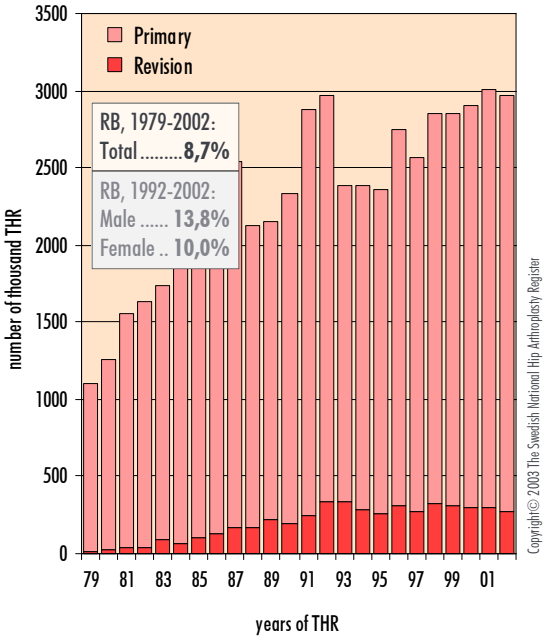
Frequency of Procedure

Osteoarthritis, 50 years or Older



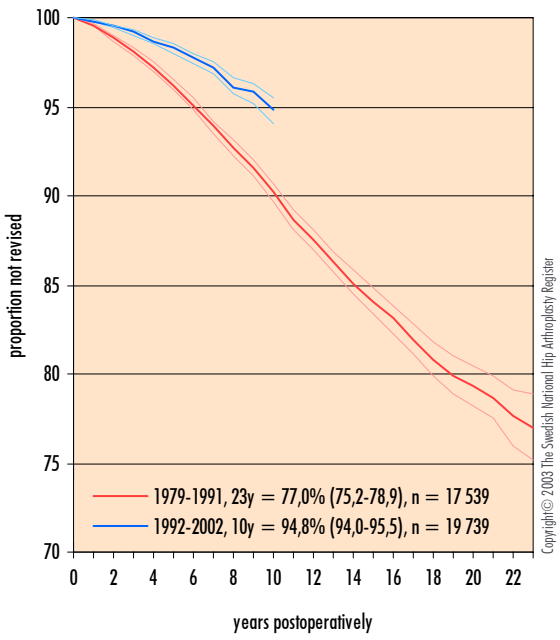
Number of THR per Year

50 375 Primary THR, 4 802 Revisions, 1979-2002



Implant Survival

Osteoarthritis and Aseptic Loosening



Number of Primary THR per Diagnosis and Year

Diagnosis	1992-1997	1998	1999	2000	2001	2002	Total
Primary osteoarthritis	9 095	1 884	1 982	2 009	2 076	2 124	19 170
Fracture	1 359	297	282	328	374	333	2 973
Inflammatory arthritis	804	144	118	106	115	99	1 386
Idiopathic femoral head necrosis	353	88	100	103	91	78	813
Childhood disease	202	50	38	43	45	49	427
Secondary osteoarthritis	193	0	0	0	0	0	193
Tumor	44	13	13	13	12	16	111
Secondary arthritis after trauma	40	8	0	3	4	2	57
(missing)	292	10	0	0	0	0	302
Total	12 382	2 494	2 533	2 605	2 717	2 701	25 432

Average Age per Gender and Year

Gender	1992-1997	1998	1999	2000	2001	2002	Totalt
Male	68,3	67,5	67,5	68,0	67,4	67,6	68,0
Female	70,4	70,0	70,9	70,8	70,9	70,8	70,6
Total	69,5	69,0	69,5	69,7	69,5	69,5	69,5

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Region: North

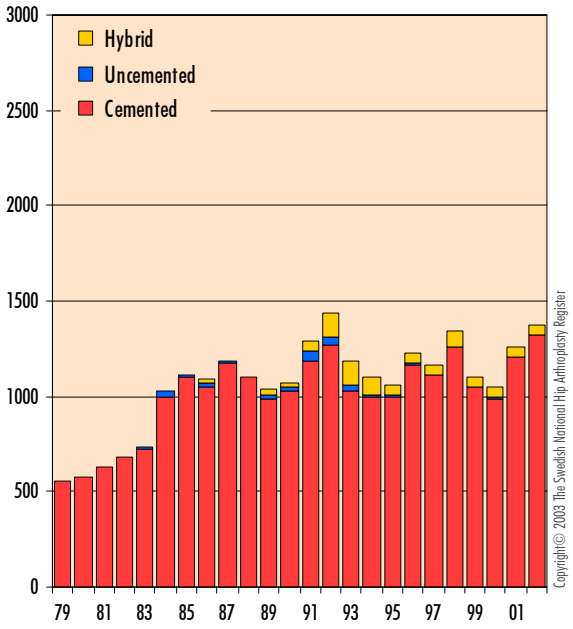
15 Most Common Implants

1992-2002

Cup	Stem	1979-1997	1998	1999	2000	2001	2002	Total
Lubinus All-Poly	Lubinus SP II	6 954	777	574	648	863	975	10 791
Exeter All-Poly	Exeter Polished	727	238	138	17	8	4	1 132
Exeter Duration	Exeter Polished	0	0	151	231	248	196	826
Charnley	Charnley	2 317	69	31	13	1	1	2 432
Scan Hip Cup	Optima	280	71	54	18	1	0	424
Scan Hip Cup	Scan Hip Collar	746	18	0	1	0	0	765
FAL	Lubinus SP II	0	0	1	1	41	140	183
Trilogy HA	Lubinus SP II	0	0	1	24	33	53	111
Reflection	Spectron EF Primary	1	1	81	26	2	0	111
Reflection	Spectron EF	39	69	0	0	0	0	108
Exeter Polished	Exeter Polished	554	0	0	0	0	0	554
Harris-Galante II	Lubinus SP II	86	0	0	0	0	0	86
Exeter Metal-backed	Exeter Polished	479	0	0	0	0	0	479
Reflection HA	Lubinus SP II	50	24	5	2	0	0	81
Omnifit	Lubinus SP II	75	0	0	0	0	0	75
Others (149)		7 091	77	79	74	79	10	7 410
Total		19 399	1 344	1 115	1 055	1 276	1 379	25 568

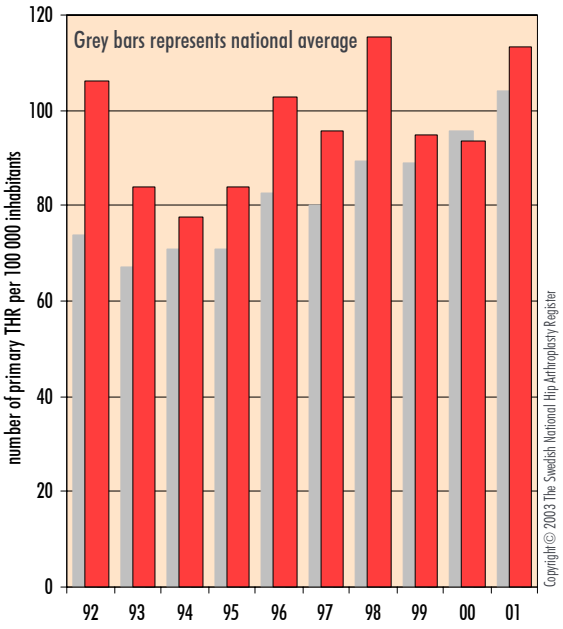
Number of Osteoarthritis

Per Type of Fixation



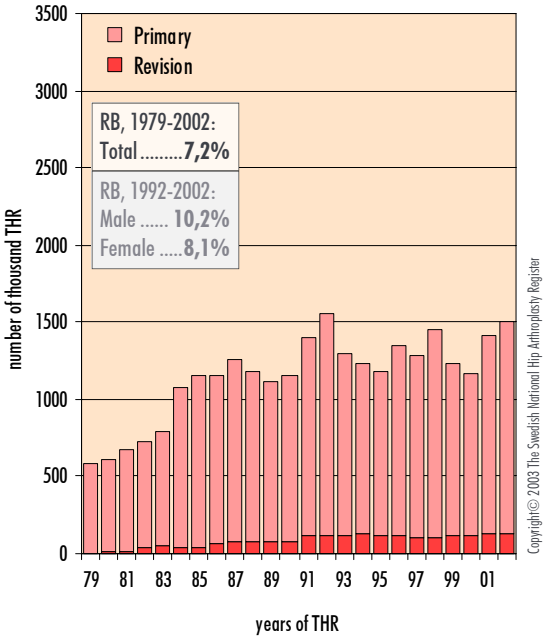
Frequency of Procedure

Osteoarthritis, 50 years or Older



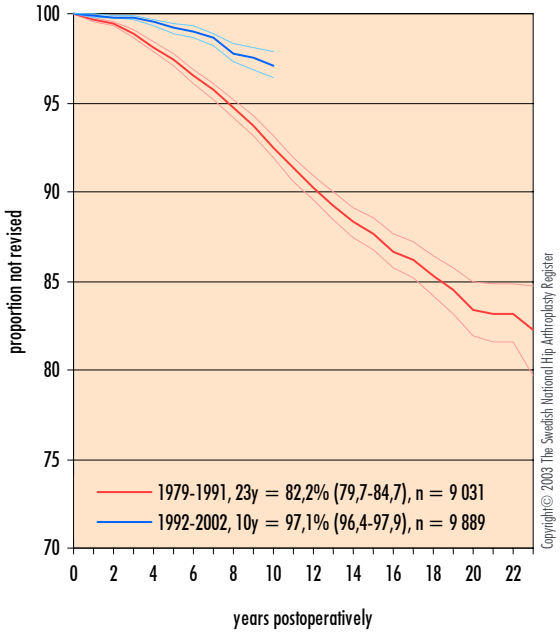
Number of THR per Year

25 568 Primary THR, 1 991 Revisions, 1979-2002



Implant Survival

Osteoarthritis and Aseptic Loosening



Number of Primary THR per Diagnosis and Year

Diagnosis	1992-1997	1998	1999	2000	2001	2002	Total
Primary osteoarthritis	5 225	1 067	866	857	1031	1 164	10 210
Fracture	547	151	117	99	136	118	1 168
Inflammatory arthritis	423	66	41	41	31	38	640
Idiopathic femoral head necrosis	224	44	50	26	47	27	418
Childhood disease	267	1	0	0	0	0	268
Secondary osteoarthritis	66	2	27	26	23	25	169
Tumor	84	2	1	1	1	0	89
Secondary arthritis after trauma	6	4	11	5	7	7	40
(missing)	353	7	2	0	0	0	362
Total	7 195	1 344	1 115	1 055	1 276	1 379	13 364

Average Age per Gender and Year

Gender	1992-1997	1998	1999	2000	2001	2002	Total
Male	67,9	67,8	68,3	68,0	68,5	67,5	67,9
Female	70,2	70,4	69,3	69,4	69,8	69,7	70,0
Total	69,3	69,4	68,9	68,8	69,3	68,7	69,2

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Conclusion

Work on clinical improvement

The National Hip Arthroplasty Register has in all probability contributed to the documented quality-raising effect on the activity. The positive development has continued, and for all patients who underwent surgery in 1992 the cumulative reoperation frequency is barely 6%, compared with just over 16% for those who had their operations in 1979. In the annual report, all diagnoses and all reasons for revision are reported. The revision rate has been reduced to a third. In the annual report, we again show the increase in quality that we see in the individual clinics. The result after 7 years has shown that with modern techniques (1992-2002) only 11 out of 85 clinics are significantly below the national average. The national average has increased to 95.8% survival for 1992-2002 from 93.5% between 1979 and 1991. This result too is based on all fixation methods, all diagnoses and all reasons for revision. However, there are regional differences that justify continued discussions and analysis of the revision material at a local level. The extent to which a rapid increase in numbers operated on within a region can adversely affect quality must be the subject of discussion and analysis of data in order to check what is involved in the activity. The reporting of data to individual clinics provides this possibility of comparison of their own data with the regional or the national average. The process is of crucial significance for flexibility in optimal routines and good choice of implant, and therefore quality.

For 12 years the register managers have been having annual meetings with local responsible "contact" doctors and during the last year have had a meeting with "contact" secretaries. At these meetings, where the current annual report is examined in detail and development projects in the register are discussed, the conditions are created for the unique flexibility that we have. At the Swedish Orthopaedic Association's annual meeting, the National Register had its own exhibition stand where the latest innovations were displayed, and we made good contacts with many of our suppliers of information.

Fulfilment of goals

A general problem in orthopaedics is that serious complications of our treatments occur so long after the operation. In the Hip Arthroplasty Register the results are mainly reported with revision or extraction of prosthesis components as the definition of failure. This technique has disadvantages in the form of late documenting of failure and delayed reporting of failure as a result of waiting times for competent treatment and the length of the waiting list. There is also an unreported number due to contraindications for further surgery and dissatisfied patients without a reason for revision.

A "follow-up model" with the aim of being able to report in the register patient experiences after arthroplasty and to measure the outcome with quality of life instruments was started in 2002 in Region West as a pilot project. Preliminary results from this project are presented in the annual report. Allowing for only 20% of the patients in the prospective cohort having been checked at 1 year, and considering that the radiography form has not yet been definitively validated, in the analysis we have found a number of cases with radiological changes and a number of patients who are not satisfied with the result of the treatment. Further analysis is being continually carried out, and a definitive result will probably be presented at the annual meeting of the Swedish Orthopaedic Association in Vasterås in 2003.

The first step in making this a nationwide project will probably be taken in the latter part of 2003, when the Northern region starts reporting data in accordance with this model.

In addition to studying effects on health experienced by patients, the project also aims to study the possibility of creating a more rapid quality parameter with feedback to surgeons through scoring points in post-operative radiography examinations. In the long term the idea is to have feedback on-line through digital handling of images.

The aim is to be able to intervene with work on improvement at an earlier stage than we can do at present, with revision as the definition of failure, and also to validate revision as the definition of failure in more depth.

The ultimate aim is to be able to measure outcome after hip prosthesis surgery throughout the country with the same scientifically tested methods in order to be able to compare results from different units in an optimal manner. If a generic instrument is included and used prospectively, and the cost of the procedure is known, the cost-benefit ratio can also be calculated. This type of calculation is being used increasingly for allocation of resources in a shrinking health economy, and is probably a very good argument in favour of increased bids for hip arthroplasty surgery.

National Centre for Orthopaedics

In the late autumn of 2002 the National Board of Health and Welfare and the Federation of County Councils decided to support a National Centre of Competence for Orthopaedics. The established registers (Hip Fracture, Hip Arthroplasty and Knee Arthroplasty) are included in the formation of this centre. The prime purpose of this work is to make use of existing competence in data processing, and through newly appointed epidemiological experts to feed back the register results from all orthopaedic registers to the profession, patients and healthcare administrators in a uniform manner. In addition, effects on health experienced by patients will be included in the quality registers' work to a greater degree than hitherto, and the work that has begun with the hip follow-up programme will also probably be integrated into the other orthopaedic quality registers.

Genus aspects

In this annual report we have emphasised gender-related differences in treatment routines, frequencies and in the range of complications to an even greater degree. The average age of women at primary operation is generally higher than that of men, with the exception of conditions resulting from childhood diseases. The extent to which this reflects different access to operations for women or has other objective explanations is not clear, but it is important for this phenomenon to be analysed further. The revision burden in general is clearly higher for men, except in the case of younger women, who have poorer results irrespective of method. This should be the object of a more in-depth analysis in order to reliably establish the causal connection of these observations.

Problem areas

The problems currently being studied in specific research projects in the register are periprosthetic post-operative femoral fractures, the primarily infected hip joints that have been replaced by prostheses, and patients under 50 years of age at the time of primary hip arthroplasty. During 2002 these projects have continued to be developed and presented at national and international meetings. Guidelines on how work on quality can be developed further in these problem areas will be discussed with new facts as the basis.

For the **periprosthetic fractures** we find a high frequency of unknown loose prostheses, which, as a result of the relative weakening of the bone cause fractures with very little trauma. Reoperation after fracture is technically difficult, and often results in repeated revision operations. An algorithm giving guidance in prophylaxis (serial radiographic examinations) is to be presented. **Infected hip prostheses** also have a poor treatment result, and we can confirm that the bacterial spectrum in infections has changed to a smaller proportion of Gram-negative bacteria as the causative pathogens and an increasing proportion of coagulase-negative staphylococci. We are also finding an increased risk of revision in men and a significantly lower risk for patients treated with antibiotic-impregnated cement. For the **younger patients** the survey is almost completed, and approx. 7 000 questionnaires are being analysed. Another problem area is the result of **revision surgery**. The recently reported revision study gives results on 13 424 hips that were revised during the period 1979-2000. The number of re-revisions has increased in recent years, and younger patients predominate, with no differences between the sexes. Early loosening of a hip prosthesis means a poor prognosis, which underlines the importance of optimal surgical technique in the primary operation. Patient selection and choice of implant are also factors of significance for early loosening. The analysis suggests that better results are obtained in larger units, and especially in regional hospitals with more experience and greater expertise. Which cases should be centralised is to be the subject of more extensive discussion within the profession.

We are aware that the methods we use for in-depth studies with patient questionnaires involves work for those involved in routine care, and we appreciate all the help we receive from a healthcare sector that has a shrinking capacity for this type of activity.

Current trends

The increased information on reasons for all reoperations that is supplied to all units shows where greater work on improvement is possible. Considerable variations in the occurrence of dislocation and deep infection can be seen, and indicate that the overall result can become even better.

In order to obtain deeper knowledge about the reasons for revision, it is important to report cup and stem survival separately. Such a project is currently ongoing, but the register work in this respect must be supplemented by specific clinical and radiographic studies.

Development of register analysis

As stated earlier, we intend to make more use of regression analysis in the future, both in annual reports but also in on-line feedback to the clinics via the Internet application. The aim is to create a more powerful tool for our users that a) will permit more in-depth statistical processing of our own material, and b) create models that can be used to assist decisions directly affecting patients. This work will be intensified as a result of the newly started centre of competence.

Final comment

Together with the Swedish Orthopaedic Association a project has begun with the aim of further simplifying the reporting routines to all orthopaedic registers. The objective is to integrate the various electronic records that are used here in Sweden and to collect data as soon as they are generated in the patient documentation. If these plans can be implemented, further resources will be released for analytical work both peripherally and centrally.

Those of us responsible for the National Hip Arthroplasty Register would like to express our thanks again for the good co-operation during the past year. Without the strong support that we receive from the hospitals the register could not function. We welcome views and comments on this report, and look forward to our future work together.

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