ANNUAL REPORT 2003

The Swedish National Hip Arthroplasty Register

229 031
PRIMARY THR
1979-2003

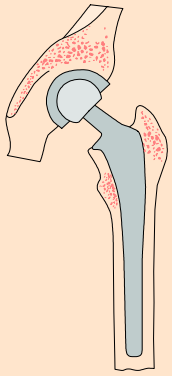
38 461
REOPERATIONS
1979-2003

21 367
REVISIONS
1979-2003

www.jru.orthop.gu.se

25 years
1979-2004

Alingsås
Arvika
Elisabeth-sjukhuset
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
Ljungby
Lund
Lycksele
Löwenströmska
Malmö
Mora
Motala
Movement
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
Södersjukhuset
Södertälje
Torsby
Trelleborg
Uddevalla
Umeå
Uppsala
Varberg
Visby
Värnamo
Västervik
Västerås
Växjö
Ystad
Ängelholm
Örebro
Örnsköldsvik
Östersund



Department of Orthopaedics
Sahlgrenska University Hospital
May 2004

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Foreword

Total hip arthroplasty is one of the most successful operations introduced and is cost effective for the community. The patients' suffering before surgery is documented and great. Most cases waiting for primary THR therefore have high priority. Medical and technological development is rapid, warranting continued monitoring of activities and continuous education.

The purpose of the register is to ensure equal quality throughout Sweden with a minimum of complications.

All units in the country (80 altogether), both public and private, which perform primary hip arthroplasty participate in the register. The coverage is complete for both primary THR and reoperations (including revisions).

Receiving reports

Most clinics report via the Internet today. Approximately 90% of primary replacements and 75% of reoperations are reported on-line. There is some delay for the remaining units. Copies of records from reoperations are used to permit further scientific studies.

Reporting

All publications, annual reports and scientific exhibitions are shown on our website (www.jru.orthop.gu.se). Reporting also takes place from this. Individual registration was introduced in 1992. Starting with this year's annual report, all results are presented according to the Kaplan-Meier survival method using the exact date of death (from the Register of Deaths). This replaces the method used since 1979, in which survival was calculated with the aid of statistical approximations. The definition of failure is, as previously, revision: replacement or removal of the prosthesis. The revision burden (revisions /(primary THR + revisions) is the key figure in national and international comparisons. Other major and minor surgical procedures, apart from revisions, constitute only 10% of the reoperations.

The individual health outcome has been documented for a couple of years in the western region and documentation started in the northern region last year and in the southern region this year. The individual health measures can be used for cost-utility analyses, thereby permitting health economic comparisons.

Primary data are presented in relation to age, sex and diagnosis. Factors related to surgical technique, choice of implant and method of fixation are analysed as previously, in order to permit discussion of suitable developments and important trends.

The open reporting for the individual units has been extended to two tables. All revisions performed with cemented prostheses based on all primary diagnosis and with all causes of failure are presented, as well as revisions with primary diagnosis of osteoarthritis only and owing to prosthesis loosening, as previously. The profession has accepted this extended general information as a basis for a deeper educational process. The confidential information to the individual units includes detailed information about the causes of their own failures, thereby permitting local efforts to achieve improvement. We in the register management hope that patients' subjective health measures can eventually be openly reported from each unit as this would increase the quality of both the process and the medical procedure. Scientific research has continued during the year.

A major organisational change in the register will occur when Henrik Malchau shortly leaves Sweden to take up a professorship at Harvard Medical School in Boston, USA. Henrik's contributions to the register, great enthusiasm and professional competency have been invaluable. We thank him for his input over the years and wish him all the best for the future.

Peter Herberts continues as the Director for another 3-year period at the most. The Swedish Orthopaedic Society has appointed Johan Kärrholm to replace Henrik Malchau. Göran Garellick works especially with patients' subjective health measures and health economic analysis. Other members of the management group are, as previously, Lars Linder, Arne Lundberg and Anders Wykman.

Many thanks for your input during the past year.

Göteborg, May 2004

Peter Herberts

Henrik Malchau

Göran Garellick

Primary THR

The register shows primary hip arthroplasties performed in Sweden since 1979. Up until 1991, the following information per unit per year was collected: number of primary operations, number and type of implants at each unit. From 1992, individual-based information on the primary procedure has been used. The patient's personal identity number automatically shows his or her sex and age. The diagnosis is shown with the ICD-9 code and since 1997 with the ICD-10 code. The type of prosthesis is shown separately for cup and stem as well as the method of fixation and type of cement. The web application was introduced on January 1, 1999 and it uses article numbers to ensure correct identification of individual implant parts and cements. The type of incision is also registered. 77 of the 80 hospitals (96%) report via the Internet and are on-line within a week after the operation. Reporting is almost one hundred per cent and no single units have any major data drop-out.

During the period 1979-2003 229 031 primary hip arthroplasties have been registered. The number of primary procedures is relatively unchanged compared to 2002 and 12 693 operations were performed in 2003. The 15 most common implant combinations are presented in tabular form. The selection is based on those most commonly used during the last 10 years. Lubinus SP II dominates and has increased continuously during the last five years and was used in 6 084 operations in 2003. It is followed by the Exeter prosthesis (3 363) and the Spectron prosthesis (1 076).

Four uncemented prosthesis systems with well-documented function in the medium-term perspective account for 80% of the production, which amounted to 580 arthroplasties in 2003. The situation is also unchanged for hybrid implants, with just over 500 cases in 2003, the Triology cup in combination with Spectron and Lubinus stems dominating. The concentration to well-functioning prosthetic systems is now strong for all three fixation principles.

The sex distribution is unchanged. Since 1992 60.7% of the patients have been women and 39.3% men. The trend that the number of primary procedures is increasing in rural hospitals continues, reflecting politicians' ambition to concentrate prosthetic surgery to elective units. Since 2001, these units have performed more operations than the central hospitals. We may expect a further redistribution. Patients operated upon at highly productive elective units must be followed thoroughly from a quality point of view as many previously used intrinsic routines for internal control are no longer relevant. The number of primary operations per hospital per year during the last five-year period is shown in the table on page 8. A few small hospitals are increasing their production markedly and a couple of university hospitals have a very low production, which in principle makes research and development impossible.

The number of primary hip arthroplasties and revisions per year with the three fixation principles cement, uncemented and hybrid are given on page 10. We have seen a rapid increase in the number of uncemented primary arthroplasties during the last two years. This observation receives some support in the literature, the results of certain prosthetic systems now being very good in a ten-year perspective. We use the revision frequency as a key figure in international comparisons (crude revision rate or revision burden). The revision burden for the period 1992-2003 is 9.9% for cemented implants, 28.1% for uncemented implants and 10.8% for hybrid implants. The total revision burden for the whole period has increased marginally, by a few tenths, to 7.8% for cemented implants. During the last ten-year period the revision burden has been generally higher for men than for women with the exception of uncemented and hybrid fixation. We note, however, that there has been a slight reduction of the revision burden for women regardless of the fixation principle. The increase of the revision burden for uncemented and hybrid implants continues but at a slower rate. In the medium-term perspective, hybrid arthroplasty seems to be as effective as cemented implants.

Osteoarthritis is the most common diagnosis for primary THR, accounting for 74.5% during the whole study period. Inflammatory joint diseases have been a relatively small and stationary group during the last few years. The number of primary hip fractures has not increased, which means that most cervical hip fractures are operated upon with hemiprostheses in Sweden. There have been very small changes in the proportions of other diagnoses. If we examine the diagnosis distribution in relation to the patient's age at operation, we find that primary osteoarthritis only accounts for 52% in patients aged below 50 years, inflammatory joint disease 17.6% and sequelae to childhood disease 12.7%. The mean age is higher for women and is unchanged at 70.5 years for the last ten-year period but has fallen somewhat to 67.9 for men. This development has been constant for many years. It is evident that there is a shift in indications so that men with primary and secondary osteoarthritis are operated upon at steadily younger age.

The production of primary hip arthroplasties is still too low in Sweden and an increase of approximately 10% would be desirable in order to meet the demand and eliminate queues. As is shown in the next section, the procedure is highly effective from the patient's point of view and offers high cost effectiveness to the community.

15 Most Common Implants

most used during the past 10 years

Cup (Stem)	1979-1998	1999	2000	2001	2002	2003	Total	Share
Lubinus All-Poly (Lubinus SP II)	25,222	3,156	3,524	4,200	4,564	4,705	45,371	19.8%
Charnley	49,108	1,770	1,612	1,598	926	280	55,294	24.1%
Exeter Duration (Exeter Polished)	0	835	1,393	1,511	1,544	1,414	6,697	2.9%
Exeter All-Poly (Exeter Polished)	5,893	416	136	24	23	8	6,500	2.8%
Reflection (Spectron EF Primary)	1,045	533	585	673	694	887	4,417	1.9%
Charnley Elite (Exeter Polished)	120	277	429	598	907	1,057	3,388	1.5%
Scan Hip All-Poly (Scan Hip Collar)	6,467	18	12	0	0	0	6,497	2.8%
FAL (Lubinus SP II)	0	21	211	347	800	832	2,211	1.0%
OPTICUP (Scan Hip II Collar)	498	294	389	382	279	126	1,968	0.9%
Charnley (Charnley Elite Plus)	942	295	159	105	12	2	1,515	0.7%
Biomet Müller (RX90-S)	1,054	191	197	7	0	0	1,449	0.6%
Cenator	950	133	134	0	0	0	1,217	0.5%
Müller All-Poly (Müller Straight)	4,058	58	48	71	60	60	4,355	1.9%
Charnley Elite (Charnley Elite Plus)	480	270	255	151	10	0	1,166	0.5%
Charnley (Exeter Polished)	489	39	27	103	158	281	1,097	0.5%
Others (total of 865)	73,172	2,268	2,237	2,451	2,720	3,041	85,889	37.5%
Total	169,498	10,574	11,348	12,221	12,697	12,693	229,031	100%

15 Most Common Uncemented Implants

most used during the past 10 years

Cup (Stem)	1979-1998	1999	2000	2001	2002	2003	Total	Share
CLS Spotorno	316	39	42	37	56	70	560	7.5%
ABG I HA (ABG uncem.)	304	0	0	0	0	0	304	4.1%
Romanus HA (Bi-Metric HA uncem.)	158	35	27	18	4	1	243	3.3%
Allofit (CLS Spotorno)	0	0	0	35	90	94	219	2.9%
Omnifit	360	0	0	0	0	0	360	4.8%
Romanus (Bi-Metric uncem.)	570	0	0	0	0	0	570	7.7%
ABGII HA (ABG uncem.)	5	20	35	31	53	19	163	2.2%
Trilogy HA (Versys uncem.)	0	2	9	16	41	80	148	2.0%
Trilogy (CLS Spotorno)	18	15	4	15	24	58	134	1.8%
Trilogy HA (Bi-Metric HA uncem.)	1	3	9	18	31	63	125	1.7%
Romanus (Bi-Metric HA uncem.)	146	1	0	0	0	0	147	2.0%
Secur-Fit (Omnifit)	101	3	0	0	0	0	104	1.4%
Trilogy (Cone uncem.)	15	23	15	18	15	15	101	1.4%
ABGII HA (Meridian)	1	8	9	18	31	32	99	1.3%
Trilogy (SL-plus uncem.)	7	13	7	10	8	17	62	0.8%
Others (total of 153)	3,622	82	112	98	66	131	4,111	55.2%
Total	5,624	244	269	314	419	580	7,450	100%

15 Most Common Hybrid Implants

most used during the past 10 years

Uncemented cup (cemented stem)	1979-1998	1999	2000	2001	2002	2003	Total	Share
Trilogy HA (Spectron EF Primary)	168	79	151	175	169	127	869	10.7%
Trilogy HA (Lubinus SP II)	155	48	114	139	130	144	730	9.0%
ABG HA (Lubinus SP II)	334	0	0	0	0	0	334	4.1%
Romanus (Bi-Metric (cem.))	562	0	0	0	0	0	562	6.9%
Harris-Galante II (Lubinus SP II)	276	0	0	0	0	0	276	3.4%
ABGII HA (Lubinus SP II)	37	59	52	31	13	5	197	2.4%
Romanus (RX90-S)	162	14	7	0	0	0	183	2.3%
ABG HA (ABG cem.)	255	0	0	0	0	0	255	3.1%
Omnifit (Lubinus SP II)	172	0	0	0	0	0	172	2.1%
Reflection HA (Lubinus SP II)	74	12	19	12	19	15	151	1.9%
Harris-Galante II (Spectron EF)	161	0	0	0	0	0	161	2.0%
BHR (BHR)	0	2	7	16	45	44	114	1.4%
Harris-Galante II (Charnley)	154	0	0	0	0	0	154	1.9%
Duralock (Spectron EF Primary)	82	20	10	0	0	0	112	1.4%
Biomex HA (Lubinus SP II)	0	0	19	18	33	30	100	1.2%
Others (total of 207)	2,892	248	158	137	169	136	3,740	46.2%
Total	5,484	482	537	528	578	501	8,110	100%

15 Most Common Cup Components

most used during the past 10 years

Cup	1979-1998	1999	2000	2001	2002	2003	Total	Share
Lubinus All-Poly	47,297	3,179	3,541	4,228	4,590	4,738	67,573	29.5%
Charnley	51,727	2,149	1,823	1,861	1,201	616	59,377	25.9%
Exeter Duration	1	905	1,442	1,590	1,627	1,533	7,098	3.1%
Charnley Elite	1,394	701	957	1,071	1,252	1,499	6,874	3.0%
Exeter All-Poly	6,109	424	139	24	25	8	6,729	2.9%
Reflection	2,529	547	606	703	719	911	6,015	2.6%
OPTICUP	1,805	487	426	421	312	182	3,633	1.6%
Biomet Müller	3,198	350	439	287	257	235	4,766	2.1%
Scan Hip All-Poly	8,345	80	41	13	2	0	8,481	3.7%
Cenator	1,638	431	373	195	3	3	2,643	1.2%
Trilogy HA	620	147	292	388	437	490	2,374	1.0%
FAL	0	21	212	348	810	843	2,234	1.0%
Müller All-Poly	4,745	158	102	116	72	70	5,263	2.3%
ABG HA	1,048	0	0	0	0	0	1,048	0.5%
Romanus	1,720	15	7	0	0	0	1,742	0.8%
Others (total of 146)	37,322	980	948	976	1 390	1 565	43,181	18.9%
Total	169,498	10,574	11,348	12,221	12,697	12,693	229,031	100%

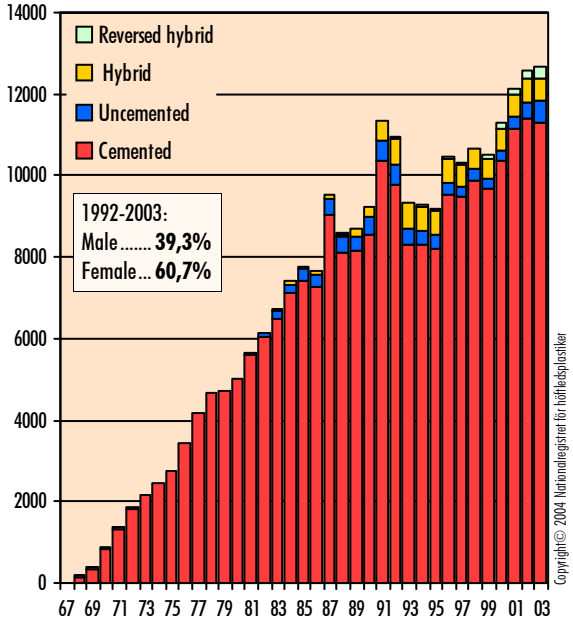
15 Most Common Stem Components

most used during the past 10 years

Stem	1979-1998	1999	2000	2001	2002	2003	Total	Share
Lubinus SP II	28,900	3,819	4,217	4,966	5,797	6,084	53,783	23.5%
Charnley	50,213	1,780	1,619	1,603	927	280	56,422	24.6%
Exeter Polished	16,416	1,823	2,240	2,515	2,968	3,363	29,325	12.8%
Spectron EF Primary	1,444	736	839	938	962	1,076	5,995	2.6%
Charnley Elite Plus	1,618	701	445	284	28	2	3,078	1.3%
Scan Hip Collar	6,656	18	13	0	0	0	6,687	2.9%
Scan Hip II Collar	724	301	409	428	281	126	2,269	1.0%
RX90-S	1,275	209	207	7	2	0	1,700	0.7%
Müller Straight	4,188	77	77	109	103	98	4,652	2.0%
Bi-Metric (cem.)	3,102	8	0	0	0	0	3,110	1.4%
Optima	1,271	128	41	1	0	0	1,441	0.6%
CPT (steel)	278	147	237	292	280	198	1,432	0.6%
Spectron EF	2,513	1	0	3	6	0	2,523	1.1%
Cenator	973	133	134	0	0	0	1,240	0.5%
CLS Spotorno	451	85	86	151	219	311	1,303	0.6%
Others (total of 153)	49,476	608	784	924	1,124	1,155	54,071	23.6%
Total	169,498	10,574	11,348	12,221	12,697	12,693	229,031	100%

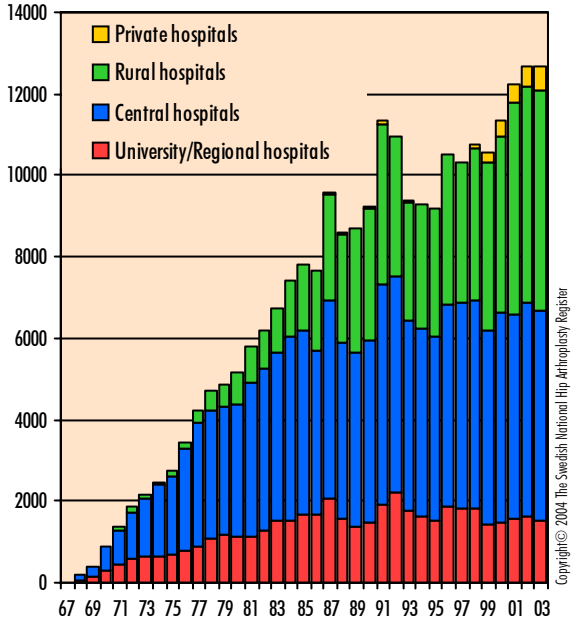
Number of Primary THR

per type of fixation, 1967-2003



Number of Primary THR

per type of hospital, 1967-2003



Number of Primary THR per Hospital and Year

Hospital	1979-1998	1999	2000	2001	2002	2003	Total	Share
Alingsås	806	86	98	119	114	98	1,321	0.6%
Arvika	734	52	41	20	20	43	910	0.4%
Bollnäs	721	92	99	106	109	215	1,342	0.6%
Borås	3,659	197	148	169	127	151	4,451	1.9%
Carlanderska	761	40	65	83	72	44	1,065	0.5%
Danderyd	4,049	341	391	330	328	291	5,730	2.5%
Eksjö	2,802	170	162	163	177	149	3,623	1.6%
Elisabethsjukhuset	0	21	44	35	30	71	201	0.1%
Enköping	520	74	103	105	134	163	1,099	0.5%
Eskilstuna	3,148	149	145	112	75	65	3,694	1.6%
Falköping	798	67	83	252	260	223	1,683	0.7%
Falun	3,551	261	206	207	180	273	4,678	2.0%
Frölunda Specialistsjukhus	0	0	0	0	1	34	35	0.0%
Gällivare	1,442	74	92	111	87	103	1,909	0.8%
Gävle	3,563	215	233	195	218	194	4,618	2.0%
Halmstad	2,184	192	220	221	203	171	3,191	1.4%
Helsingborg	2,735	117	178	152	176	101	3,459	1.5%
Huddinge	3,675	125	171	148	202	192	4,513	2.0%
Hudiksvall	1,602	85	129	138	164	186	2,304	1.0%
Hässleholm-Kristianstad	3,530	258	306	333	482	581	5,490	2.4%
Jönköping	2,532	152	175	196	163	161	3,379	1.5%
Kalix	362	132	62	61	82	96	795	0.3%
Kalmar	2,600	177	189	161	189	203	3,519	1.5%
Karlshamn	849	61	94	132	122	210	1,468	0.6%
Karlskoga	1,367	99	121	127	136	156	2,006	0.9%
Karlskrona	1,900	83	90	42	50	39	2,204	1.0%
Karlstad	2,892	119	85	92	163	215	3,566	1.6%
Karolinska	2,338	122	177	342	293	281	3,553	1.6%
Katrineholm	642	96	123	133	207	203	1,404	0.6%
Kungälv	874	206	139	191	198	175	1,783	0.8%
Köping	685	201	187	228	190	190	1,681	0.7%
Landskrona	1,720	203	323	301	300	225	3,072	1.3%
Lidköping	952	133	101	152	111	102	1,551	0.7%
Lindesberg	1,012	106	106	83	132	138	1,577	0.7%
Linköping	4,013	207	152	134	250	207	4,963	2.2%

(continued on next page.)

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

Hospital	1979-1998	1999	2000	2001	2002	2003	Total	Share
Ljungby	1,188	102	98	138	138	96	1,760	0.8%
Lund	3,503	144	98	105	75	104	4,029	1.8%
Lycksele	1,022	74	107	155	196	200	1,754	0.8%
Löwenströmska	729	0	6	70	99	130	1,034	0.5%
Malmö	4,670	192	202	176	135	108	5,483	2.4%
Mora	1,569	143	133	169	133	138	2,285	1.0%
Motala	980	140	126	123	147	161	1,677	0.7%
Movement	0	0	0	0	0	8	8	0.0%
Norrköping	3,279	232	206	214	219	177	4,327	1.9%
Norrtälje	559	97	88	101	106	92	1,043	0.5%
Nyköping	1,604	92	86	127	126	121	2,156	0.9%
Ortopediska,Huset	3	99	116	117	143	181	659	0.3%
Oskarshamn	925	77	85	113	112	114	1,426	0.6%
Piteå	425	64	62	72	98	92	813	0.4%
S:t Göran	5,348	409	505	549	463	443	7,717	3.4%
Sabbatsberg Närsjukhuset	96	137	207	238	336	364	1,378	0.6%
Simrishamn	661	0	0	29	153	185	1,028	0.4%
Skellefteå	1,301	102	115	147	160	148	1,973	0.9%
Skene	415	50	64	89	83	87	788	0.3%
Skövde	4,072	142	141	137	143	173	4,808	2.1%
Sollefteå	851	60	57	105	130	123	1,326	0.6%
Sophiahemmet	2,993	218	249	245	175	163	4,043	1.8%
SU/Mölndal	1,728	118	160	150	124	119	2,399	1.0%
SU/Sahlgrenska	3,406	189	177	192	201	225	4,390	1.9%
SU/Östra	3,231	136	151	129	173	114	3,934	1.7%
Sunderby (inklusive Boden)	3,717	103	95	151	127	117	4,310	1.9%
Sundsvall	3,910	178	151	200	198	181	4,818	2.1%
Södersjukhuset	4,495	329	311	237	278	264	5,914	2.6%
Södertälje	141	101	119	135	125	145	766	0.3%
Torsby	687	90	100	132	74	56	1,139	0.5%
Trelleborg	1,560	189	157	193	165	196	2,460	1.1%
Uddevalla	2,918	135	301	202	290	292	4,138	1.8%
Umeå	3,471	113	97	72	44	59	3,856	1.7%
Uppsala	3,806	200	254	256	259	230	5,005	2.2%
Varberg	2,391	148	174	219	219	168	3,319	1.4%

(continues on the next page.)

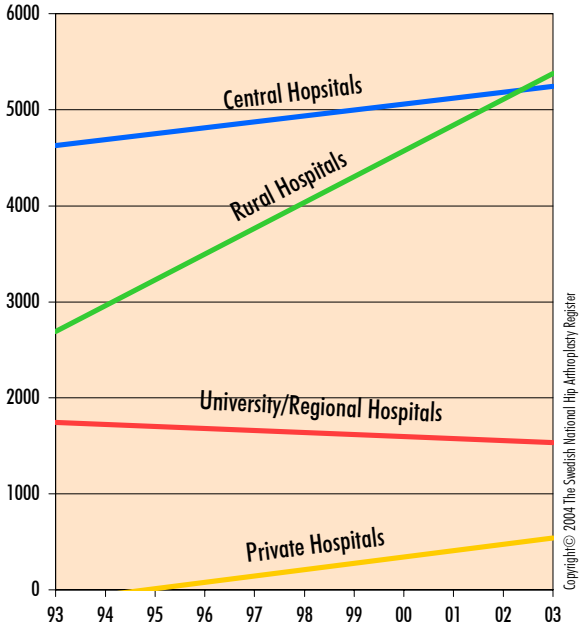
Number of Primary THR per Hospital and Year (cont.)

Hospital	1979-1998	1999	2000	2001	2002	2003	Total	Share
Visby	1,356	85	81	85	83	71	1,761	0.8%
Värnamo	1,414	110	115	98	92	101	1,930	0.8%
Västervik	1,657	113	118	92	114	115	2,209	1.0%
Västerås	2,415	77	105	121	123	88	2,929	1.3%
Växjö	2,347	88	93	107	106	67	2,808	1.2%
Ystad	1,718	94	130	121	108	98	2,269	1.0%
Ängelholm	1,888	116	149	184	186	152	2,675	1.2%
Örebro	3,527	160	141	134	190	197	4,349	1.9%
Örnsköldsvik	1,465	79	86	90	127	100	1,947	0.9%
Östersund	2,738	136	130	113	128	181	3,426	1.5%
Others [1)]	12,301	200	164	215	48	0	12,928	5.6%
Total of	169,498	10,574	11,348	12,221	12,697	12,693	229,031	100%

1) Includes clinics that are no longer active or that does not perform primary THR anymore.

Trends in Number of Primary THR

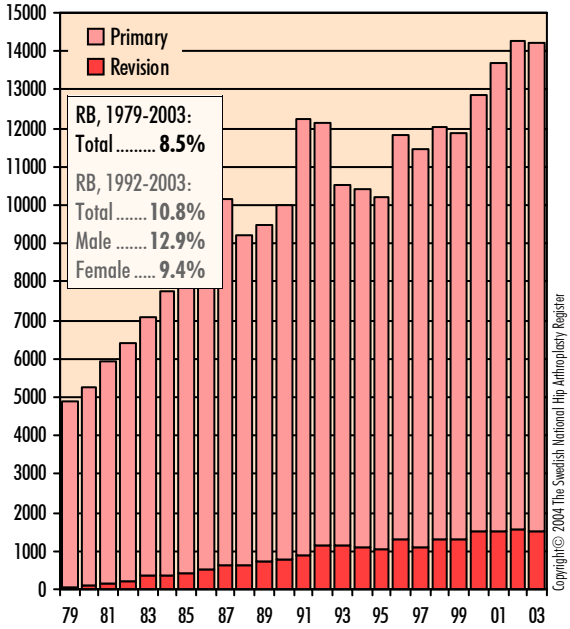
per type of clinic, 1993-2003



Years				
1993	1,750	4,684	2,916	13
1994	1,636	4,586	3,058	19
1995	1,547	4,471	3,161	0
1996	1,865	4,960	3,679	1
1997	1,796	5,103	3,428	2
1998	1,823	5,081	3,764	96
1999	1,428	4,780	4,109	257
2000	1,479	5,171	4,328	370
2001	1,554	5,028	5,230	409
2002	1,632	5,247	5,304	514
2003	1,520	5,159	5,390	624

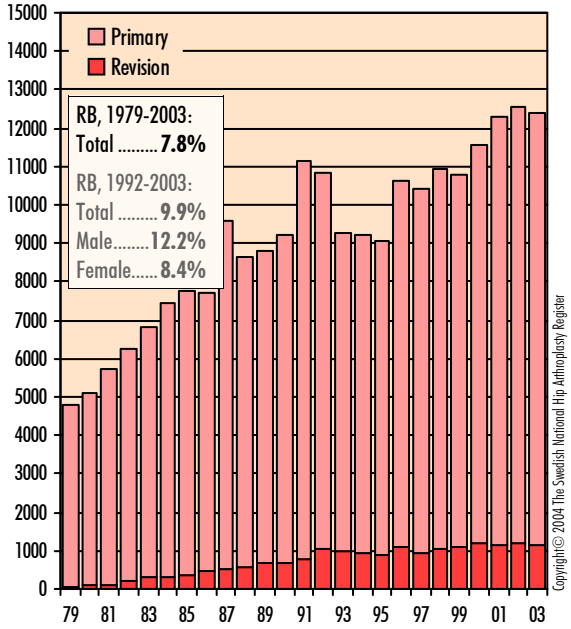
Number of THR per Year

229,031 primary THR, 21,367 revisions, 1979-2003



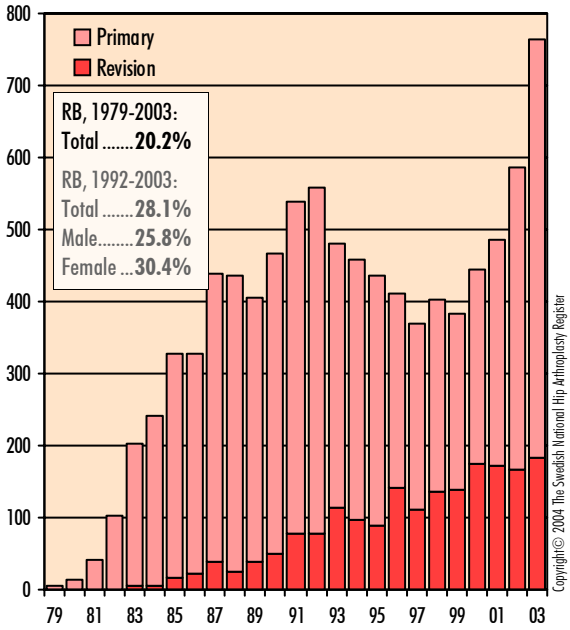
THR with Cemented Implants

211,164 primary THR, 17,852 revisions, 1979-2003



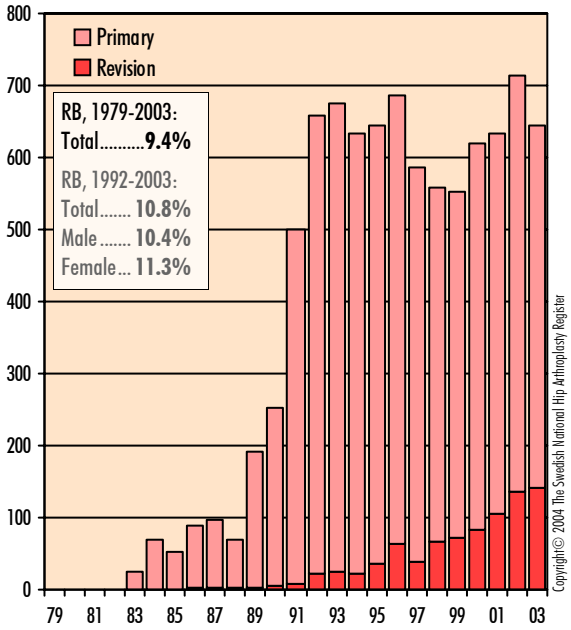
THR with Uncemented Implants

7,450 primary THR, 1,882 revisions, 1979-2003



THR with Hybrid Implants

8,110 primary THR, 841 revisions, 1979-2003



Number of THR per Diagnosis and Year

Diagnosis	1992-1998	1999	2000	2001	2002	2003	Total	Share
Primary osteoarthritis	48,770	8,113	8,793	9,570	10,187	10,122	95,555	74.5%
Fracture	7,344	1,390	1,491	1,522	1,433	1,477	14,657	11.4%
Inflammatory arthritis	3,894	428	399	424	375	375	5,895	4.6%
Idiopathic femoral head necrosis	1,952	351	359	362	331	342	3,697	2.9%
Childhood disease	765	199	225	255	288	271	2,003	1.6%
Secondary osteoarthritis	1,288	0	1	0	1	3	1,293	1.0%
Tumor	214	66	71	71	69	66	557	0.4%
Secondary arthritis after trauma	239	20	9	17	13	37	335	0.3%
(missing)	4,340	7	0	0	0	0	4,347	3.4%
Total	68,806	10,574	11,348	12,221	12,697	12,693	128,339	100%

Number of Primary THR per Diagnosis and Age

1992-2003

Diagnosis	< 50 years		50-59 years		60-75 years		> 75 years		Total	Share
Primary osteoarthritis	3,129	52.0%	13,067	78.2%	51,775	80.5%	27,584	66.9%	95,555	74.5%
Fracture	207	3.4%	686	4.1%	5,106	7.9%	8,658	21.0%	14,657	11.4%
Inflammatory arthritis	1,058	17.6%	1,140	6.8%	2,770	4.3%	927	2.2%	5,895	4.6%
Idiopathic femoral head necrosis	374	6.2%	456	2.7%	1,298	2.0%	1,569	3.8%	3,697	2.9%
Childhood disease	762	12.7%	636	3.8%	489	0.8%	116	0.3%	2,003	1.6%
Secondary osteoarthritis	95	1.6%	110	0.7%	469	0.7%	619	1.5%	1,293	1.0%
Tumor	71	1.2%	127	0.8%	234	0.4%	125	0.3%	557	0.4%
Secondary arthritis after trauma	51	0.8%	48	0.3%	121	0.2%	115	0.3%	335	0.3%
(missing)	274	4.6%	437	2.6%	2,094	3.3%	1,542	3.7%	4,347	3.4%
Total	6,021	100%	16,707	100%	64,356	100%	41,255	100%	128,339	100%

Number of Primary THR with Uncemented Implant per Diagnosis and Age

1992-2003

Diagnosis	< 50 years		50-59 years		60-75 years		> 75 years		Total	Share
Primary osteoarthritis	838	54.7%	1,537	81.2%	559	84.1%	10	66.7%	2,944	71.7%
Childhood disease	242	15.8%	123	6.5%	26	3.9%	0	0.0%	391	9.5%
Inflammatory arthritis	183	11.9%	48	2.5%	12	1.8%	1	6.7%	244	5.9%
Idiopathic femoral head necrosis	82	5.4%	52	2.7%	7	1.1%	1	6.7%	142	3.5%
Fracture	30	2.0%	25	1.3%	9	1.4%	1	6.7%	65	1.6%
Secondary osteoarthritis	31	2.0%	7	0.4%	4	0.6%	1	6.7%	43	1.0%
Secondary arthritis after trauma	16	1.0%	2	0.1%	0	0.0%	0	0.0%	18	0.4%
Tumor	1	0.1%	3	0.2%	0	0.0%	0	0.0%	4	0.1%
(missing)	109	7.1%	97	5.1%	48	7.2%	1	6.7%	255	6.2%
Total	1,532	100%	1,894	100%	665	100%	15	100%	4,106	100%

Number of Primary THR per Type of Fixation and Age

1992-2003

Diagnosis	< 50 years		50-59 years		60-75 years		> 75 years		Total	Share
Cemented	2,807	46.6%	11,403	68.3%	60,971	94.7%	40,679	98.6%	115,860	90.3%
Hybrid	1,354	22.5%	2,812	16.8%	2,247	3.5%	287	0.7%	6,700	5.2%
Uncemented	1,532	25.4%	1,894	11.3%	665	1.0%	15	0.0%	4,106	3.2%
Reversed hybrid	273	4.5%	513	3.1%	271	0.4%	33	0.1%	1,090	0.8%
(missing)	55	0.9%	85	0.5%	202	0.3%	241	0.6%	583	0.5%
Total	6,021	100%	16,707	100%	64,356	100%	41,255	100%	128,339	100%

Number of Primary THR per Type of Fixation and Year — Younger than 60 Years

Diagnosis	1992-1998	1999	2000	2001	2002	2003	Total	Share
Cemented	6,976	1,330	1,385	1,533	1,523	1,462	14,209	62.5%
Hybrid	2,479	328	354	318	383	304	4,166	18.3%
Uncemented	1,945	203	218	262	333	461	3,422	15.1%
Reversed hybrid	160	63	96	119	149	198	785	3.5%
(missing)	57	17	11	19	32	4	140	0.6%
Total	11,617	1,941	2,064	2,251	2,420	2,429	22,722	100%

Number of Primary THR per Type of Fixation and Year — 60 Years or Older

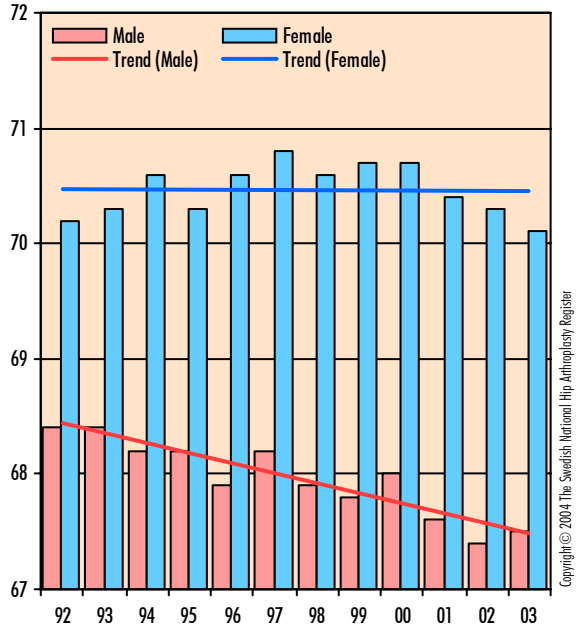
Diagnosis	1992-1998	1999	2000	2001	2002	2003	Total	Share
Cemented	55,050	8,354	8,973	9,602	9,854	9,814	101,647	96.3%
Hybrid	1,594	154	183	210	195	197	2,533	2.4%
Uncemented	331	41	51	52	86	119	680	0.6%
Reversed hybrid	55	16	22	40	59	111	303	0.3%
(missing)	149	68	55	66	81	23	442	0.4%
Total	57,179	8,633	9,284	9,970	10,275	10,264	105,605	100%

Number of Primary THR per Brand of Cement and Year

Diagnosis	1992-1998	1999	2000	2001	2002	2003	Total	Share
Palacos with Gentamycin	45,583	8,961	9,856	10,939	9,554	7,356	92,249	71.9%
Palacos	7,617	276	136	7	5	2	8,043	6.3%
Refobacin-Palacos R	0	0	0	92	1,677	3,770	5,539	4.3%
CMW with Gentamycin	31	424	257	33	13	6	764	0.6%
Copal	0	0	2	6	4	9	21	0.0%
DuraCem 1 with Gentamycin	0	1	5	3	1	9	19	0.0%
Others	4,674	7	41	17	3	0	4,742	3.7%
(partly cementless)	7,919	814	938	990	1,222	1,392	13,275	10.3%
(missing)	2,982	91	113	134	218	149	3,687	2.9%
Total	68,806	10,574	11,348	12,221	12,697	12 693	128,339	100%

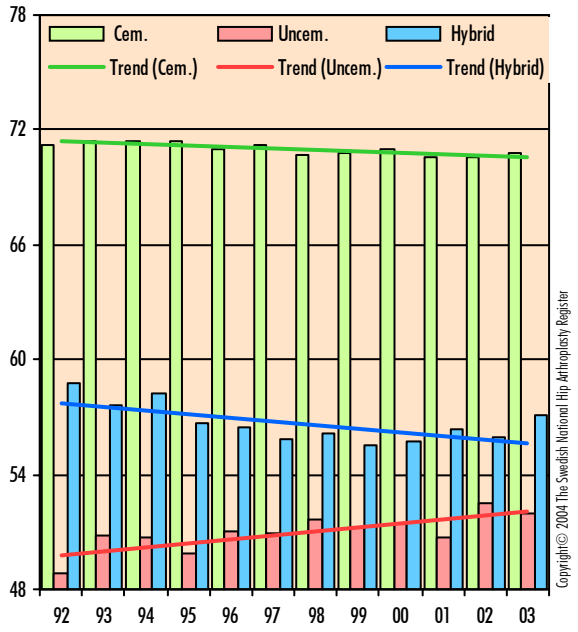
Average Age

per gender, n=128,338, 1992-2003



Average Age

per type of fixation, n=127,756, 1992-2003



Mean Age per Diagnosis and Gender

1992-2003

Diagnosis	Male	Female	Total
Fracture	73.8	76.8	76.1
Secondary osteoarthritis	67.8	73.2	71.6
Idiopathic femoral head necrosis	62.2	72.9	69.7
Primary osteoarthritis	68.1	70.1	69.2
Secondary osteoarthritis after trauma	63.5	69.6	66.6
Tumor	68.4	61.5	64.5
Inflammatory arthritis	60.5	62.5	61.9
Childhood disease	55.2	52.9	53.6
Total	67.9	70.5	69.5

Mean Age per Type of Hospital and Gender

1992-2003

Type of Hospital	Male	Female	Total
Rural Hospitals	68.6	70.9	70.0
Central Hospitals	68.0	70.7	69.6
Private Hospitals	67.9	68.5	68.3
University/Regional Hospitals	65.8	69.1	67.9
Total	67.9	70.5	69.5

Follow-up model for patient-related outcome

THR follow-up after 2 years

Standardised follow-up of all patients subjected to primary THR started as a pilot project 2 years ago in the western region. (See Annual Report 2002).

Summary of the logistics and method

All patients complete a preoperative questionnaire with 10 questions (Charnley category, pain VAS and EQ-5D). The same questionnaire with an additional question about satisfaction (VAS) is sent to the patient after 1 year. The same procedure is repeated after 6 and 10 years, when x-rays are also taken. A short questionnaire with 6 questions has been created for the radiological examination.

Patients operated upon with an undocumented implant, as in studies, or who are judged to be high-risk patients are followed up by the responsible surgeon but are still included in the routine follow-up at 1, 6 and 10 years.

Follow-up does not take place at our orthopaedic unit but only by means of the questionnaire and visit to the Department of Radiology. Patients with symptoms are urged to contact the respective orthopaedic unit and those with important radiological findings requiring intervention or extra controls are notified of this. Patients are informed about this routine in a standardised letter.

In addition to the prospective routine, a retrospective 6-year study has also been performed in the western region and a 10-year study is in progress in the northern region. The main purpose of the retrospective studies is to evaluate the radiological instrument.

Overall objective

- To include patient-related outcome in the register.
- To increase the sensitivity of the register analysis.
- To identify clinically "silent" radiological changes in order to be able to intervene surgically in the event of threatening loosening and/or development of osteolysis.
- To create a methodologically adequate health economic instrument for cost-effectiveness analysis and resource allocation.
- To reduce the number of routine controls after THR.

Participating hospitals

During 2002 the follow-up routine was introduced as a pilot project in the western region in which all 11 hospitals (plus 2 small private units) participated. The northern region joined the project with all 11 prosthesis-producing hospitals in September 2003. During the spring of 2004 4 hospitals in the southern region have also joined the project. At present, 28 hospitals report – all via the Internet. Västmanland, Halland, Närke and parts of Småland have also expressed interest in participating. The aim is to have the system used throughout Sweden within 2 years.

Results

6-year study in the western region

During the period January 1, 1996 – May 31, 1997, 2 429 patients underwent THR in the region. All of the surviving and unrevised patients (1 881 patients) were included in the study. The clinical questionnaire was returned completed by 1 791 patients (after 1 reminder). The response rate was 95%. 1 703 patients were x-rayed (91%). The mean age at follow-up was 76 years (26-98 years).

Clinical results

The patients classified themselves according to Charnley category: A 37% (unilateral hip disease), B 11% (bilateral hip disease) and C 52% (multiple joint disease or intercurrent disease influencing the ability to walk). As expected in this age group, a large proportion of the patients belong to group C, which has to be considered in the outcome analyses. For obvious reasons, the patients with multiple diseases do not experience the same improvement after surgery as the patients in groups A and B. This applies above all to health effects measured with generic instruments, which in turn can influence cost-utility analyses. If such an analysis is used for comparison of different medical interventions as part of the allocation process, the patients' demographic profile, the so-called case-mix, must be stated.

In the following tables, the results (mean values) for all patients in the 6-year study and for Charnley categories A + B and C are presented. VAS-pain: 0-100 (none-unbearable), VAS-satisfaction: 0-100 (satisfied-dissatisfied). EQ-5D health index is a weighted total value for health with the lowest value -0.594 and the highest 1.0.

All patients	6 years, n=1,791
VAS – pain	18
VAS – satisfaction	20
EQ-5D index	0.73

Charnley category A+B	6 years, n= 856
VAS – pain	12
VAS – satisfaction	15
EQ-5D index	0.87

Charnley category C	6 years, n=935
VAS – pain	24
VAS – satisfaction	26
EQ-5D index	0.60

In summary, most of the patients were well 6 years after the operation, with good pain relief and high satisfaction. In 2003 a population study in which the EQ-5D questionnaire was included was performed in the western region. The study comprised 16 300 individuals. The mean value of the EQ-5D health index in the age-group 75-79 years (718 individuals) was 0.75, i.e. the patients reported practically the same self-rated quality of life (0.73 versus 0.75) as a regional age-matched population.

Radiological results

The analysis was done at the local hospital by an orthopaedic surgeon. 181 patients had 1 radiological change, 31 patients 2, 5 patients 3 and 1 patient had 5 changes.

Radiographic results (n=1,703)	Share
Cup loosening	4,9%
Pelvic osteolysis	1,7%
Poly wear	4,4%
Stem loosening	1,2%
Femur osteolysis	3,4%

Radiological changes were found in 13% of the cases (218 patients) and 1% (19 patients) were scheduled for revision.

Concluding evaluation by the orthopaedic surgeon	Share
No loosening and/or osteolysis	87%
Waiting list for revision	1%
Expectance – control after 1 year	11%
Medical contraindications for revision surgery	1%

It should be emphasised that the above results are not the definitive radiological results for the whole cohort that underwent surgery from January 1, 1996 to May 31, 1997. 87 patients (3.6%) have already undergone revision, according to the register. In addition, approximately 19% have died and approximately 9% have declined x-ray examination.

Patients found to have radiological changes (218) were analysed as a subcohort for the outcome part of the clinical questionnaire and the results were as follows:

All patients	6 years, n=218
VAS – pain	19
VAS – satisfaction	20
EQ-5D index	0.75

This group of patients thus had almost exactly the same good outcome as the whole group, confirming that the changes sought are to be considered clinically silent.

Inter- and intra-observer analysis

The radiological instrument of the follow-up routine aims to detect easily visible and substantial radiological changes with the aid of conventional x-ray examination and ocular inspection without the use of compasses and a ruler. This method is used to register clinically silent but "threatening" radiological changes. Of the five variables included, 3 cup and 2 stem questions (see appendix to Annual Report 2002), only definite stem loosening usually gives clinical symptoms and causes the patient to consult his or her doctor.

Conventional radiological follow-up of THR has on several occasions been criticised in the literature owing to the poor results, particularly as regards inter-observer analysis, but less variability in intra-observer analyses. The recommendation has been that the same examiner should analyse x-rays continuously.

To test the radiological questionnaire, we have carried out an inter- and intra-observer analysis on a subgroup of the 6-year patients. 21 patients were randomly selected from each unit, i.e. 231 radiological examinations were included in the analysis. 4 examinations could not be found, so the assessed material came to comprise 227 hips. When examined by the local orthopaedic surgeons, 13% of the patients in this subgroup had been found to have changes, i.e. the material reflected the findings in the total group well (13%). The films were re-examined by two experienced prosthetic surgeons (A and B), one of whom (A) performed a second and a blind evaluation after 4 weeks.

The agreement between A and B was very good. The inter-observer variability between the experienced and local orthopaedic surgeons is shown in the table below.

A versus local (interobserver)	concordance	95% CI
Cup loosening	93.4 %	89.3–96.6
Pelvic osteolysis	98.2 %	96.5–100
Poly wear	94.3 %	90.7–97.3
Stem loosening	98.7 %	96.2–99.7
Femur osteolysis	97.4 %	94.3–99.4

A:s re-test results:

A versus A (intraobserver)	concordance	95% CI
Cup loosening	98.2 %	96.5–100
Pelvic osteolysis	99.1 %	96.9–99.9
Poly wear	99.1 %	96.9–99.9
Stem loosening	100 %	98.4–100
Femur osteolysis	100 %	98.4–100

As expected, the question concerning radiological loosening of the cup is the question that shows the greatest variability. Radiological loosening of the acetabular component according to Hodgkinson's definition (circumferential demarcation with or without migra-

tion) is the most common definition in the literature but its clinical relevance is difficult to evaluate, particularly in older patients and those with low activity. Most patients with this finding are hardly in need of revision surgery.

The analysis is consistent with previously published work on similar studies; the same individual should carry out all radiological evaluations. In a future radiological follow-up routine, the interested local orthopaedic surgeon (the contact doctor – the one responsible for the unit's hip surgery) should examine radiograms in a 1-2-hour session once or twice a month instead of seeing all these patients at outpatient appointments.

10-year study in the northern region

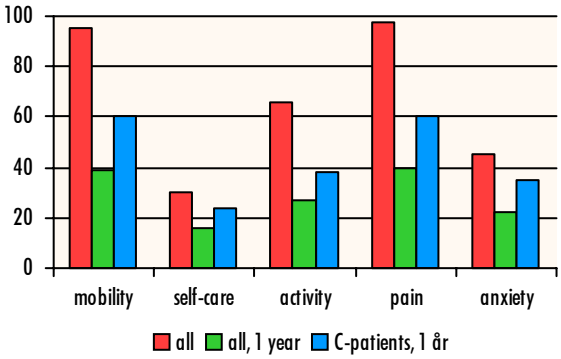
In 1993 1,186 primary THRs were performed at 11 hospitals in the northern region. 68 of them were revised until the end of 2003 and 398 had died. 220 patients were randomly selected (20 per unit, 30% of the surviving non-revised group) for a 10-year radiological follow-up examination and completion of the clinical questionnaire. The study has not yet been completed as the radiological examinations have been delayed at some units.

A population study in which 16,000 individuals completed the EQ-5D questionnaire was also performed in the northern region in 2003. Also in this part of Sweden, the THR patients rated their quality of life the same as a local age-matched population (1,315 individuals) (EQ-5D 0.73 and 0.74, respectively).

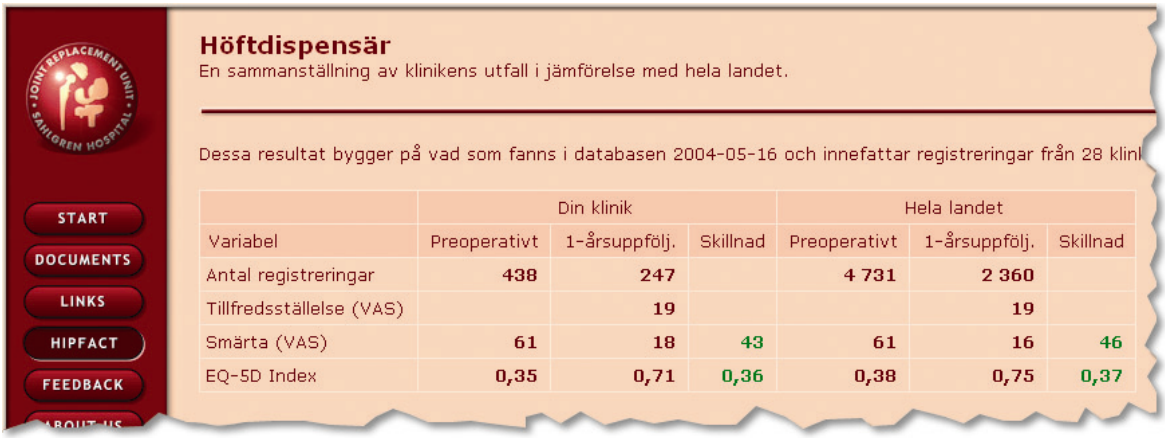
Ongoing prospective follow-up

On May 16, 2004, the prospective preoperative database (28 units) contained 4,731 patients. The 1-year follow-up comprised 2,360 patients (western region). The prospective function is reported online to the website. Each unit can log in with a password and obtain its results in real time and compare them with the rest of the country (see picture below). In the report function, pre- and postoperative results for pain (VAS) and satisfaction (VAS) and EQ-5D index are given. The Charnley category preoperatively and at follow-up and the EQ-5D profile are also given as another way to present EQ-5D results.

The bar chart is a health profile according to EQ-5D. It is expressed as the percentage of patients that reported any problem in the five different dimensions of the EQ-5D instrument. The red bars are the results for the whole group (4,717 patients) preoperatively. This profile reflects a very low self-related quality of life compared with reported profiles for other medical conditions. The green bars are the reported results after 1 year (2,360 patients) and the profile is significantly improved for all dimensions. The blue bars are the results for the patients in group C after 1 year (1,121 patients). This profile is poorer for the different parts of the instrument and clearly illustrates the case-mix problem in outcome reporting.



The preoperative percentage of C-patients varies from 28.5% to 43% between the 28 reporting units. A small highly productive elective unit has the lowest value and a university hospital the highest. This skewed distribution warrants consideration in the light of the current discussion as to where implant surgery should be produced.



	Din klinik			Hela landet		
Variabel	Preoperativt	1-årsuppfölj.	Skillnad	Preoperativt	1-årsuppfölj.	Skillnad
Antal registreringar	438	247		4 731	2 360	
Tillfredsställelse (VAS)		19			19	
Smärta (VAS)	61	18	43	61	16	46
EQ-5D Index	0,35	0,71	0,36	0,38	0,75	0,37

Pain-VAS and satisfaction-VAS are presented not only as numerical values but also as a histogram in order to show the variability in pain relief and degree of satisfaction.

The reporting system also includes a reporting system per unit and, finally, each unit can download its own database in Excel format at any time. In the table from the website (page 16), the prospectively improved values (green figures) of pain relief and EQ-5D index are shown. These values are perhaps the most important ones in the entire outcome analysis and clearly show that the patients have radically less pain and markedly better self-rated quality of life after THR. The improved value of EQ-5D is also an essential variable for the cost-utility analysis.

Drop-out in the prospective study
If one compares the number of primary THRs registered and the preoperative follow-up protocol data, there is a deficit of approximately 150 patients (total number operated upon in 2003 1,793). Most of these patients were operated upon as acute cases with a total implant after a dislocated femoral shaft fracture. This preoperative drop-out is accepted but the patients are followed up according to the routine at 1, 6 and 10 years.

Development

The overall objective is to have the routine used throughout Sweden. We are agreed, however, that stepwise introduction is optimal. Logistics, instruments and cost-effectiveness should be tested and evaluated further in limited regions before the routine is introduced nationwide. Approximately half of the prosthetic surgery units will be using the routine in the autumn of 2004. It is important that the big elective units that have increased their production dramatically join and ensure the quality of their production.

The radiological instrument has been tested during the year in a meticulous analysis which showed that it is suitable for clinical use. Evaluation of cup changes is most difficult, both regarding the analysis of the radiograms and assessing their clinical importance. The 10-year study in the northern region is still in progress and only when it has been completed and the results compared with those of the 6-year study will we be able to make final recommendations for future radiological follow-up as part of the routine. Units which join now only have to implement the local routine in order to collect prospective clinical questionnaire data.

The paperless web function
In September 2003 we introduced touch screens at most units in the western region. Using the touch screen, the patient answers the preoperative questionnaire in connection with registration. Each question is a unique web application and the responses are stored momentarily in the register's server. The additional cost for a touch screen is approximately 6,000 SEK (Swedish krona), which is rapidly recovered in secretarial costs and we strongly recommend that joining units utilise this labour-saving function. The follow-up questionnaire is at present sent to the patients with a reply-paid envelope. This function can probably also be handled over the Internet in future, at least for the younger patients that are on-line.

As we have about 60 medical quality registers in Sweden, it is essential, both from a cost-effectiveness point of view and in order not to interfere with daily routines and patient care, that we use high-tech IT solutions.

A future model for calculation of cost effectiveness
Multidisciplinary collaboration has been established with health economists for development of a methodologically adequate model for cost-effectiveness calculation (cost-utility analysis) for patients undergoing THR. Such an analysis requires a number of variables, all of which except cost are now available in the National Hip Arthroplasty Register's database. For cost calculation, we will use the large KPP database (KPP = cost per patient), which comprises a number of hospitals in Sweden, and calculate the average cost for primary THR, which for the first year will probably be approximately 80,000 SEK. The cost-utility index may be seen as a patient-related measure of cost-effectiveness.

Cost-utility index = cost/((gain in EQ-5D index) x duration)

or cost per quality adjusted life years (QALY).

As an example, the following simple calculation may be performed with 80,000 SEK as the estimated cost and a gain in EQ-5D index of 0.37 – see the web table on the previous page. In this example, we assume that the hip implant functions well for 10 years:

80,000 SEK/(0.37 x 10) = 22,000 SEK. Thus, the cost for 10 years of quality adjusted life years is 22,000 SEK per year. This figure is extremely low compared to the corresponding calculation for other medical interventions. A cost below 500,000 SEK for 1 QALY is considered cost-effective. To achieve a more sophisticated and more individual-related cost-effectiveness calculation, one has to allow for inflation, death and reoperation.

The Swedish National Board of Health and Welfare and the Federation of Swedish County Councils have shown great interest in both the patient-related follow-up and the methodological development of the health-economic instrument.

Implant survival as a quality indicator

Implant survival for the individual units is illustrated below (all implants, diagnoses, reasons for revision). Each mark on the x axis represents a unit. Note that this year all units in the two periods are included and that the results are now based on 10 years' follow-up. Only units which have reached a statistically evaluable 10-year result (more than 50 patients with risk for revision after 10 years) are included. The y axis shows the units' results and 95% confidence interval. For each period, the national average and 95% confidence interval is indicated (as a broad line).

The aim of this analysis is to illustrate changes over time in the country, based on the individual units' results. The analysis does not take differences in case-mix into consideration. The results are based on Kaplan-Meier survival statistics.

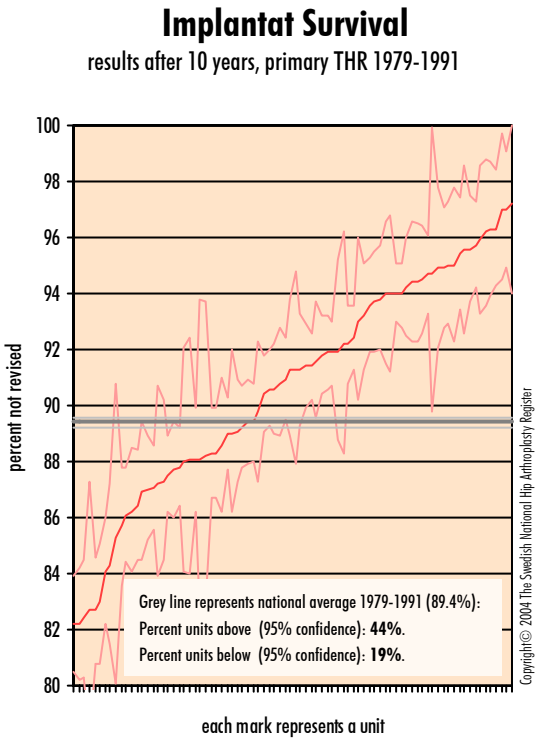
The national average for 10-year survival has improved from 89.4% (+/- 0.15) to 92.5% (+/- 0.15) between the observation periods 1979-1991 and 1992-2003.

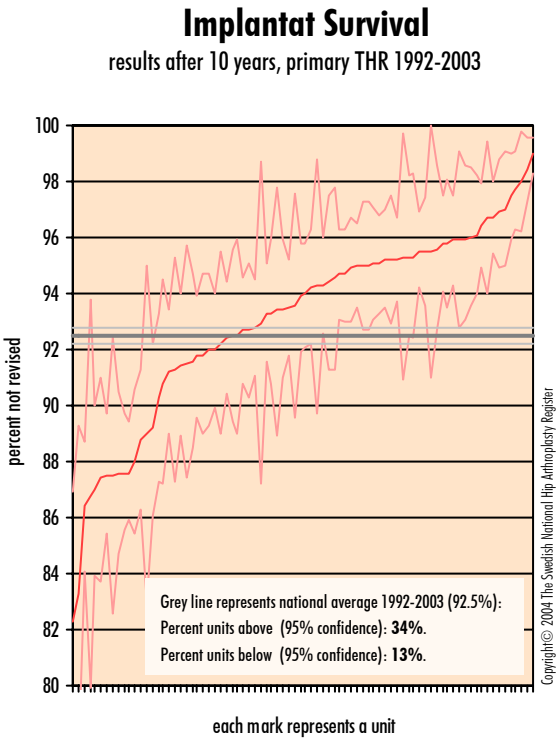
In the period 1979-1991 84 units are represented and in the period 1992-2003 82 units.

During the period 1979-1991, 27% of the units did not differ significantly from the national average, 19% were below it and 44% above it. The corresponding figures for the period 1992-2003 are 53% not significantly different from the national average, only 13% below it and 34% above it.

The previously observed improvement remains with 10 years' follow-up. The percentage of units with a result significantly below the average has decreased from 19% to 13%, a positive development which probably reflects improved implants in combination with improvement of the cementing and surgical techniques. The result should above all be viewed on a national level and comparison between individual units is less relevant until it becomes possible to compensate for differences in case-mix with regression analysis.

An advanced regression analysis permitting retrieval on line via the web application will not be possible to perform until sufficient follow-up data are available for those patients operated upon since the start of Internet-based reporting (1999). We expect to be able to present the first results in Annual Report 2004.





Reoperation

Ever since the start of registration in 1979, all reoperations after primary THR have been recorded. In the middle of 2000 we ceased registration of closed reduction of implant dislocation and as from this annual report reduction in connection with dislocation has been deleted completely from the database. As discussed in previous reports, the reason is the large drop-out that always occurs when one attempts to register closed reduction of dislocated hip implants. The number of reoperations has therefore decreased by between 12,000 and 13,000 and this must be borne in mind when making comparisons with previous reports.

As previously, we have analysed three categories of reoperations: revision with exchange or extraction of implant components, major surgical intervention and minor surgical intervention. Revision is the dominating procedure, accounting for 86% of reoperations.

The reasons for reoperation have been relatively constant during recent years. Aseptic loosening (60.6%), dislocation requiring surgery (10.7%) and deep infection are the dominating causes of reoperation (and revision).

As we have previously reported, we see a slight increase in frequency even for previously reported years. The reason is that on examining case records, we identify a few unreported interventions.

The survival curves with reoperation as the definition of failure show a better result then reported in last year's annual report. This is explained by an error in the previous statistical analysis. The differences between the groups that were previously shown are unchanged, however.

The previously demonstrated difference in results between cemented and uncemented/hybrid implants persists and must be the subject of an extended analysis, although the most likely explanation is a different case-mix (more younger patients receive uncemented implants).

When the survival results are compared with revision as the definition of failure, the difference for the period 1992-2003 (modern techniques) is very small. A possible explanation for this is a gradually decreasing tendency to report non-revision procedures to the register.

Number of Reoperations per Procedure and Year

primary THR performed 1979-2003

Procedure at reoperation	1979-1998	1999	2000	2001	2002	2003	Total	Share
Exchange of cup and/or stem or extraction	14,679	1,393	1,572	1,559	1,638	1,608	22,449	86.0%
Major surgical intervention	1,898	186	137	151	155	128	2,655	10.2%
Minor surgical intervention	647	46	54	85	86	89	1,007	3.9%
(missing)	0	0	0	0	0	0	0	0.0%
Total	17,224	1,625	1,763	1,795	1,879	1,825	26,111	100%

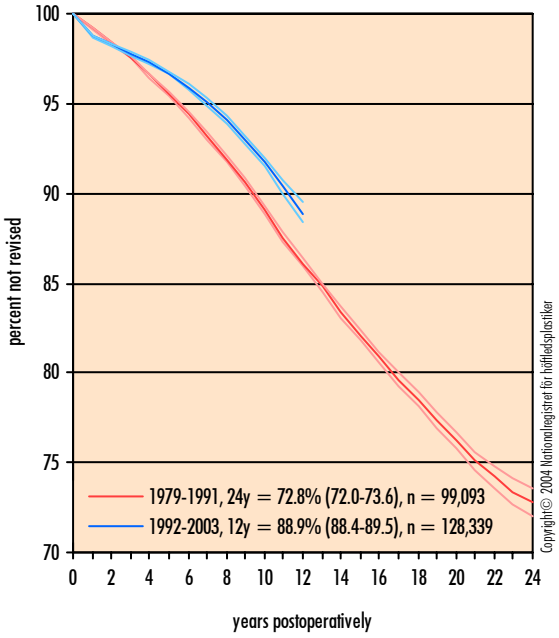
Number of Reoperations per Reason and Year

primary THR performed 1979-2003

Reason for reoperation	1979-1998	1999	2000	2001	2002	2003	Total	Share
Aseptic loosening	10,509	964	1,072	1,087	1,133	1,061	15,826	60.6%
Dislocation	1,640	212	233	229	233	242	2,789	10.7%
Deep infection	1,476	104	120	117	166	188	2,171	8.3%
Fracture only	947	182	174	162	152	146	1,763	6.8%
2-stage procedure	682	68	68	74	83	99	1,074	4.1%
Miscellaneous	714	54	39	75	61	33	976	3.7%
Technical error	750	13	22	16	24	16	841	3.2%
Implant fracture	237	21	27	29	18	32	364	1.4%
Pain only	238	5	6	5	8	7	269	1.0%
(missing)	31	2	2	1	1	1	38	0.1%
Total	17,224	1,625	1,763	1,795	1,879	1,825	26,111	100%

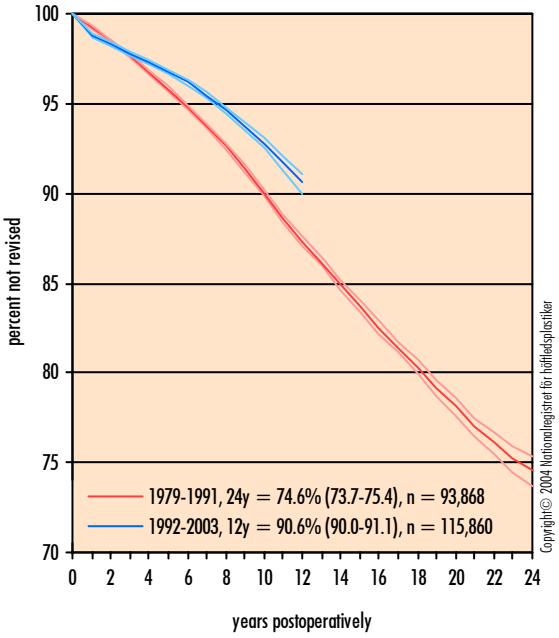
All Implants

all diagnoses and all reasons for revision



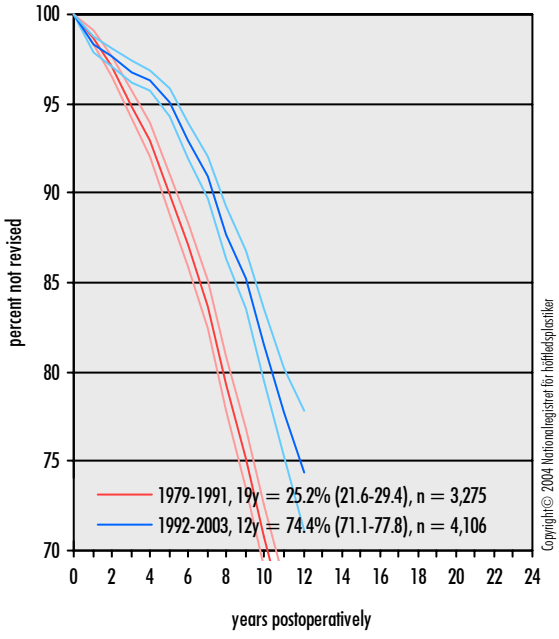
All Cemented Implants

all diagnoses and all reasons for revision



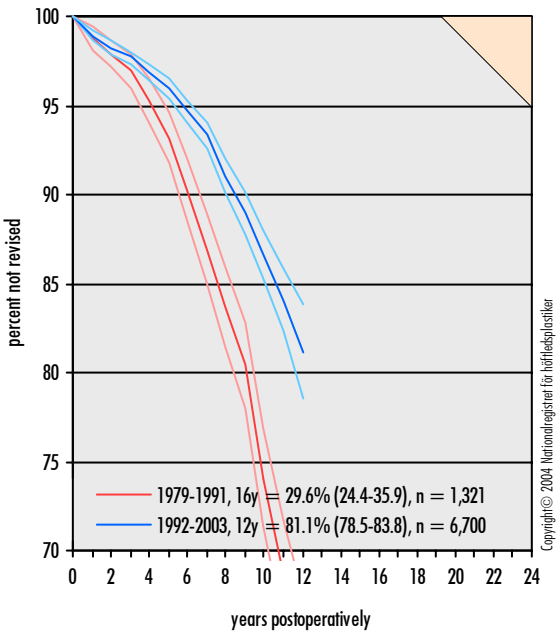
All Uncemented Implants

all diagnoses and all reasons for revision



All Hybrid Implants

all diagnoses and all reasons for revision



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 implant components or part of the prosthesis, e.g. the plastic liner or head.

In Annual Report 2003, we have used a new method for all statistical calculations which include data registered in 1992 or later. As we previously only registered primary data aggregated per unit, approximations for diagnosis, sex and age distribution and mortality risk have been used in the survival calculations. These approximations have been continuously controlled (Söderman et al) and been found to be valid. We now have more than 10 years' follow-up of patients operated upon from 1992. The survival statistics are therefore based on actual observations of diagnosis, age and multiprogramming with the National Tax Board of Sweden's mortality data. In the revision analysis, we have also systematically analysed the group all diagnoses and all reasons for revision and the group osteoarthritis and revision because of aseptic loosening. For the first time, we present separate survival analyses for cup and stem. This means that in the survival analysis for the cup the definition of failure is exchange of the cup or total revision. The analysis for the stem is done in the corresponding way. Finally, we have added percentages in several tables in order to facilitate interpretation of the data.

In the tables on page 23 and 24, the number of revisions and number of previous implant exchanges is stated per reason and per year. A new table shows the number of revisions per reason and time to revision. We see a continued reduction of the total number of revisions in 2003, indicating a continued quality improvement as the number of patients at risk is constantly increasing. As previously, on the other hand, patients subjected to revision for deep infection, fracture close to the implant and dislocation are over-represented in the group with multiple revisions. This has motivated our special studies on deep infection and fracture close to the implant. The primary diagnoses inflammatory joint disease and sequelae to childhood disease are over-represented in the multiple revision group, indicating that these often younger patients should be treated at centres with knowledge of the increased risk factors that exist.

The reasons for revision have been relatively stationary during recent years but some increase is noted for dislocation/technical reasons. As expected, we see in the new table that the early (within 3 years) revisions are caused by deep infection, dislocation and technical reasons.

The total number of revisions during the period 1979-2003 is 21 367, 17 881 of which were first-time revisions. The revision burden (RB) is commented upon in the primary THR section. The cumulative revision rate with at least 10 years' follow-up is presented for patients operated upon in five different years. The diagrams show the revision rate for all diagnoses and all reasons for revision and revision for aseptic loosening, deep infection and dislocation. The quality improvement over the years for mechanical strength and less risk of infection is well documented, as previously. The problem of dislocation, on the other hand, remains and is steadily increasing and for patients with 5 years' follow-up the cumulative revision rate is 5-6 times higher for the group operated upon in 1998 compared to those operated upon in 1984. This must be analysed in a statistically more adequate way and the intention is to obtain more insight, using regression models (Cox or Poisson), into factors which can explain this dramatic increase. Possible explanations are that the head diameter has gradually decreased from 32 to 28 mm. A shift in indications, with an increased proportion of elderly individuals with neuromuscular disease, and fracture problems are alternative explanations for the increase. The surgeon's role and training of new orthopaedic surgeons must also be considered when the deeper analysis is performed. Finally, the rapidly increasing use of implants with a suboptimal head-to-neck ratio and/or cup geometry may influence the results.

On page 26 implant survival for all diagnoses/all reasons, for all implants with cemented, uncemented and hybrid fixation respectively is shown. The figures for the period 1979-1991 are calculated with the previously presented approximations and those for 1992-2003 with individual-based demographic factors. In addition, survival for the different fixation principles is presented for the primary diagnoses osteoarthritis only and aseptic loosening as the reason for revision. The difference in survival after 12 years between the two periods including all diagnoses, all reasons and the group with osteoarthritis or aseptic loosening is 2.7%. The corresponding difference for cemented implants is 2.1%. For the uncemented and hybrid implants, however, the difference is much greater, approximately 6%. This means that the uncemented implants are revised to a greater extent for, for example, pain, technical error or specific cup problems. Note that the survival curve for the first years for hybrid and uncemented implants has a more horizontal course. This may be an indication that the register now reproduces the improved results presented in the literature for the modern uncemented systems (especially the improved design of the cup).

For the most extensively used implant types in each fixation group, the results are also presented for survival of the cup and stem separately. Again, the figures for the groups all diagnoses/all reasons and osteoarthritis/loosening are presented.

Note that for cemented implants the results for the stem are generally better than those for the cup. The flanged Charnley cup is an exception in this respect, perhaps illustrating the importance of pressure-cementing on the acetabular side. The somewhat poorer long-term results for the Reflection cup (all plastic) may possibly be related to the increased wear this polyethylene cup has. The reason for this is probably that the plastic is sterilised with ethylene oxide gas.

For the group uncemented and hybrid implants, we find that the results for the stems are generally good. In contrast to this, the cups show a poorer result, which is no doubt related to the properties of the liner plastic and/or the liner fixation. A better result for the uncemented acetabular component may be achievable as the result of development of cross-linked plastics that are more resistant to wear. It is important to emphasise, however, that we only have clinical results for 3-4 years' follow-up and it is extremely important that these new biomaterials are studied very thoroughly in traditional clinical trials.

This year, we present in figures the results for the four most commonly used implant systems in each fixation group only. For further information, readers are referred to the tables on pages 40-43.

The results for different sex and age-groups are presented in four intervals: younger than 50 years, 50-59 years, 60-75 years and older than 75 years. For each age-interval, all observations, cemented, uncemented and hybrid implants are presented for each sex. Only the total results are presented and we limit them to the period 1992-2003.

Apart from the group with the younger patients, men generally have poorer results than women. The results are being analysed especially in a research project that includes all patients aged under 55 years and we will revert with further reports from this project.

Number of Revisions per Reason and Number of Previous Revisions

primary THR performed 1979-2003

Reason for reoperation	0		1		2		> 2		Total	Share
Aseptic loosening	13,581	76.0%	1,829	64.4%	319	61.3%	59	46.8%	15,788	73.9%
Deep infection	1,292	7.2%	316	11.1%	64	12.3%	26	20.6%	1,698	7.9%
Dislocation	1,176	6.6%	325	11.4%	69	13.3%	27	21.4%	1,597	7.5%
Fracture only	966	5.4%	221	7.8%	38	7.3%	2	1.6%	1,227	5.7%
Technical error	447	2.5%	71	2.5%	17	3.3%	2	1.6%	537	2.5%
Implant fracture	276	1.5%	45	1.6%	7	1.3%	3	2.4%	331	1.5%
Miscellaneous	86	0.5%	24	0.8%	5	1.0%	6	4.8%	121	0.6%
Pain only	57	0.3%	9	0.3%	1	0.2%	1	0.8%	68	0.3%
Total	17,881	100%	2,840	100%	520	100%	126	100%	21,367	100%

Number of Revisions per Diagnosis and Number of Previous Revisions

primary THR performed 1979-2003

Diagnosis at Primary THR	0		1		2		> 2		Total	Share
Primary osteoarthritis	13,252	74.1%	2,034	71.6%	361	69.4%	82	65.1%	15,729	73.6%
Fracture	1,684	9.4%	233	8.2%	36	6.9%	6	4.8%	1,959	9.2%
Inflammatory arthritis	1,451	8.1%	272	9.6%	61	11.7%	15	11.9%	1,799	8.4%
Childhood disease	843	4.7%	182	6.4%	38	7.3%	15	11.9%	1,078	5.0%
Idiopathic femoral head necrosis	280	1.6%	46	1.6%	9	1.7%	2	1.6%	337	1.6%
Secondary osteoarthritis after trauma	150	0.8%	45	1.6%	9	1.7%	6	4.8%	210	1.0%
Secondary arthritis	49	0.3%	6	0.2%	1	0.2%	0	0.0%	56	0.3%
Tumor	23	0.1%	5	0.2%	2	0.4%	0	0.0%	30	0.1%
(missing)	149	0.8%	17	0.6%	3	0.6%	0	0.0%	169	0.8%
Total	17,881	100%	2,840	100%	520	100%	126	100%	21,367	100%

Number of Revisions per Year of Revision and Number of Previous Revisions

primary THR performed 1979-2003

Year of Revision	0		1		2		> 2		Total	Share
1979-1998	11,978	67.0%	1,691	59.5%	275	52.9%	46	36.5%	13,990	65.5%
1999	1,251	7.0%	230	8.1%	57	11.0%	17	13.5%	1,555	7.3%
2000	1,195	6.7%	242	8.5%	55	10.6%	18	14.3%	1,510	7.1%
2001	1,197	6.7%	245	8.6%	48	9.2%	13	10.3%	1,503	7.0%
2002	1,158	6.5%	251	8.8%	54	10.4%	23	18.3%	1,486	7.0%
2003	1,102	6.2%	181	6.4%	31	6.0%	9	7.1%	1,323	6.2%
Total	17,881	100%	2,840	100%	520	100%	126	100%	21,367	100%

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

only the first revision, primary THR performed 1979-2003

Type of fixation at primary THR	1979-1998	1999	2000	2001	2002	2003	Total	Share
Cemented	10,373	903	967	928	979	916	15,066	84.3%
Uncemented	880	114	135	125	136	141	1,531	8.6%
Hybrid	259	63	72	80	103	115	692	3.9%
Reversed hybrid	58	5	8	5	8	10	94	0.5%
(missing)	408	17	15	20	25	13	498	2.8%
Total	11,978	1,102	1,197	1,158	1,251	1,195	17,881	100%

Number of Revisions per Reason and Year of Revision

only the first revision, primary THR performed 1979-2003

Reason for revision	1979-1998	1999	2000	2001	2002	2003	Total	Share
Aseptic loosening	9,169	819	894	877	948	874	13,581	76.0%
Deep infection	976	63	53	53	73	74	1 292	7.2%
Dislocation	612	104	113	105	121	121	1 176	6.6%
Fracture only	548	81	95	80	73	89	966	5.4%
Technical error	405	9	12	7	8	6	447	2.5%
Implant fracture	185	15	19	24	12	21	276	1.5%
Miscellaneous	42	9	8	10	11	6	86	0.5%
Pain only	41	2	3	2	5	4	57	0.3%
Total	11,978	1,102	1,197	1,158	1,251	1,195	17,881	100%

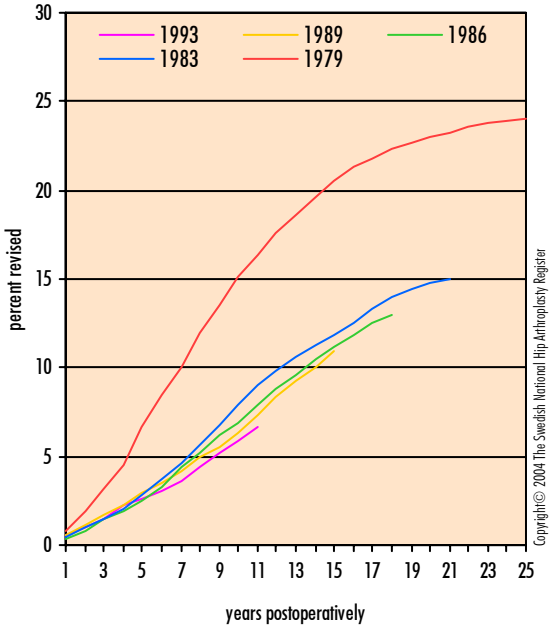
Number of Revisions per Reason and Time to Revision

only the first revision, primary THR performed 1979-2003

Reason for revision	0 – 3 years		4 – 6 years		7 – 10 years		> 10 years		Total	Share
Aseptic loosening	2,525	49.5%	3,200	84.7%	4,134	87.4%	3,722	87.1%	13,581	76.0%
Deep infection	961	18.8%	168	4.4%	106	2.2%	57	1.3%	1,292	7.2%
Dislocation	829	16.2%	123	3.3%	112	2.4%	112	2.6%	1,176	6.6%
Fracture only	240	4.7%	188	5.0%	255	5.4%	283	6.6%	966	5.4%
Technical error	408	8.0%	22	0.6%	14	0.3%	3	0.1%	447	2.5%
Implant fracture	42	0.8%	56	1.5%	95	2.0%	83	1.9%	276	1.5%
Miscellaneous	53	1.0%	14	0.4%	10	0.2%	9	0.2%	86	0.5%
Pain only	45	0.9%	6	0.2%	3	0.1%	3	0.1%	57	0.3%
Total	5,103	100%	3,777	100%	4,729	100%	4,272	100%	17,881	100%

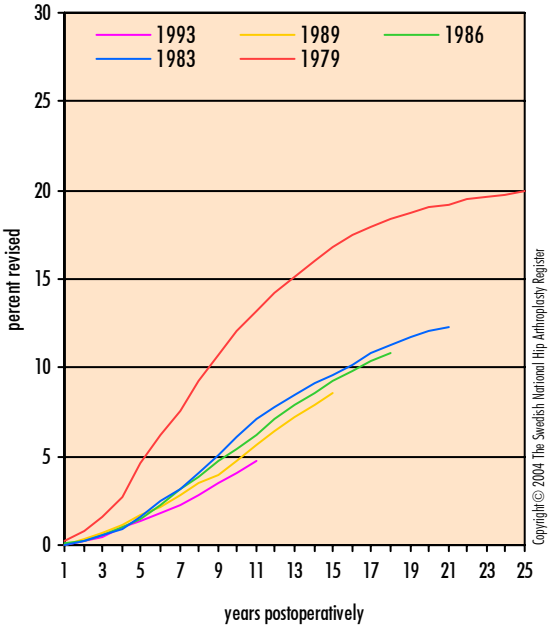
Cumulative Frequency of Revision

all diagnoses and all reasons for revision



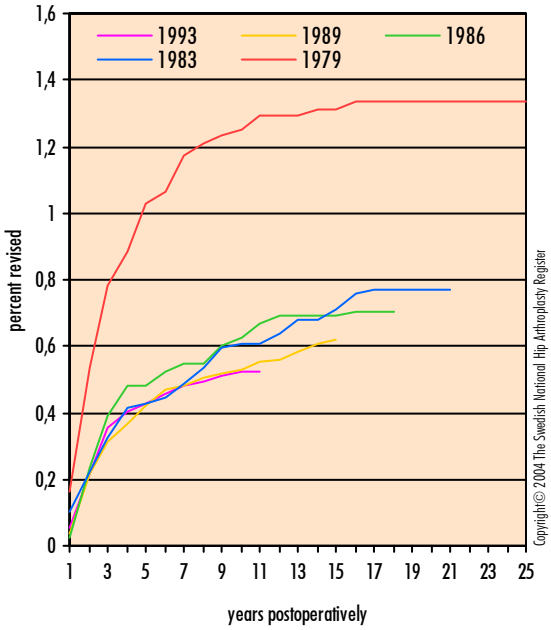
Cumulative Frequency of Revision

revision due to aseptic loossning



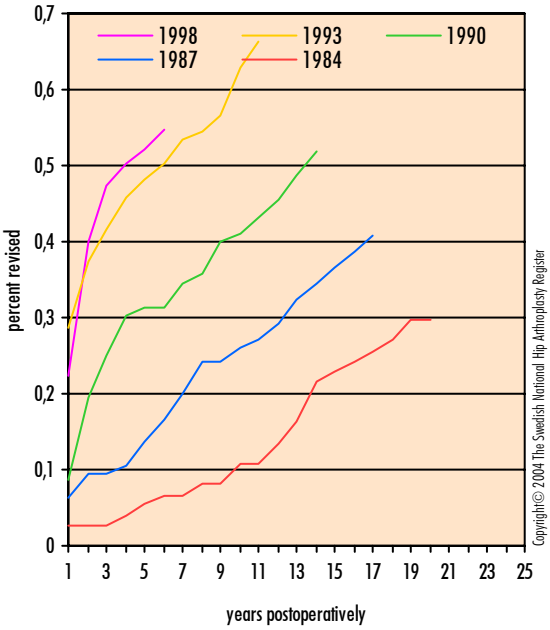
Cumulative Frequency of Revision

revision due to deep infection



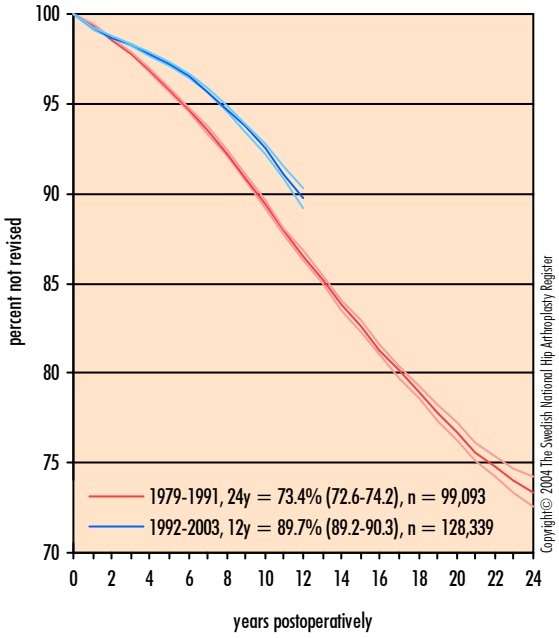
Cumulative Frequency of Revision

revision due to dislocation



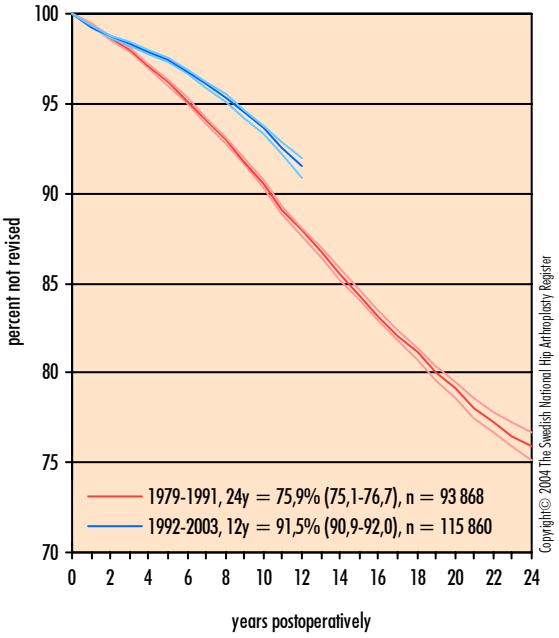
All Implants

all diagnoses and all reasons for revision



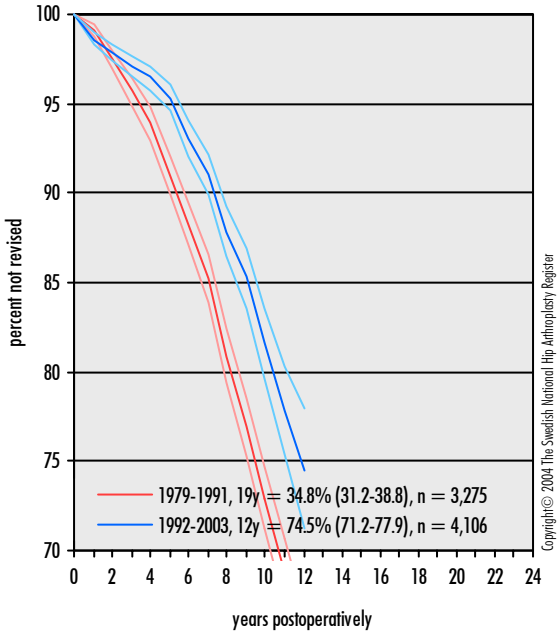
All Cemented Implants

All Diagnoses and All Reasons



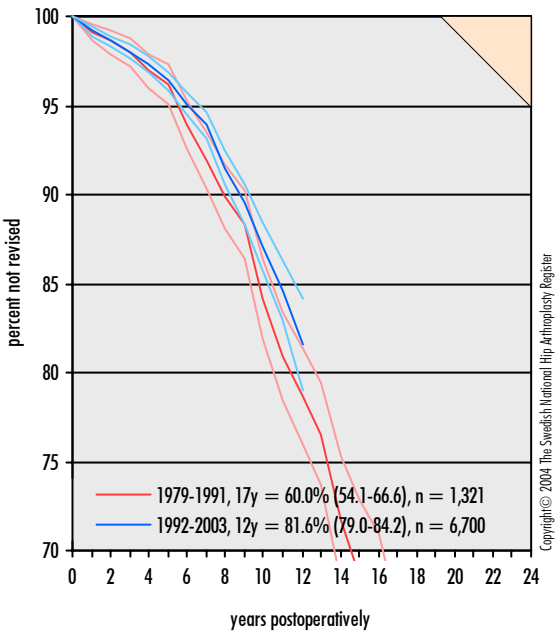
All Uncemented Implants

all diagnoses and all reasons for revision



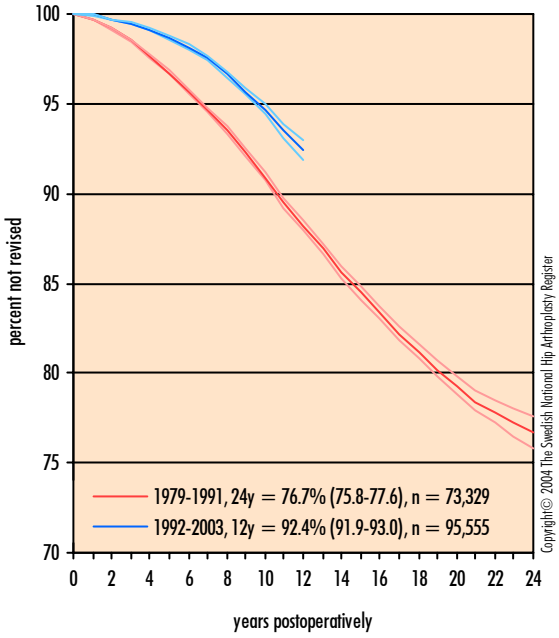
All Hybrid Implants

all diagnoses and all reasons for revision



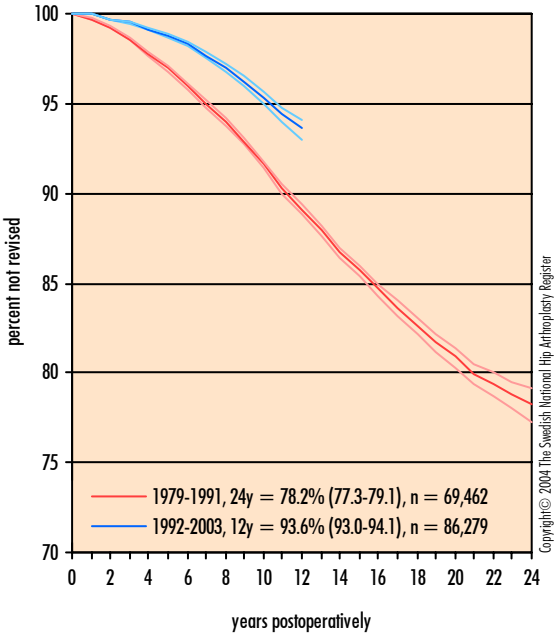
All Implants

osteoarthritis and aseptic loosening



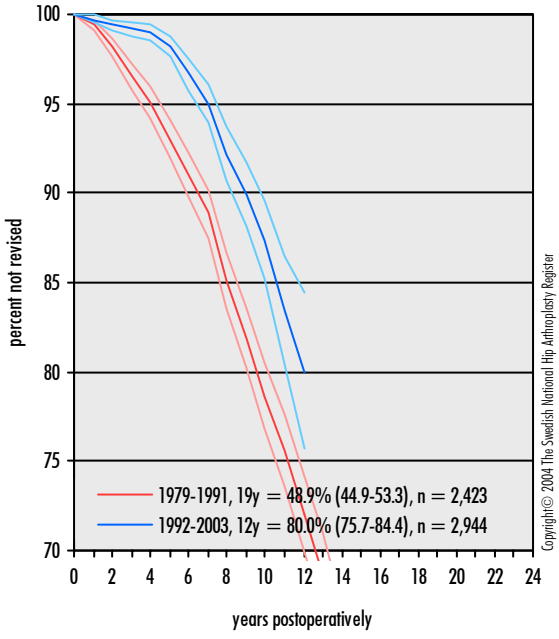
All Cemented Implants

osteoarthritis and aseptic loosening



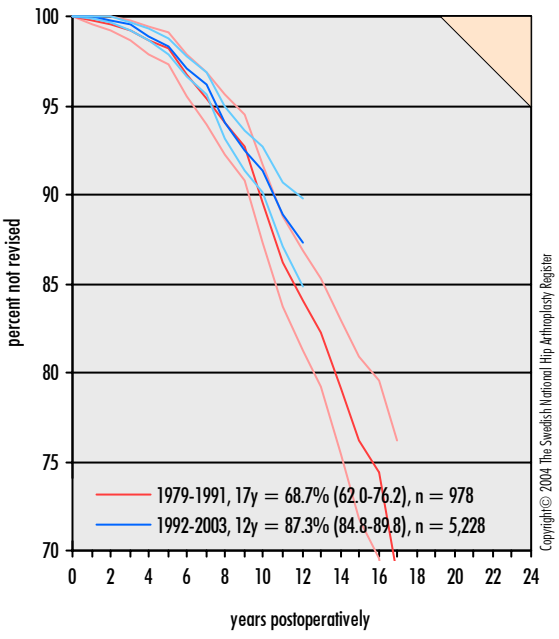
All Uncemented Implants

osteoarthritis and aseptic loosening



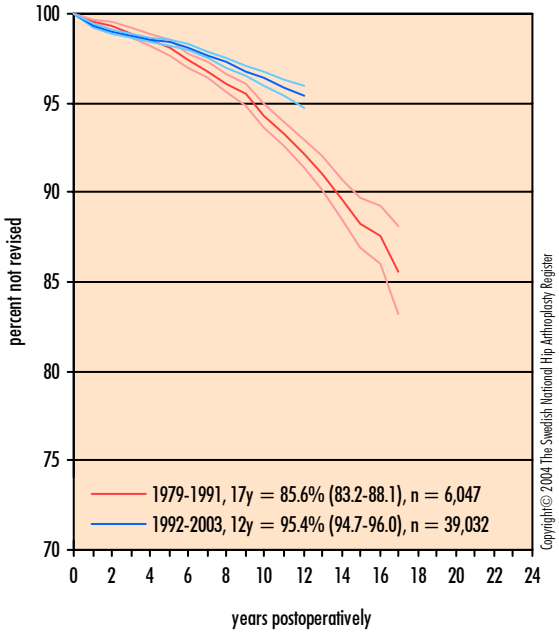
All Hybrid Implants

osteoarthritis and aseptic loosening



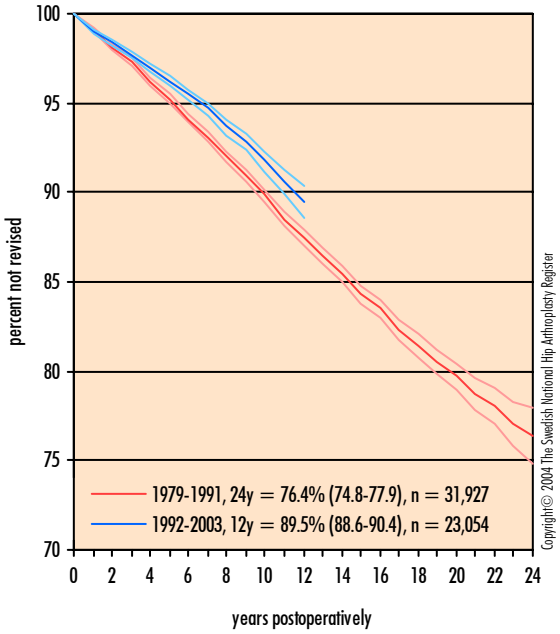
Lubinus SP II

all diagnoses and all reasons for revision



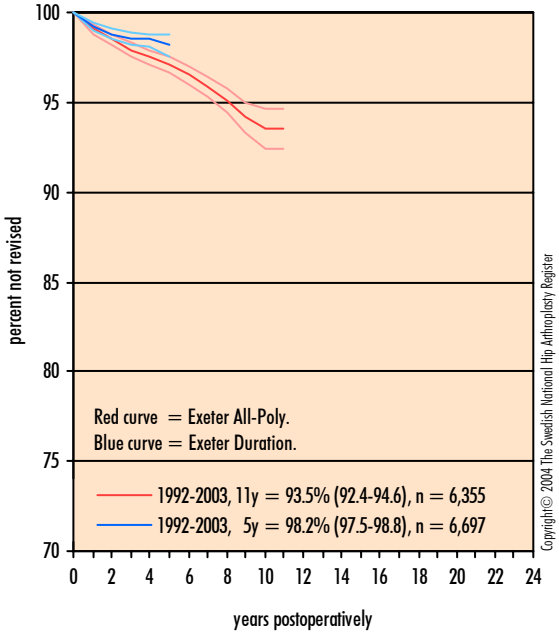
Charnley

all diagnoses and all reasons for revision



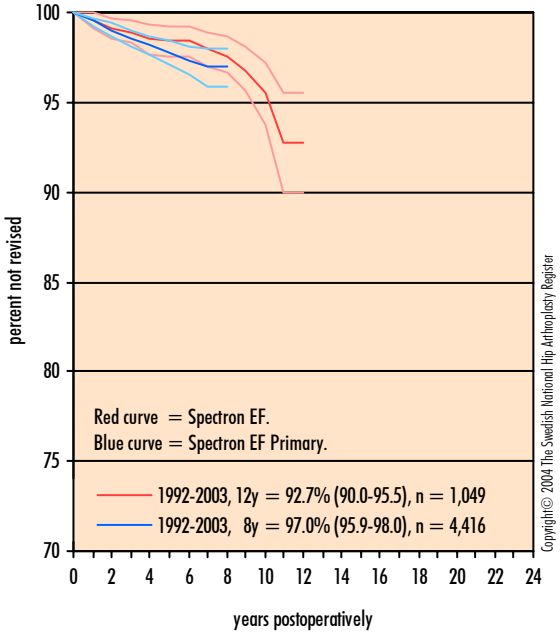
Exeter (Exeter Polished)

all diagnoses and all reasons for revision



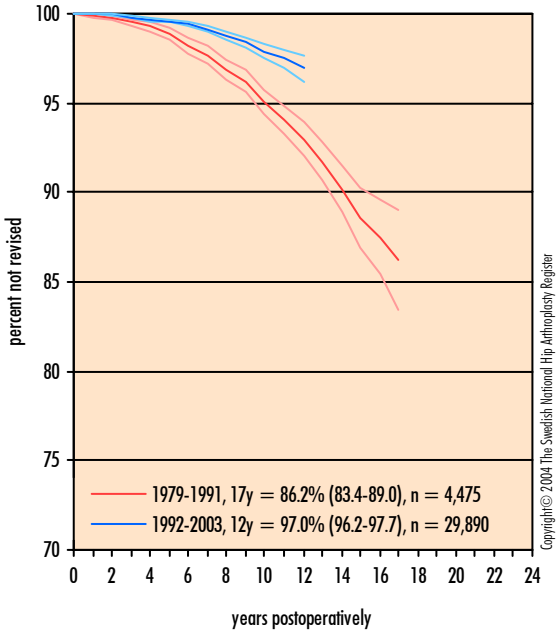
Reflection All-Poly (Spectron)

all diagnoses and all reasons for revision



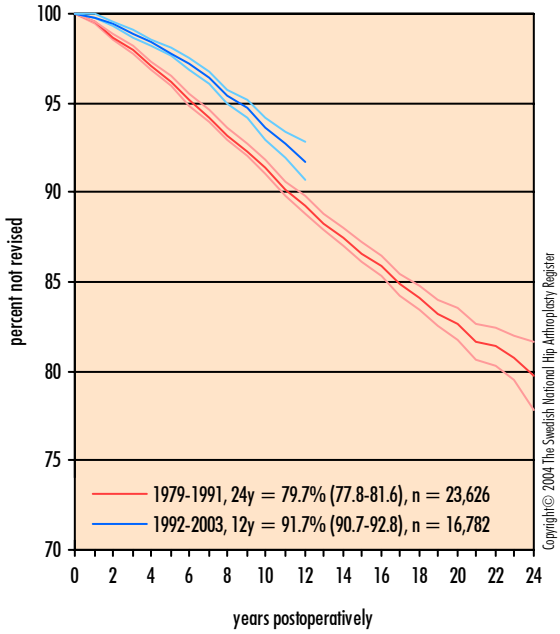
Lubinus SP II

osteoarthritis and aseptic loosening



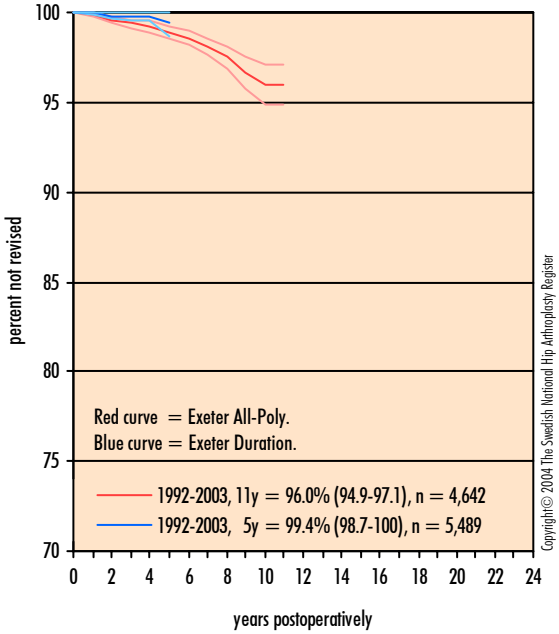
Charnley

osteorthritis and aseptic loosening



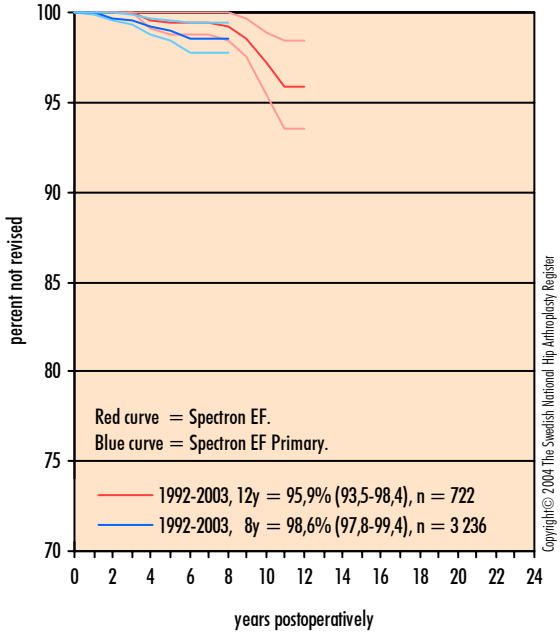
Exeter (Exeter Polished)

osteoarthritis and aseptic loosening



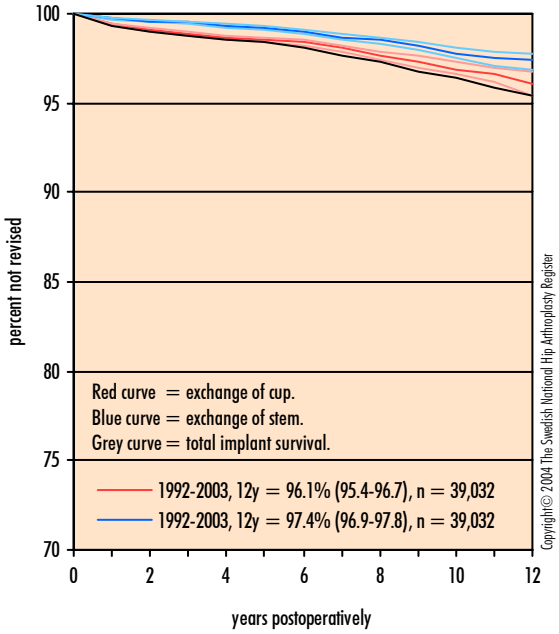
Reflection All-Poly (Spectron)

osteoarthritis and aseptic loosening



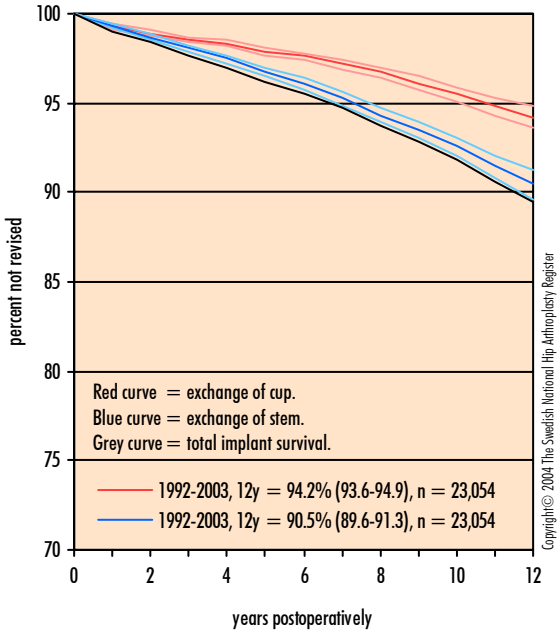
Lubinus SP II

all diagnoses and all reasons for revision



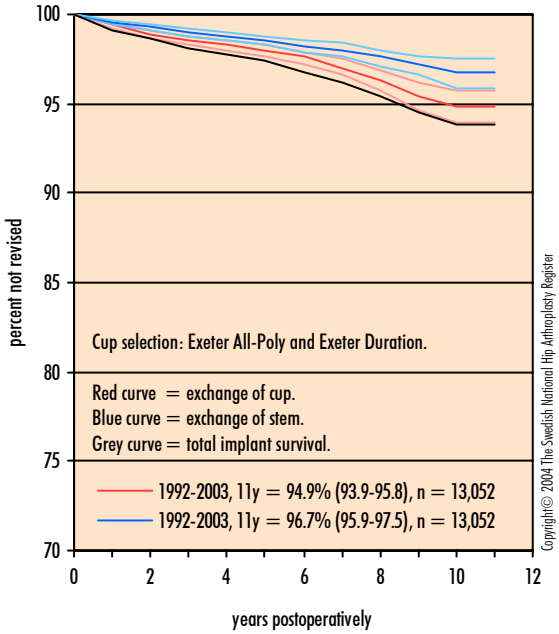
Charnley

alla diagnoses and all reasons for revision



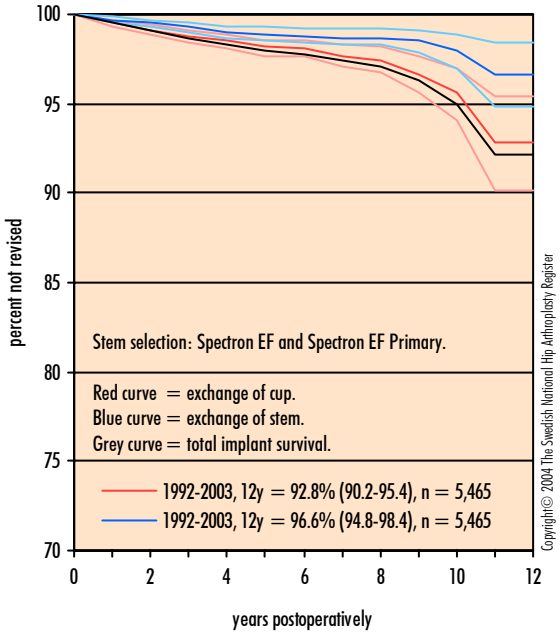
Exeter (Exeter Polished)

all diagnoses and all reasons for revision



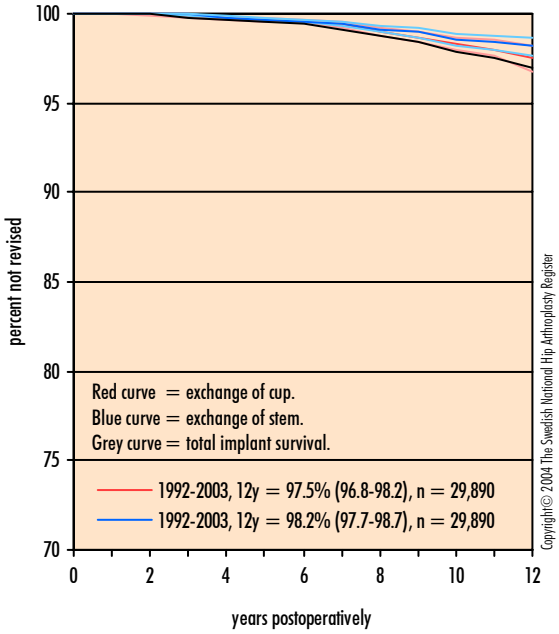
Reflection All-Poly (Spectron)

all diagnoses and all reasons for revision



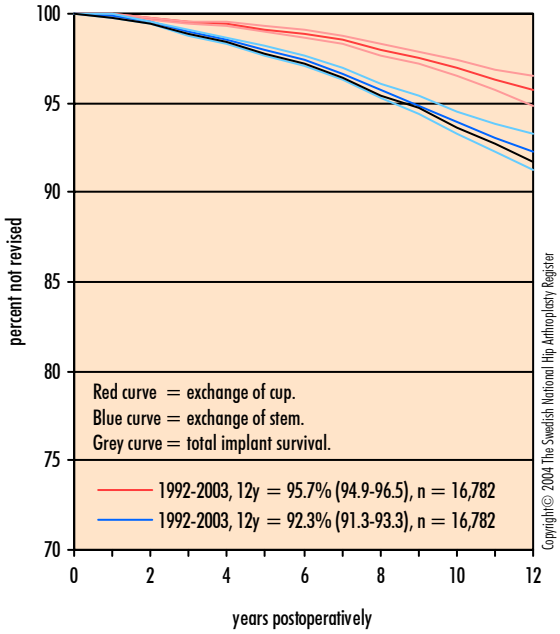
Lubinus SP II

osteoarthritis and aseptic loosening



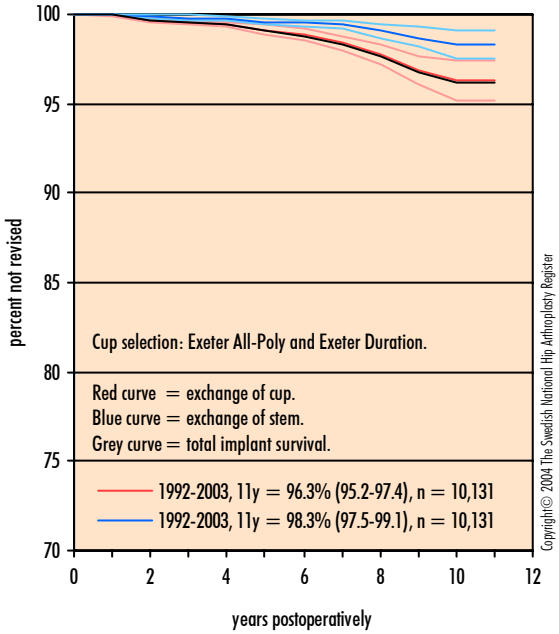
Charnley

osteoarthritis and aseptic loosening



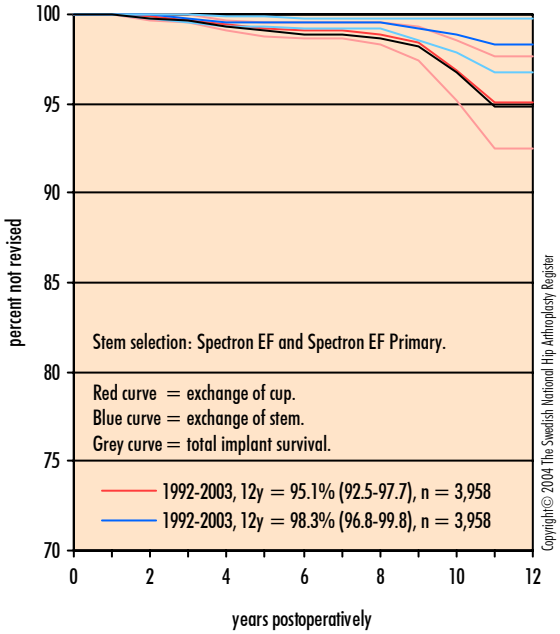
Exeter (Exeter Polished)

osteorthritis and aseptic loosening



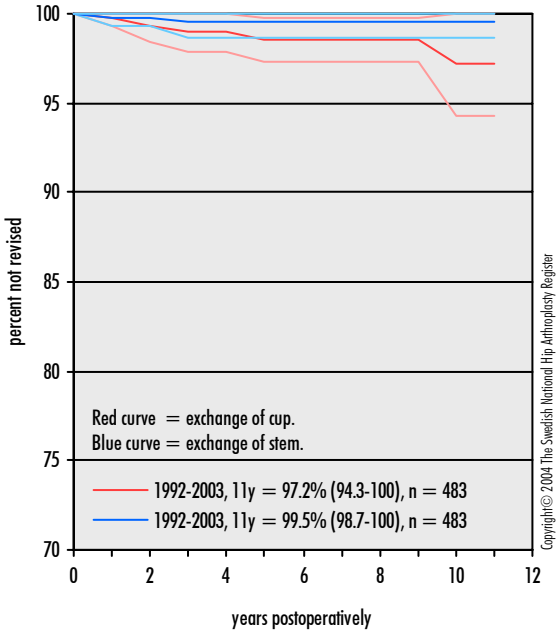
Reflection All-Poly (Spectron)

osteoarthritis and aseptic loosening



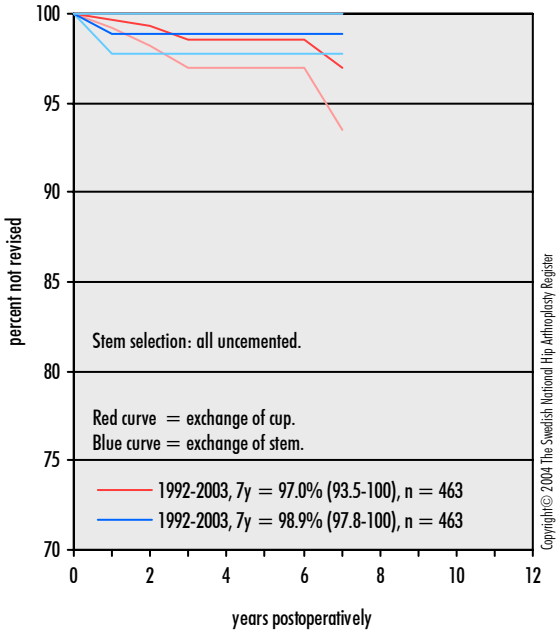
CLS Spotorno

all diagnoses and all reasons for revision



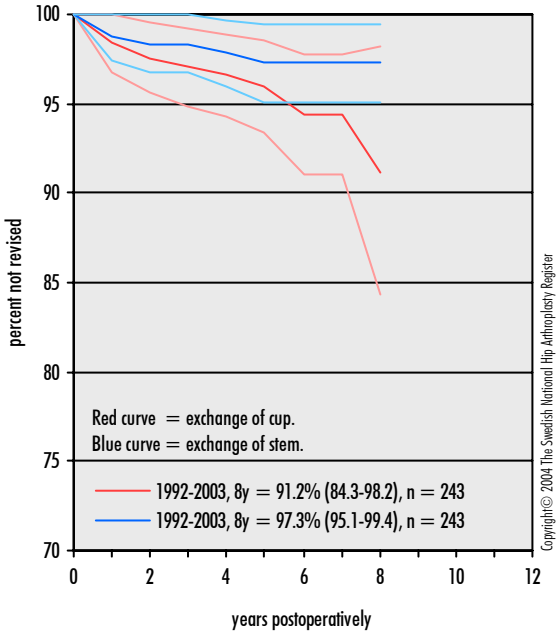
Trilogy HA

all diagnoses and all reasons for revision



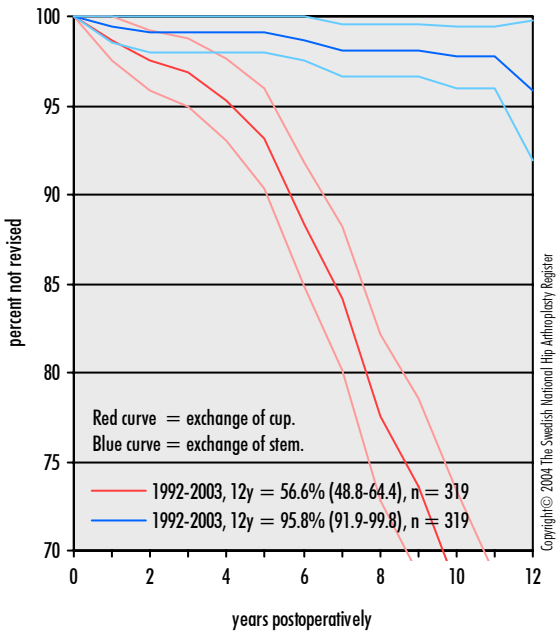
Romanus HA (Bi-Metric HA)

all diagnoses and all reasons



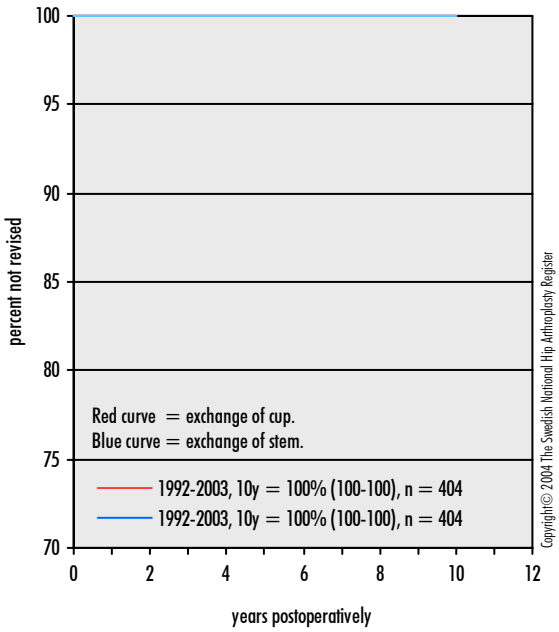
Omnifit

all diagnoses and all reasons for revision



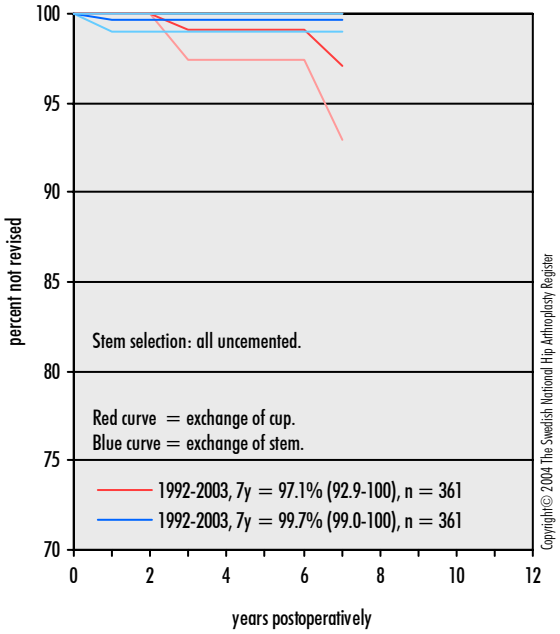
CLS Spotorno

osteoarthritis and aseptic loosening



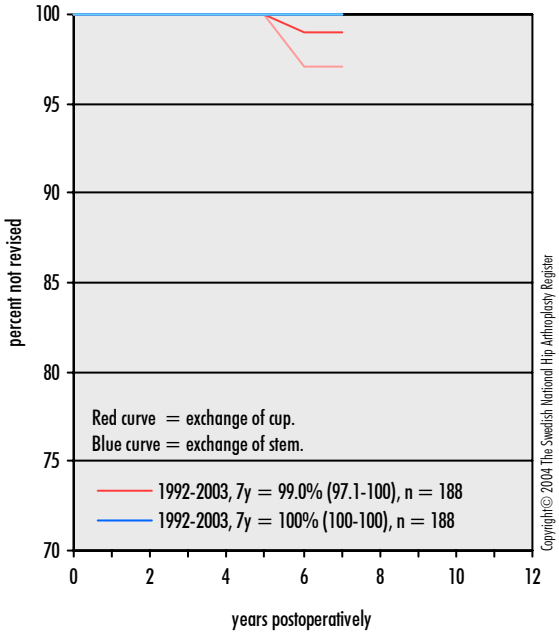
Trilogy HA

osteoarthritis and aseptic loosening



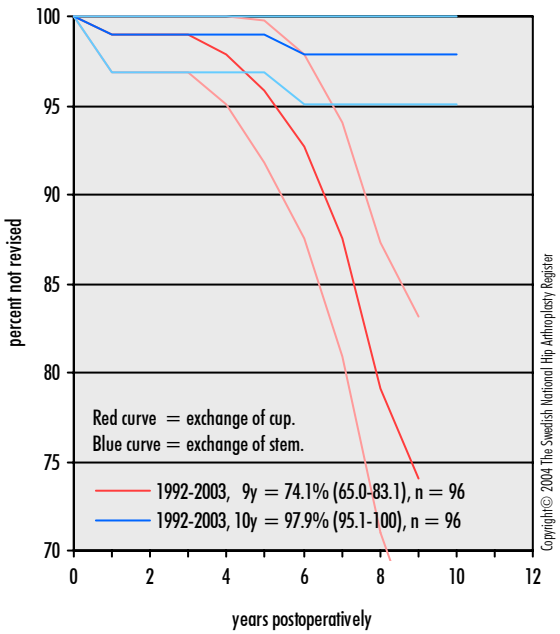
Romanus HA (Bi-Metric HA)

osteoarthritis and aseptic loosening



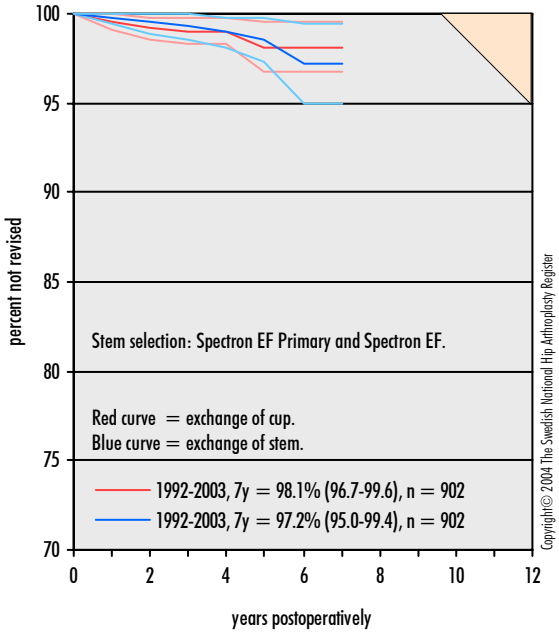
Omnifit

osteoarthritis and aseptic loosening



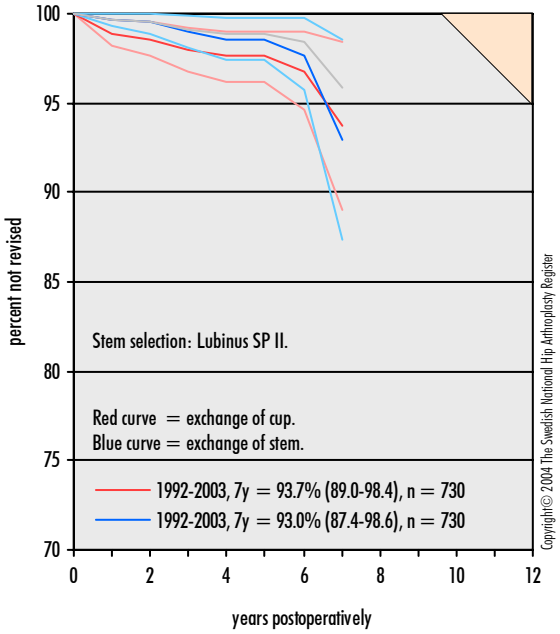
Trilogy HA (Spectron)

all diagnoses and all reasons for revision



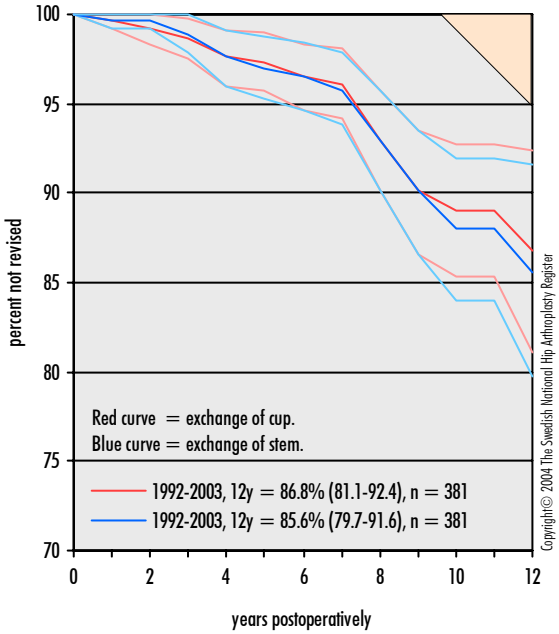
Trilogy HA (Lubinus SP II)

all diagnoses and all reasons for revision



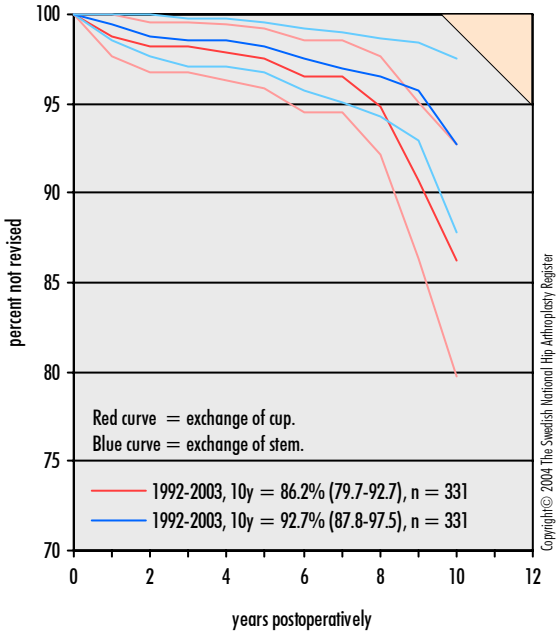
Romanus (Bi-Metric cem.)

all diagnoses and all reasons for revision



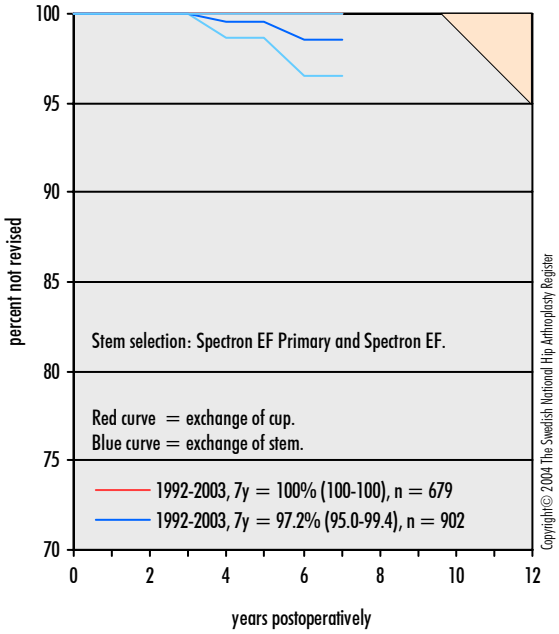
ABG HA (Lubinus SP II)

all diagnoses and all reasons for revision



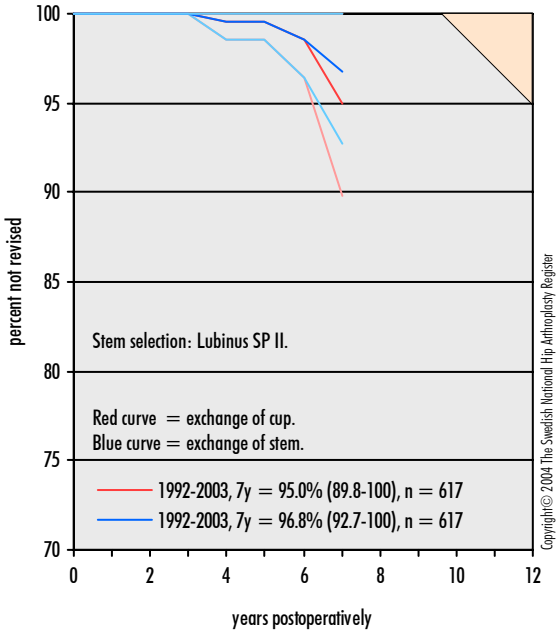
Trilogy HA (Spectron)

osteoarthritis and aseptic loosening



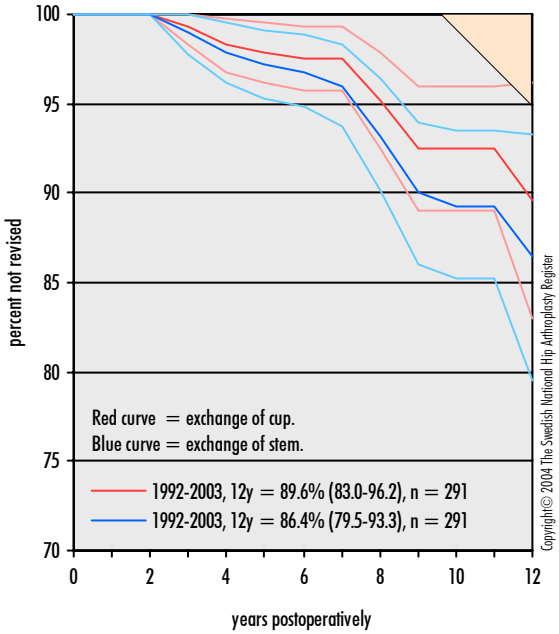
Trilogy HA (Lubinus SP II)

osteoarthritis and aseptic loosening



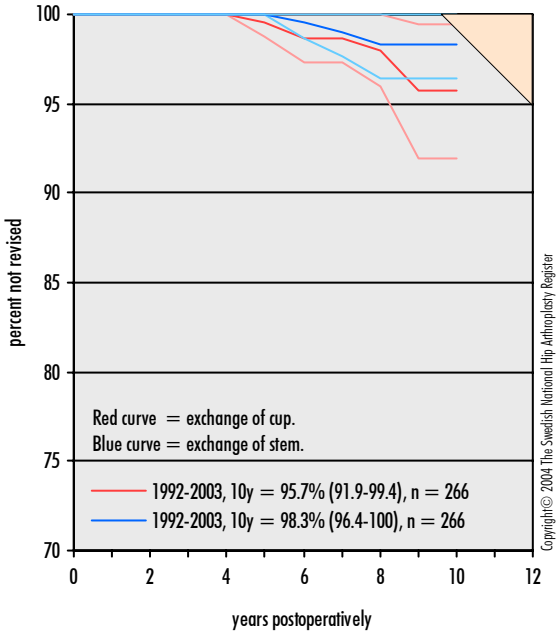
Romanus (Bi-Metric cem.)

osteoarthritis and aseptic loosening

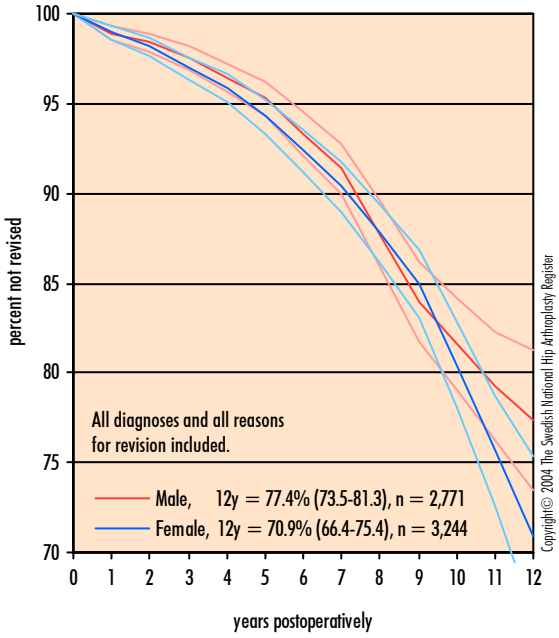


ABG HA (Lubinus SP II)

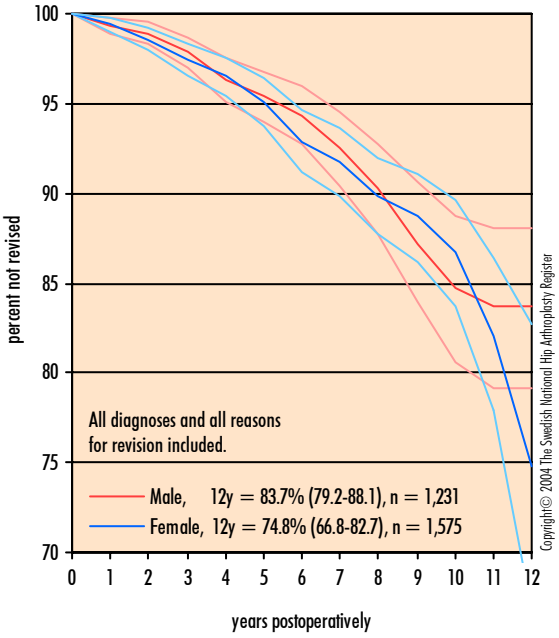
osteoarthritis and aseptic loosening



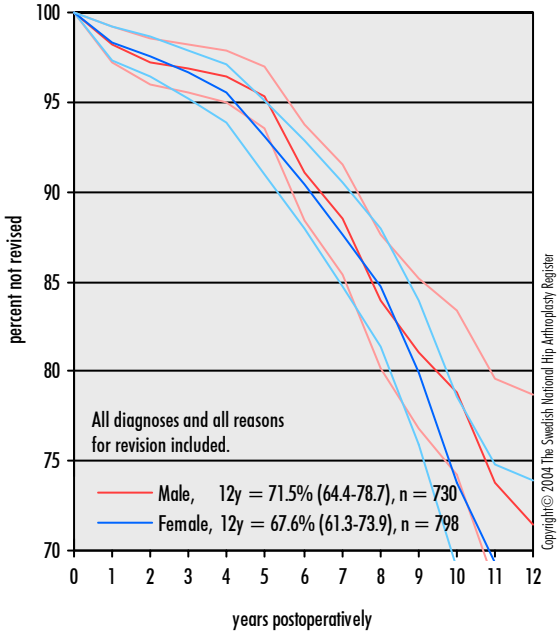
Younger than 50 years
all observations, 1992-2003



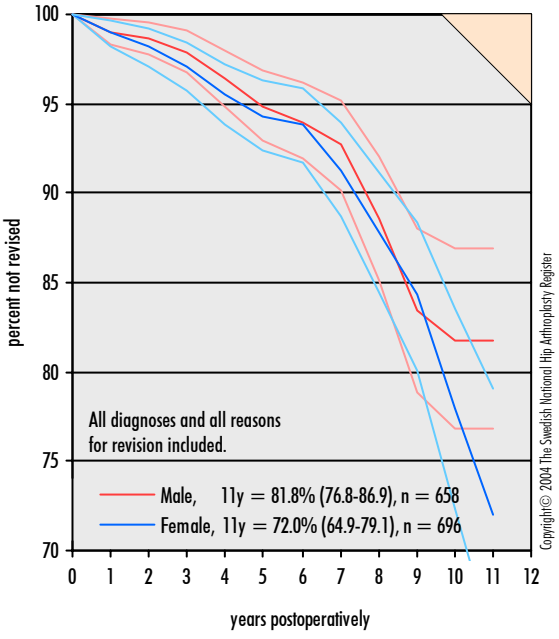
Younger than 50 years
cemented implants, 1992-2003



Younger than 50 years
uncemented implants, 1992-2003

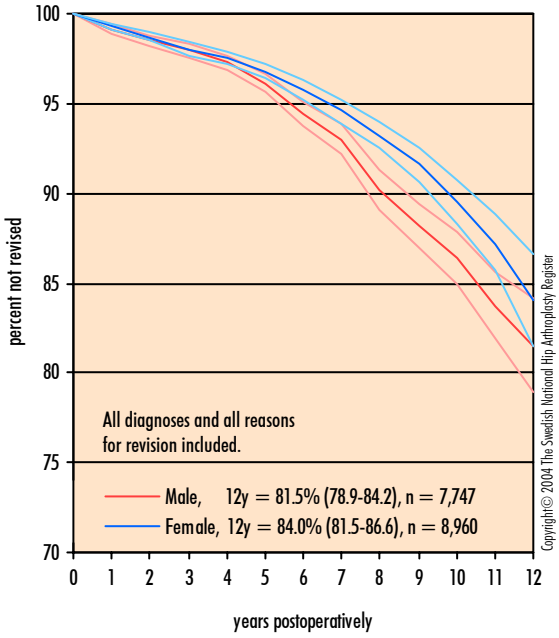


Younger than 50 years
hybrid implants, 1992-2002



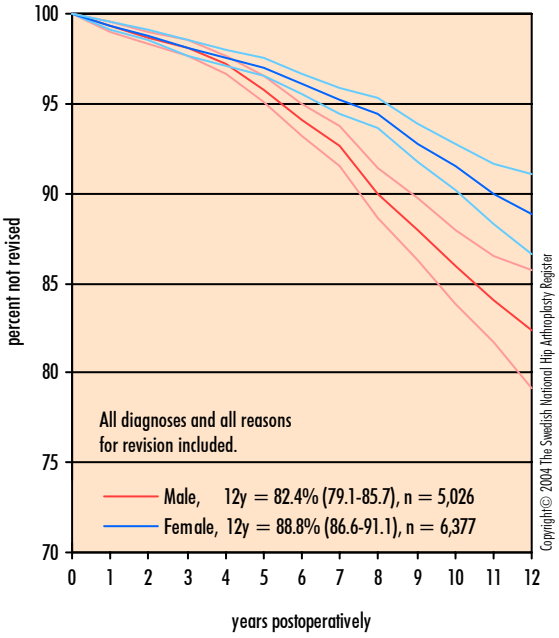
Between 50 and 59 years

all observations, 1992-2003



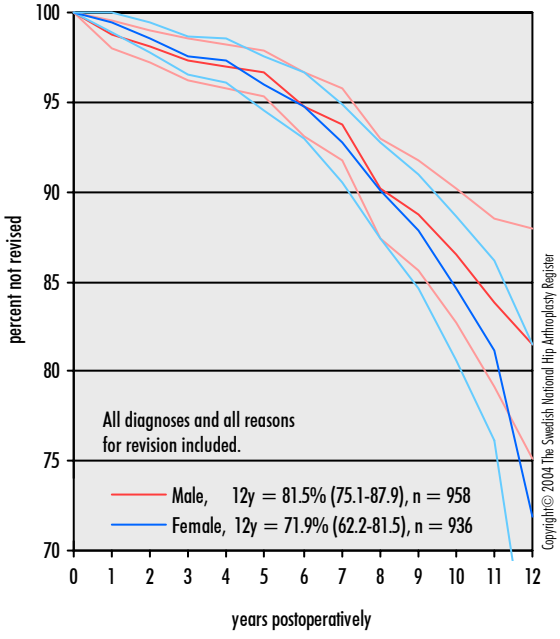
Between 50 and 59 years

cemented implants, 1992-2003



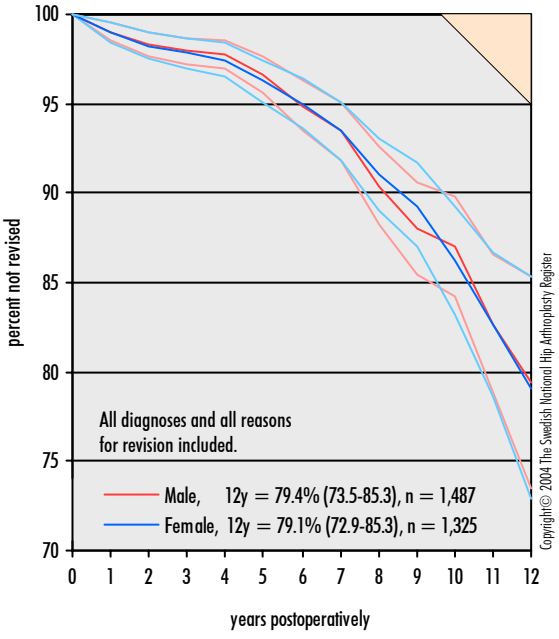
Between 50 and 59 years

uncemented implants, 1992-2003



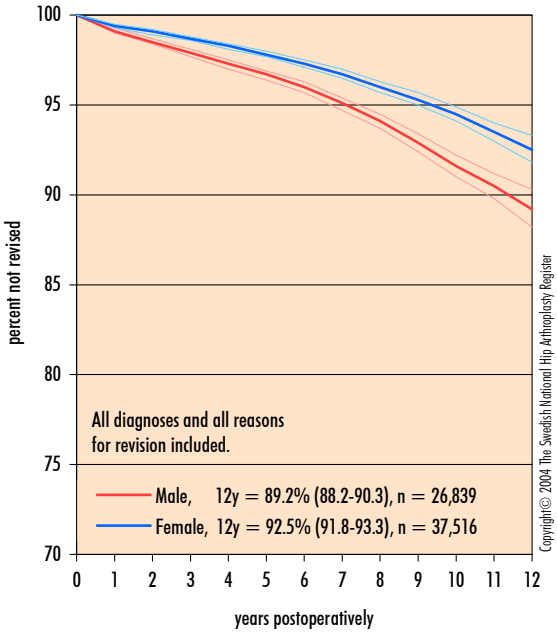
Between 50 and 59 years

hybrid implants, 1992-2003



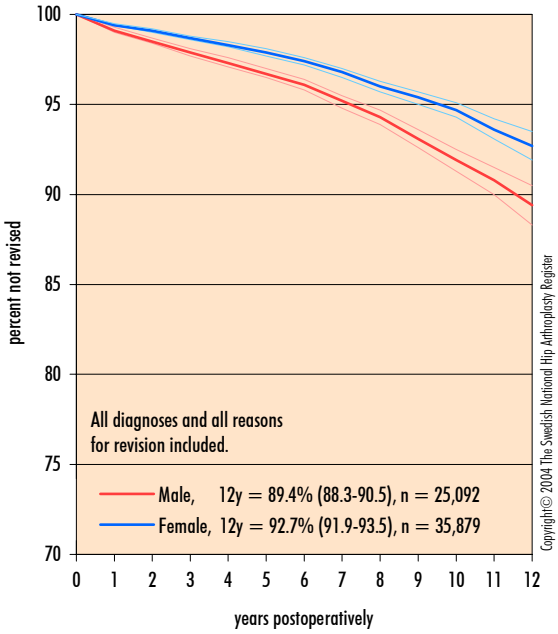
Between 60 and 75 years

all observations, 1992-2003



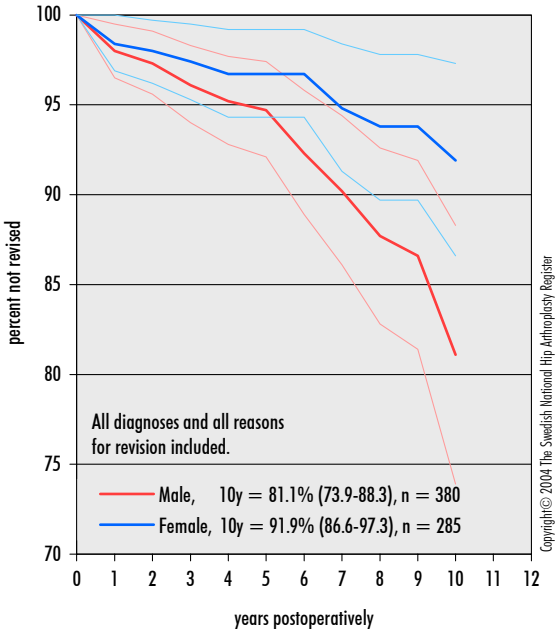
Between 60 and 75 years

cemented implants, 1992-2003



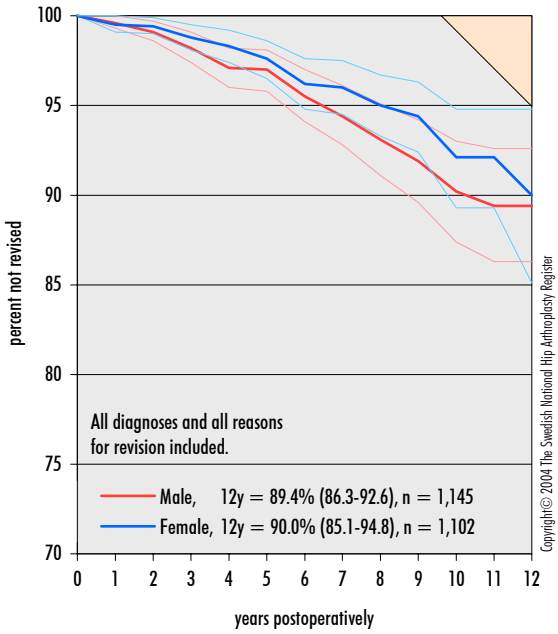
Between 60 and 75 years

uncemented implants, 1992-2003



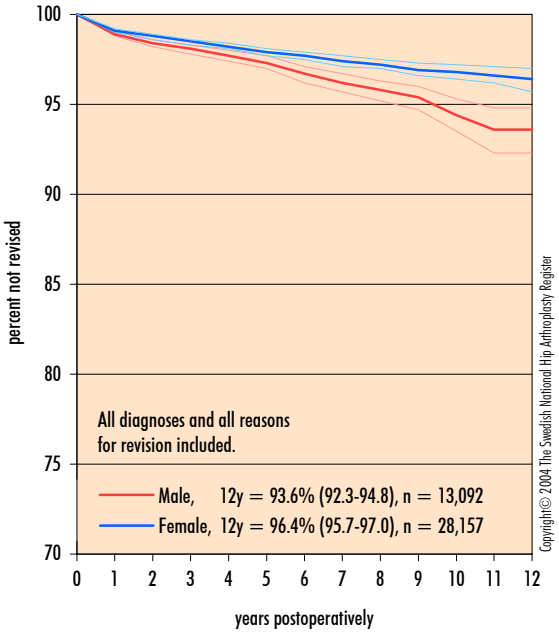
Between 60 and 75 years

hybrid implants, 1992-2003



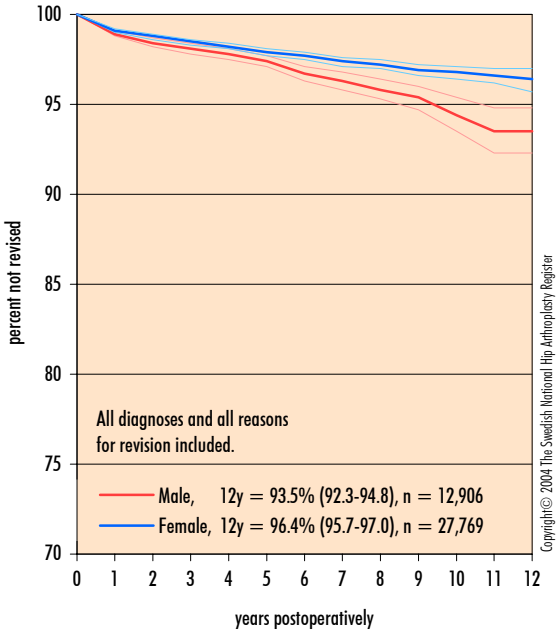
Older than 75 years

all observations, 1992-2003



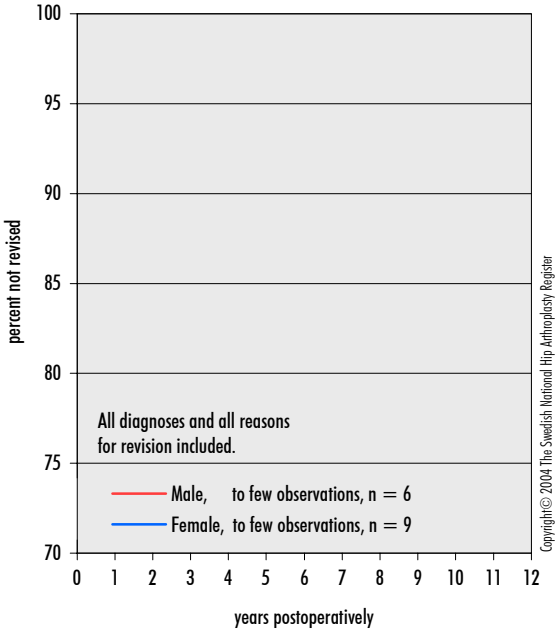
Older than 75 years

cemented implants, 1992-2003



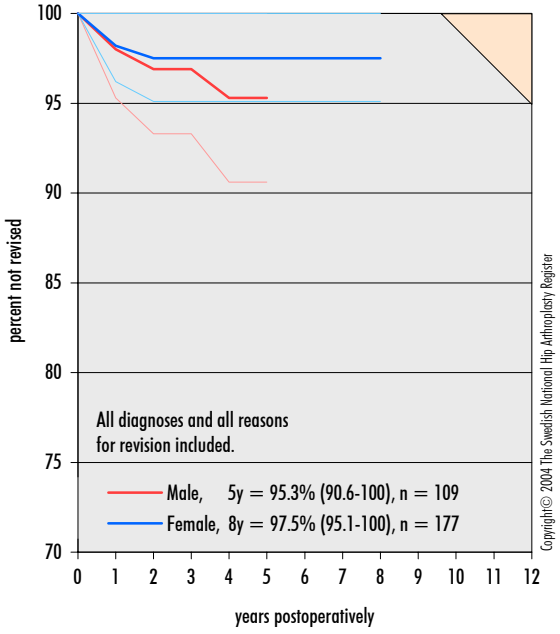
Older than 75 years

uncemented implants, 1992-2003



Older than 75 years

hybrid implants, 1992-2003



Implant Survival per Type

all diagnoses and all reasons for revision, 1992-2003

Cup (Stem)	Period [1]	Number [2]	5 years	95% CL	10 years	95% CL	12 years	95% CL
ABG HA (ABG cem.)	1992–1998	241	98.2%	96.5–100	92.2%	87.8–96.6		
ABG HA (ABG uncem.)	1992–1998	281	97.1%	95.2–99.1	84.3%	79.2–89.3		
ABG HA (Lubinus SP II)	1992–1998	331	96.9%	95.0–98.8	85.2%	78.7–91.8		
ABGII HA (Lubinus SP II)	1997–2003	197	97.9%	94.7–100				
Biomet Müller (Bi-Metric cem.)	1992–1996	1,066	96.4%	95.2–97.5	90.4%	88.4–92.4	88.7%	85.8–91.5
Biomet Müller (CPT Steel)	1997–2003	949	95.6%	93.4–97.7				
Biomet Müller (RX90-S)	1994–2001	1,449	97.8%	97.0–98.6	94.6%	92.6–96.7		
Cenator (Bi-Metric cem.)	1993–1999	293	97.1%	95.1–99.1				
Cenator (Cenator)	1993–2000	1,217	92.6%	91.0–94.2	80.3%	74.3–86.2		
Cenator (Charnley Elite Plus)	1996–2000	319	96.9%	94.9–98.9				
Cenator (Cone uncem.)	1994–2000	56	96.4%	91.5–100				
Cenator (Exeter Polished)	1998–2003	660	99.5%	99.0–100				
Charnley (Bi-Metric cem.)	1992–1998	58	96.1%	90.8–100				
Charnley (CAD)	1992–1996	224	97.2%	95.0–99.4	95.4%	92.5–98.4	94.4%	90.8–97.9
Charnley (Charnley Elite Plus)	1994–2003	1,405	96.4%	95.4–97.5				
Charnley (Charnley)	1992–2003	23,054	96.2%	96.0–96.5	91.8%	91.2–92.3	89.5%	88.6–90.4
Charnley (Exeter Polished)	1992–2003	969	98.5%	97.5–99.5	96.8%	94.8–98.9		
Charnley (Lubinus SP II)	1992–2003	332	97.7%	96.1–99.4				
Charnley (Müller Straight)	1992–1998	104	96.9%	93.5–100	95.7%	91.5–99.8		
Charnley (PCA E-series Textured)	1992–1996	129	96.8%	93.7–99.9	82.6%	75.2–90.1		
Charnley Elite (Charnley Elite Plus)	1992–2002	943	94.0%	92.0–96.0				
Charnley Elite (Charnley)	1992–2001	336	95.6%	93.2–97.9	89.6%	85.2–94.0		
Charnley Elite (Exeter Polished)	1996–2003	3,388	99.1%	98.7–99.5				
Charnley Elite (Lubinus SP II)	1992–2003	641	97.8%	96.1–99.5				
Charnley Elite (PCA E-series Textured)	1992–1997	213	96.9%	94.5–99.3	88.3%	83.2–93.4		
CLS Spotorno (CLS Spotorno)	1992–2003	483	98.6%	97.3–99.8	97.2%	94.3–100		
Contemporary (Exeter Polished)	1996–2003	319	96.6%	94.6–98.7				
Contemporary (Lubinus SP II)	1994–2001	102	96.9%	93.5–100				
Duralock uncem. (Spectron EF Primary)	1996–2000	112	97.3%	94.3–100				
Duralock uncem. (Spectron EF)	1993–1999	53	96.2%	91.1–100				
Exeter Duration (Exeter Polished)	1999–2003	6,697	98.2%	97.5–98.8				
Exeter Duration (Lubinus SP II)	1999–2003	329	100%	100–100				
Exeter Metal-backed (Exeter Polished)	1992–1994	589	98.7%	97.8–99.7	95.5%	93.7–97.4	92.8%	89.8–95.8
Exeter All-Poly (Exeter Polished)	1992–2003	6,355	97.1%	96.7–97.5	93.5%	92.4–94.6		
Exeter All-Poly (Lubinus SP II)	1992–2002	202	97.2%	94.8–99.6				
Exeter Polished (Exeter Polished)	1992–1995	669	95.9%	94.4–97.5	92.4%	90.2–94.7	87.1%	83.2–91.0
Harris-Galante I (Lubinus SP II)	1992–1997	72	97.2%	93.3–100	93.4%	87.2–99.7		
Harris-Galante II (Charnley)	1992–1996	144	93.0%	88.8–97.2	84.7%	78.1–91.2		
Harris-Galante II (Lubinus SP II)	1992–1997	232	94.8%	91.9–97.7	84.4%	79.3–89.4		
Harris-Galante II (Spectron EF)	1992–1996	161	96.2%	93.2–99.2	89.1%	83.7–94.4		
HGPII/HATCP (HG III) (Spectron EF)	1992–1995	93	100%	100–100	96.3%	92.2–100		
ITH (ITH)	1992–1997	316	98.5%	97.1–100	96.4%	94.0–98.9	96.4%	94.0–98.9
LINK Pressfit (Lubinus SP II)	1996–2002	62	100%	100–100				
Lubinus helplast (Lubinus IP)	1992–1998	822	99.3%	98.7–100	98.2%	96.9–99.5	92.2%	84.0–100
Lubinus helplast (Lubinus SP II)	1992–2003	39,032	98.4%	98.2–98.5	96.4%	96.0–96.7	95.4%	94.7–96.0

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Implant Survival per Type (cont.)

all diagnoses and all reasons for revision, 1992-2003

Cup (Stem)	Period [1)]	Number [2)]	5 years	95% CL	10 years	95% CL	12 years	95% CL
Mallory-Head uncem. (Lubinus SP II)	1995–2003	93	96.2%	91.9–100				
Müller All-Poly (Bi-Metric cem.)	1992–1995	95	96.6%	92.8–100	94.7%	89.5–100		
Müller All-Poly (Müller Straight)	1992–2003	1,475	97.8%	97.0–98.6	96.4%	95.1–97.8	96.4%	95.1–97.8
Müller All-Poly (Straight-stem standard)	1996–2003	123	92.7%	85.7–99.7				
Omnifit (Lubinus SP II)	1992–1995	172	95.9%	92.9–98.9	79.0%	72.0–86.0		
Omnifit (Omnifit)	1992–1995	319	92.1%	89.2–95.1	66.8%	61.3–72.2	55.5%	47.7–63.2
OPTICUP (Lubinus SP II)	1995–2003	543	98.7%	97.6–99.7				
OPTICUP (NOVA Scan Hip)	1993–2000	157	91.6%	87.1–96.2				
OPTICUP (Optima)	1993–2000	755	96.5%	95.1–97.9	88.4%	84.8–91.9		
OPTICUP (Scan Hip II Collar)	1996–2003	1,968	96.4%	95.1–97.7				
OPTICUP (Scan Hip Collar)	1995–1996	83	97.2%	93.3–100				
PCA (PCA)	1992–1994	71	94.3%	88.9–99.7	83.7%	74.9–92.5		
Reflection (Spectron EF Primary)	1992–2003	4,417	97.8%	97.1–98.4				
Reflection (Spectron EF)	1992–1998	1,048	98.4%	97.6–99.2	95.5%	93.8–97.2	93.2%	90.6–95.8
Reflection HA (Lubinus SP II)	1995–2003	151	92.8%	87.4–98.1				
Reflection HA (Spectron EF)	1995–1998	70	98.5%	95.6–100				
Romanus (Bi-Metric cem.)	1992–1998	381	95.4%	93.3–97.5	82.4%	77.9–87.0	80.2%	74.0–86.4
Romanus (Bi-Metric uncem.)	1992–1997	262	96.9%	94.8–99.0	87.2%	82.8–91.7		
Romanus (Bi-Metric HA uncem.)	1992–1999	147	99.3%	98.0–100	91.5%	86.7–96.4		
Romanus (Lubinus SP II)	1992–1996	102	98.0%	95.3–100	89.4%	83.2–95.6		
Romanus (RX90-S)	1994–2000	183	96.1%	93.3–98.9				
Romanus HA (Bi-Metric HA uncem.)	1994–2003	243	96.0%	93.4–98.6				
Scan Hip Cup (Lubinus SP II)	1992–2002	91	95.3%	90.8–99.8				
Scan Hip Cup (Optima)	1993–2001	507	98.5%	97.3–99.6	90.0%	84.8–95.2		
Scan Hip Cup (Scan Hip II Collar)	1996–2001	207	96.7%	94.1–99.3				
Scan Hip Cup (Scan Hip Collar)	1992–2000	2,873	97.8%	97.2–98.3	92.2%	90.8–93.5	88.7%	86.1–91.2
Scan Hip Cup (Scan Hip Collarless)	1992–1999	133	98.4%	96.3–100	90.4%	84.3–96.5	87.4%	80.2–94.6
Secur-Fit (Omnifit)	1996–1999	104	89.1%	82.9–95.2				
SHP (Lubinus SP II)	1994–2003	606	99.4%	98.6–100				
SLS (CLS Spotorno)	1992–1998	66	96.9%	92.7–100				
Spectron Metal-backed (Spectron EF)	1992–1993	113	99.1%	97.4–100	99.1%	97.4–100		
Spectron (Spectron EF)	1992–1998	75	100%	100–100				
Stanmore (Stanmore)	1992–1998	104	96.8%	93.3–100	89.7%	82.8–96.6		
Trilogy HA (Anatomic HA/HATCP (HG V))	1994–1999	58	94.8%	89.1–100				
Trilogy HA (Lubinus SP II)	1995–2003	730	97.4%	95.9–98.9				
Trilogy HA (Optima)	1995–1999	97	96.8%	93.2–100				
Trilogy HA (Spectron EF Primary)	1996–2003	869	98.0%	96.4–99.6				
ZCA (CPT Steel)	1993–2003	111	95.7%	91.6–99.9				

Implant Survival per Type

primary osteoarthritis and aseptic loosening, 1992-2003

Cup (Stem)	Period [1)]	Number [2)]	5 years	95% CL	10 years	95% CL	12 years	95% CL
ABG HA (ABG cem.)	1992–1998	142	100%	100–100	93.2%	87.8–98.5		
ABG HA (ABG uncem.)	1992–1998	221	98.6%	97.1–100	85.3%	79.4–91.1		
ABG HA (Lubinus SP II)	1992–1998	266	99.6%	98.8–100	95.1%	91.3–99.0		
ABGII HA (Lubinus SP II)	1997–2003	162	98.2%	94.6–100				

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Implant Survival per Type (cont.)

primary osteoarthritis and aseptic loosening, 1992-2003

Cup (Stem)	Period [1)]	Number [2)]	5 years	95% CL	10 years	95% CL	12 years	95% CL
Biomet Müller (Bi-Metric cem.)	1992–1995	706	97.4%	96.2–98.6	91.6%	89.2–93.9	90.6%	88.0–93.3
Biomet Müller (CPT Steel)	1997–2003	901	99.5%	99.0–100				
Biomet Müller (RX90-S)	1994–2001	1 112	99.1%	98.5–99.7	95.8%	93.6–98.1		
Cenator (Bi-Metric cem.)	1993–1999	207	98.5%	96.8–100				
Cenator (Cenator)	1993–2000	732	94.2%	92.4–96.0	83.7%	77.8–89.7		
Cenator (Charnley Elite Plus)	1997–2000	268	98.8%	97.5–100				
Cenator (Exeter Polished)	1998–2003	558	99.8%	99.5–100				
Charnley (CAD)	1992–1996	141	98.5%	96.5–100	95.9%	92.3–99.4		
Charnley (Charnley Elite Plus)	1994–2002	811	98.2%	97.2–99.2				
Charnley (Charnley)	1992–2003	16,782	97.8%	97.6–98.1	93.6%	93.0–94.2	91.7%	90.7–92.8
Charnley (Exeter Polished)	1992–2003	730	100%	100–100	98.7%	96.9–100		
Charnley (Lubinus SP II)	1992–2003	276	99.2%	98.1–100				
Charnley (Müller Straight)	1992–1998	91	98.8%	96.4–100	97.3%	93.6–100		
Charnley (PCA E-series Textured)	1992–1996	106	97.1%	93.9–100	82.5%	74.3–90.7		
Charnley Elite (Charnley Elite Plus)	1992–2002	619	94.9%	92.6–97.3				
Charnley Elite (Charnley)	1992–2001	204	94.6%	91.4–97.9	91.1%	86.8–95.5		
Charnley Elite (Exeter Polished)	1996–2003	2,379	99.8%	99.5–100				
Charnley Elite (Lubinus SP II)	1992–2003	512	99.0%	97.8–100				
Charnley Elite (PCA E-series Textured)	1992–1997	170	98.2%	96.1–100	89.2%	83.8–94.7		
CLS Spotorno (CLS Spotorno)	1992–2003	404	100%	100–100	100%	100–100		
Contemporary (Exeter Polished)	1996–2003	283	98.5%	97.0–100				
Contemporary (Lubinus SP II)	1994–2001	68	100%	100–100				
Duralock uncem. (Spectron EF Primary)	1996–2000	98	98.0%	95.1–100				
Exeter Duration (Exeter Polished)	1999–2003	5,489	99.4%	98.7–100				
Exeter Metal-backed (Exeter Polished)	1992–1994	403	99.2%	98.3–100	96.0%	93.9–98.2	93.3%	89.9–96.6
Exeter All-Poly (Exeter Polished)	1992–2003	4,642	98.9%	98.6–99.2	96.0%	94.9–97.1		
Exeter All-Poly (Lubinus SP II)	1992–2002	160	97.9%	95.6–100				
Exeter Polished (Exeter Polished)	1992–1995	460	97.7%	96.3–99.1	94.8%	92.6–97.1	90.8%	86.5–95.0
Harris-Galante I (Lubinus SP II)	1992–1997	57	100%	100–100				
Harris-Galante II (Charnley)	1992–1996	123	98.4%	96.1–100	95.7%	91.9–99.4		
Harris-Galante II (Lubinus SP II)	1992–1997	144	98.6%	96.7–100	88.3%	82.4–94.2		
Harris-Galante II (Spectron EF)	1992–1996	118	100%	100–100	97.1%	93.8–100		
ITH (ITH)	1992–1996	184	98.8%	97.1–100	97.4%	94.8–100		
Lubinus All-Poly (Lubinus IP)	1992–1998	456	99.3%	98.5–100	98.1%	96.4–99.7		
Lubinus All-Poly (Lubinus SP II)	1992–2003	29,890	99.6%	99.5–99.7	97.9%	97.5–98.3	97.0%	96.2–97.7
Mallory-Head uncem. (Lubinus SP II)	1995–2003	76	100%	100–100				
Müller All-Poly (Bi-Metric cem.)	1992–1995	77	97.2%	93.4–100				
Müller All-Poly (Müller Straight)	1992–2003	1,077	99.6%	99.2–100	98.0%	96.7–99.4	98.0%	96.7–99.4
Müller All-Poly (Straight-stem standard)	1996–2003	112	95.5%	88.8–100				
Omnifit (Lubinus SP II)	1992–1995	140	97.8%	95.4–100	79.5%	71.6–87.4		
Omnifit (Omnifit)	1992–1995	96	94.8%	90.3–99.2				
OPTICUP (Lubinus SP II)	1995–2003	341	99.3%	98.4–100				
OPTICUP (NOVA Scan Hip)	1993–2000	104	91.8%	86.3–97.2				
OPTICUP (Optima)	1994–2000	557	97.5%	96.1–98.9				
OPTICUP (Scan Hip II Collar)	1996–2003	1,494	98.1%	96.9–99.3				

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Implant Survival per Type (cont.)

primary osteoarthritis and aseptic loosening, 1992-2003

Cup (Stem)	Period [1]	Number [2]	5 years	95% CL	10 years	95% CL	12 years	95% CL
OPTICUP (Scan Hip Collar)	1995–1996	66	98.3%	95.0–100				
Reflection (Spectron EF Primary)	1992–2003	3,236	99.0%	98.4–99.5				
Reflection (Spectron EF)	1992–1998	722	99.4%	98.8–100	97.2%	95.4–98.9	95.9%	93.5–98.4
Reflection HA (Lubinus SP II)	1995–2003	131	94.6%	89.4–99.8				
Reflection HA (Spectron EF)	1995–1998	58	100%	100–100				
Romanus (Bi-Metric cem.)	1992–1998	291	96.5%	94.4–98.6	86.7%	82.2–91.3	83.8%	76.8–90.9
Romanus (Bi-Metric uncem.)	1992–1997	186	99.4%	98.4–100	92.9%	88.8–97.0		
Romanus (Bi-Metric HA uncem.)	1992–1999	121	100%	100–100				
Romanus (Lubinus SP II)	1992–1996	75	98.6%	96.0–100	91.3%	84.7–98.0		
Romanus (RX90-S)	1994–2000	167	96.9%	94.3–99.6				
Romanus HA (Bi-Metric HA uncem.)	1994–2002	188	100%	100–100				
Scan Hip Cup (Optima)	1993–2001	357	99.7%	99.0–100				
Scan Hip Cup (Scan Hip II Collar)	1996–2001	159	99.3%	98.1–100				
Scan Hip Cup (Scan Hip Collar)	1992–2000	2,043	98.8%	98.3–99.3	93.4%	91.9–94.8	89.9%	87.1–92.6
Scan Hip Cup (Scan Hip Collarless)	1992–1995	90	100%	100–100	91.2%	84.4–98.0		
Secur-Fit (Omnifit)	1996–1999	74	95.8%	91.2–100				
SHP (Lubinus SP II)	1994–2003	491	100%	100–100				
SLS (CLS Spotorno)	1992–1998	54	98.1%	94.5–100				
Spectron Metal-backed (Spectron EF)	1992–1993	87	100%	100–100	100%	100–100		
Spectron (Spectron EF)	1993–1998	61	100%	100–100				
Stanmore (Stanmore)	1992–1998	91	97.6%	94.3–100	91.3%	84.6–98.0		
Trilogy HA (Lubinus SP II)	1995–2003	617	99.5%	98.6–100				
Trilogy HA (Optima)	1995–1999	92	97.7%	94.6–100				
Trilogy HA (Spectron EF Primary)	1996–2003	651	100%	100–100				

Implant Survival per Hospital

all diagnoses and all reasons for revision, 1992-2003

Hospital	Period [1]	Number [2]	5 years	95% CL	10 years	95% CL	12 years	95% CL
Alingsås	1992–2003	1,033	98.9%	98.1–99.7	96.9%	94.9–98.8	90.4%	81.6–99.3
Arvika	1992–2003	452	91.5%	88.5–94.5	83.3%	77.4–89.3		
Bollnäs	1992–2003	1,126	98.3%	97.5–99.2	93.6%	89.6–97.6		
Borås	1992–2003	2,107	97.7%	96.9–98.4	94.7%	93.1–96.3	93.6%	91.5–95.8
Carlanderska	1992–2003	484	98.6%	97.4–99.9	95.3%	90.9–99.7		
Danderyd	1992–2003	3,334	96.8%	96.1–97.6	92.8%	91.1–94.5	92.3%	90.3–94.3
Eksjö	1992–2003	2,041	96.5%	95.6–97.4	92.7%	90.8–94.6	91.3%	88.6–94.0
Enköping	1992–2003	775	96.6%	94.7–98.5	89.0%	83.0–95.0		
Elisabethsjukhuset								
Eskilstuna	1992–2003	1,748	97.9%	97.1–98.6	95.2%	93.5–97.0	95.2%	93.5–97.0
Falköping	1992–2003	1,388	97.8%	96.8–98.8	90.8%	87.2–94.5		
Falun	1992–2003	1,529	95.3%	93.7–96.9				
Frölunda Specialistsjukhus								
Gällivare	1992–2003	1,030	98.9%	98.1–99.6	97.5%	95.9–99.0	94.1%	88.8–99.3

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Implant Survival per Hospital (cont.)

all diagnoses and all reasons for revision, 1992-2003

Hospital	Period [1]	Number [2]	5 years	95% CL	10 years	95% CL	12 years	95% CL
Gävle	1992–2003	1,763	97.1%	96.1–98.1				
Halmstad	1992–2003	1,954	97.5%	96.7–98.3	94.2%	92.2–96.3	92.7%	89.8–95.6
Helsingborg	1992–2003	1,802	96.1%	95.1–97.2	87.6%	84.7–90.5	82.5%	76.4–88.5
Huddinge	1992–2003	2,408	95.2%	94.2–96.3	87.5%	85.4–89.7	86.8%	84.4–89.2
Hudiksvall	1992–2003	1,378	97.7%	96.8–98.6	96.4%	94.9–97.9		
Hässleholm-Kristianstad	1992–2003	3,500	98.1%	97.6–98.7	95.0%	93.5–96.5	89.9%	84.9–94.8
Jönköping	1992–2003	1,879	97.4%	96.5–98.2	95.5%	94.2–96.9	95.5%	94.2–96.9
Kalix	1992–2003	712	99.5%	99.0–100	98.0%	96.2–99.8		
Kalmar	1992–2003	2,062	98.3%	97.7–98.9	94.9%	93.0–96.7	92.5%	88.6–96.5
Karlshamn	1992–2003	1,055	97.5%	96.4–98.7	95.2%	92.9–97.5		
Karlskoga	1992–2003	1,166	98.5%	97.7–99.3	94.4%	91.3–97.5		
Karlskrona	1992–2003	1,024	95.5%	94.2–96.9	89.2%	86.1–92.2	85.5%	79.4–91.7
Karlstad	1992–2003	1,575	97.2%	96.3–98.2	92.0%	89.3–94.7	90.2%	86.6–93.8
Karolinska	1992–2003	2,013	94.7%	93.4–95.9	87.0%	83.9–90.0	82.5%	78.2–86.8
Katrineholm	1992–2003	1,240	99.0%	98.3–99.6	99.0%	98.3–99.6		
Kungälv	1992–2003	1,572	99.1%	98.4–99.7	92.9%	87.2–98.7		
Köping	1992–2003	1,474	98.9%	98.1–99.7	96.7%	94.0–99.4		
Landskrona	1992–2003	2,193	98.2%	97.4–98.9	92.5%	89.4–95.6	83.8%	75.1–92.5
Lidköping	1992–2003	912	98.0%	96.9–99.0				
Lindesberg	1992–2003	1,076	98.2%	97.2–99.1	96.0%	93.6–98.5	94.9%	91.6–98.2
Linköping	1992–2003	2,356	99.0%	98.5–99.4	95.8%	94.1–97.5	95.2%	93.1–97.2
Ljungby	1992–2003	1,224	98.1%	97.1–99.0	95.5%	93.6–97.4	95.5%	93.6–97.4
Lund	1992–2003	1,854	97.0%	96.1–97.9	88.8%	86.3–91.3	86.0%	82.0–89.9
Lycksele	1992–2003	1,351	99.0%	98.3–99.7	97.0%	95.0–99.1		
Löwenströmska	1992–2003	864	95.9%	94.3–97.5	90.3%	87.3–93.3		
Malmö	1992–2003	2,713	95.7%	94.9–96.6	87.6%	85.6–89.7	83.8%	79.9–87.6
Mora	1992–2003	1,517	96.8%	95.7–97.9	93.9%	91.9–95.8	89.4%	83.7–95.2
Motala	1992–2003	1,374	99.2%	98.5–99.8	95.3%	92.5–98.2		
Movement								
Norrköping	1992–2003	2,433	98.1%	97.4–98.7	91.8%	89.6–93.9	86.8%	82.2–91.4
Norrtälje	1992–2003	923	96.2%	94.7–97.7	95.9%	94.3–97.5		
Nyköping	1992–2003	1,272	98.6%	97.8–99.3	97.7%	96.3–99.1	97.7%	96.3–99.1
Ortopediska Huset	1996–2003	659	95.2%	90.5–99.9				
Oskarshamn	1992–2003	934	99.1%	98.4–99.8	95.9%	92.8–99.1		
Piteå	1992–2003	813	98.6%	97.7–99.6	95.9%	93.1–98.6		
S:t Göran	1992–2003	4,980	94.5%	93.7–95.2	87.6%	85.9–89.4	84.8%	82.0–87.5
Sabbatsberg Närsjukhuset	1998–2003	1,378	99.5%	99.1–100				
Simrishamn	1992–2003	661	99.1%	98.0–100	91.5%	87.4–95.7		
Skellefteå	1992–2003	1,395	97.6%	96.7–98.5	96.7%	95.4–98.0	95.6%	93.1–98.1
Skene	1992–2003	788	98.3%	97.2–99.4	95.8%	93.5–98.1		
Skövde	1992–2003	1,972	96.2%	95.2–97.2	88.0%	85.4–90.6	84.5%	79.8–89.2
Sollefteå	1992–2003	964	97.7%	96.5–98.8	92.5%	89.0–95.9	91.2%	86.9–95.4
Sophiahemmet	1992–2003	1,669	94.3%	92.8–95.7	82.3%	77.8–86.9		
SU/Mölndal	1992–2003	1,480	97.0%	96.0–98.0	91.6%	88.5–94.7	87.1%	81.9–92.3
SU/Sahlgrenska	1992–2003	2,392	97.7%	97.0–98.4	91.2%	89.0–93.4	86.2%	81.8–90.5

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Implant Survival per Hospital

all diagnoses and all reasons for revision, 1992-2003

Hospital	Period [1]	Number [2]	5 years	95% CL	10 years	95% CL	12 years	95% CL
SU/Östra	1992–2003	2,011	97.3%	96.5–98.2	92.4%	90.4–94.4	89.6%	85.9–93.3
Sunderby	1992–2003	1,819	97.2%	96.4–98.1	92.0%	89.9–94.0	88.4%	84.3–92.5
Sundsvall	1992–2003	2,247	96.2%	95.3–97.2	93.5%	91.8–95.2	91.1%	86.9–95.2
Södersjukhuset	1992–2003	3,395	98.3%	97.8–98.8	93.3%	91.6–95.1	88.9%	84.4–93.4
Södertälje	1995–2003	766	99.0%	97.9–100				
Torsby	1992–2003	734	97.2%	95.6–98.8	91.3%	87.3–95.3		
Trelleborg	1992–2003	1,722	96.4%	95.3–97.5	92.7%	90.3–95.1		
Uddevalla	1992–2003	2,348	98.0%	97.3–98.7	94.0%	92.1–95.8	92.7%	90.3–95.2
Umeå	1992–2003	1,468	97.6%	96.7–98.4	95.2%	93.7–96.7	93.0%	89.7–96.2
Uppsala	1992–2003	3,032	94.2%	93.2–95.2	86.4%	84.1–88.7	82.0%	77.5–86.5
Varberg	1992–2003	1,966	97.2%	96.2–98.1	91.4%	88.9–94.0	88.1%	84.0–92.1
Visby	1992–2003	954	93.4%	91.5–95.3	87.4%	83.7–91.0	84.1%	76.8–91.3
Värnamo	1992–2003	1,079	98.6%	97.7–99.5	96.1%	94.0–98.2		
Västervik	1992–2003	1,164	97.9%	96.9–98.8	95.1%	93.1–97.1	93.9%	90.8–97.0
Västerås	1992–2003	1,425	97.6%	96.6–98.5	91.8%	89.0–94.7	85.0%	77.2–92.7
Växjö	1992–2003	1,207	97.7%	96.7–98.7	93.3%	90.8–95.9	91.8%	88.4–95.1
Ystad	1992–2003	1,283	97.4%	96.4–98.4	95.0%	92.7–97.3		
Ängelholm	1992–2003	1,656	97.5%	96.5–98.4	93.4%	91.0–95.9	93.4%	91.0–95.9
Örebro	1992–2003	2,151	98.5%	97.9–99.1	95.1%	93.3–96.8	94.6%	92.6–96.6
Örnsköldsvik	1992–2003	1,228	99.5%	99.1–99.9	98.4%	97.3–99.6	98.4%	97.3–99.6
Östersund	1992–2003	1,726	97.5%	96.6–98.3	94.3%	92.6–96.0	92.8%	89.5–96.2

Implant Survival per Hospital

primary osteoarthritis and aseptic loosening, 1992-2003

Hospital	Period [1]	Number [2]	5 years	95% CL	10 years	95% CL	12 years	95% CL
Alingsås	1993–2003	835	99.8%	99.3–100	97.7%	95.3–100		
Arvika	1992–2003	364	95.4%	92.8–98.0				
Bollnäs	1992–2003	902	99.7%	99.3–100	97.9%	95.4–100		
Borås	1992–2003	1,442	99.2%	98.6–99.7	97.0%	95.5–98.5	97.0%	95.5–98.5
Carlanderska	1992–2003	449	99.3%	98.2–100				
Danderyd	1992–2003	2,889	99.1%	98.7–99.6	96.6%	95.2–98.0	96.6%	95.2–98.0
Eksjö	1992–2003	1,685	98.6%	97.9–99.3	95.2%	93.4–97.1	95.2%	93.4–97.1
Enköping	1992–2003	725	97.7%	96.1–99.4	91.2%	85.3–97.1		
Elisabethsjukhuset								
Eskilstuna	1992–2003	1,055	99.0%	98.3–99.6	95.7%	93.5–97.9	95.7%	93.5–97.9
Falköping	1992–2003	1,188	98.6%	97.6–99.6	90.1%	84.5–95.8		
Falun	1992–2003	1,254	96.9%	95.4–98.3				
Frölunda Specialistsjukhus								
Gällivare	1992–2003	825	100%	100–100	99.1%	97.8–100	95.3%	89.6–100
Gävle	1992–2003	1,278	99.2%	98.5–100				
Halmstad	1992–2003	1,235	99.6%	99.2–100	96.9%	94.6–99.1		
Helsingborg	1992–2003	1,323	97.7%	96.7–98.7	90.2%	87.1–93.3	86.1%	80.2–92.1

(Continued on next page.)

Implant Survival per Hospital (cont.)

primary osteoarthritis and aseptic loosening, 1992-2003

Hospital	Period [1]	Number [2]	5 years	95% CL	10 years	95% CL	12 years	95% CL
Huddinge	1992–2003	1,555	95.6%	94.4–96.8	88.1%	85.7–90.5	87.7%	85.1–90.2
Hudiksvall	1992–2003	1,039	99.7%	99.3–100	99.3%	98.5–100		
Hässleholm-Kristianstad	1992–2003	2,841	99.0%	98.5–99.6	95.9%	94.1–97.7	91.7%	85.8–97.6
Jönköping	1992–2003	1,486	99.6%	99.3–100	98.5%	97.5–99.6	98.5%	97.5–99.6
Kalix	1992–2003	584	100%	100–100	98.7%	96.9–100		
Kalmar	1992–2003	1,331	99.6%	99.1–100	96.7%	94.6–98.8	94.4%	89.5–99.3
Karlshamn	1992–2003	932	99.3%	98.5–100	97.8%	96.1–99.4		
Karlskoga	1992–2003	1,007	99.9%	99.6–100	97.4%	95.0–99.9		
Karlskrona	1992–2003	748	97.4%	96.2–98.6	92.7%	89.8–95.7	88.6%	81.9–95.4
Karlstad	1992–2003	1,062	99.1%	98.4–99.8	96.7%	94.9–98.5		
Karolinska	1992–2003	1,143	97.5%	96.1–98.8	87.1%	81.6–92.5		
Katrineholm	1992–2003	1,071	99.6%	99.1–100	99.6%	99.1–100		
Kungälv	1992–2003	1,355	99.5%	99.0–100				
Köping	1993–2003	1,353	99.0%	98.1–99.8	97.0%	94.0–100		
Landskrona	1992–2003	1,971	99.3%	98.7–99.8	93.3%	90.1–96.6	83.5%	73.8–93.2
Lidköping	1992–2003	813	99.2%	98.5–100				
Lindesberg	1992–2003	857	99.9%	99.6–100	97.7%	95.2–100	96.4%	92.8–100
Linköping	1992–2003	1,619	99.5%	99.0–99.9	96.3%	94.4–98.3	95.6%	93.2–98.0
Ljungby	1992–2003	1,080	99.7%	99.2–100	97.5%	95.6–99.3		
Lund	1992–2003	940	98.7%	97.8–99.5	91.6%	88.8–94.4	89.4%	85.8–93.1
Lycksele	1992–2003	1,049	99.3%	98.7–100				
Löwenströmska	1992–2003	707	96.8%	95.1–98.5	91.3%	87.6–94.9		
Malmö	1992–2003	539	98.4%	97.0–99.7				
Mora	1992–2003	1,300	97.7%	96.7–98.7	94.8%	92.9–96.7	89.9%	83.5–96.3
Motala	1993–2003	1,025	99.6%	99.1–100	96.7%	93.2–100		
Movement								
Norrköping	1992–2003	1,622	99.0%	98.4–99.6	91.8%	89.0–94.5	88.5%	84.4–92.6
Norrtälje	1992–2003	681	98.6%	97.5–99.8	98.2%	96.8–99.6		
Nyköping	1992–2003	1,022	99.8%	99.4–100	99.4%	98.7–100	99.4%	98.7–100
Ortopediska Huset	1996–2003	643	97.2%	92.6–100				
Oskarshamn	1992–2003	739	99.8%	99.5–100	96.4%	92.8–100		
Piteå	1992–2003	669	100%	100–100	99.3%	97.9–100		
S:t Göran	1992–2003	3,555	97.0%	96.2–97.7	86.8%	82.5–91.0		
Sabbatsberg Närsjukhuset	1998–2003	1,232	100%	100–100				
Simrishamn	1992–2003	596	99.4%	98.5–100	92.8%	88.7–97.0		
Skellefteå	1992–2003	1,052	99.7%	99.3–100	98.8%	97.6–100		
Skene	1992–2003	715	98.8%	97.7–99.8	96.9%	94.7–99.0		
Skövde	1992–2003	1,421	97.6%	96.7–98.6	90.3%	87.7–93.0	85.3%	78.9–91.7
Sollefteå	1992–2003	821	98.8%	97.8–99.8	93.3%	89.6–97.0		
Sophiahemmet	1992–2003	1,606	96.1%	94.8–97.3	85.4%	80.6–90.1		
SU/Mölndal	1992–2003	1,126	98.8%	98.1–99.6	96.6%	94.7–98.6		
SU/Sahlgrenska	1992–2003	1,450	98.8%	98.1–99.5	93.3%	90.9–95.7	88.2%	83.1–93.3
SU/Östra	1992–2003	1,519	98.4%	97.7–99.2	93.6%	91.4–95.7	90.5%	86.2–94.9
Sunderby	1992–2003	1,148	99.2%	98.6–99.9	95.6%	93.4–97.7	93.9%	90.9–97.0
Sundsvall	1992–2003	1,858	98.8%	98.2–99.4	97.1%	95.7–98.5	97.1%	95.7–98.5

Implant Survival per Hospital (cont.)

primary osteoarthritis and aseptic loosening, 1992-2003

Hospital	Period [1]	Number [2]	5 years	95% CL	10 years	95% CL	12 years	95% CL
Södersjukhuset	1992–2003	1,991	99.6%	99.3–100	96.1%	94.4–97.8	94.0%	90.5–97.6
Södertälje	1995–2003	647	100%	100–100				
Torsby	1992–2003	593	98.2%	96.4–100	90.5%	84.9–96.0		
Trelleborg	1992–2003	1,299	98.2%	97.3–99.2	93.9%	91.1–96.6		
Uddevalla	1992–2003	1,627	99.4%	98.8–99.9	96.2%	94.4–97.9	94.8%	92.1–97.4
Umeå	1992–2003	1,033	99.1%	98.5–99.8	98.2%	97.2–99.3	97.2%	95.4–98.9
Uppsala	1992–2003	1,689	95.6%	94.5–96.8	89.6%	87.2–92.1	88.9%	86.1–91.7
Varberg	1992–2003	1,639	98.2%	97.4–99.1	93.2%	90.6–95.7	93.2%	90.6–95.7
Visby	1992–2003	782	94.7%	92.8–96.6	91.0%	87.7–94.3		
Värnamo	1992–2003	888	99.4%	98.7–100	96.8%	94.6–99.0		
Västervik	1992–2003	913	99.7%	99.3–100	97.2%	95.3–99.2		
Västerås	1992–2003	967	99.3%	98.8–100	94.6%	91.7–97.5	89.4%	82.2–96.5
Växjö	1992–2003	995	99.0%	98.3–99.7	95.3%	92.9–97.7	94.4%	91.5–97.4
Ystad	1992–2003	988	99.4%	98.8–100	97.2%	94.8–99.5		
Ängelholm	1992–2003	1,249	98.9%	98.1–99.6	96.5%	94.5–98.4	96.5%	94.5–98.4
Örebro	1992–2003	1,519	99.3%	98.8–99.8	97.2%	95.6–98.8	96.6%	94.6–98.6
Örnsköldsvik	1992–2003	975	100%	100–100	99.8%	99.4–100	99.8%	99.4–100
Östersund	1992–2003	1,379	99.7%	99.3–100	96.6%	95.0–98.3	94.8%	91.0–98.7

[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 a sufficient number of primary THR during the period to give a 12-year figure for implant survival. A condition that has been consistently used in the survival statistics from the register is that values are given only when at least 50 patients at risk remain. Units with a smaller production are therefore not included in the tables. In order to be able to calculate the 12-year value, the longest observed time between primary THR and revision, must be at least 12 years. We have therefore also included 5 and 10-year survival.

Environmental profile

In the environmental profile, the units report their surgical technique and environment annually. It is important to be aware that if a unit does not update its environmental profile via the website, it is assumed that it is unchanged from the previous year.

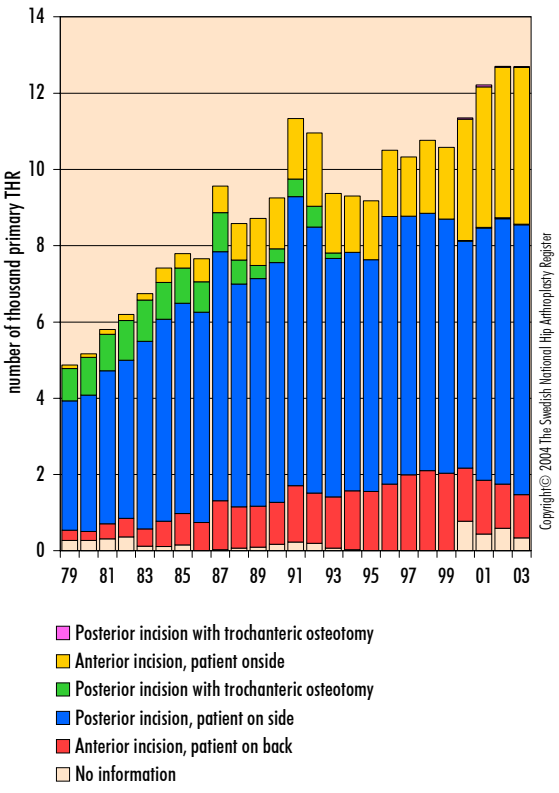
The variation is now increasing negligibly, above all as regards the technical factors which previously did not influence the results significantly in the Poisson model (see Annual Report 2001). Most of the operations are now carried out with very similar techniques but because of the changes in application of the modern surgical technique, we plan to perform a regression analysis.

We note a continued increase in the use of compression instruments for cementing the cup. On the femoral side, the percentage that do not use proximal femoral sealing has been rather constant for the last few years and now amounts to approximately 15%. Regression analysis indicates clear advantages of using proximal plugs, however.

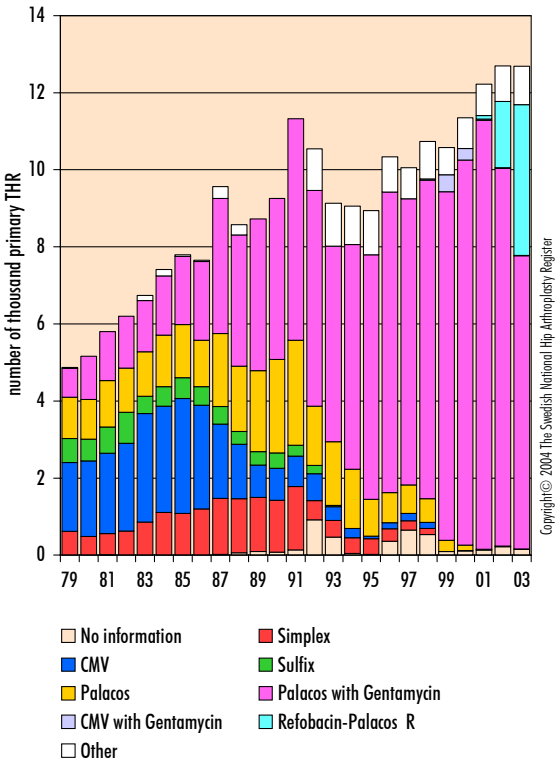
The reason why some units hesitate to use the technique is no doubt related to the increased risk of thromboembolic complications. This risk can be reduced, however, by careful cleansing of the bone bed (high-pressure lavage) prior to cementing. The proportion of units that do not use a brush for cleansing now exceeds 30%. This is consistent with previous information from the register as we were not able to demonstrate any significant effect of this method of cleansing and illustrates the impact the information from the register has. Almost 60% of the patients have been operated upon via posterior incisions, which is a slight increase. At the same time, we note a reduction in anterolateral incisions in the supine position while the number of anterolateral incisions in the lateral position is almost unchanged.

The majority of the patients have been operated upon using Palacos Gentamycin. As last year, we find a rapid increase in the use of Refobacin-Palacos R at the cost of Palacos Gentamycin, however. According to the information we have received, the products are identical but we register both nonetheless and we will be able to analyse the effect of the "new" cement.

Type of Incision
1979-2003

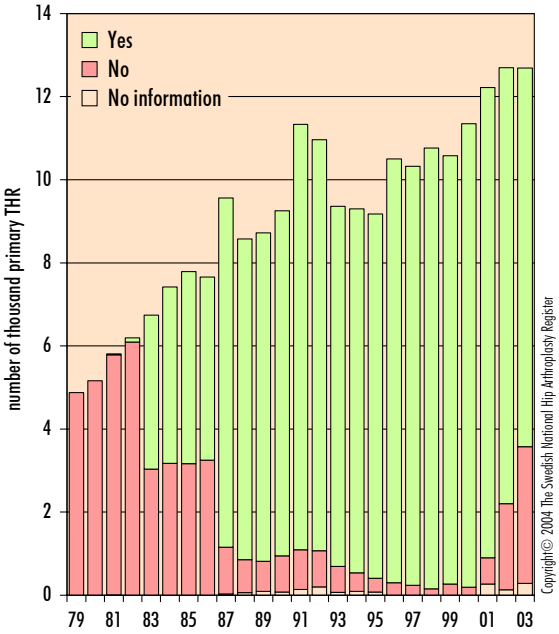


Brand of Cement
1979-2003



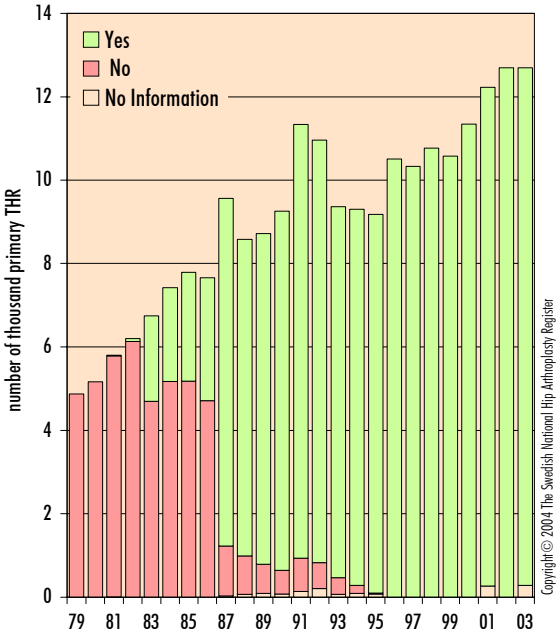
Cleansing by Brush

1979-2003



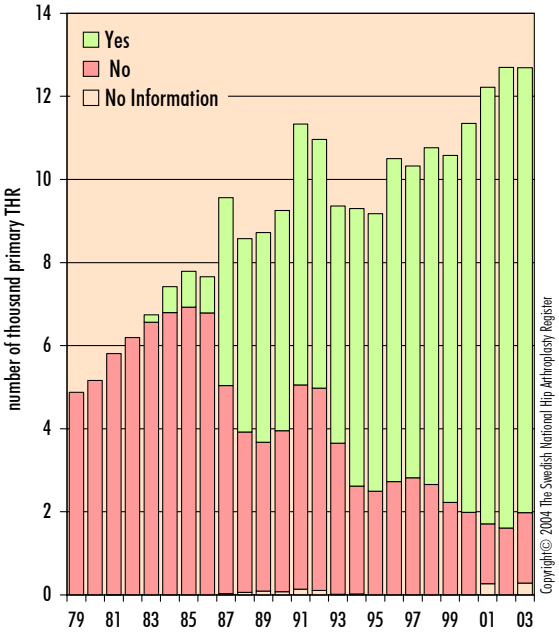
Cleansing by Pulsatile Lavage

1979-2003



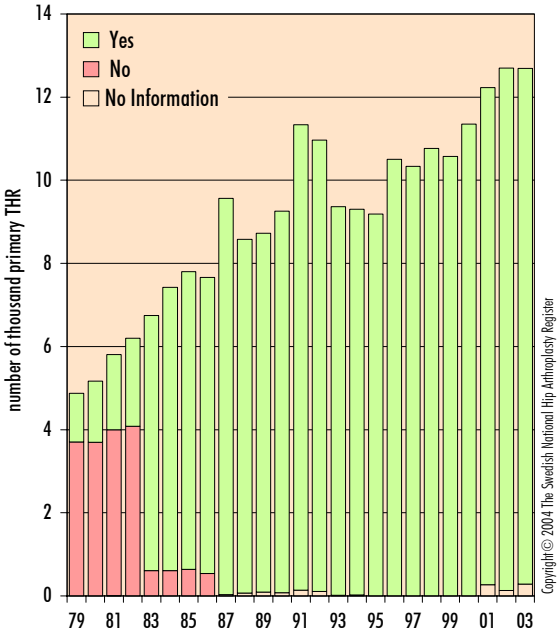
Proximal Femoral Sealing

1979-2003



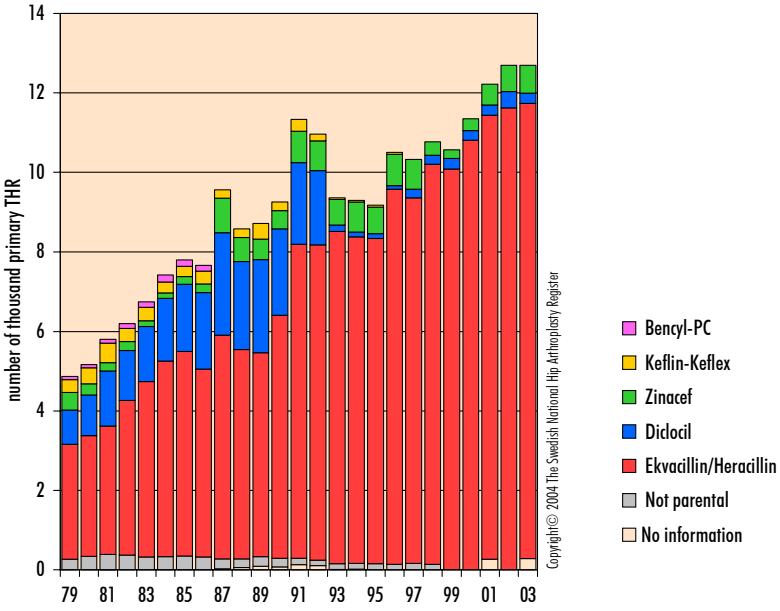
Distal Femoral Sealing

1979-2003



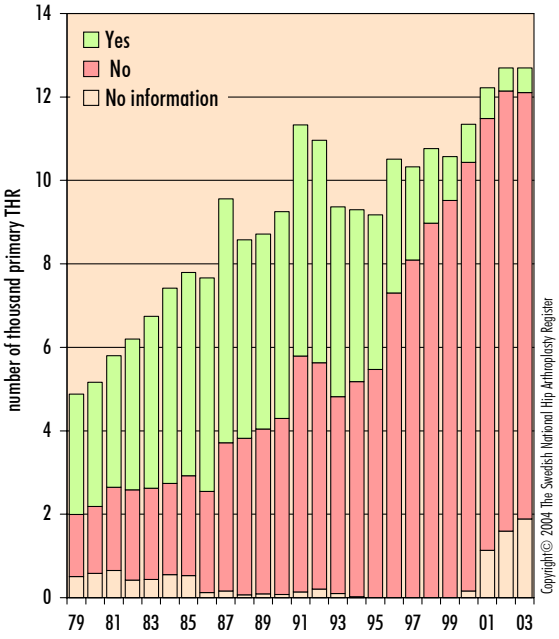
Type of Parental Antibiotics

1979-2003



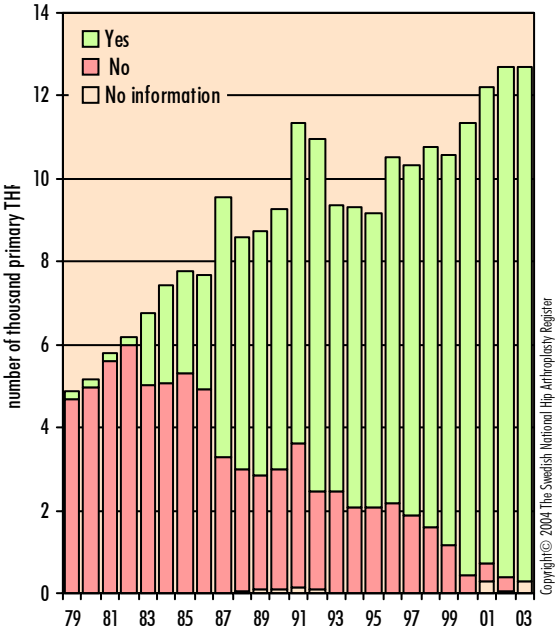
Oral Antibiotics

1979-2003



Acetabular Compression

1979-2003



Regions

The procedure frequency per 100,000 inhabitants for patients aged 50 years and older and with the diagnosis primary osteoarthritis is shown for the period 1992-2003. The national average is given for comparisons between the different regions (see diagram this page). The variation in procedure frequency (77-102/100,000 inhabitants) can be explained by a real difference in incidence of osteoarthritis requiring treatment but more probably reflects a resource problem, which is now clearly evident in the western region.

For all six regions, the 15 most common implants during the period 1993-2003 are indicated, with annual data for the last five years and the percentage distribution for 1979-2003. In addition, the number of primary operations and the procedure frequency are shown, in relation to the national average, for primary osteoarthritis per year since 1992. The number of primary operations in the region and the revisions to which these gave rise are shown in the form of histograms. The total revision burdens (RB) for 1979-2003 and 1992-2003 are shown, as well as the RB separately for women and men in the period 1992-2003. The aggregated survival curves for the whole group and for primary osteoarthritis/aseptic loosening are shown for the 1992-2003 cohort (modern technique). Finally, the diagnosis panorama and average ages per sex for each year during the last 10 years are shown in tables.

The procedure frequency still varies considerably between the regions. The positive development in the Stockholm/Gotland region has come to a halt and apart from the western region, which unfortunately has a decreased procedure frequency, most regions match the national average.

With regard to the fixation method, the difference due to the fact that certain regions are responsible for developments in the implant field and are therefore using uncemented and hybrid techniques more often still persists. Use of both the traditional hybrid and the reversed hybrid (cemented cup, uncemented stem) implants is increasing markedly in one region. The survival figures (all observations) vary between 87.5% and 93%. The differences that exist may reflect a true difference in quality but may also be due to the fact that patients included in prospective, longitudinal clinical and radiological studies are treated earlier with revision for osteolysis, changes which are often clinically silent. The register data cannot answer these questions but the radiological follow-up according to the follow-up model (page 14) will hopefully provide the answer within a few years.

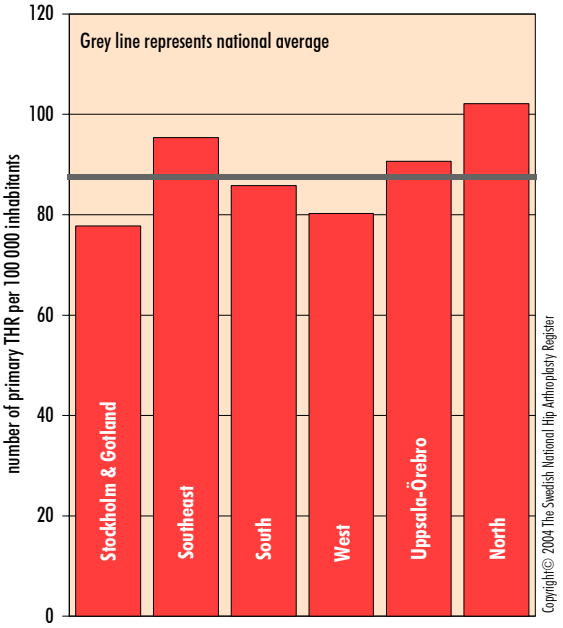
The revision burden (RB) varies between 8.9% and 11.5%. The lowest RB is noted in the northern region, where well-documented cemented implants and rather few uncemented implants have been used. A distinctly higher RB is noted for men than for women. This difference is accentuated inter-regionally, with a variation for men between 14.3% in the Stockholm/Gotland region and 10.2% in the northern region. The variation in RB between the regions is less for women. The dominance in RB for men may be due to greater bodyweight and activity, with increased implant wear and subsequent osteolysis and loosening problems.

The indication for a total joint prosthesis because of fracture of the hip varies between the regions. In the southeastern region, 13.8% of the primary operations are performed due to hip fractures while in the northern region the corresponding figure is 8.7%. There is also a large variation for primary osteoarthritis; in the southern region 70.2% of the primary operations are performed on this diagnosis, in the northern region 77.2%. We note a relatively small difference in average age between the regions.

The regional differences that exist are a reflection of differences between individual hospitals and the register managers encourage the regions to organise regional meetings and discussions in order to evaluate and explain the results and learn from previous experience. The follow-up model is now spreading relatively rapidly across the country and when the patient-related outcome is analysed other variables that can be used in comparisons between the regions emerge.

Average Frequency of Procedure

1992-2003, osteoarthritis, 50 years or older



Region: Stockholm & Gotland

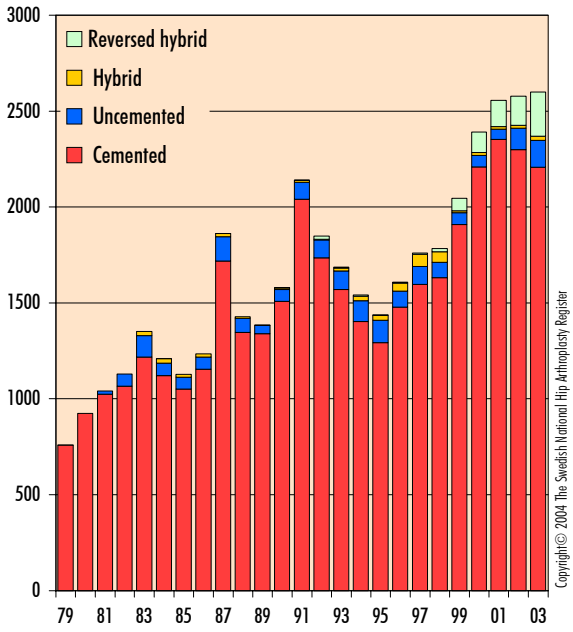
15 Most Common Implants

most used during the past 10 years

Cup (Stem)	1979-1998	1999	2000	2001	2002	2003	Total	Share
Charnley (Charnley)	18,547	1,030	1,054	996	629	153	22,409	54.1%
Charnley Elite (Exeter Polished)	0	218	365	454	702	770	2,509	6.1%
Biomet Müller (CPT steel)	85	116	189	214	212	133	949	2.3%
Reflection (Spectron EF Primary)	0	79	105	145	190	386	905	2.2%
Lubinus All-Poly (Lubinus SP II)	355	59	125	135	136	82	892	2.2%
Weber All-Poly (Straight-stem standard)	0	26	99	99	114	138	476	1.1%
Charnley (Exeter Polished)	92	15	8	23	86	188	412	1.0%
Exeter Plast (Exeter Polished)	353	9	1	1	1	0	365	0.9%
Charnley Elite (ABG uncem.)	1	9	48	71	94	127	350	0.8%
Charnley Elite (Charnley)	319	1	0	1	0	0	321	0.8%
Charnley Elite (Charnley Elite Plus)	161	63	57	13	1	0	295	0.7%
Charnley (Charnley Elite Plus)	67	53	30	68	12	0	230	0.6%
Romanus HA (Bi-Metric HA uncem.)	154	31	26	15	2	0	228	0.6%
OPTICUP (Lubinus SP II)	131	35	13	20	4	3	206	0.5%
Biomet Müller (Bi-Metric cem.)	343	0	0	0	0	0	343	0.8%
Others (total 263)	8,465	319	301	342	448	637	10,512	25.4%
Total	29,073	2,063	2,421	2,597	2,631	2,617	41,402	100%

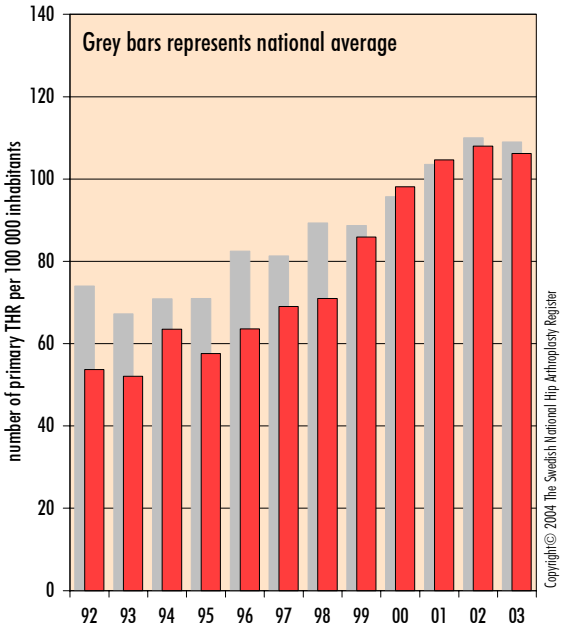
Number of Primary THR

per type of fixation, 1979-2003



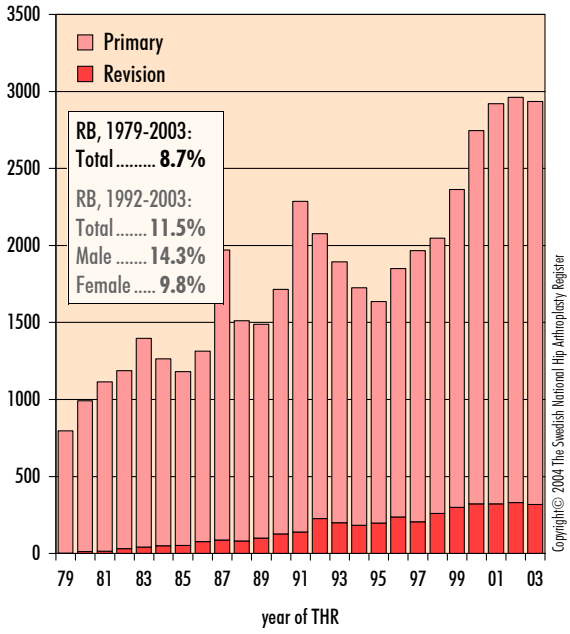
Frequency of Procedure

osteoarthritis, 50 years or older



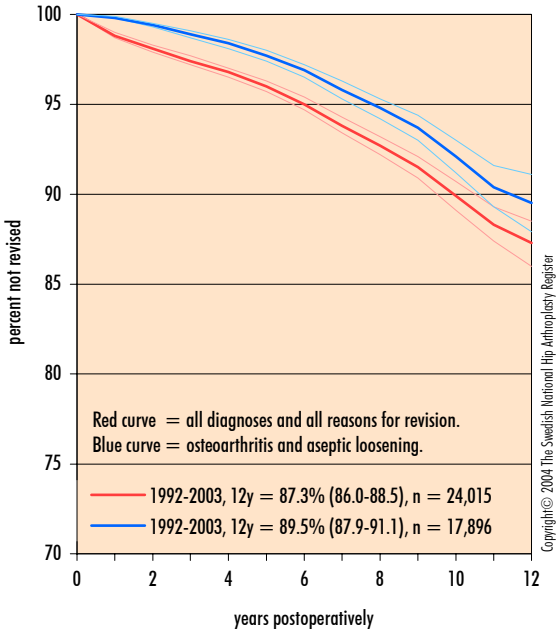
Number of THR per Year

41,402 primary THR, 3,934 revisions, 1979-2003



Implant Survival

1992-2003



Number of Primary THR per Diagnosis and Year

Diagnosis	1992-1998	1999	2000	2001	2002	2003	Total	Share
Primary osteoarthritis	8,015	1,657	1,907	2,053	2,143	2,121	17,896	74.5%
Fracture	1,375	253	310	284	263	271	2,756	11.5%
Inflammatory arthritis	563	41	51	65	46	55	821	3.4%
Idiopathic femoral head necrosis	375	59	63	82	74	64	717	3.0%
Childhood disease	77	31	64	83	85	79	419	1.7%
Secondary osteoarthritis	151	0	0	0	1	3	155	0.6%
Tumor	40	9	25	22	15	12	123	0.5%
Secondary osteoarthritis after trauma	30	10	1	8	4	12	65	0.3%
(missing)	1,060	3	0	0	0	0	1,063	4.4%
Total	11,686	2,063	2,421	2,597	2,631	2,617	24,015	100%

Mean Age per Gender and Year

Gender	1992-1998	1999	2000	2001	2002	2003	Total
Male	67.9	67.9	67.7	66.7	67.5	66.3	67.5
Female	70.5	71.2	71.0	70.1	69.9	69.8	70.4
Total	69.6	70.0	69.9	68.9	69.0	68.5	69.4

Region: Southeast

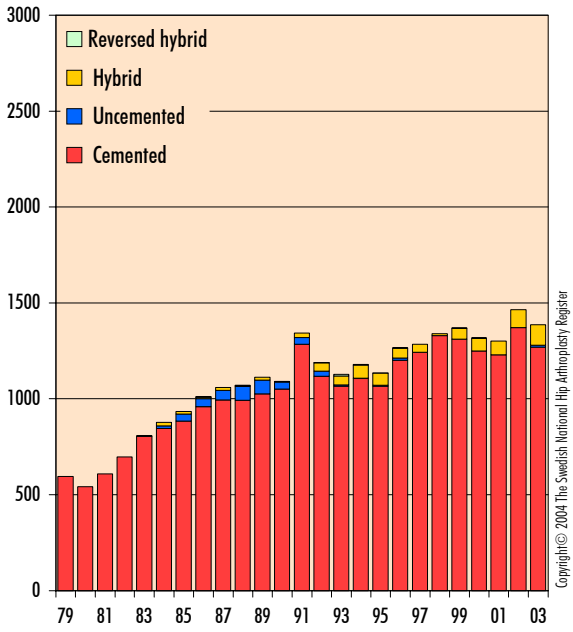
15 Most Common Implants

most used during the past 10 years

Cup (Stem)	1979-1998	1999	2000	2001	2002	2003	Total	Share
Lubinus All-Poly (Lubinus SP II)	5,918	814	786	741	827	794	9,880	36.4%
FAL (Lubinus SP II)	0	20	210	283	314	290	1,117	4.1%
Exeter All-Poly (Exeter Polished)	928	9	8	1	2	0	948	3.5%
SHP (Lubinus SP II)	397	140	20	0	5	1	563	2.1%
Exeter Duration (Exeter Polished)	0	152	140	140	107	16	555	2.0%
Charnley (Charnley)	3,802	0	0	0	0	0	3,802	14.0%
Charnley Elite (Exeter Polished)	119	42	38	24	26	20	269	1.0%
Charnley Elite (Lubinus SP II)	158	19	30	11	16	7	241	0.9%
Lubinus All-Poly (Lubinus IP)	3,296	0	0	0	0	0	3,296	12.1%
OPTICUP (Lubinus SP II)	143	87	0	0	0	0	230	0.8%
Contemporary Duration (Exeter Polished)	0	0	0	7	67	133	207	0.8%
Scan Hip Cup (Scan Hip Collar)	212	0	0	0	0	0	212	0.8%
ITH (ITH)	687	0	0	0	0	0	687	2.5%
Charnley Elite (PCA E-series Textured)	128	0	0	0	0	0	128	0.5%
Trilogy HA (Lubinus SP II)	11	1	19	29	17	40	117	0.4%
Others (total 131)	4,484	94	80	77	87	87	4,909	18.1%
Total	20,283	1,378	1,331	1,313	1,468	1,388	27,161	100%

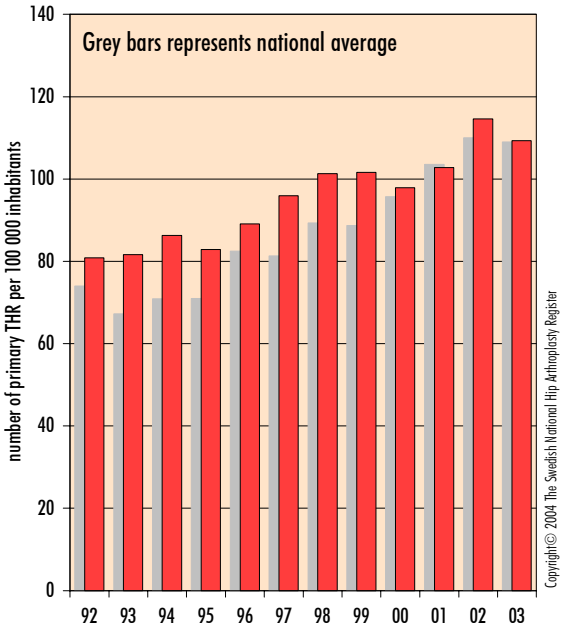
Number of Primary THR

per type of fixation, 1979-2003



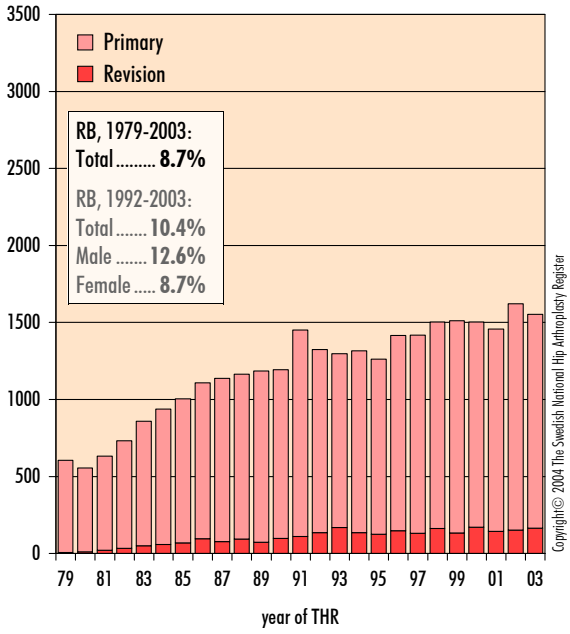
Frequency of Procedure

osteoarthritis, 50 years or older



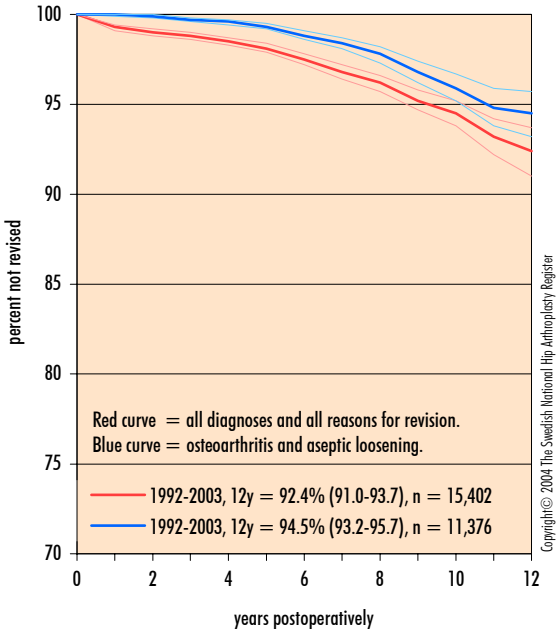
Number of THR per Year

27,161 primary THR, 2,584 revisions, 1979-2003



Implant Survival

1992-2003



Number of Primary THR per Diagnosis and Year

Diagnosis	1992-1998	1999	2000	2001	2002	2003	Total	Share
Primary osteoarthritis	6,099	1,014	978	1,033	1,152	1,100	11,376	73.9%
Fracture	1,082	243	239	172	206	183	2,125	13.8%
Inflammatory arthritis	539	63	45	46	38	42	773	5.0%
Idiopathic femoral head necrosis	298	29	41	34	31	40	473	3.1%
Secondary osteoarthritis	272	0	0	0	0	0	272	1.8%
Childhood disease	58	26	24	23	30	11	172	1.1%
Tumor	14	2	4	4	11	10	45	0.3%
Secondary osteoarthritis after trauma	34	0	0	1	0	2	37	0.2%
(missing)	128	1	0	0	0	0	129	0.8%
Total	8,524	1,378	1,331	1,313	1,468	1,388	15,402	100%

Mean Age per Gender and Year

Gender	1992-1998	1999	2000	2001	2002	2003	Total
Male	69.0	69.0	69.2	68.0	68.0	68.3	68.8
Female	71.4	71.8	72.0	70.8	71.0	71.0	71.4
Total	70.4	70.6	70.8	69.6	69.7	69.9	70.3

Region: South

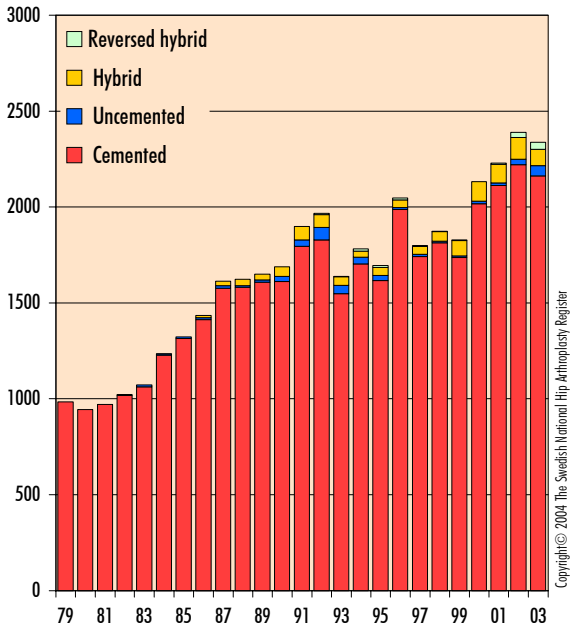
15 Most Common Implants

most used during the past 10 years

Cup (Stem)	1979-1998	1999	2000	2001	2002	2003	Total	Share
Lubinus All-Poly (Lubinus SP II)	3,422	481	523	628	692	577	6,323	15.3%
Exeter Duration (Exeter Polished)	0	265	681	774	930	962	3,612	8.7%
Exeter All-Poly (Exeter Polished)	2,360	224	95	9	13	6	2,707	6.5%
Charnley (Charnley)	6,010	55	34	20	9	4	6,132	14.8%
OPTICUP (Scan Hip II Collar)	498	293	387	364	279	126	1,947	4.7%
Scan Hip Cup (Scan Hip Collar)	5,326	18	11	0	0	0	5,355	12.9%
Charnley (Charnley Elite Plus)	617	184	119	31	0	0	951	2.3%
Trilogy HA (Lubinus SP II)	85	41	66	69	53	40	354	0.9%
Charnley Elite (Exeter Polished)	0	3	2	86	99	158	348	0.8%
Charnley Elite (Charnley Elite Plus)	18	148	109	44	0	0	319	0.8%
OPTICUP (Optima)	280	9	0	0	0	0	289	0.7%
Scan Hip Cup (Scan Hip II Collar)	185	1	0	0	0	0	186	0.4%
Charnley (Exeter Polished)	8	1	2	65	51	44	171	0.4%
Weber All-poly (MS30 Polished)	0	2	8	4	28	115	157	0.4%
Exeter Polished (Exeter Polished)	1,255	0	0	0	0	0	1255	3.0%
Others (total 215)	10,389	114	101	140	245	309	11,298	27.3%
Total	30,453	1,839	2,138	2,234	2,399	2,341	41,404	100%

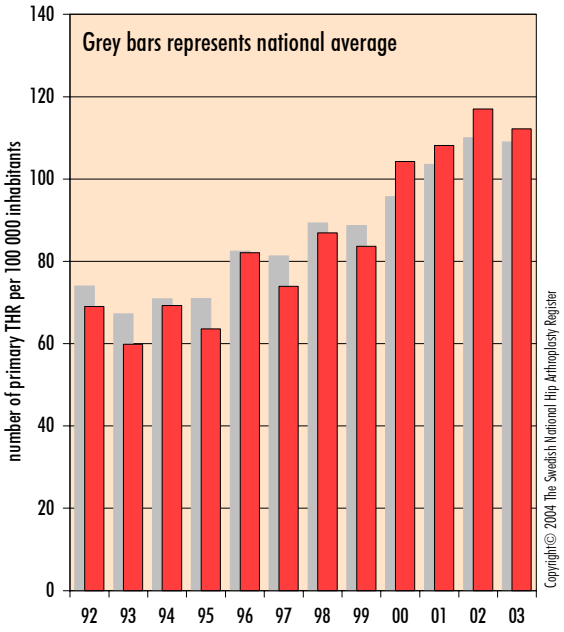
Number of Primary THR

per type of fixation, 1979-2003



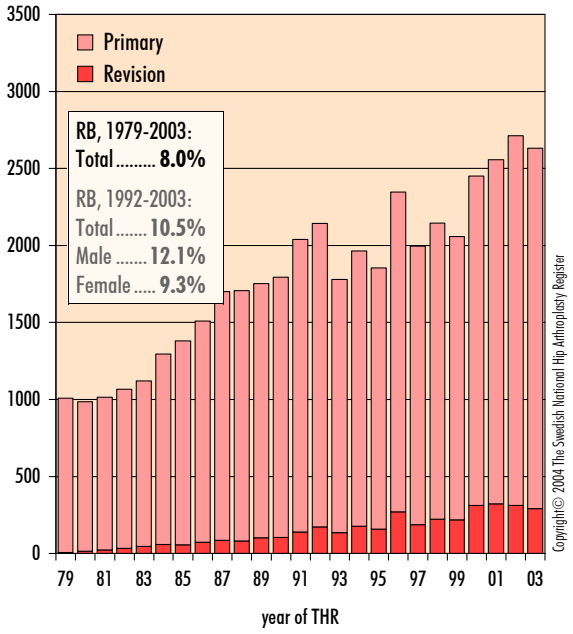
Frequency of Procedure

osteoarthritis, 50 years or older



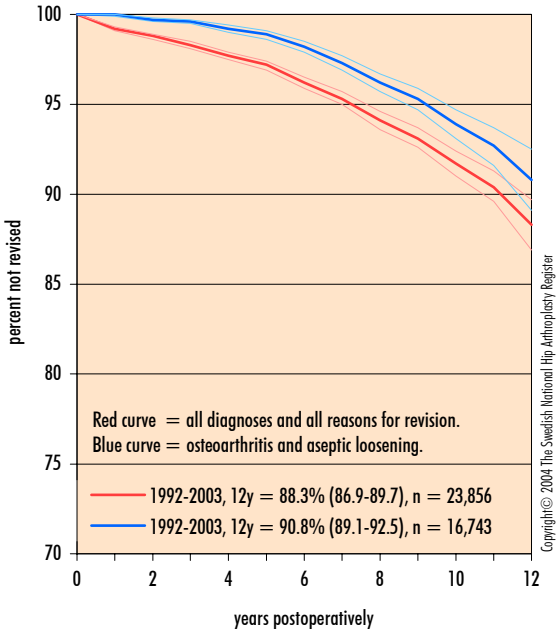
Number of THR per Year

41,404 primary THR, 3,613 revisions, 1979-2003



Implant Survival

1992-2003



Number of Primary THR per Diagnosis and Year

Diagnosis	1992-1998	1999	2000	2001	2002	2003	Total	Share
Primary osteoarthritis	8,091	1,371	1,698	1,767	1,958	1,858	16,743	70.2%
Fracture	1,411	230	223	233	223	244	2,564	10.7%
Inflammatory arthritis	669	107	99	106	80	83	1,144	4.8%
Idiopathic femoral head necrosis	336	74	73	69	77	82	711	3.0%
Childhood disease	97	32	30	44	48	47	298	1.2%
Tumor	69	19	13	12	9	17	139	0.6%
Secondary osteoarthritis	136	0	1	0	0	0	137	0.6%
Secondary arthritis after trauma	23	5	1	3	4	10	46	0.2%
(missing)	2,073	1	0	0	0	0	2 074	8.7%
Total	12,905	1,839	2,138	2,234	2,399	2,341	23,856	100%

Mean Age per Gender and Year

Gender	1992-1998	1999	2000	2001	2002	2003	Total
Male	68.4	67.4	68.0	68.2	66.8	67.6	68.0
Female	70.9	69.9	70.5	69.9	70.0	69.9	70.5
Total	70.0	68.9	69.5	69.2	68.7	69.0	69.5

Region: West

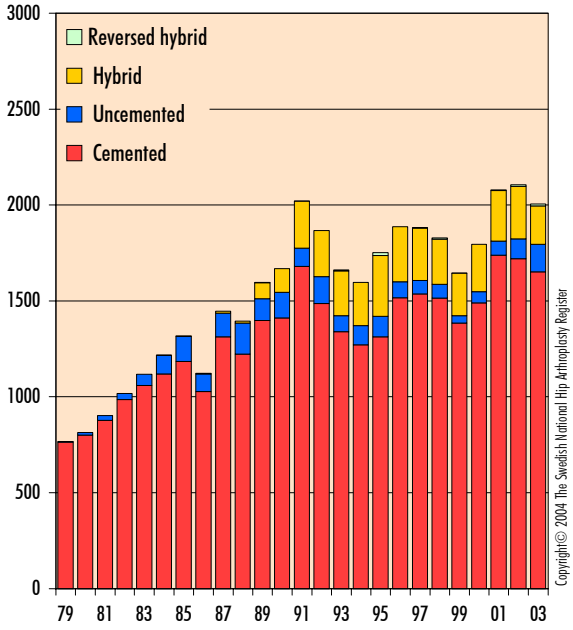
15 Most Common Implants

most used during the past 10 years

Cup (Stem)	1979-1998	1999	2000	2001	2002	2003	Total	Share
Lubinus All-Poly (Lubinus SP II)	3,900	661	728	1,153	1,177	1,157	8,776	22.7%
Reflection (Spectron EF Primary)	1,013	315	385	442	401	382	2,938	7.6%
Biomet Müller (RX90-S)	967	191	197	7	0	0	1,362	3.5%
Trilogy HA (Spectron EF Primary)	168	79	146	174	169	127	863	2.2%
Charnley (Charnley)	4,667	2	3	0	0	0	4,672	12.1%
Reflection (Spectron EF)	1,211	0	0	0	0	0	1,211	3.1%
Biomet Müller (Bi-Metric cem.)	1,256	0	0	0	0	0	1,256	3.2%
OPTICUP (Optima)	410	39	0	0	0	0	449	1.2%
Lubinus All-Poly (Lubinus IP)	3,695	0	0	0	0	0	3,695	9.6%
Contemporary (Exeter Polished)	306	43	7	2	2	1	361	0.9%
ABG HA (Lubinus SP II)	268	0	0	0	0	0	268	0.7%
Romanus (RX90-S)	161	14	7	0	0	0	182	0.5%
Charnley Elite (Spectron EF Primary)	18	30	28	36	20	36	168	0.4%
ABGII HA (Lubinus SP II)	37	45	37	21	9	2	151	0.4%
ZCA (Stanmore mod)	0	0	14	16	56	52	138	0.4%
Others (total 264)	10,921	228	250	233	282	248	12,162	31.5%
Total	28,998	1,647	1,802	2,084	2,116	2,005	38,652	100%

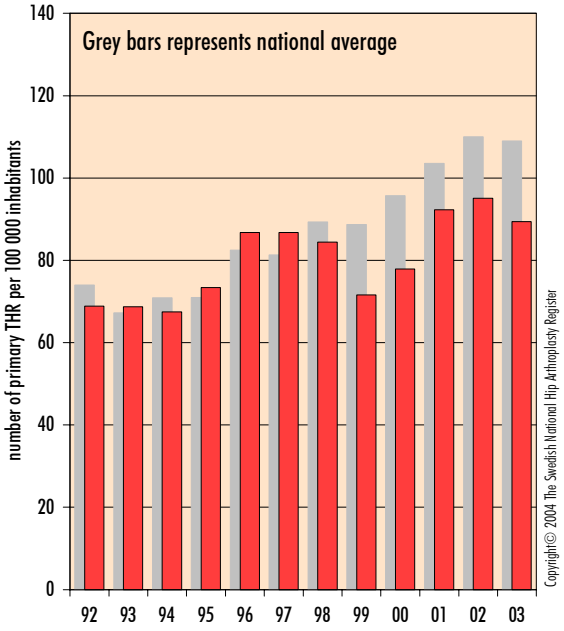
Number of Primary THR

per type of fixation, 1979-2003



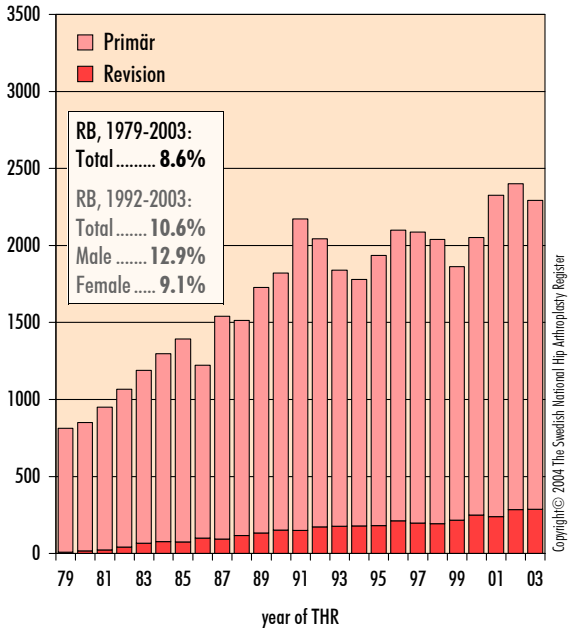
Frequency of Procedure

osteoarthritis, 50 years or older



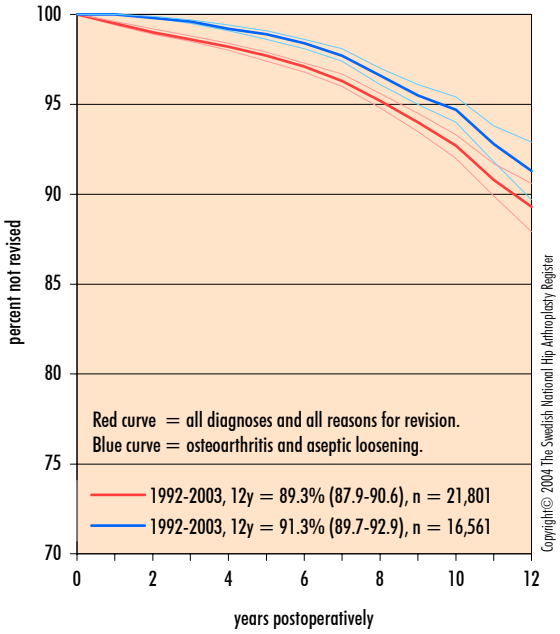
Number of THR per Year

38,652 primary THR, 3,657 revisions, 1979-2003



Implant Survival

1992-2003



Number of Primary THR per Diagnosis and Year

Diagnosis	1992-1998	1999	2000	2001	2002	2003	Total	Share
Primary osteoarthritis	9,180	1,224	1,348	1,610	1,646	1,553	16,561	76.0%
Fracture	1,117	266	292	323	287	295	2,580	11.8%
Inflammatory arthritis	676	58	57	61	75	65	992	4.6%
Idiopathic femoral head necrosis	231	38	53	39	44	44	449	2.1%
Childhood disease	211	45	38	37	51	33	415	1.9%
Secondary osteoarthtritis	269	0	0	0	0	0	269	1.2%
Tumor	24	12	11	14	11	9	81	0.4%
Secondary arthritis after trauma	19	4	3	0	2	6	34	0.2%
(missing)	420	0	0	0	0	0	420	1.9%
Total	12,147	1,647	1,802	2,084	2,116	2,005	21,801	100%

Mean Age per Gender and Year

Gender	1992-1998	1999	2000	2001	2002	2003	Total
Male	67.8	67.2	67.4	67.3	67.2	68.0	67.6
Female	69.9	70.7	70.0	70.8	70.4	70.2	70.1
Total	69.1	69.3	69.0	69.4	69.1	69.3	69.1

Region: Uppsala-Örebro

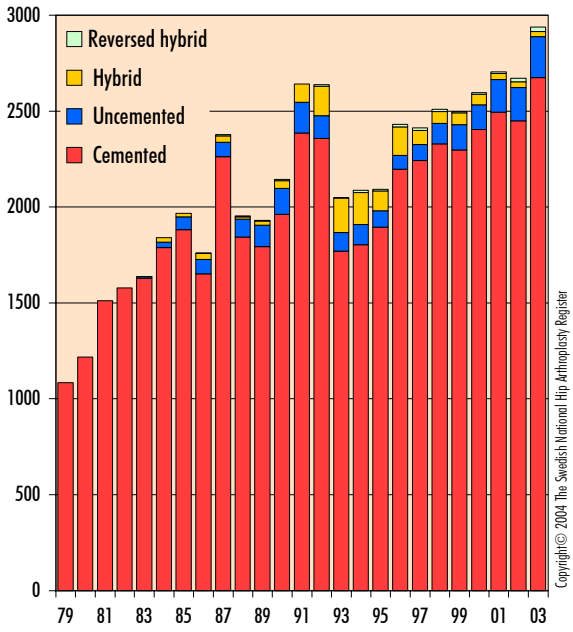
15 Most Common Implants

most used during the past 10 years

Cup (Stem)	1979-1998	1999	2000	2001	2002	2003	Total	Share
Lubinus All-Poly (Lubinus SP II)	3,900	567	714	678	759	1,034	7,652	14.3%
Charnley (Charnley)	13,698	652	508	581	287	122	15,848	29.7%
Exeter Duration (Exeter Polished)	0	243	324	334	303	210	1,414	2.6%
Exeter All-Poly (Exeter Polished)	1,212	36	15	5	3	0	1,271	2.4%
Müller Al-Poly (Müller Straight)	3,854	58	48	71	60	60	4,151	7.8%
Cenator (Cenator)	883	133	134	0	0	0	1,150	2.2%
FAL (Lubinus SP II)	0	0	0	23	286	451	760	1.4%
Cenator (Exeter Polished)	142	132	187	195	3	1	660	1.2%
Charnley Elite (Charnley Elite Plus)	300	59	89	94	9	0	551	1.0%
Stanmore (Stanmore mod)	0	0	71	211	183	18	483	0.9%
Reflection (Spectron EF Primary)	30	58	69	84	103	119	463	0.9%
Contemporary Duration (Exeter Polished)	0	0	0	9	177	271	457	0.9%
CLS Spotorno (CLS Spotorno)	301	38	42	37	33	35	486	0.9%
Charnley (Exeter Polished)	383	23	17	14	21	46	504	0.9%
Charnley (Charnley Elite Plus)	255	58	10	6	0	2	331	0.6%
others (total 293)	14,988	475	374	374	479	573	17,263	32.3%
Total	39,946	2,532	2,602	2,716	2,706	2,942	53,444	100%

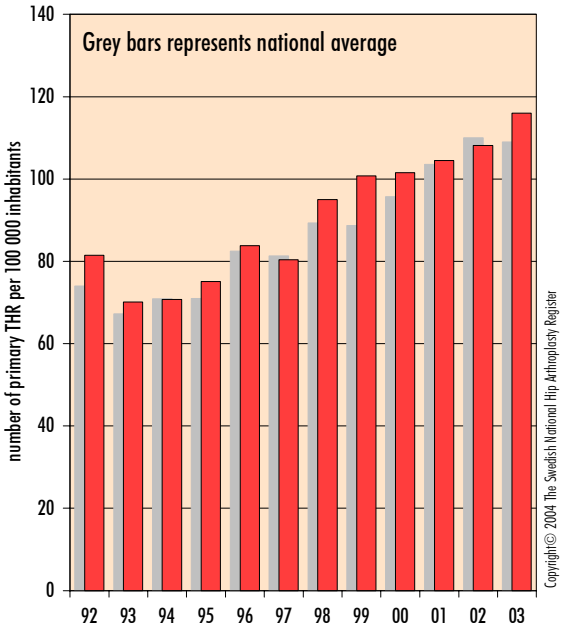
Number of Primary THR

per type of fixation, 1979-2003



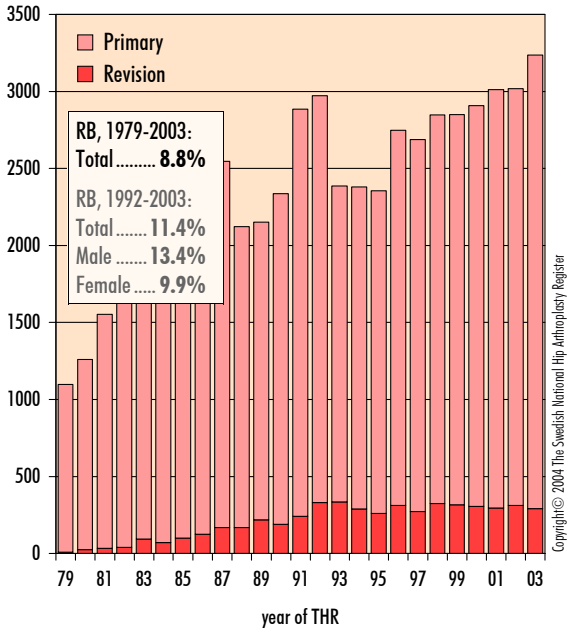
Frequency of Procedure

osteoarthritis, 50 years or older



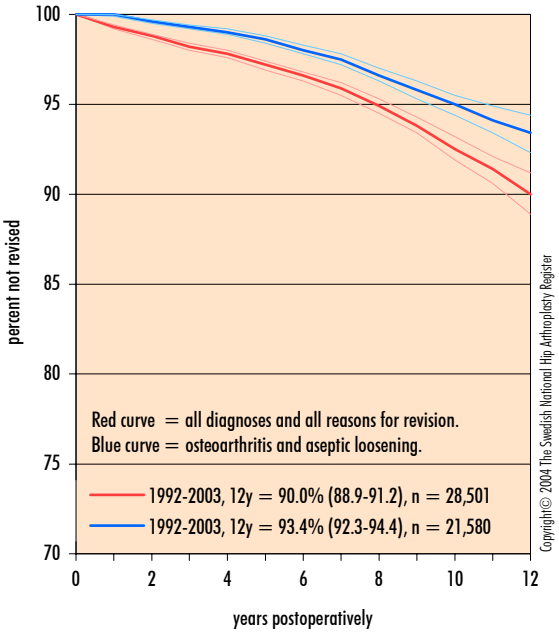
Number of THR per Year

53,444 primary THR, 5,144 Revisions, 1979-2003



Implant Survival

1992-2003



Number of Primary THR per Diagnosis and Year

Diagnosis	1992-1998	1999	2000	2001	2002	2003	Total	Share
Primary osteoarthritis	11,092	1,981	2,006	2,075	2,125	2,301	21,580	75.7%
Fracture	1,659	282	328	374	336	370	3,349	11.8%
Inflammatory arthritis	958	118	106	115	99	100	1,496	5.2%
Idiopathic femoral head necrosis	443	100	103	91	78	82	897	3.1%
Childhood disease	254	38	43	45	49	69	498	1.7%
Secondary arthritis	193	0	0	0	0	0	193	0.7%
Tumor	57	13	13	12	16	13	124	0.4%
Secondary arthritis after trauma	47	0	3	4	3	7	64	0.2%
(missing)	300	0	0	0	0	0	300	1.1%
Total	15,003	2,532	2,602	2,716	2,706	2,942	28,501	100%

Mean Age per Gender and Year

Gender	1992-1998	1999	2000	2001	2002	2003	Total
Male	68.1	67.4	67.9	67.3	67.6	68.0	67.9
Female	70.3	70.9	70.7	70.9	70.8	70.3	70.5
Total	69.4	69.4	69.6	69.5	69.5	69.4	69.4

Region: North

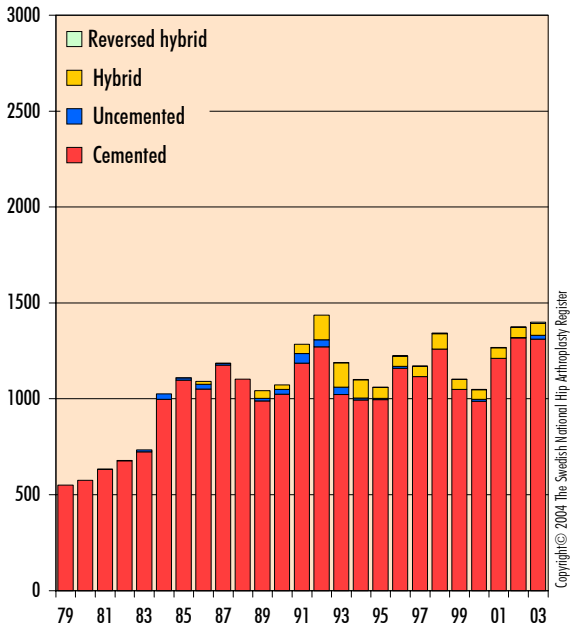
15 Most Common Implants

most used during the past 10 years

Cup (Stm)	1979-1998	1999	2000	2001	2002	2003	Total	Share
Lubinus All-Poly (Lubinus SP II)	7,727	574	648	865	973	1,061	11,848	43.9%
Exeter All-Poly (Exeter Polished)	965	138	17	8	4	2	1,134	4.2%
Exeter Duration (Exeter Polished)	0	151	231	248	196	224	1,050	3.9%
Charnley (Charnley)	2,383	31	13	1	1	1	2,430	9.0%
Scan Hip Cup (Optima)	351	54	18	1	0	0	424	1.6%
Scan Hip Cup (Scan Hip Collar)	764	0	1	0	0	0	765	2.8%
FAL (Lubinus SP II)	0	1	1	41	140	20	203	0.8%
Trilogy HA (Lubinus SP II)	0	1	23	33	53	61	171	0.6%
Reflection (Spectron EF Primary)	2	81	26	2	0	0	111	0.4%
Reflection (Spectron EF)	108	0	0	0	0	0	108	0.4%
Reflection HA (Lubinus SP II)	74	5	2	0	0	0	81	0.3%
Omnifit (Lubinus SP II)	75	0	0	0	0	0	75	0.3%
Reflection HA (Spectron EF)	70	0	0	0	0	0	70	0.3%
Harris-Galante II (Lubinus SP II)	87	0	0	0	0	0	87	0.3%
Reflection HA (Spectron EF Primary)	24	25	1	0	0	0	50	0.2%
Others (total 156)	8,110	54	73	78	10	31	8,356	31.0%
Total	20,740	1,115	1,054	1,277	1,377	1,400	26,963	100%

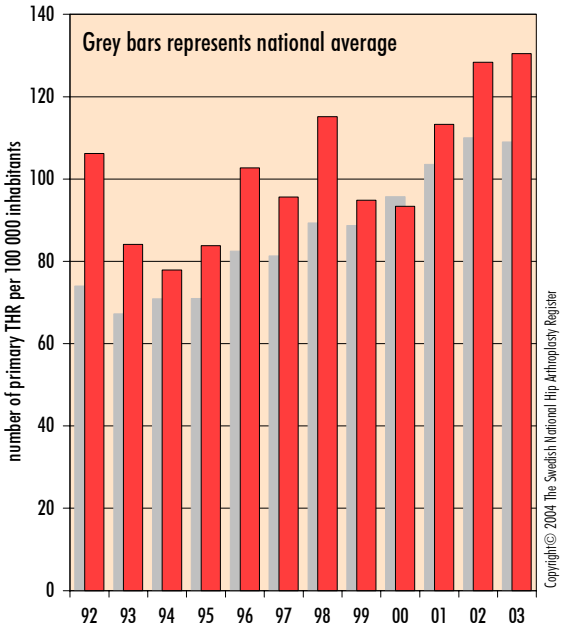
Number of Primary THR

per type of fixation, 1979-2003



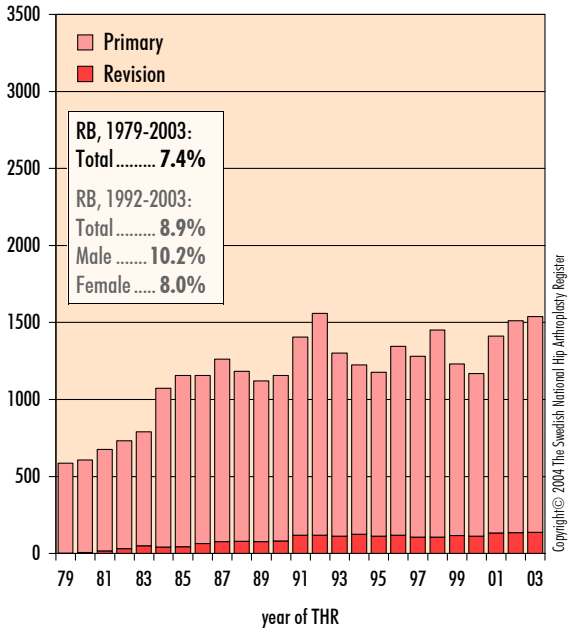
Frequency of Procedure

osteoarthritis, 50 years or older



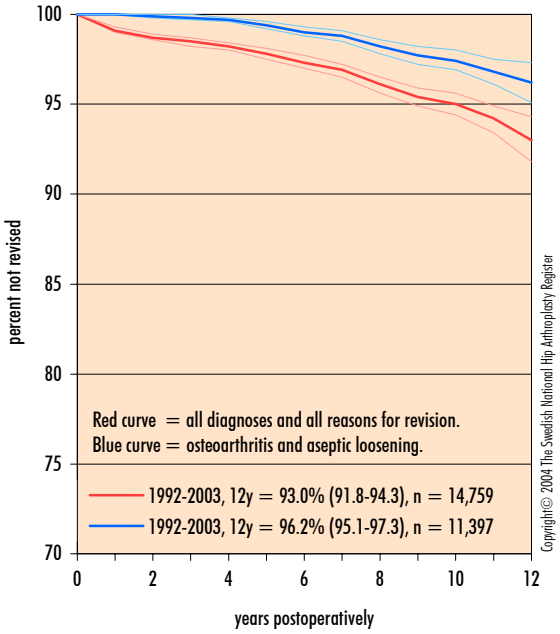
Number of THR per Year

26,963 primary THR, 2,140 revisions, 1979-2003



Implant Survival

1992-2003



Number of Primary THR per Diagnosis and Year

Diagnosis	1992-1998	1999	2000	2001	2002	2003	Total	Share
Primary osteoarthritis	6,291	866	856	1,032	1,163	1,189	11,397	77.2%
Fracture	700	116	99	136	118	114	1,283	8.7%
Inflammatory arthritis	489	41	41	31	37	30	669	4.5%
Idiopathic femoral head necrosis	269	51	26	47	27	30	450	3.0%
Secondary osteoarthritis	267	0	0	0	0	0	267	1.8%
Childhood disease	68	27	26	23	25	32	201	1.4%
Secondary arthritis after trauma	86	1	1	1	0	0	89	0.6%
Tumor	10	11	5	7	7	5	45	0.3%
(missing)	356	2	0	0	0	0	358	2.4%
Total	8,536	1,115	1,054	1,277	1,377	1,400	14,759	100%

Mean Age per Gender and Year

Gender	1992-1998	1999	2000	2001	2002	2003	Total
Male	67.9	68.3	67.9	68.4	67.5	67.1	67.8
Female	70.2	69.3	69.3	69.7	69.7	69.4	69.9
Total	69.3	68.9	68.8	69.2	68.7	68.5	69.1

Summary and Conclusions

The major change in this year's report is that the results are presented with the new survival method. Since 1979 we have used approximations to allow for the fact that we have not had individual-related information from primary operations before 1992. These approximations have concerned age at operation, diagnosis distribution and death in the respective diagnostic group. We have previously performed several evaluations (se previous annual reports and exhibitions) and shown that the method used agrees well with a more precise Kaplan-Meier method used since 1992.

This year all information is presented from 1992 with individual-based information on age, diagnosis and prosthetic information. Date of death has been obtained by multiprogramming with the Register of Deaths. We find a negligible change of the results compared to the previous reports but now have an exact method which makes international comparison possible.

Clinical development

The positive development has continued, with a low cumulative revision rate for all diagnoses and all reasons for revision. For patients operated upon in 1993 the figure is just over 5% after 10 years, compared to 16% for those operated upon in 1979. During the same period, the proportion revised for the most common complication (aseptic loosening) has decreased to one third. In contrast, we see an obvious problem with an increase in revision due to dislocation. This worrying development may be due to the fact that we operate increasingly more elderly patients with hip fractures and that we used smaller femoral head sizes during the nineties than during the eighties (28 mm instead of 32 mm). Most important, however, is to discuss the possibility that the surgical technique has deteriorated. There is room for intensive efforts to improve the situation as far as this problem is concerned.

The fact that we present data from all units from two aspects (all diagnoses/all reasons for revision and osteoarthritis/aseptic loosening) openly this year provides a basis for more informed discussion at each unit.

In their confidential report, the units receive annual information about the distribution of the problems that have led to revision. With this thorough analysis, the individual units can more easily initiate efforts to improve their results.

Implant survival as a quality indicator shows that the national average for 10-year survival has improved from 89.4% to 92.5% between the two periods 1979-1991 and 1992-2003. It is very gratifying that the proportion of units under the national average has decreased from 19% to 13% and that the proportion with an average result has increased from 27% to 53%. Individual units' patient profiles (case mixes) influence their results and a more precise comparison will be relevant when an advanced regression analysis can be performed. Such an analysis will be presented in next year's annual report.

The clinical development has as usual been stimulated by our annual meeting with the doctors and secretaries responsible for reporting to the register. Current developments were discussed at a separate prior meeting for all companies that market hip and knee prostheses in Sweden. The companies can also obtain on-line information about the results for their products.

One of the things we discussed with the contact doctors was the possibility of simplifying registration of data by using electronic patient records and extending registration of individual patient-related experience of the operation to other regions as well as the western region. We also discussed scientific spin-off projects, where the register has generated hypotheses and contributed to several scientific studies in such areas as deep infection, reasons for multiple revisions and the occurrence of periprosthetic fracture. As usual, the annual meeting of the Swedish Orthopaedic Association provided an opportunity for exchange of information and discussion in connection with our exhibition stand, where the register's web application and model for registration of patient-related outcome (the THR follow-up system) were presented. The register's managers have worked hard to get this extended registration adopted by more regions. Participation in clinical development work has thereby been intensive at the local, regional and national level.

Achievement of goals

During recent years our ambition has been to improve the value of the register by analysing patients' own opinion of the results of THR. Both the 6-year results and prospective 1-year results for the western region are now available after two years. They show extremely good pain relief and very high patient satisfaction, and a self-rated quality of life that is equal to that of an age-matched normal population. The model has now been adopted in the northern region and the southern region and is about to be implemented in three more regions. The aim is to increase the sensitivity of the register analysis and create a routine that reduces the number of follow-up visits after hip replacement surgery. Most important is perhaps also to develop an instrument for adequate health-economic analysis of the cost-utility effect of THR. In the health-economic crisis with limited resources the Swedish

health services are currently experiencing, it is of great value to Swedish prosthetic surgery to have access to this instrument. We can show a very good cost-utility result and assert ourselves well in comparisons with other medical interventions when priorities and resource allocation are discussed.

Genus aspects

In this Annual Report, as in previous years, we have highlighted sex differences in treatment routines, frequencies and the complication panorama. We have not found any major differences from 2002. The average age at primary THR is generally higher for women than for men except when the indication is sequelae to childhood disease. Whether this reflects different access to surgery for women or has other objective explanations is not clear but it is important to analyse this phenomenon further. The revision burden is generally significantly higher for men except for young women, in whom the results are poorer regardless of the method.

Problem areas

The problem areas currently being studied in specific research projects in the register are periprosthetic postoperative femoral fractures, the primarily infected hip joints that have been replaced by prostheses and patients aged under 50 at the time of primary THR. During 2003 development of these projects has continued and they have been presented in papers at national and international meetings.

For the periprosthetic fractures, we find a high frequency of previously unknown loose femoral components. Reoperation after fracture is technically difficult and often results in repeated revisions. Infected hip prostheses also have a poor treatment result and we note that the bacterial spectrum in infections has changed to a smaller proportion of Gram-negative bacteria as the pathogen and an increasing proportion of coagulase-negative staphylococci. We also find a significantly lower risk for patients treated with antibiotic-impregnated cement. For the younger patients, the questionnaire survey is almost completed and the first results will be presented at the NOF meeting in Iceland.

We are well aware that the method we use in in-depth studies, with patient questionnaires, means extra work for those involved in routine patient care and we appreciate all the help we receive from a health-care sector that has a decreasing capacity for this kind of activity. We will of course make material from these four in-depth studies available, including preliminary results if desired.

Current trends

The increased information to each unit concerning the reasons for all reoperations provides a basis for more intensive efforts to improve the results. Considerable variations in the occurrence of dislocation and deep infection can be seen, indicating that the overall result can be even better.

In order to obtain more knowledge about the reasons for revision, cup and stem survival are reported separately for the first time this year. The poorer results for uncemented implants are probably related to poor plastic quality in combination with a deficient locking mechanism for the liner. Preliminary results with new cross-linked plastics and improved implant design seem to be an adequate way to address these problems. These issues cannot be resolved solely from the register results, however, but require traditional clinical studies to elucidate.

As mentioned in several places in this annual report, we intend to use regression analysis more extensively in the future, both in future annual reports and in online feedback to the units via the web application. The aim is to create a better tool for our users that enables them to carry out statistical analyses of their own material and to create models that can be used as a basis for decisions relating to patient care.

Final comment

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

We who are responsible for the National Hip Arthroplasty Register would like once again to thank everybody involved for their cooperation during the past year. Without the strong support we have received from Swedish orthopaedic units, the register could not function. We welcome your views and comments on this report and look forward to continued good collaboration.

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Address
The Swedish National Hip Arthroplasty Register
Department of Orthopaedics
Sahlgrenska University Hospital
SE-413 45 Göteborg, Sweden

Telephone: (at each contact below)
Fax: +46 31 82 55 99
Web site: http://www.jru.orthop.gu.se

Project Leaders
Professor Peter Herberts, MD, PhD
Telephone: +46 31 342 19 52
E-mail: peter.herberts@orthop.gu.se

Professor Henrik Malchau, MD, PhD
Telephone: +46 31 342 35 16
E-mail: henrik.malchau@orthop.gu.se

Register Associates
Göran Garellick, MD, PhD
Telefon: +46 31 342 42 47
E-post: goran.garellick@orthop.gu.se

Thomas Eisler, MD, PhD
E-post: eisler@algonet.se

Others Contact Persons
Project Secretary Kajsa Erikson
Telephone: +46 31 342 35 16
E-mail: kajsa.erikson@orthop.gu.se

Project Secretary Karin Lindborg
Telephone: +46 31 342 18 39
E-mail: karin.lindborg@orthop.gu.se

Project Secretary Catarina Sporre
Telephone: +46 31 342 26 69
E-mail: catarina.sporre@orthop.gu.se

Systems Manager Ramin Namitabar
Telephone: +46 31 342 35 13
E-mail: ramin@orthop.gu.se

Swedish Orthopaedic Association

Joint Replacement Unit
Sahlgrenska University Hospital
Göteborg