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Annual Report 2006

The Swedish Knee Arthroplasty Register

Dept. of Orthopedics, Lund University Hospital

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This 2006 annual report concerns data reported during 2005 and is based on the content of the register as of October 1st 2006.

The Swedish name of the Swedish Knee Arthroplasty Register (SKAR) been changed from Svenska knäplastikregistret to Svenska knäprotesregistret in order to create a more uniform naming system among the Swedish orthopedic registers.

The SKAR has previously been cautious regarding public disclosure of the results of individual units. The reasons for this have mainly been that we are not able to consider differences in case-mix among the units, that the results are historical (the operations having been performed 1-11 years prior to the analyses) and that it has been difficult to take into account effects caused by differences in volumes (it is more likely that units with small volumes have extremely good or bad results). Because of this, the register chose for many years only to report the specific results of each individual unit to that particular unit together with the aggregated results of all the other units to allow for comparison. This stimulated the units to investigate the reasons for why their results were better or worse than that of others.

The interest in the results of individual units has increased substantially over the years. Some years ago the SKAR contact physicians requested (at the annual Arlanda meeting) such information and recently our financiers (The National Board of Health and Welfare and The Swedish Association of Local Authorities and Regions) began to insist on this. Thus, a year ago the SKAR started openly to disclose the 10-year risk of becoming revised at individual units. Although the problems with the case-mix and historical results remain, we used a statistical method (frailty analysis) which takes into consideration the differences in volumes among the units. To account for the method and the statistical basis an article was recently published; Variation in outcome and issues in ranking hospitals. An analysis from the Swedish Knee Arthroplasty Register. Acta Orthop. 2006 Jun;77(3):487-93. (http://www.actaorthop.org)

The register continues to request that the units use the paper form when reporting their surgeries and that they provide one set of the stickers found in the implant packages. Although it seems attractive to input data using the Internet, we still feel that the technology and flow of information from the implant distributors is not good enough in order for us changing our practice. However, the register uses the Internet when reporting back to the participating units. The NKO (the National Competence Center within the area of musculoskeletal disorders) has built a computer platform on which the participating units have their own “folder” which the contact physician can access after having been provided with a user name and password (from the SKAR project secretary). The folder contains among other things patient related data reported from the unit (Excel file) that includes information about patients that have been revised elsewhere. As it is unclear if all the contact physicians have a current password we deliver the same information on a CD. It is our hope that this information will help the participating units to perform their own analyses.

We want to use the opportunity to notify that as our secretary Christina Jonsson has taken one year leave of absence, Angelica Berg will take over the work as Project Secretary until further notice.
As previously the report consists of 3 parts. The first part describes the routines of the register, epidemiology and general results. The second part contains information regarding what has been

reported to the register during 2005 as well as analyses covering the 10-year period 1995-2004. The third part is specific for each reporting unit and contains lists with information regarding all the operations reported by the unit in 2005. One list is sorted by ID and the other by the date of operation.

It is our hope that the lists will be compared to locally available information in an attempt to find and correct any errors in the registration. Further, we feel that it is important that information about the report is passed on at hospital meetings so that the content can be discussed and analyzed. As described above, for the second time openly we publicly render the risk ratios of individual units regarding cemented TKA in patients with osteoarthritis.

We find it again appropriate to remind you that the Swedish Knee Arthroplasty Register is a prospective project and that revisions reported to the register are only accepted if the primary operation previously was reported according to prevalent routines. Thus, if a primary operation is discovered as it becomes a subject of a revision at a later time neither the primary nor the revision will be taken into account. Late reporting of primary procedures is only allowed in cases when all primaries performed during a time period are reported collectively.

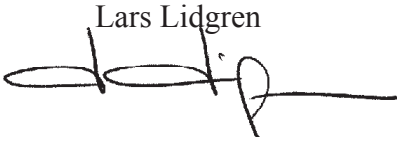
By close cooperation with statisticians (Jonas Ranstam) regarding the choice of statistical methods and techniques the Register has always exerted a great effort in providing sound data analyses.
In January 2006, authorized Physiotherapist Ann Bremander dissertated in the topic of clinical medicine concentrated upon musculoskeletal disease. Her work included an article based on register data. A Ph.D. work regarding the infection problem of implants is still ongoing (Anna Stefánsdóttir). In cooperation with the Stockholm School of Economics (Fredrik Borgström and Bengt Jönson), the hip and knee registers are evaluating the cost-effectiveness of the different types of arthroplasty. A preliminary summary was presented at the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) during their European annual meeting in Florence in 2005. A more comprehensive EuroQol patient related study is ongoing in Skåne and Western Götaland. The register also cooperates with institutions abroad and during the annual meeting of the Hip and Knee Society in Dallas there was a poster in cooperation with researchers at the Minnesota Medical which run a multicenter register study. During the year the register also has had visiting researchers from Canada and Australia.

The register has had presentations at a number of conferences, among others at the American Academy of Orthopedic Surgeons (AAOS) annual meeting in Chicago and at the Canadian Institute of Health Information (CIHI).

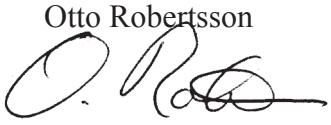
We at the knee register center in Lund want to thank you for your cooperation during the last year and ask you to analyze and circulate the presented information.

Lund, November 15th, 2006
On behalf of the Swedish Knee Arthroplasty Register.

Lars Lidgren



Otto Robertsson



Content

Definitions

Revision is defined as a new operation in a previously resurfaced knee during which one or more of the components are exchanged, removed or added (incl. arthrodesis or amputation). This implies that soft tissue operations such as arthroscopy and lateral release are not considered revisions. The reason for this stringent definition is that some minor operations are not necessarily related to the primary surgery and thus cannot be considered a complication or failure.

TKA (Total or Tricompartmental Knee Arthroplasty) is defined as a knee arthroplasty in which the femoral component has a flange and thus all three compartments of the knee are affected. Even in cases where a patellar button is absent, the flange resurfaces half of the femoropatellar compartment and the arthroplasty is still considered to be a TKA.

Bicompartmental arthroplasty (historical) uses two components, one on the femoral and one on the tibial side to resurface both the femorotibial compartments (medial and lateral) but not the femoropatellar compartment. Thus, this implant has no femoral flange and is not meant to allow for resurfacing of the patella.

UKA (Unicompartmental Knee Arthroplasty) implies an arthroplasty that separately resurfaces the medial or lateral femorotibial compartment. (med. UKA or lat. UKA). If 2 UKA implants are used to resurface both femorotibial compartments the arthroplasty it is named bilateral UKA.

Patellar arthroplasty is used to resurface only the femoropatellar compartment. Even if this arthroplasty is unicompartmental by definition, it is accounted for separately.

Hinged implants. As the name implies these implants only allow for flexion and extension through a fixed axis.

Linked implants (Linked/Rotating hinge) have a mechanical coupling between the femoral and tibial components allowing for flexion and extension as well as for varying amount of rotation.

Stabilized implants. Even if the hinges and the linked implants are extremely stabilizing, the term stabilized implants is used for a group of prostheses that are a kind of TKA but use the form of the femoral and tibial components to restrict movement in valgus, varus and rotation. The posterior cruciate sacrificing type most often has an eminence in the middle part of the tibial polyethylene that can be contained by a box in the femoral component that lies between the medial and lateral sliding surfaces. By a camshaft-like property, the femoral component is forced to slide back during flexion, which simulates the effect of the posterior cruciate ligament. The fit between polyethylene and metal is such that it allows for some rotation. In so-called superstabilized implants the congruency has been increased by making the eminence larger with a total fit against the box of the femoral component thus, restricting the rotation and varus/valgus movement. Intermediary forms also occur. Stabilized implants are most often used for revision but also for the more difficult primary arthroplasties.

The ordinary TKA can be made somewhat more stabilized by increasing the congruency between the sliding surfaces. In these instances there is a slight eminence of the polyethylene that fits against the femoral component. However, the term stabilized is only used for those implants that are more stabilized than usual by use the above mentioned camshaft construction.

For those interested there is an excellent article on the history and the developement of the TKA; Robinson RP; The Early Innovators of Today's Resurfacing Condylar Knees. J of Arthroplasty 2005 (suppl 1); 20: 1.

Filling in the Knee Register form

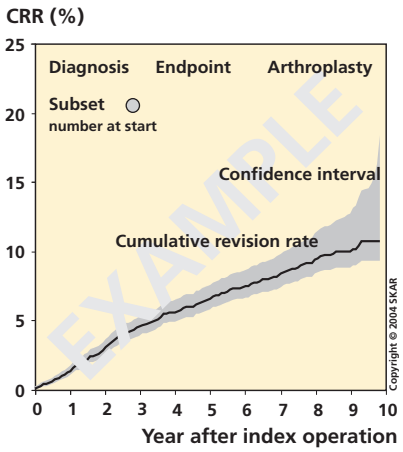
The Knee Register uses a form that it recommends to be filled in during the operation, (by a nurse or other attending staff). The implant stickers (containing the Part No's and Lot No's) for all used implants are to be affixed to the form. Besides the ID of the patient, the date of operation, diagnosis, side operated, brand of cement and cementing of components has to be filled in. Information whether a mini-arthrotomy was used must be specified. Information regarding the operating surgeon is voluntary. Forms are sent to Lund (once a month is recommended) where the data is computerized. In our opinion, this procedure has considerable advantages such as a minimal workload for the participating units and the most correct information with the least risk of wrong coding. Furthermore, it allows the staff of the registry to check unknown Part No's during input.

How the register compares implants

Survival analyses are used for graphical presentation of data. The curves show the Cumulative Revision Rate (CRR) which describes what percentage of the operated patients was expected to become revised with time. The calculation is based on the sum of all the revisions and expresses the rate for surviving patients. Most often the time axis shows a 10-year period. However, it has to be kept in mind that patients are continuously being added during this time. Thus, all the patients have not been followed for the whole period. This implies that if 1,000 patients were operated on each year (and nobody dies), a 10-year study would include 10,000 patients of which only 1,000 had been followed for more than 9 years. The last part of the curve (at the right) therefore expresses the long-term rate of revision for patients operated more than 9 years earlier. As the number of these patients is relatively small, the 95% confidence interval becomes large. When the number of patients at risk is small (at the right of the curve), each revision has a large effect (e.g. 50% are revised when 2 patients are left at risk and one of them has a revision). For this reason the Register cuts the curves when less than 40 patients are left at risk.

Survival statistics are used to calculate how long an implant is left unrevised. With increasing observation time the fraction of deceased patients increases (figure below). These patients are not disregarded because they were at risk of becoming revised during their lifetime and are thus allowed to deliver data for the period they lived. The probability for each revision is related to the number of remaining unrevised patients. The sum of all the probabilities is the cumulative risk of revision which specifies the risk for a surviving patient of becoming revised at a given time.

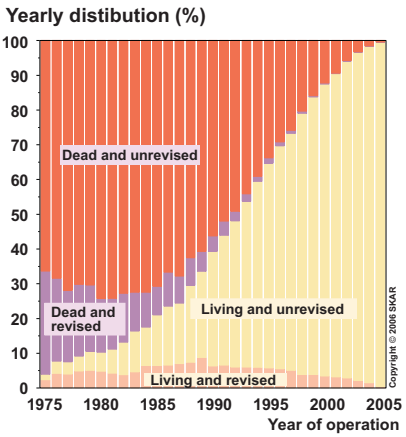
Cox regression allows for taking into account different factors that may vary within groups. The results are expressed as risk ratios (RR) between factors. If a factor is a category (e.g. implant model), one category is defined as a reference with a risk of 1 to which the other categories are compared. An implant with the risk of 1.2 thus has a 20% increased risk of becoming revised etc.. For numerical variables (e.g. age) the risk ratio relates to the change in risk if the variable increases by one unit (e.g. 1 year). When comparing groups where uneven distribution of factors can be expected (e.g. age in cemented vs. uncemented implants) the Cox regression is especially important.



CRR curve example.

It is important to note that as the individual patient also is at risk of dying, the real proportion of revisions is lower than the CRR. As the figure below shows, more than half of the patients alive that were operated in 1975 have been revised but only one third of all the patients that were operated at the time.

When one tries to estimate differences in risk of revision between units this is complicated by the variation in volume. The reason is that units with few observations (operations) are more likely to have overly good or bad results. Thus the register received help from NKO statisticians to calculate the risc using a "shared gamma frailty model" which takes volume into consideration. However, one has to remember that the units may have different "case-mix", i.e. patients with different grade of joint destruction or differences in general health and activity. These factors, which we at present are unable to take into account, may influence the risk of revision and thus the results of individual units.

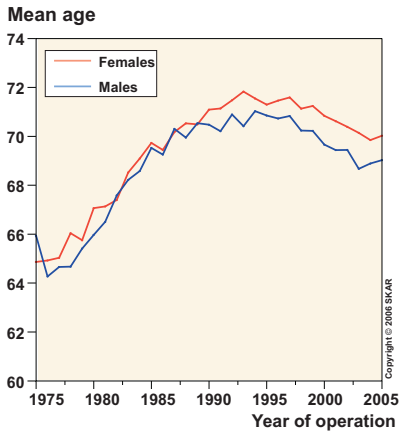


The status in 2005 for each yearly batch of patients operated since 1975.

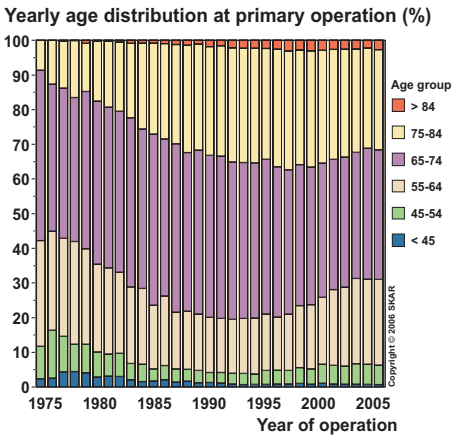
Age distribution and prevalence

Between 1975 and 1995 the mean age at primary operation increased from 65 years to almost 72 years. The main reason was the relative large increase in number of operations for the older age groups. Probable explanations are improvements in anesthetic techniques as well as a changed age distribution of the population. Since 1994 the proportion of younger patients having arthroplasty has increased again, why the mean age again has started to decrease. This can be explained by an increased confidence in the operation technique.

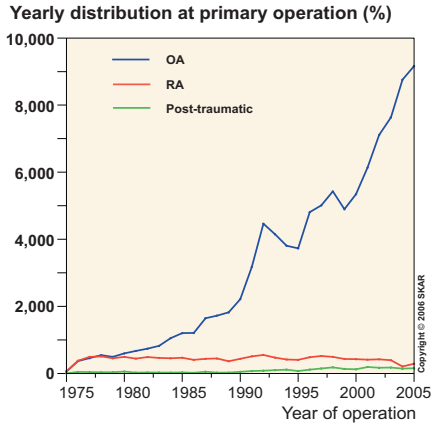
As the picture to the right shows, the real rise in number of operations started in the beginning of the eighties. This was mainly caused by a large increase in the number of operations for osteoarthritis. Operations for rheumatoid arthritis have become marginally fewer while operations for post traumatic conditions have only increased slightly.



The mean age of patients increased until the mid-nineties when it started to decrease again. Therefore, when comparing the rate of revision in series of patients operated during different time periods, Cox regression or separate analyses for different age groups have to be performed.



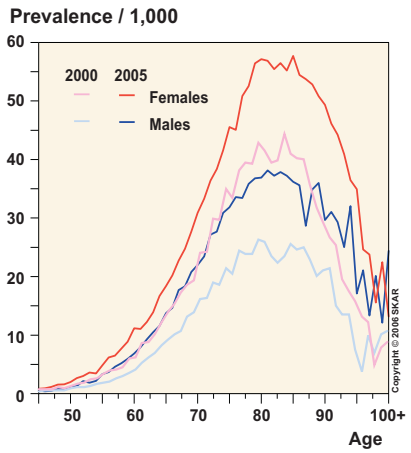
The relative percentage of older age groups increased until the mid-nineties after which the relative proportion of younger increased again.



The yearly number of arthroplasties for different diagnoses

The large increase in number of operations causes a rise in the number of patients walking around with knee implants. The picture below shows the prevalence in 2005 i.e. the no. of patients per 1,000 inhabitants in different age groups with a knee implant. The prevalence for both men and women peaks around 80 years of age. The decrease after 85 years of age is probably a sign of that this group is provided below its actual needs (assuming that arthroplasty patients don't have an increased mortality rate).

Compared to the prevalence in 2000 the influx seems to be insignificant after 87 years of age. The increase in prevalence for the oldest age groups between 2000 and 2005 is caused by ageing of previously operated patients by five years. Thus, it seems that within few years there will be a steady state among the elderly in which at least one in twenty women has a knee implant. Further increase is still possible through widening of indications.

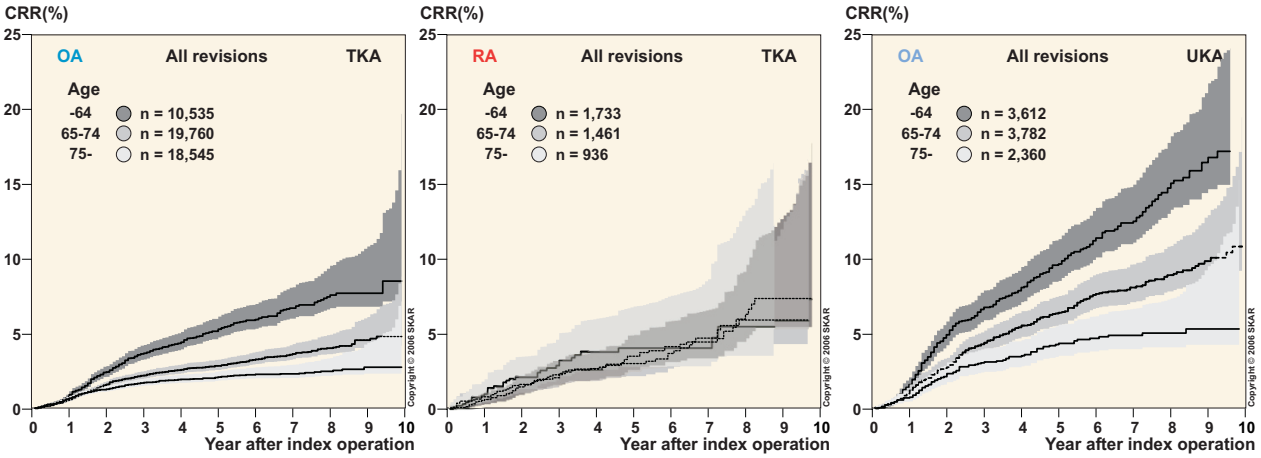


The prevalence of knee arthroplasty in 2000 and 2005. Accordingly, every twentieth woman has a knee arthroplasty

Factors that influence the revision rate

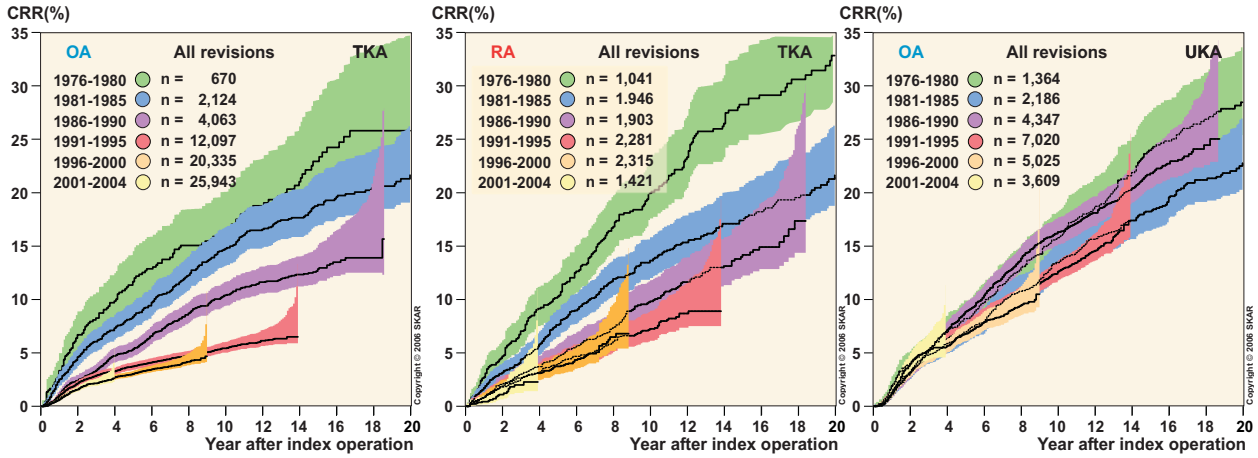
Primary disease – Early it became evident that patients with different primary disease, e.g. rheumatoid arthritis (RA) and osteoarthritis (OA) followed a different postoperative course with differences in the revision rate. Therefore the registry has always produced separate curves for these diagnoses. The differences in CRR between OA and RA treated with unicompartmental arthroplasty (UKA) demonstrate the importance of this.

Age – The effect that the age of the patients has on the CRR can be illustrated by analyzing different age groups separately. For OA the age has a considerable effect on the rate of revision both in TKA and UKA. One can wonder why this is the case. A possible explanation is that the younger have a higher level of activity, higher demand regarding pain-relief and a state of health that more often allows for revision surgery. In RA (TKA) there is no similar effect of age to be found which can be due to the fact that the younger have multiple joint disease, a lower physical level, a higher pain threshold and poorer general health which may reduce the likelihood of being offered revision surgery.

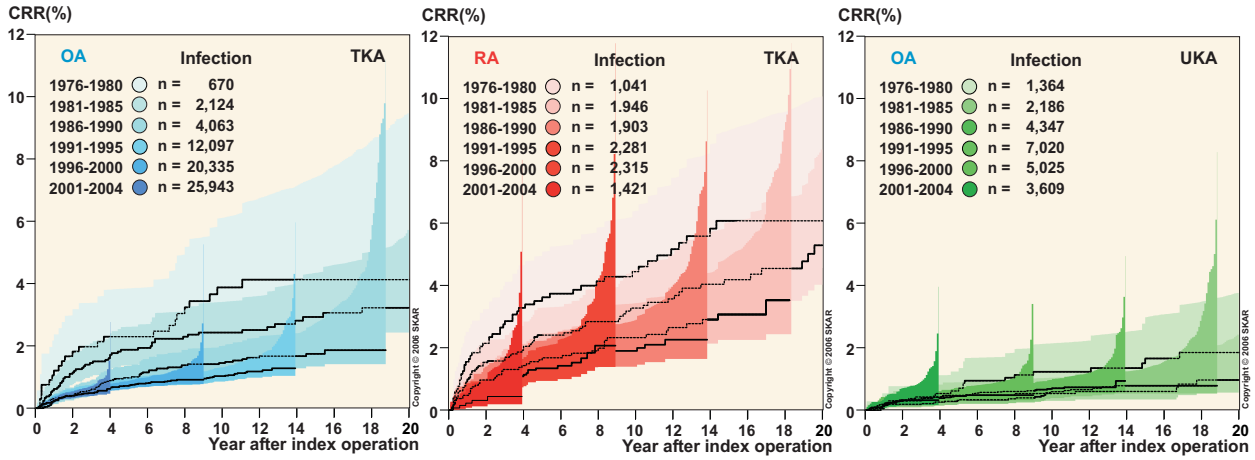


The differences in CRR (1995–2004) between the 3 age groups <65, 65–75, >75 were significant for OA operated on with TKA and UKA but nor for RA operated on with TKA.

Year of operation – During 1975-1995 we find for TKA that there has been a constant reduction in risk of revision. The reduction can't only be explained by an increasing mean age of patients at surgery.. Even if improved implants may provide some explanation, reduction has also been seen for unchanged implants (Lewold et al. 1993). This indicates improvement in technique (cementing/seating) or in patient selection which has caused us to take into account the time-period during which the operations were made, when comparing implants by Cox regression. Improvement with time has not



Comparing the CRR of operations performed during the time periods 1976–1980, 1981–1985, 1986–1990, 1991–1995, 1996–2000 and 2001-2004 we found improvement for the TKA until 1995 but not for UKA.



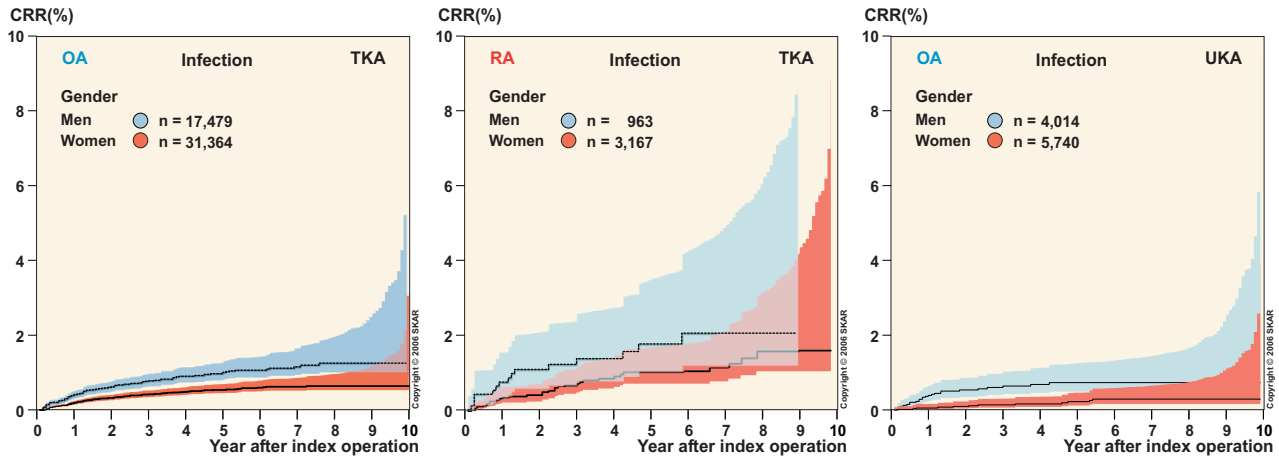
Comparing the CRR of operations performed during the time periods 1976–1980, 1981–1985, 1986–1990, 1991–1995, 1996–2000 and 2001-2004 using only revision for infection as end-point, we found improvement with time for both TKA and UKA.

been seen for the UKA, which probably is caused by some newer models and methods with inferior results. Furthermore, the relative number of UKA operations has decreased which may have reduced the surgical routine which has been found to be of importance. Further, changes in implants, instruments, surgical technique and approach may have resulted in a new or prolonged learning curve.

When the Knee Register accounts for the risk of revision for infection, this means the risk of any revision after the primary operation being performed for infection. With time we have seen a reduction in this risk both for OA and RA. However, infection as the proportion of the total revision-burden has not diminished.

Gender – Analyzing OA in the period 1995-2004 (Cox regression), no significant difference in CRR was found between the sexes, whether it was for TKA or UKA. Overall, there was neither any significant difference between the sexes for RA (TKA). However, there was a sex difference regarding revision for infection (see below).

It is well known that RA patients have a greater risk of infection which has been ascribed to the effect of corticosteroid and immunosuppressive medications. Still, it is not as obvious why men more often are having their knee arthroplasties revised for infection than women. Either men are more prone to infections or they more often than women are being offered revision surgery for their infected knee implants. The latter is contradicted by the fact that in other context men also have been found more susceptible to infections than women.

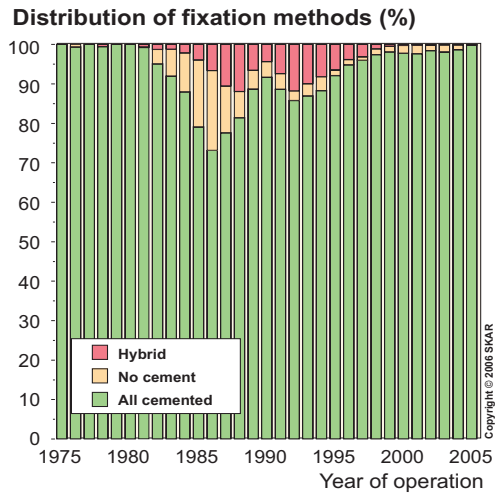


Using the end-point revision for infection, the CRR (1995–2004) shows in TKA for OA that men are more affected than women (RR 3.2). The same tendency is true for RA, although not significant. UKA with its smaller implant size does better than the larger TKA but even in UKA men have 1.9 times the risk of women of becoming revised for infection. In TKA, patients with RA are more affected than those with OA (RR 1.6).

Type of implant – Hinges, linked and stabilized implants are mainly used for revisions or especially difficult primary cases. In uncomplicated primary cases a TKA is used and if the disease is unicompartmental an UKA may do. Although UKA has been found to have a substantially higher CRR than TKA (see figures on page 4), the number of serious complications such as infection/arthrodesis/amputation is much less. If a primary UKA is revised to a TKA at a later time, the risk of re-revision is not significantly increased compared to the risk of revision if the patient had primarily been treated with a TKA. As the UKA implants are less expensive than the TKA, the increased number of revisions due to their use has not resulted in additional cost. When asked, patients with TKA and UKA seem equally satisfied with their knees. In summary we conclude that it cannot be considered wrong to use UKA implants in OA patients with unicompartmental disease.

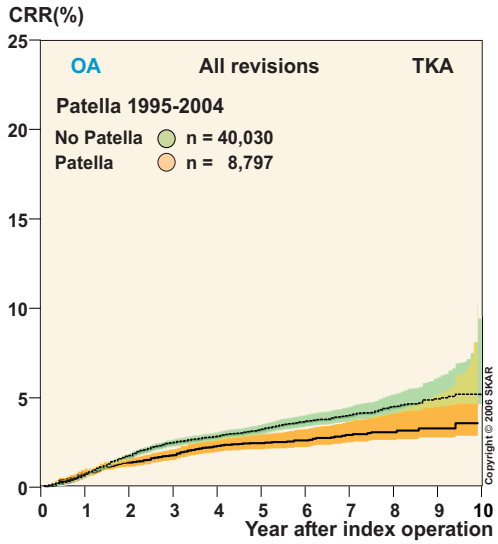
Implant model (brand) – The model is the factor that generates most interest and most often is related to the result after knee arthroplasty. As can be suspected from what has been said previously, the results are not only affected by the model or design of the implants. In Sweden the most commonly used implants have also been those with the lowest CRR. This may be due to a good design but also due to the increased surgical routine when the same implant is often used. Models that have been found to have considerably inferior results most often have been withdrawn from the Swedish market. An exception is the Oxford implant that initially had inferior results but that with modification and increased surgical routine showed improved results and recovered.

Use of bone-cement – As can be seen from the figure on the right, bone-cement has been used in the majority of arthroplasties that have been performed in recent years. Because the number of uncemented arthroplasties has become so small in recent years there is no longer possible to perform meaningful comparisons. However, for the period 1985–1994, during which use of uncemented implants was relative common, we found that the risk of revision was 1.4 (1.1-1.7) times higher if the tibial component was left uncemented. This is in agreement with the results of the Finnish implant register that also found substantially increased risk of revision for uncemented implants.

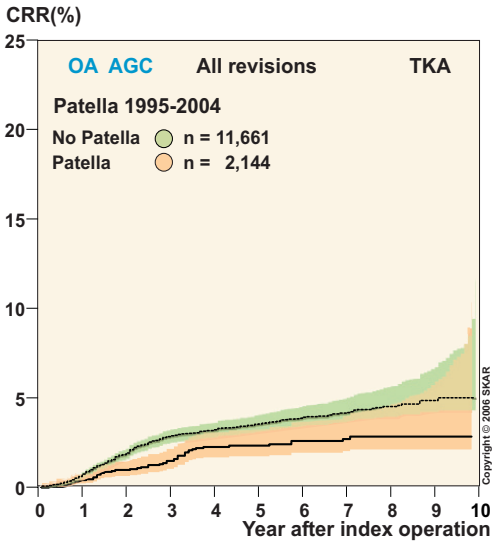


The figure shows the yearly distribution for cemented, uncemented and hybrid fixation of components.

Patellar button in TKA – Estimating how the use of a patellar button affects the revision rate is complex. The use of a patellar button varies with the brand of prosthesis used and its use also has lessened in the recent years. Earlier, when analyzing all TKA implants together, we did not find that the use of patellar button influenced the revision rate. However, when analyzing different time-periods we found that during the eighties, when patellar buttons were used in half of the cases, its use had a negative effect. Since then its use has continuously diminished and in 2005 a button was used in little less than 10% of the TKA cases. At the same time, as we have described in previous reports, the curves have turned to the advantage of the patellar button (see opposite page). However, it has to be kept in mind that revisions for femoropatellar symptoms generally are performed relatively soon after the primary operation while revisions for wear or loosening of the patellar component occur later on. This in combination with our previous finding that patients that have had patellar resurfacing more often are satisfied with their knee, at least initially, speaks for a more liberal use of the patellar button, at least in the elderly.



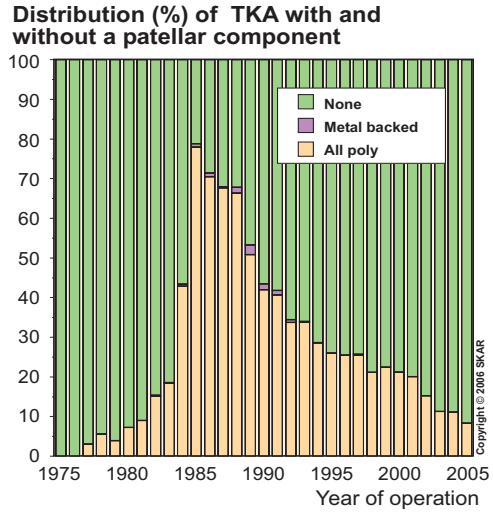
CRR during the current 10-year period for all TKA OA, with and without patellar component respectively..



CRR during the current 10-year period for all AGC OA, with and without patellar component respectively..

For the current period (1995–2004) we found for TKA patients operated for OA that compared to TKA using a patellar button, the CRR was 1.4 (1.2-1.6) times higher if no button had been used (see figure above). If only AGC implants were analyzed, the risk for revision without a patellar button was 1.7 (1.3-2.3) times higher (see figure above right). For RA we find no significant difference (p=0.1 / 0.3). However, the material is also considerably smaller. The increased frequency of revisions is caused by the need for secondary patellar resurfacing because of femoropatellar pain.

It can then be debated if one should take this into consideration when units and implants are compared with respect to risk of revision. In the figures, we have chosen to describe the total CRR of all implants (with and without a button). That way one can get a general picture of the results for certain group of patients and implants. When comparing the risk-ratios of the implants (page 19-20) we separately account for the results of TKA with and without a patellar button. Finally, when comparing the risk of revision for the different units (page 20-21), we include the use of patellar button in the regression analysis.



The figure shows the yearly distribution regarding the use of patellar button in TKA.

The use of patellar button in TKA varies between different countries. The Danish knee arthroplasty register (http://www.ortopaedi.dk/registre.htm) reports that in Denmark, a patellar button is used two thirds of the TKA cases. while in Norway it is only used in 5 percent of cases according to the Norwegian arthroplasty register (http://www.haukeland.no/nrl/). The Australian arthroplasty register (http://www.dmac.adelaide.edu.au/aoanjrr/index.jsp) reports that down under a button is used in just less than 40 percent of the cases and that TKA inserted without a patellar button have 1.4 (1.3-1.6) times higher risk of revision than those with a button, which is a similar ro our findings. It is unclear why surgeons have such different treatment approaches but possebly previous bad experience when using metal backed patellar buttons has played a role.

Types of operation and implants in 2005

9,708 primary arthroplasties reported in 2005 by type and region

TYPE	Stockholm Gotland	Uppsala Örebro	Southeast	South	West	North
Hinges	–	–	–	–	–	–
Linked	3	16	1	7	8	5
TKA	1,652	1,864	1,079	1,595	1,568	978
UKA medial	169	217	79	104	288	46
UKA lateral	9	–	–	–	–	–
Patella	3	1	3	10	2	1
Total:	1,836	2,098	1,162	1,716	1,866	1,030

Implants for primary TKA in 2005

	Number	Percent
PFC Sigma	3,150	36.1
AGC	1,723	19.7
NexGen	1,528	17.5
Duracon	967	11.1
Free-Sam MIII	801	9.2
Profix	150	1.7
Natural	128	1.5
Kinemax Plus	71	0.8
PFC rot, platform	59	0.7
Triathlon	47	0.5
Vanguard	38	0.4
Scan	10	0.1
Other	64	0.7
Total :	8,736	100

Implants for primary UKA in 2005

	Number	Percent
Link-Uni	344	37.7
Oxford-Uni	251	27.5
MillerGalante-Uni	246	27
Genesis	41	4.5
Preservation Uni	29	3.2
Other	1	0.1
Total :	912	100

All active units reported to the registry during 2005 and although some additional reports may occur later, these are only expected to cause minor changes in the number of operations. As compared to 2004 the number of reported primary arthroplasties increased from 9,170 to 9,707 or by 5.9%. The increase for TKA was 6.1% and for UKA 2.5%.

During 2005, 631 revisions were performed of which 128 were secondary revisions. In 377 of the revisions the primary procedure had been a TKA and in 220 cases an UKA. One has to take into consideration that the use of primary UKA has been reduced by half in the last 10 years while the use of TKA has more than doubled.

De 3 most common implants for primary TKA in each region in 2005

	Modell 1	n	Modell 2	n	Modell 3	n	Other
Stockholm/Gotland	PFC Sigma	1144	F/S MIII	190	Duracon	114	204
Uppsala/Örebro	NexGen	529	AGC	489	F/S MIII	391	455
Southeast	PFC Sigma	409	NexGen	399	AGC	255	16
South	PFC Sigma	695	Duracon	458	AGC	303	139
West	AGC	500	PFC Sigma	304	NexGen	227	537
North	NexGen	329	PFC Sigma	272	AGC	140	237

De 3 most common implants for primary UKA in each region in 2005

	Modell 1	n	Modell 2	n	Modell 3	n	Other
Stockholm/Gotland	MillerGalante	99	Link	50	Oxford	25	4
Uppsala/Örebro	Link	135	MillerGalante	38	Preservation	25	19
Southeast	Link	42	Genesis	22	MillerGalante	9	6
South	Link	73	Oxford	29	MillerGalante	2	–
West	Oxford	191	MillerGalante	82	Link	14	1
North	Link	30	MillerGalante	16	–	–	–

Bone cement and minimally invasive surgery in 2005

Use of cement in primary surgery during 2005

	Primary TKA		Primary UKA	
No components inserted without cement	8,594		911	
Only the patellar button without cement	127			
The femur- and tibial components without cement	8		1	
Only the femoral component without cement	6			
Only the tibial component without cement	0			
The femur- and patellar components without cement	0			
The femur-. tibial and patellar components without cement	0			
Information missing	1		1	
Total	8,736		912	
	Number	Percent	Number	Percent
Palacos Genta	4,382	50.2	451	49.5
Refobacin-Palacos R	3,539	40.5	384	42.2
Refobacin-bonecement	623	7.1	61	6.7
Cemex Genta	82	0.9		
Palacos	75	0.9	12	1.3
Copal	8	0.1		
Gentamicin unspecified	6	0.1	2	0.2
Palamed G	2	0		
Combinations	1	0		
Information missing	10	0.1	1	0.1
Total:	8,728	100	911	100
All implanted components without cement	8		1	
Grand Total	8,736		912	

NB Handwriting the type of cement on the reprot may be a source of error.
The units are encouraged to use the sticker that comes with the cement package.

Type of bone cement

In Sweden, the use of bone cement is the most common method for fixing components to the bone. During 2005, only 0.1% of all TKA were completely without cement (1.2% in 2004) and cement was used in all UKA. Previously there was only one manufacturer of the Palacos cement type but presently there are several generic copies. Combined these cements were used in 99% of the cemented cases during 2005. As only 0.1% of the TKA were inserted completely without cement the variation is minimal and statistical comparisons are not meaningful.

We want to remind the surgical units to report the type of bone cement used using the stickers that normally are to be found in the cement packages.

Minimally invasive surgery in UKA

For UKA we have since 1999 registered whether the implant was inserted by a mini-arthrotomy.

Our definition of mini-incision implies that the surgeon gains access to the knee joint by the use of a very small arthrotomy and without dislocating / everting the patella. The benefit of the procedure has been claimed to be less traumatic surgery, quicker rehabilitation and shorter hospital stay.

From the start of the registration in 1999, the popularity of minimally invasive surgery increased constantly until 2003 when it was being used in 58% of the UKA cases. In 2004 the proportion of MIS diminished somewhat but during the current year 2005 it increased again and accounted for 63% of the cases. The Register has previously reported that there were indications that the mini-incision might increase the revision rate. Further analyses suggest that the method may initiate a new learning process which however can be shortened if the surgeons are offered training before they start using the method.

The type of incision for 912 primary UKA in 2005

	Standard incision	Mini-incision	Missing
Link-Uni	221	120	3
MillerGalante-Uni	45	199	2
Genesis	30	11	0
Oxford-Uni	24	224	3
Preservation Uni	18	10	1
Other	0	1	0
Total	338	565	9

The use of patellar button for TKA in 2005

The use of patellar button is heavily dependent on the implant model used. Thus, in primary arthroplasty, surgeons using the Freeman-Samuelson and Kinemax implants commonly resurface the patella while those using the Triathlon and NexGen infrequently do so.

In the southern and northern region a patellar button is relatively infrequently used while the western region is the one that most often makes use of a patellar button (see figure below). However, it is not that the western region to a large extent uses implants that often are associated with a patellar button. Instead, it are the most common implants that they use more frequently with a button.

It is not only in Sweden that geographical variations are to be found. The Australian arthroplasty register (http://www.dmac.adelaide.edu.au/aoanjrr/index) reports that ther is up to 30% difference in use of patellar button between the different states.

Compared to males, for a long time in Sweden it has been slightly more common that females having a TKA were provided with a patellar button. During 2005 8.2% of the females received a button compared to 7% of the males which is a significant difference. The reason is probably that femoropatellar pain is more common in females.

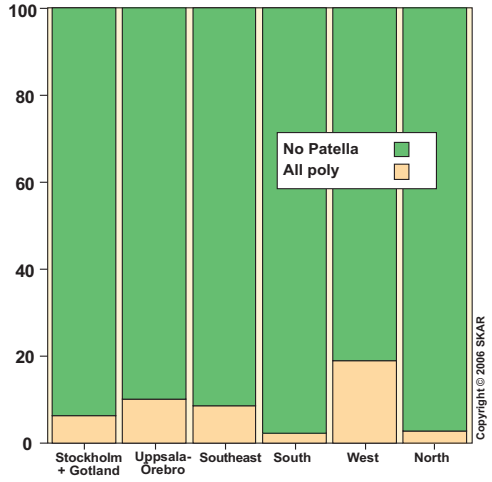
Looking at the relative use of patellar button in the different age groups during 2005 there are comparatively small differences. However, it can be noted that the oldest category of patients 85 years and older is the one that most often has a patellar resurfacing (see figure below).

Some discussion regarding how the frequency of revisions is influenced by the use of patellar button can be found on page 7 together with CRR curves for TKA inserted during the current period of 1995-2004, with and without a button respectively.

Use of patellar button with different implants in 2005

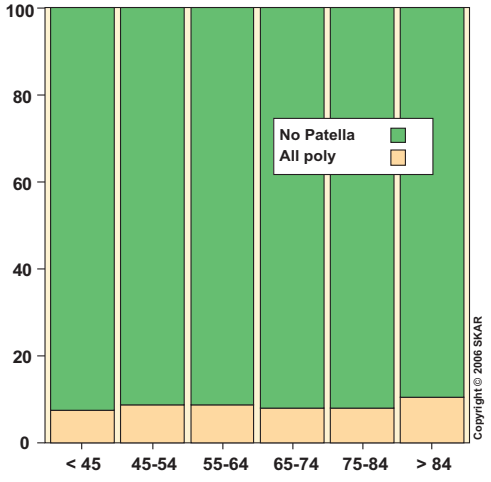
	No patellar button	%	Patellar button	%
PFC Sigma	3,041	96.6	108	3.4
AGC	1,535	89.1	188	10.9
NexGen	1,510	98.9	17	1.1
Duracon	902	93.3	65	6.7
Free-Sam MIII	525	65.5	276	34.5
Profix	134	89.3	16	10.7
Natural	124	96.9	4	3.1
PFC rot, platform	57	96.6	2	3.4
Triathlon	46	100	0	0.0
Vanguard	35	92.1	3	7.9
Kinemax Plus	26	36.6	45	63.4
Scan	10	100	0	0.0
Maxim	0	0.0	1	100
Other	57	90.5	6	9.5
Total	8,002	91.6	731	8.4

Distribution (%) of patellar resurfacing in the regions 2005



The figure shows the relative proportion in 2005 of TKA with and without patellar button in the different regions.

Distribution (%) of patellar resurfacing in different age groups 2005



The figure shows the relative proportion in 2005 of TKA with and without patellar button in the different age-groups.

The number of primary arthroplasties by unit and year

Hospital	1975-2000	2001	2002	2003	2004	2005	Totalt	Percent
Akademiska (Uppsala Univ Hosp)	1,583	58	88	93	143	111	2,076	1.8
Alingsås	235	56	73	87	97	145	693	0.6
Arvika	305	18	10	35	124	120	612	0.5
Avesta	67						67	0.1
Boden	1,617						1,617	1.4
Bollnäs	440	77	61	179	202	242	1,201	1.0
Borås	1,610	54	63	74	116	70	1,987	1.7
Carlanderska						21	21	0.0
Dalsland	12	26	27	16			81	0.1
Danderyd	1,184	154	141	118	125	172	1,894	1.6
Eksjö-Nässjö	1,431	91	101	86	106	114	1,929	1.6
Elisabethkliniken	5		13	36	68	88	210	0.2
Enköping	163	83	117	118	104	144	729	0.6
Eskilstuna	1,370	46	25	15	21	39	1,516	1.3
Fagersta	71						71	0.1
Falköping	535	32	49	113	138	122	989	0.8
Falun	2,098	134	153	186	264	150	2,985	2.5
Frölunda Spec.		10	96	73	68	94	341	0.3
Gothenburg Med Center				41	84	91	216	0.2
Gällivare	555	67	43	57	72	81	875	0.7
Gävle	2,055	134	165	158	77	67	2,656	2.3
Halmstad	1,182	103	132	140	128	158	1,843	1.6
Helsingborg	1,222	127	116	89	51	43	1,648	1.4
Huddinge	1,387	65	89	89	116	80	1,826	1.6
Hudiksvall	607	80	77	79	73	79	995	0.8
Hässleholm	1,229	276	296	390	434	529	3,154	2.7
Jönköping	1,188	92	94	111	136	106	1,727	1.5
Kalix	51	52	36	42	34		215	0.2
Kalmar	1,173	82	125	130	132	134	1,776	1.5
Karlshamn	594	111	102	157	166	184	1,314	1.1
Karlskoga	707	84	102	111	95	73	1,172	1.0
Karlskrona	1,059	10	19	10	7	6	1,111	0.9
Karlstad	2,041	55	133	132	200	169	2,730	2.3
Karolinska	527	178	198	180	178	279	1,540	1.3
Kristianstad	1,298						1,298	1.1
Kristinehamn	242	10					252	0.2
Kullbergska sjukhuset	365	70	97	72	96	115	815	0.7
Kungsbacka			1	9	11	12	33	0.0
Kungälv	364	89	123	106	68	163	913	0.8
Köping	406	144	113	106	94	99	962	0.8
Landskrona	1,050	214	199	238	215		1,916	1.6
Lidköping	241	57	104	133	125	186	846	0.7
Lindesberg	594	65	73	80	84	115	1,011	0.9
Linköping	1,397	53	122	127	33		1,732	1.5
Linköping medical cent	11						11	0.0
Ljungby	681	77	70	53	87	86	1,054	0.9
Ludvika	338						338	0.3
Luleå	2						2	0.0
Lund	2,188	40	37	49	43	51	2,408	2.1
Lycksele	177	20	34	37	39	61	368	0.3
Löwenströmska	368	71	85	92	125	143	884	0.8
Malmö	1,839	63	44	32	31	46	2,055	1.8
Mora	632	96	92	107	98	99	1,124	1.0
Motala	280	44	61	94	282	409	1,170	1.0
Movement Halmstad				7	6	63	76	0.1
Mölndal	743	67	74	64	70	88	1,106	0.9
Nacka	202						202	0.2
Nacka-Proxima						8	8	0.0
Norrköping	1,576	101	100	89	23		1,889	1.6
Norrtälje	375	62	45	67	66	79	694	0.6
Nyköping	524	68	58	81	72	95	898	0.8
Ortopediska huset	53	110	153	156	189	227	888	0.8
Oskarshamn	463	59	93	79	111	187	992	0.8
Piteå	112	35	64	78	84	179	552	0.5

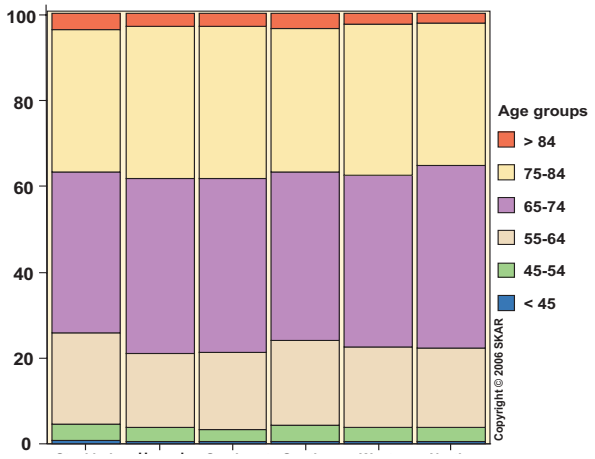
(cont.)

Number of primary arthroplasties by unit and year (cont.)

Hospital	1975-2000	2001	2002	2003	2004	2005	Totalt	Percent
S:t Göran	2,865	343	397	406	448	419	4,878	4.2
Sabbatsb.närsjh.	134	105	161	269	152		821	0.7
Sabbatsberg	628						628	0.5
Sahlgrenska	1,051	51	69	77	94	97	1,439	1.2
Sala	115						115	0.1
Sandviken	299						299	0.3
Sergelkliniken			27	76	57		160	0.1
Simrishamn	282	19	145	162	209	204	1,021	0.9
Skellefteå	499	57	57	49	83	90	835	0.7
Skene	420	102	107	75	70	68	842	0.7
Skövde	1,668	78	89	98	70	104	2,107	1.8
Sollefteå	219	68	85	102	103	107	684	0.6
Sophiahemmet	261	100	96	131	125	176	889	0.8
Sunderby	49	77	50	41	66	37	320	0.3
Sundsvall	1,593	112	122	161	144	75	2,207	1.9
Säffle	319	134	30				483	0.4
Söderhamn	279						279	0.2
Södersjukhuset	2,073	119	110	108	101	126	2,637	2.3
Södertälje	231	87	94	81	84	81	658	0.6
Torsby	558	135	71	47	69	92	972	0.8
Trelleborg	1,152	203	221	194	233	386	2,389	2.0
Uddevalla	1,715	72	130	108	115	184	2,324	2.0
Umeå	1,283	82	58	63	108	139	1,733	1.5
Varberg	1,052	143	153	114	140	124	1,726	1.5
Visby	614	62	52	32	42	46	848	0.7
Vänersborg-NÄL	936						936	0.8
Värnamo	754	91	83	85	113	94	1,220	1.0
Västervik	754	108	92	91	124	118	1,287	1.1
Västerås	1,289	46	63	44	54	82	1,578	1.3
Växjö	1,115	54	71	45	81	79	1,445	1.2
Ystad	843	71	57	80	69	48	1,168	1.0
Ängelholm	571	127	139	118	149	54	1,158	1.0
Örebro	1,905	81	114	102	133	119	2,454	2.1
Örnsköldsvik	698	52	84	91	197	150	1,272	1.1
Östersund	958	59	75	96	83	111	1,382	1.2
Östra sjukhuset	1,248	78	125	82	69	75	1,677	1.4
	75,254	6,886	7,813	8,329	9,196	9,707	117,185	100

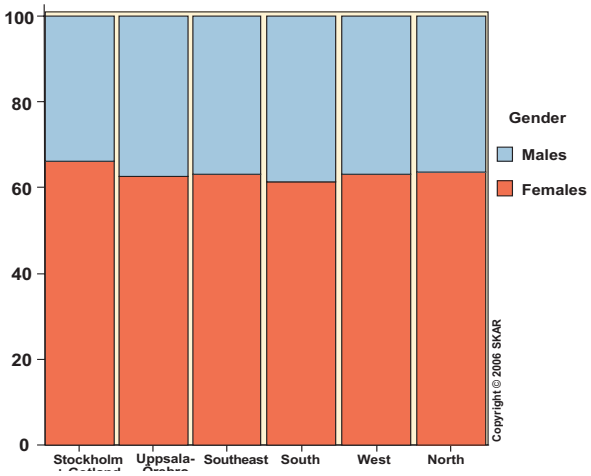
Sex and age distribution in the regions 1995-2004

Distribution (%) of gender in the regions 1996-2005



The age distribution is relatively even in the regions. However, it seems that Stockholm/Gotland do relatively more operations on the youngest and oldest.

Gender distribution (%) in the regions



The relative proportion of females is good 60% in all the regions although Stockholm/Gotland has a slightly higher proportion of females compared to the other regions.

Implants and revisions during 1995-2004

Operations performed early on during the analyzed period have a relatively large influence on the cumulative revision rate. Subsequently, the older models are mainly affected.

To be able to account for the reasonably long-term results of relatively modern types of implant types, the register usually uses the latest 10-year period that is available for analysis.

Implants for primary TKA during 1995-2004

	Number	Percent
AGC	15,448	28
PFC Sigma	11,536	20.9
Free-Sam MIII	6,551	11.9
Duracon	6,081	11
NexGen	5,196	9.4
Kinemax Plus	2,724	4.9
Scan	2,161	3.9
PFC	2,002	3.6
MillerGalante2	797	1.4
AMK	633	1.1
Profix	517	0.9
LCS	501	0.9
Natural	143	0.3
Axiom Knee	139	0.3
PFC rot, platform	74	0.1
Rotaglide	55	0.1
F/S unspec.	55	0.1
Nuffieid	37	0.1
Genesis	28	0.1
MillerGalante unspec.	27	0.0
NexGen Mobile bearing	27	0.0
Oxford Rotating Knee	26	0.0
Maxim	23	0.0
Synatomic	15	0.0
Performance	15	0.0
Evolution	12	0.0
Vanguard	11	0.0
Other	369	0.7
Total :	55,203	100

Implants for primary UKA during 1995-2004

	Number	Percent
Link-Uni	4,369	43.2
MillerGalante-Uni	2,274	22.5
Oxford-Uni	745	7.4
PFC-Uni+S	528	5.2
Marmor	478	4.7
Genesis	448	4.4
Duracon-Uni	416	4.1
Birgham	384	3.8
Allegretto	240	2.4
Repicci (AARS)	152	1.5
EIUS Uni	44	0.4
Preservation Uni	34	0.3
Other	8	0.1
Total	10,120	100

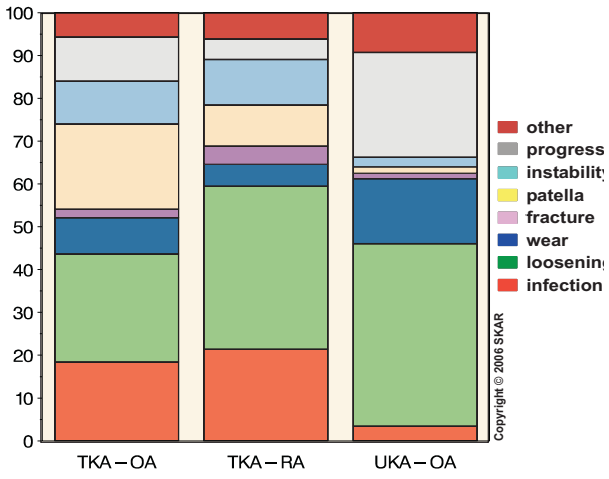
Linked implants (primary) during 1995-2004

	Number	Percent
Rotalink	165	74,0
Kotz	34	15,0
NexGen rotating hinge	10	4,5
Kinemax Plus rotating hinge	5	2,2
Noiles rotating hinge	5	2,2
Other	5	2,2
Total	224	100

Revisions during 1995-2004

1,660 revisions of TKA´s for OA, 379 of TKA´s for RA and 1,627 revisions of UKA´s for OA were performed during the 10-year period. The indications for the revisions are shown in the diagram to the right. Note that the primary operations may have been performed before the accounted 10-year period. Loosening remains the dominant reason for revision. ”Progression” in TKA mainly reflects revisions performed for femoropatellar arthrosis/arthritis. ”Patella” includes all kind of problems with the patella in patients that had their primaries inserted with or without a patellar button (excluding loosening and wear). Please note that the distribution of the indications does not have to reflect the risk for revision which preferably is evaluated by CRR.

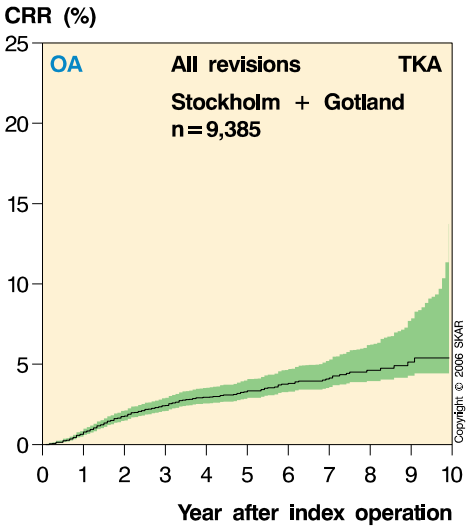
Distribution (%) of indications for revision 1995-2004



Primary TKA implants for OA in the regions during 1995-2004

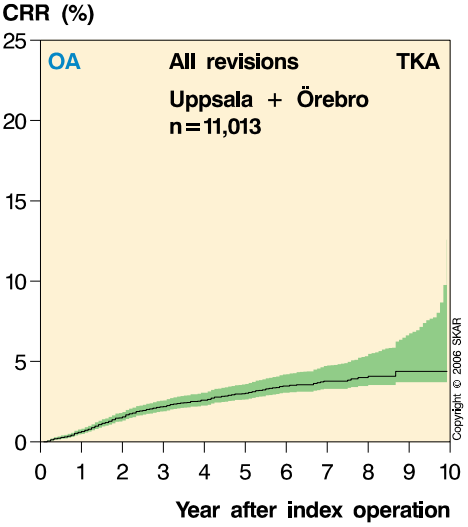
Stockholm + Gotland
Implants for primary TKA in OA 1995-2004

	Number	Percent
PFC Sigma	4,453	47.4
AGC	1,411	15.0
Duracon	1,117	11.9
Kinemax Plus	625	6.7
NexGen	582	6.2
Free-Sam MIII	582	6.2
PFC	395	4.2
AMK	62	0.7
Natural	58	0.6
PFC rot, platform	38	0.4
Genesis	14	0.1
Rotaglide	10	0.1
LCS	10	0.1
Other	28	0.3
Total:	9,385	100.0



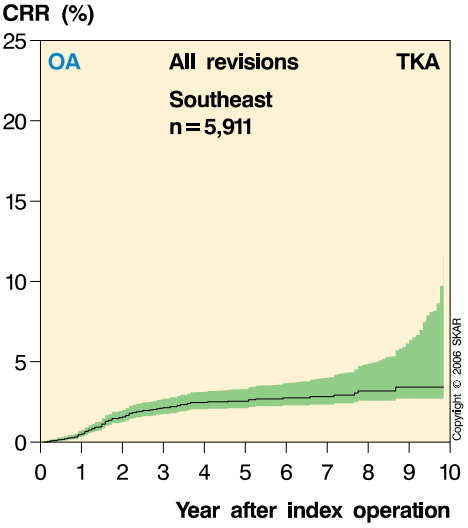
Uppsala-Örebro
Implants for primary TKA in OA 1995-2004

	Number	Percent
AGC	3,008	27.3
Free-Sam MIII	2,880	26.2
Kinemax Plus	1,764	16.0
NexGen	1,449	13.2
PFC Sigma	755	6.9
MillerGalante2	315	2.9
AMK	305	2.8
Scan	187	1.7
Duracon	125	1.1
PFC	72	0.7
Natural	65	0.6
NexGen Mobile bearing	27	0.2
Other	61	0.6
Total	11,013	100



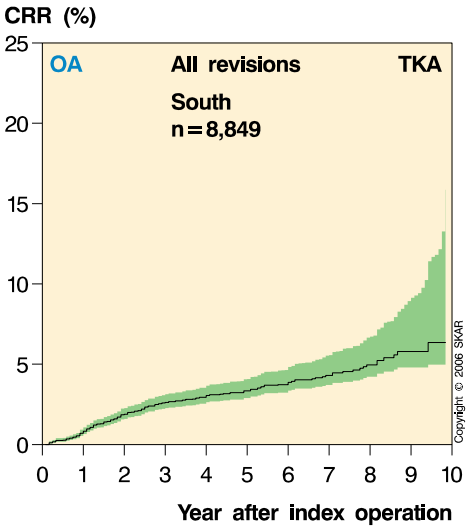
Southeast
Implants for primary TKA in OA 1995-2004

	Number	Percent
AGC	2,190	37.0
NexGen	1,526	25.8
PFC Sigma	1,319	22.3
PFC	289	4.9
MillerGalante2	279	4.7
Duracon	221	3.7
Scan	12	0.2
Evolution	11	0.2
Other	64	1.1
Total	5,911	100



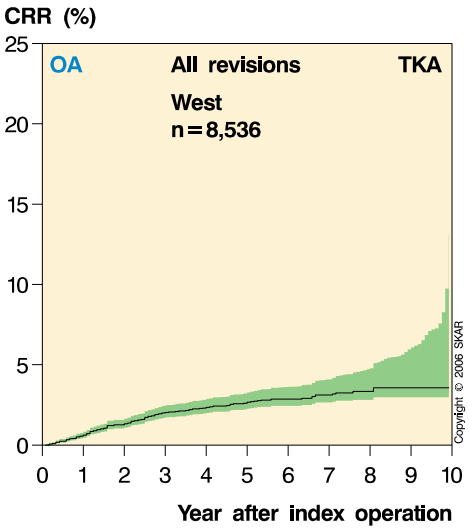
South
Implants for primary TKA in OA 1995-2004

	Number	Percent
Duracon	2,577	29.1
PFC Sigma	2,370	26.8
AGC	1,992	22.5
Scan	979	11.1
PFC	532	6.0
Axiom Knee	62	0.7
Free-Sam MIII	60	0.7
LCS	47	0.5
Rotaglide	45	0.5
Nuffieid	37	0.4
PFC rot, platform	25	0.3
Oxford Rotating Knee	22	0.2
AMK	13	0.1
Profix	10	0.1
Other	78	0.9
Total	8,849	100



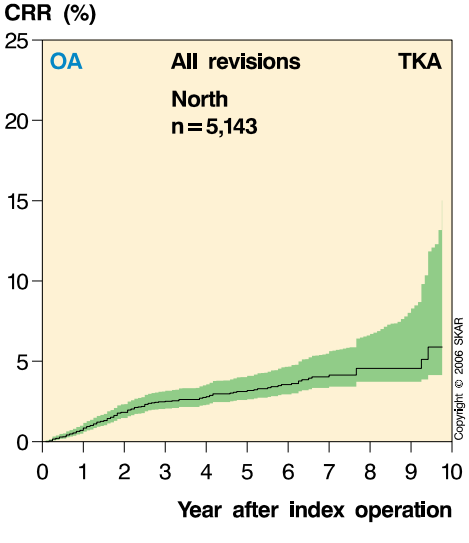
West
Implants for primary TKA in OA 1995-2004

	Number	Percent
AGC	3,384	39.6
Free-Sam MIII	2,112	24.7
Duracon	906	10.6
PFC Sigma	783	9.2
NexGen	638	7.5
Scan	393	4.6
AMK	113	1.3
Axiom Knee	72	0.8
PFC	33	0.4
F/S ospec	32	0.4
MillerGalante ospec	18	0.2
Other	52	0.6
Total	8,536	100



North
Implants for primary TKA in OA 1995-2004

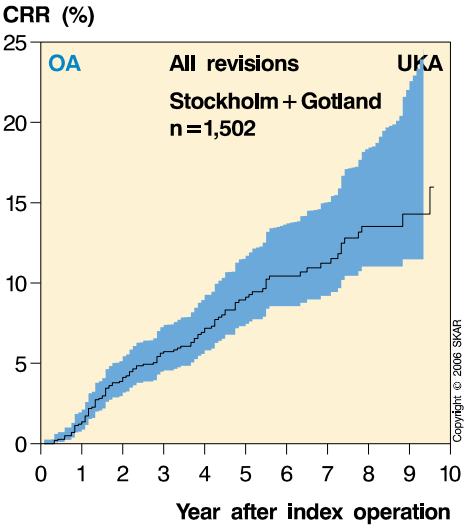
	Number	Percent
AGC	1822.0	35.4
PFC Sigma	766.0	14.9
NexGen	591.0	11.5
Duracon	581.0	11.3
Profix	385.0	7.5
LCS	369.0	7.2
PFC	325.0	6.3
Scan	95.0	1.8
MillerGalante2	61.0	1.2
Free-Sam MIII	60.0	1.2
AMK	42.0	0.8
Performance	13.0	0.3
Other	33.0	0.6
Total	5,143	100



Primary UKA implants for OA in the regions during 1995-2004

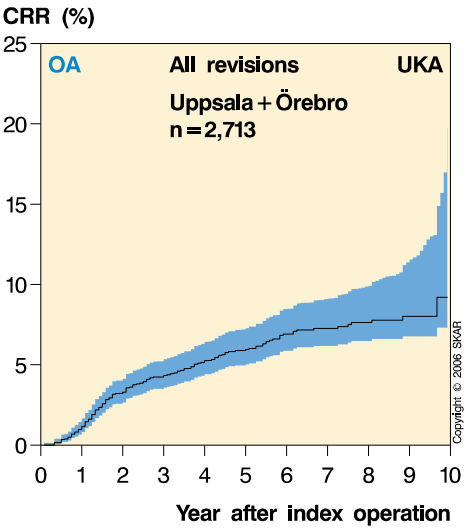
Stockholm + Gotland
Implants for primary UKA in OA 1995-2004

	Number	Percent
MillerGalante-Uni	921	61.3
Birgham	226	15.0
Link-Uni	138	9.2
Oxford-Uni	83	5.5
Genesis	57	3.8
Allegretto	37	2.5
Repicci(AARS)	18	1.2
Preservation Uni	12	0.8
Other	10	0.7
Total:	1,502	100



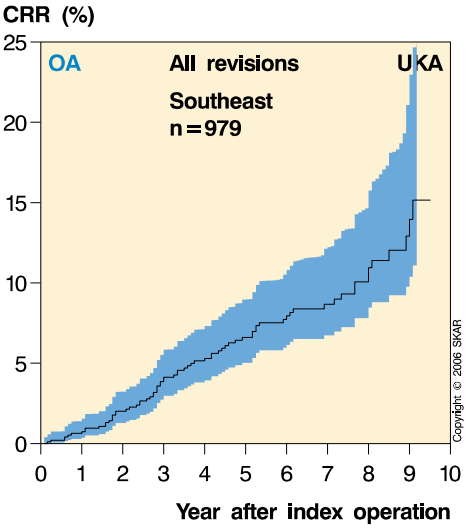
Uppsala-Örebro
Implants for primary UKA in OA 1995-2004

	Number	Percent
Link-Uni	1894	69.8
PFC-Uni+S	251	9.3
Marmor	217	8.0
Genesis	150	5.5
MillerGalante-Uni	86	3.2
Duracon-Uni	46	1.7
Allegretto	22	0.8
Birgham	20	0.7
Preservation Uni	10	0.4
Other	17	0.6
Total:	2,713	100



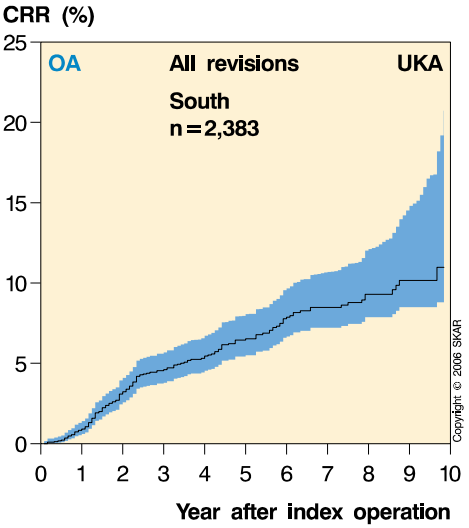
Southeast
Implants for primary UKA in OA 1995-2004

	Number	Percent
Link-Uni	266	27.2
Genesis	170	17.4
Marmor	120	12.3
Duracon-Uni	114	11.6
MillerGalante-Uni	100	10.2
Birgham	76	7.8
Allegretto	59	6.0
PFC-Uni+S	53	5.4
Oxford-Uni	15	1.5
Other	6	0.6
Total:	979	100



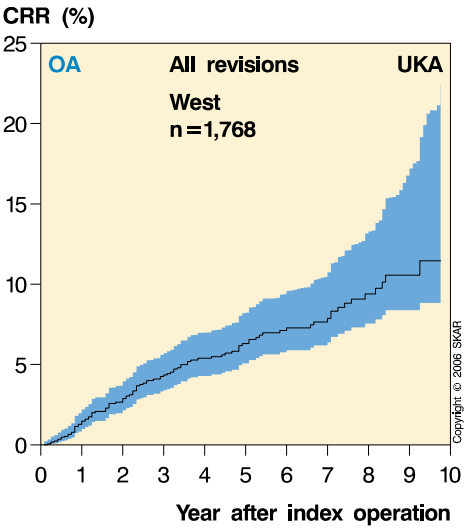
South
Implants for primary UKA in OA 1995-2004

	Number	Percent
Link-Uni	1,311	55.0
PFC-Uni+S	181	7.6
MillerGalante-Uni	175	7.3
Duracon-Uni	142	6.0
Oxford-Uni	132	5.5
Marmor	130	5.5
Allegretto	108	4.5
Repicci(AARS)	58	2.4
Genesis	56	2.3
Birgham	47	2.0
EIUS Uni	38	1.6
Other	5	0.2
Total:	2,383	100



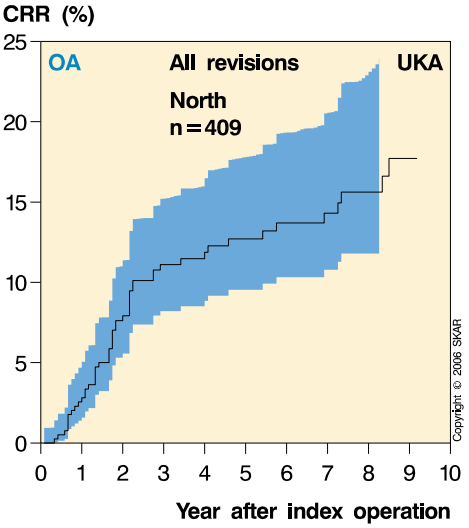
West
Implants for primary UKA in OA 1995-2004

	Number	Percent
MillerGalante-Uni	836	47.3
Oxford-Uni	468	26.5
Link-Uni	310	17.5
Duracon-Uni	78	4.4
Repicci(AARS)	70	4.0
Other	6	0.3
Total:	1,768	100



North
Implants for primary UKA in OA 1995-2004

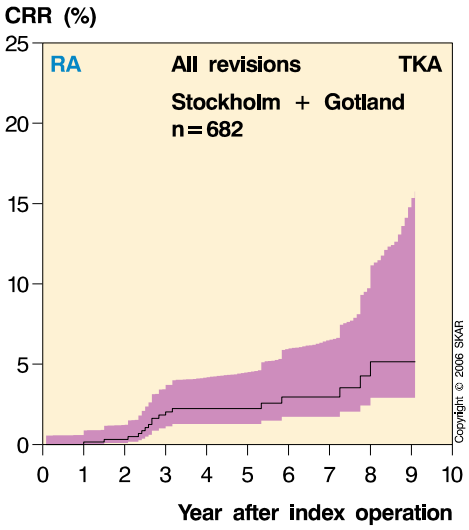
	Number	Percent
Link-Uni	312	76.3
MillerGalante-Uni	66	16.1
Oxford-Uni	13	3.2
Other	18	4.4
Total	409	100



Primary TKA implants for RA in the regions during 1995-2004

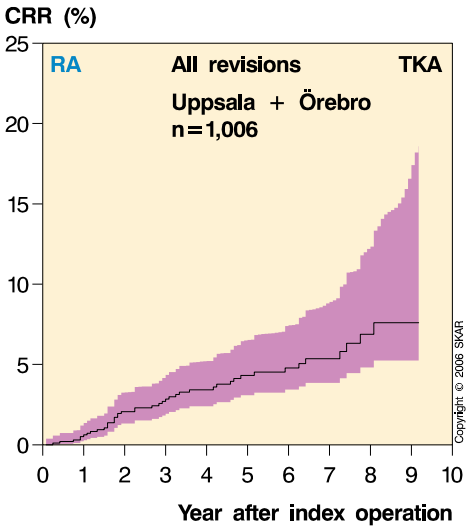
Stockholm + Gotland
Implants for primary TKA in RA 1995-2004

	Number	Percent
PFC Sigma	268	39.3
AGC	175	25.7
Duracon	115	16.9
PFC	42	6.2
Kinemax Plus	41	6.0
Free-Sam MIII	11	1.6
Other	30	4.4
Total	682	100



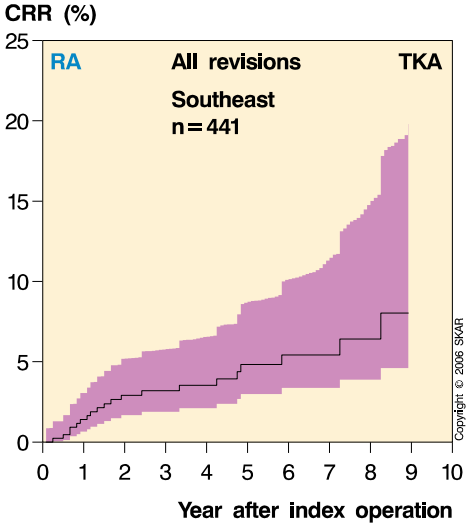
Uppsala-Örebro
Implants for primary TKA in RA 1995-2004

	Number	Percent
Free-Sam MIII	318	31.6
AGC	254	25.2
Kinemax Plus	182	18.1
NexGen	70	7.0
Scan	70	7.0
MillerGalante2	44	4.4
PFC Sigma	24	2.4
AMK	15	1.5
PFC	11	1.1
Other	18	1.8
Total	1,006	100



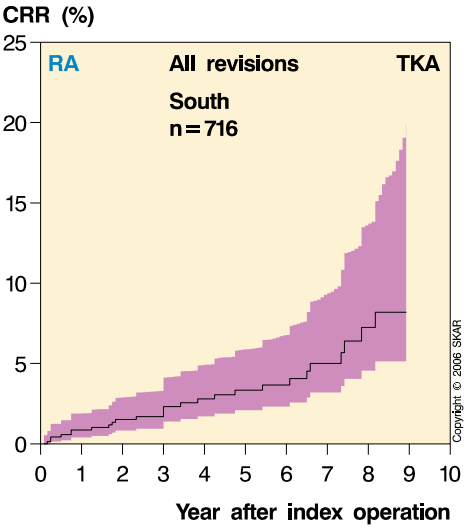
Southeast
Implants for primary TKA in RA 1995-2004

	Number	Percent
AGC	156	35.4
NexGen	122	27.7
PFC Sigma	66	15.0
PFC	38	8.6
MillerGalante2	25	5.7
Duracon	25	5.7
Other	9	2.0
Total	441	100



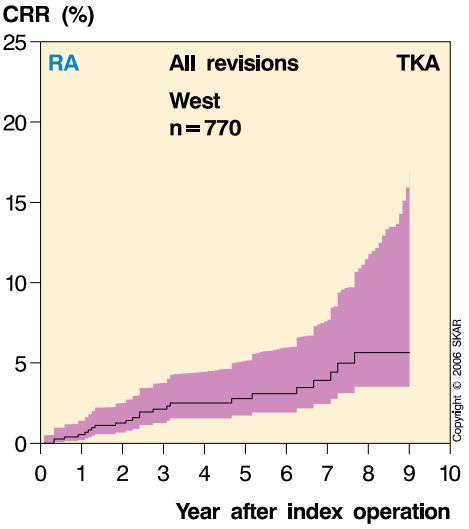
South
Implants for primary TKA in RA 1995-2004

	Number	Percent
Scan	243	33.9
AGC	120	16.8
PFC Sigma	118	16.5
Duracon	99	13.8
PFC	94	13.1
Synatomic	11	1.5
Other	31	4.3
Total	716	100



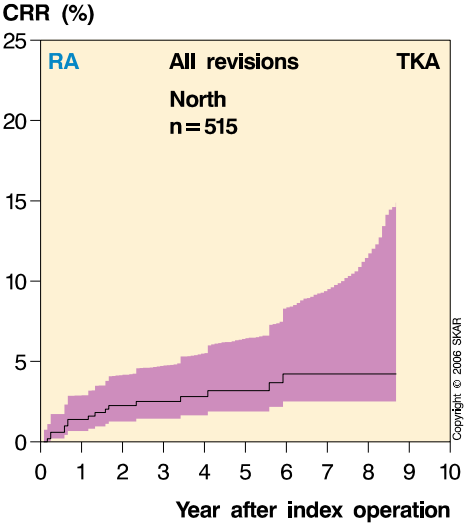
West
Implants for primary TKA in RA 1995-2004

	Number	Percent
AGC	295	38.3
Free-Sam MIII	243	31.6
Scan	78	10.1
PFC Sigma	51	6.6
Duracon	49	6.4
AMK	21	2.7
NexGen	13	1.7
Other	20	2.6
Total	770	100



North
Implants for primary TKA in RA 1995-2004

	Number	Percent
AGC	139	27.0
PFC Sigma	87	16.9
Duracon	82	15.9
PFC	65	12.6
Profix	47	9.1
LCS	26	5.0
NexGen	20	3.9
MillerGalante2	20	3.9
Other	29	5.6
Total	515	100



The relative risk for implants used in primary arthroplasty during 1995-2004

The registry typically uses the latest 10-year period available for analysis when presenting the results of relatively modern implant types with a reasonable long-term follow-up.

The risk of revision is one of the many measures of outcome. Although not accounted for here, the type of the revision should also be considered.

If the use of patellar button is primarily deliberately avoided with a preparedness for a secondary resurfacing of the patella if needed, this will increase the risk of revision. Therefore, we have decided to also account for OA/TKA separately when used with and without a patellar button (see next page).

CRR curves for common TKA and UKA implants used for OA are displayed on pages 22-25.

As the table below shows, there were no significant differences between the various models used for RA why no curves were made.

For TKA it can be noted that those implants having significantly lower or higher risk than the reference implant AGC are the same as in last years report concerning the period 1994-2003.

When F/S MIII is used as a reference for TKA with a patellar button everything is unchanget but for Kinemax that now has a significantly higher risk of revision.

In UKA Brigham now has a significantly higher risk than the refernece Link but otherwise there are no changes.

As previously there is no difference depending on gender while the risk decreases with increasing age.

The risk of revision (RR) with 95% confidence intervals. AGC is the reference in TKA and Link-Uni in UKA. The Cox regression adjusts for differences in gender, age and year of operation.

OA / TKA	n	p-value	RR	95% CI
AGC	13,807		ref.	
PFC-Sigma	10,429	0.3	0.9	0.74-1.10
F/S MIII	5,694	<0.01	0.63	0.50-0.79
Duracon	5,527	0.6	0.95	0.77-1.16
NexGen	4,794	<0.01	0.37	0.26-0.55
Kinemax	2,403	0.14	1.19	0.95-1.51
Scan	1,666	0.13	1.22	0.94-1.58
PFC	1,620	<0.01	1.48	1.17-1.87
MillerGalante II	662	0.11	1.34	0.93-1.92
AMK	523	0.02	1.55	1.07-2.25
LCS	427	0.91	0.97	0.56-1.68
Profix	403	0.15	0.53	0.22-1.27
Axiom	138	0.1	1.74	0.90-3.38
Other	744	0.09	1.41	0.95-2.10
Gender (male is ref.)		0.44	0.95	0.85-1.08
Age (per year)		<0.01	0.96	0.95-0.96
Year of op. (per year)		0.46	0.99	0.96-1.02

RA / TKA	n	p–value	RR	95% CI
AGC	1,139		ref.	
PFC-Sigma	597	0.15	0.58	0.27-1.22
F/S MIII	574	0.26	0.72	0.41-1.27
Duracon	373	0.92	1.03	0.57-1.89
NexGen	236	0.12	0.33	0.08-1.36
Kinemax	223	0.1	1.62	0.91-2.87
Scan	399	0.78	0.92	0.52-1.63
PFC	244	0.51	1.22	0.67-2.21
MillerGalante II	90	0.43	1.41	0.60-3.34
AMK	43	0.98	<0.01	#Value
LCS	29	0.98	<0.01	#Value
Profix	53	0.75	0.72	0.10-5.33
Axiom	1			
Other	129	0.6	0.73	0.23-2.35
Gender (male is ref.)		0.14	0.76	0.53-1.10
Age (per year)		0.24	1.01	0.99-1.02
Year of op. (per year)		0.81	1.01	0.93-1.10

OA / UKA	n	p–value	RR	95% CI
Link-Uni	4,231		ref.	
MillerGalante	2,184	0.03	1.27	1.02-1.58
Oxford	719	0.28	1.22	0.85-1.77
PFC	501	<0.01	1.72	1.28-2.31
Marmor/Richards	467	<0.01	1.62	1.19-2.22
Genesis	433	0.74	1.08	0.69-1.67
Duracon	391	<0.01	1.94	1.40-2.67
Brigham	369	0.1	1.37	0.94-2.00
Allegretto	232	0.07	1.46	0.96-2.22
Repicci (AARS)	146	<0.01	2.66	1.77-3.99
Other	81	0.44	0.46	0.06-3.30
Gender (male is ref.)		0.65	0.96	0.82-1.13
Age (per year)		<0.01	0.95	0.95-0.96
Year of op. (per year)		0.81	1.00	0.97-1.05

No new implants have been introduced in such numbers that they can be analyzed

Significant difference with higher risk ratio.
Significant difference with lower risk ratio.

The risk of revision (RR) with 95% confidence intervals for TKA/OA inserted without and with a patellar component respectively. In the table to the right F/S MIII is used as reference instead of AGC.

Without patellar button OA / TKA	n	p–value	RR	95% CI
AGC	11661		ref.	
PFC-Sigma	9632	0.31	0.9	0.73-1.10
F/S MIII	1420	0.18	0.74	0.48-1.14
Duracon	5116	0.25	0.88	0.71-1.09
NexGen	4688	<0.01	0.37	0.25-0.54
Kinemax	1875	0.35	1.13	0.88-1.46
Scan	1600	0.54	1.09	0.83-1.43
PFC	1440	0.04	1.3	1.01-1.67
MillerGalante II	632	0.27	1.23	0.85-1.77
AMK	468	0.16	1.34	0.89-2.01
LCS	427	0.69	0.89	0.51-1.55
Profix	348	0.13	0.47	0.17-1.26
Axiom	129	0.12	1.7	0.88-3.31
Other	594	0.69	1.1	0.68-1.79
Gender (male is ref.)		0.65	0.97	0.85-1.11
Age (per year)		<0.01	0.95	0.95-0.96
Year of op. (per year)		0.11	0.97	0.94-1.01

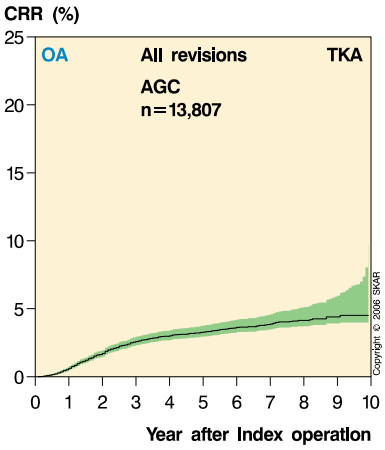
With patellar button OA / TKA	n	p–value	RR	95% CI
AGC	2144		ref.	
PFC-Sigma	796	0.73	0.89	0.46-1.72
F/S MIII	4274	0.4	0.85	0.58-1.24
Duracon	406	0.22	1.55	0.77-3.11
NexGen	106	0.97	<0.01	#Value
Kinemax	527	0.1	1.6	0.92-2.80
Scan	66	0.02	3.16	1.25-8.01
PFC	180	<0.01	2.8	1.48-5.30
MillerGalante II	30	0.76	1.37	0.19-9.97
AMK	54	<0.01	3.84	1.52-9.69
LCS				
Profix	55	0.98	1.03	0.14-7.53
Axiom	9	0.99	<0.01	#Value
Other	150	<0.01	3.24	1.58-6.63
Gender (male is ref.)		0.44	0.89	0.66-1.20
Age (per year)		<0.01	0.98	0.96-0.99
Year of op. (per year)		0.32	1.04	0.97-1.11

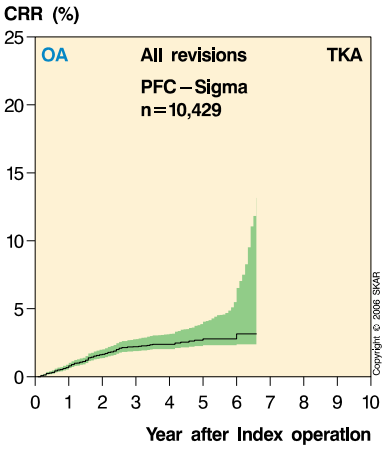
With patellar button (using F/S MIII as the ref.) OA / TKA	n	p–value	RR	95% CI
F/S MIII	4274		ref.	
AGC	2144	0.4	1.18	0.81-1.72
PFC-Sigma	796	0.88	1.05	0.56-1.95
Duracon	406	0.08	1.82	0.94-3.54
NexGen	106	0.98	<0.01	#Value
Kinemax	527	0.02	1.89	1.11-3.21
Scan	66	0.01	3.72	1.48-9.37
PFC	180	<0.01	3.29	1.77-6.14
MillerGalante II	30	0.64	1.61	0.22-11.71
AMK	54	<0.01	4.51	1.80-11.31
LCS				
Profix	55	0.85	1.21	0.17-8.76
Axiom	9	0.99	<0.01	#Value
Other	150	<0.01	3.81	1.90-7.63
Gender (male is ref.)		0.44	0.89	0.66-1.20
Age (per year)		<0.01	0.98	0.96-0.99
Year of op. (per year)		0.32	1.04	0.97-1.11

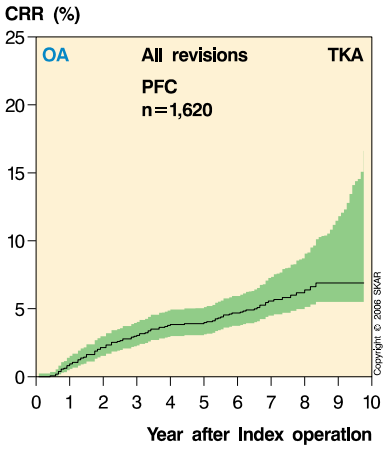
No new implants have been introduced in such numbers that they can be analyzed

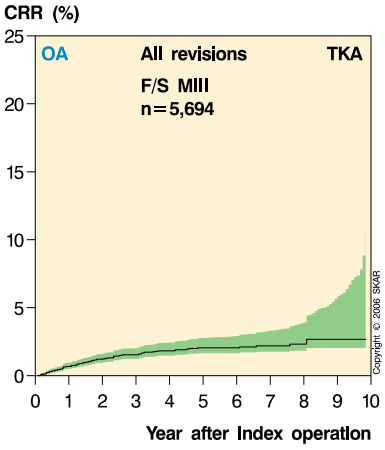
Significant difference with higher risk ratio.
Significant difference with lower risk ratio.

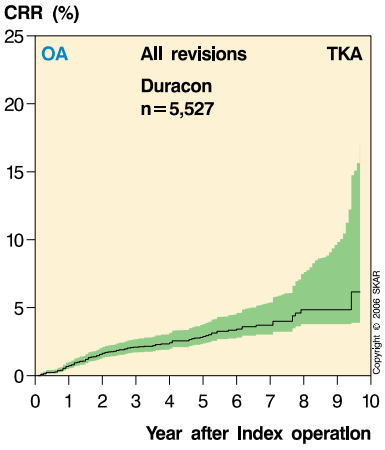
CRR for commonly used TKA implants in OA during 1995–2004

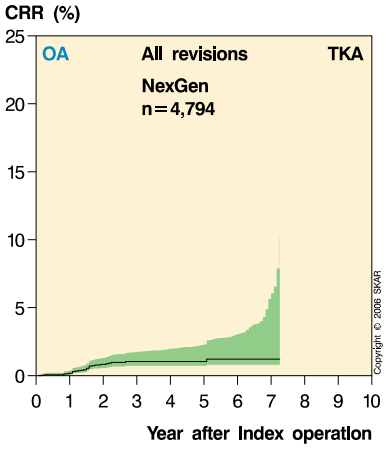


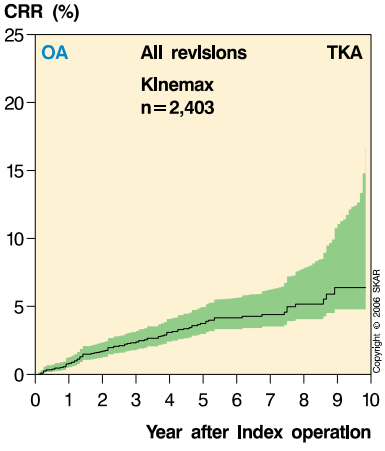


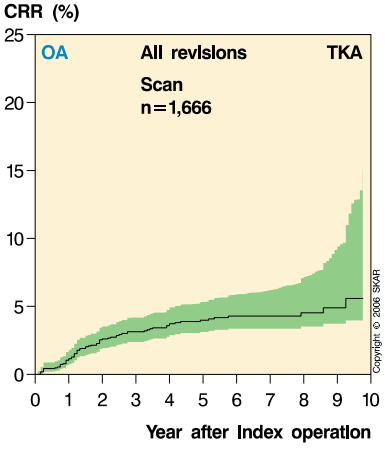


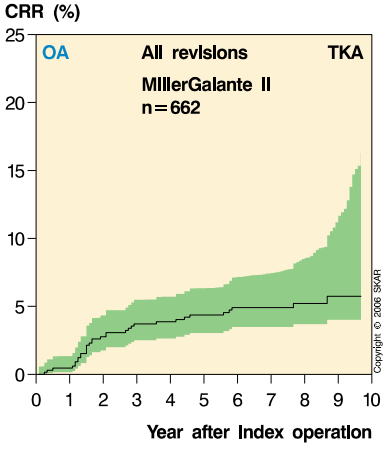


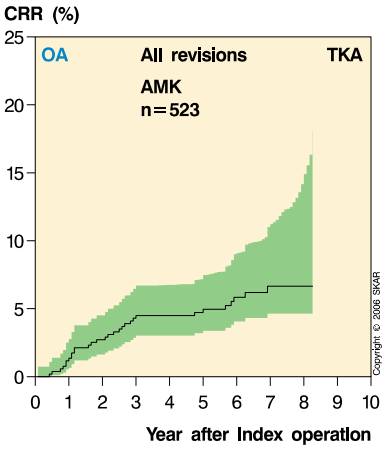











CRR (%)
OA
All revisions
TKA
AMK
n=523
Year after Index operation
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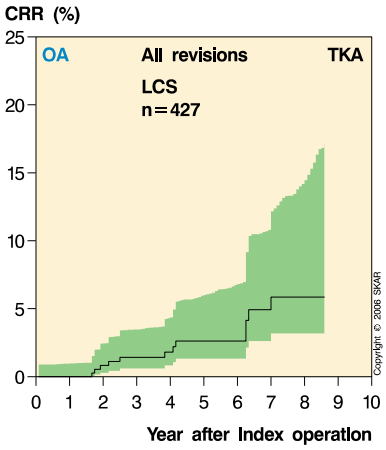
CRR (%)
OA
All revisions
TKA
LCS
n=427
Year after Index operation
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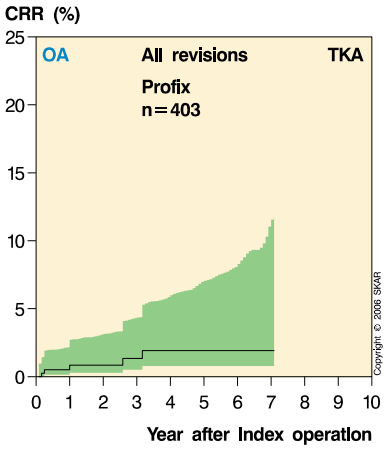
CRR (%)
OA
All revisions
TKA
Profix
n=403
Year after Index operation
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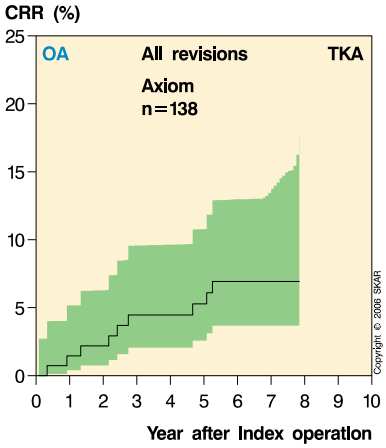
CRR (%)
OA
All revisions
TKA
Axiom
n=138
Year after Index operation
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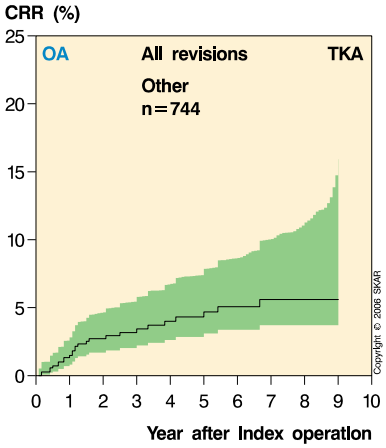
CRR (%)
OA
All revisions
TKA
Other
n=744
Year after Index operation
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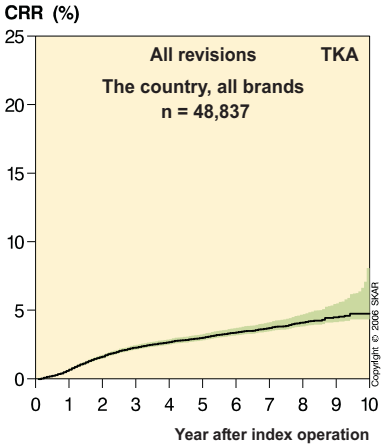
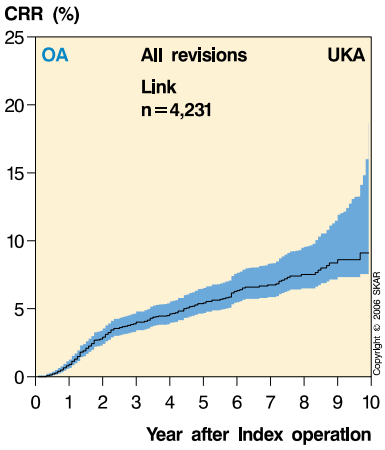
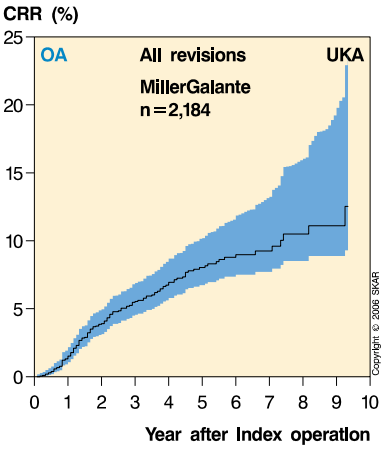
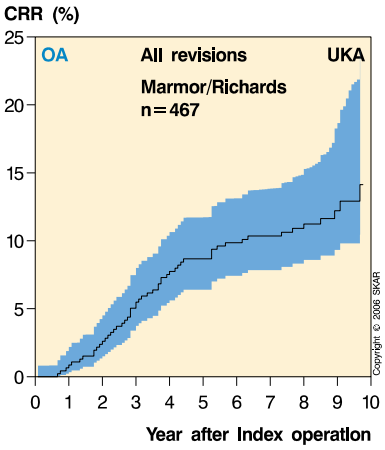
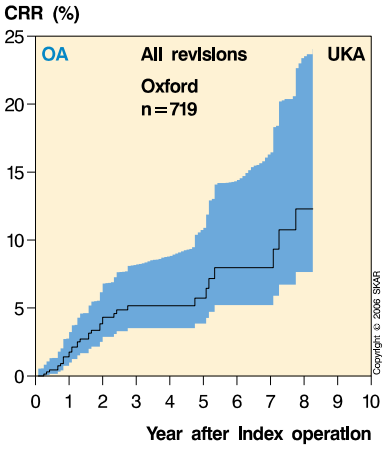

CRR (%)
All revisions
TKA
The country, all brands
n = 48,837
Year after index operation
Copyright © 2006 SKAR

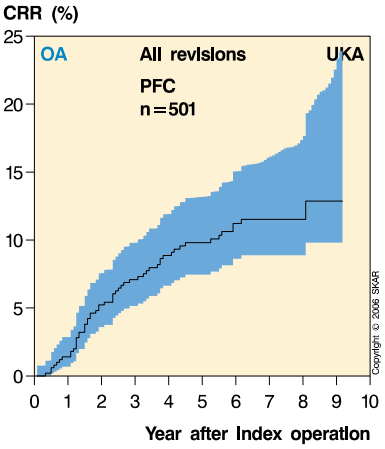
CRR for commonly used UKA implants in OA during 1995–2004

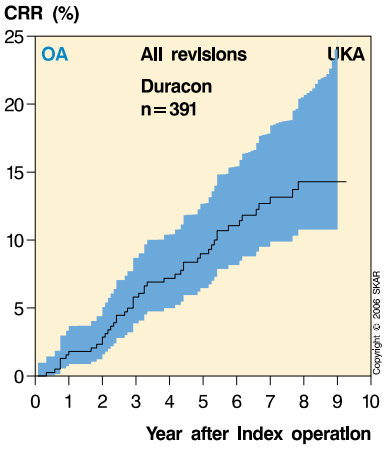


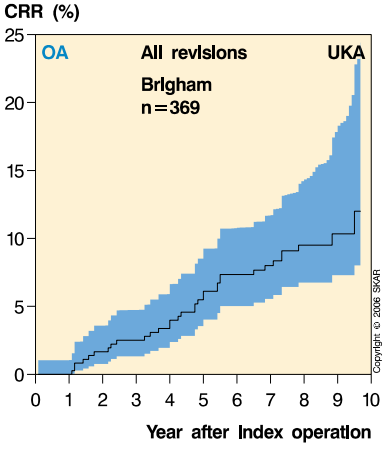


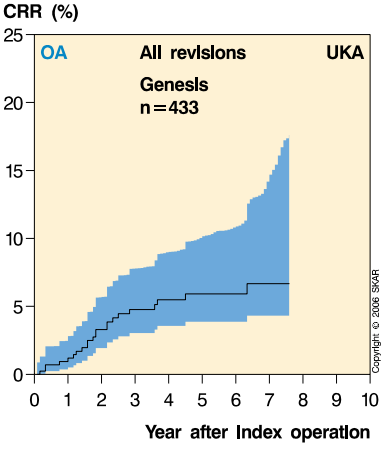


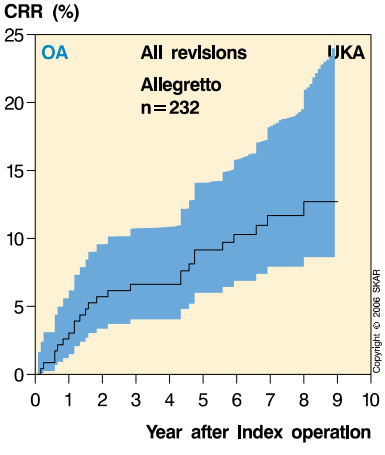


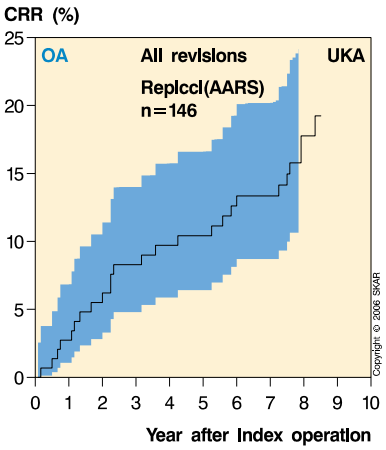


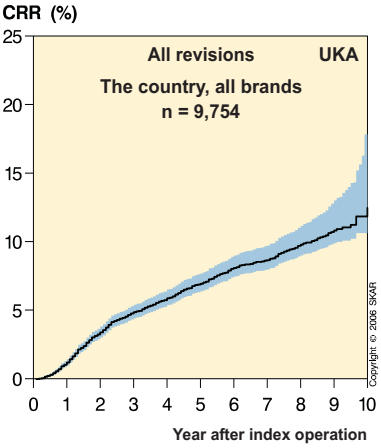












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Relative risk of revision over time (cemented TKA/OA)

The clinicspecific risk of revision – The register has been requested to account for hospital specific results. In order to do a reasonable comparison with respect to risk for revision only analyzed cemented TKA inserted for OA. Further, the results were adjusted for differences in age and gender as well as for differences with respect to if a patellar button had been used or not.

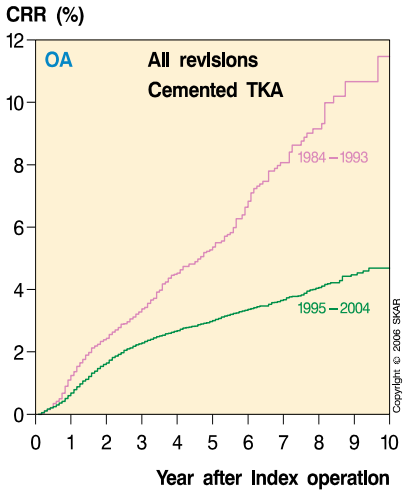
Compared to the period 1984-1993, the total risk of revision had decreased by 50% in 1994-2005 (figure upper, left). At the same time the distribution in the absolute risk of revision among the units had considerably reduced (figure below, right). However, the relative differences between the units have remained unchanged with some units having half or double the risk (figure below, left).

A complete list with the relative risk for each hospital, as compared to the national mean in 1995-2004, is shown on the opposite page.

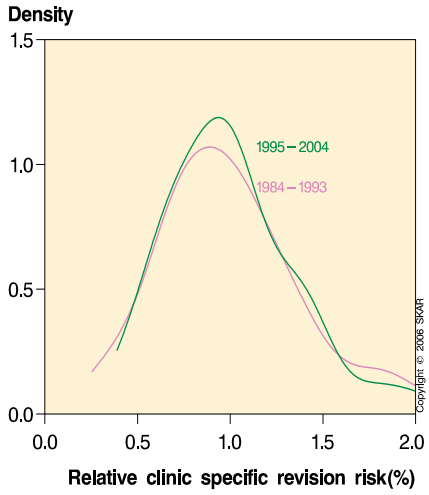
The 10-year risk of revision was calculated by the shared gamma frailty model which is a specific type of survival analysis. The register has published an article accounting for the method; Variation in outcome and issues in ranking hospitals. An analysis from the Swedish Knee Arthroplasty Register. Acta Orthop. 2006 Jun;77(3):487-93. (http://www.actaorthop.org)

There were 4 hospitals having significantly better results than the average hospital and 8 with significanly inferior results. One can only speculate on the causes for these differences. Unfortunate choice of implants, methods or surgeons may be the explanation but also selection of patients with higher risk profile (case-mix)

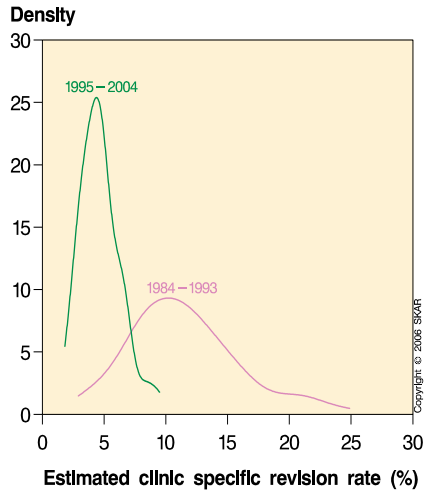
We find it appropriate to point out that the results are based on historical data in which the last implants were inserted 2 years ago and the first 12 years ago. Thus, the results do not have to reflect the current risk for patients undergoing surgery.



Total CRR for cemented TKA in OA during the 2 periods 1984–1993 and 1995–2004. Implants inserted during the latter period have half the risk of becoming revised.



Plotting the relative clinicspecific risk of revision as compared to the national mean shows that the distribution of relative risk among the hospitals has not changed between 1983–1992 and 1995–2004 (x-axis = relative risk).



Plotting the estimated absolute clinicspecific risk of revision shows that the absolute distribution has diminished between 1984-1993 and 1995-2004 (x-axis = absolute risk of revision).

Relative risk of revision for hospitals during 1995–2004 (cemented TKA/OA)

Kod	Klinik	n	rev.	RR	95% CI
13010	Eskilstuna	380	2	0.39	(0.19-0.82)
62011	Örnsköldsvik	677	3	0.41	(0.20-0.82)
53010	Falköping	522	2	0.44	(0.21-0.91)
10484	Sabbatsbergs närsjh.	704	3	0.45	(0.23-0.91)
64010	Skellefteå	488	4	0.52	(0.27-1.00)
22012	Värnamo	639	7	0.56	(0.32-0.99)
53013	Skövde	576	6	0.56	(0.31-1.02)
55012	Lindesberg	521	5	0.57	(0.30-1.05)
21001	Linköping	653	8	0.59	(0.34-1.01)
56012	Köping	633	7	0.61	(0.35-1.07)
28013	Simrishamn	551	3	0.61	(0.31-1.23)
65014	Kalix	164	0	0.62	(0.26-1.48)
54013	Säffle	410	5	0.62	(0.34-1.16)
13012	Kullbergska sjukh.	539	6	0.64	(0.35-1.15)
50010	Östra sjukhuset	737	11	0.65	(0.40-1.06)
23010	Växjö	456	6	0.68	(0.37-1.22)
22010	Jönköping	730	10	0.68	(0.41-1.13)
52011	Borås	704	12	0.7	(0.43-1.12)
54014	Torsby	513	7	0.7	(0.40-1.23)
13011	Nyköping	367	5	0.7	(0.38-1.31)
52012	Alingsås	442	5	0.71	(0.38-1.33)
65016	Sunderby sjukhus	241	2	0.73	(0.35-1.53)
56010	Västerås	404	7	0.74	(0.42-1.31)
42011	Varberg	926	16	0.74	(0.49-1.13)
11001	Karolinska	724	10	0.76	(0.46-1.26)
27011	Karlshamn	680	9	0.77	(0.46-1.30)
21014	Motala	657	8	0.78	(0.45-1.34)
10010	Sabbatsberg	31	0	0.81	(0.34-1.94)
57012	Ludvika	35	0	0.81	(0.34-1.94)
50001	Sahlgrenska	451	9	0.83	(0.49-1.41)
11014	Nacka / Södersjh.	57	1	0.84	(0.38-1.87)
24010	Västervik	640	11	0.84	(0.52-1.38)
28011	Ängelholm	718	13	0.85	(0.53-1.35)
54010	Karlstad	724	12	0.85	(0.53-1.37)
41001	Lund	223	5	0.86	(0.46-1.59)
12481	Elisabethsjukhuset	91	0	0.86	(0.36-2.06)
12010	Enköping	530	8	0.87	(0.50-1.50)
50071	Frölunda Spec.Sjukh.	190	2	0.88	(0.42-1.85)
50080	Sergelkliniken Gbg	140	1	0.9	(0.40-1.99)
55010	Örebro	515	10	0.91	(0.55-1.51)
61013	Sandviken	15	0	0.91	(0.38-2.18)
52013	Skene	498	11	0.92	(0.56-1.50)
25010	Kalmar	839	18	0.95	(0.63-1.43)
42010	Halmstad	772	17	0.95	(0.63-1.45)
41012	Helsingborg	490	12	0.96	(0.59-1.54)
55011	Karlskoga	463	9	0.96	(0.57-1.62)
50020	Gothenb Med Center	42	0	0.96	(0.40-2.30)
61011	Bollnäs / Söderhamn	521	10	0.98	(0.59-1.63)
42015	Movement Halmstad	12	0	0.98	(0.41-2.36)
10015	Sophiahemmet	490	10	0.99	(0.60-1.65)
65011	Luleå	1	0	0.99	(0.42-2.38)
27010	Karlskrona	338	11	1	(0.61-1.63)
64011	Lycksele	285	7	1	(0.57-1.76)
21013	Norrköping	687	19	1	(0.67-1.49)
54012	Arvika	289	5	1.03	(0.55-1.91)
11011	Södertälje	528	12	1.03	(0.64-1.66)
11002	Huddinge	571	15	1.03	(0.67-1.61)
26010	Visby	407	12	1.06	(0.66-1.70)
64001	Umeå	393	9	1.06	(0.63-1.79)
56011	Sala	17	1	1.07	(0.48-2.37)
41010	Landskrona	635	14	1.07	(0.68-1.68)
28012	Hässleholm	1,732	38	1.08	(0.80-1.46)
65012	Gällivare	394	12	1.08	(0.67-1.74)
53011	Lidköping	490	12	1.09	(0.68-1.76)
11010	Danderyd	1,008	28	1.1	(0.78-1.55)
65010	Boden	227	9	1.11	(0.66-1.88)
63010	Östersund	542	14	1.11	(0.71-1.75)
10013	Södersjukhuset	922	29	1.12	(0.80-1.57)
10016	Ortopediska huset	536	10	1.13	(0.68-1.87)
28010	Kristianstad	22	2	1.2	(0.57-2.52)
51010	Uddevalla	684	20	1.23	(0.83-1.82)
61014	Söderhamn	41	3	1.24	(0.62-2.47)
10011	S:t Göran	2,368	69	1.27	(1.00-1.60)
57011	Mora	761	26	1.3	(0.91-1.85)
12001	Akademiska sjukh.	801	31	1.3	(0.94-1.81)
25011	Oskarshamn	497	15	1.31	(0.84-2.03)
11012	Norrtälje	446	16	1.32	(0.86-2.02)
61012	Hudiksvall	463	16	1.32	(0.86-2.02)
11013	Löwenströmska	513	20	1.38	(0.93-2.04)
23011	Ljungby	489	19	1.38	(0.92-2.06)
51011	Mölndal	435	17	1.4	(0.92-2.12)
62010	Sundsvall	835	30	1.41	(1.01-1.97)
51012	Kungälv	632	24	1.43	(0.99-2.07)
52016	Vänersborg-NÄL	147	10	1.45	(0.87-2.40)
22011	Eksjö-Nässjö	559	23	1.47	(1.01-2.14)
57010	Falun	1,384	51	1.48	(1.13-1.93)
41013	Ystad	328	13	1.48	(0.93-2.35)
30001	Malmö	286	14	1.52	(0.97-2.39)
54011	Kristinehamn	147	11	1.74	(1.07-2.85)
62013	Sollefteå	396	17	1.79	(1.18-2.72)
41011	Trelleborg	999	39	1.82	(1.35-2.46)
61010	Gävle	391	23	2	(1.38-2.90)
65013	Piteå	323	17	2.03	(1.33-3.08)

The risk of revision has been calculated using ”the shared gamma frailty model” that estimates how the risk of revision is affected by the operating hospital. In the table, the risk is shown as compared to the national mean (RR=relative risk of revision).
The method takes into consideration that units performing few operations more easily suffer far too optimistic or pessimistic risk estimates. Thus, the method shrinks such estimates towards the national mean in proportion to the amount of information they are based on.
For further information; Glidden DV & Vittinghoff E. Modelling clustered survival data from multicenter clinical trials. Statistics in Medicine 2004; 23: 369-388.

The results are adjusted for differences in sex and gender as well as for differences with respect to if a patellar button had been used or not.

Publications :

Robertsson O, Ranstam J & Lidgren L.
Variation in outcome and issues in ranking hospitals: An analysis from the Swedish Knee Arthroplasty Register.
Acta Orthop. 2006 Jun;77(3):487-93.

Bremander AB, Dunbar M, Knutson K, Petersson IF, Robertsson O.
Revision in previously satisfied knee arthroplasty patients is the result of their call on the physician, not on pre-planned follow-up: A retrospective study of 181 patients who underwent revision within 2 years.
Acta Orthop. 2005 Dec;6(76):785-90

Lidgren L, Robertson O.
Acrylic bone cements: clinical developments and current status: Scandinavia.
Orthop Clin North Am. 2005 Jan;36(1):55-61, vi. Review.

Harrysson OL, Robertsson O, Nayfeh JF
Higher Cumulative Revision Rate of Knee Arthroplasties in Younger Patients with Osteoarthritis.
Clin Orthop. 2004 Apr;1(421):162-168.

Dunbar MJ, Robertsson O, Ryd L.
What's all that noise? The effect of co-morbidity on health outcome questionnaire results after knee arthroplasty.
Acta Orthop Scand. 2004 Apr;75(2):119-26.

Robertsson O, Ranstam J.
No bias of ignored bilaterality when analysing the revision risk of knee prostheses: analysis of a population based sample of 44,590 patients with 55,298 knee prostheses from the national Swedish Knee Arthroplasty Register.
BMC Musculoskelet Disord. 2003 Feb 05;4(1):1.

Lidgren L
Arthroplasty and its complications.
In Rheumatology, 3rd edition. Ed by March C Hochberg, Alan J Silman, Josef S Smolen, Michael E Weinblatt, Michael H Weissman. Mosby, 2003, pp 1055-1065.

Lidgren L, Knutson K, Stéfansdóttir A.
Infection of prosthetic joints.
Best Pract Res Clin Rheumatol 2003;17(2):209-218.

Lidgren L.
Arthroplasty and its complications.
In Osteoarthritis, 2nd ed. Eds: Kenneth D. Brandt, Michael Doherty, L Stefan Lohmander. Oxford Univerity Press, 2003, chapter 9.19, pp 361-

Robertsson, O and K. Knutson.
Knee arthroplasty registers.
Prothéses totales du genou. Ed. by Roger Lemaire and Jacques Witvoet. Éditions scientifiques et médicales Elsevier SAS, 2002.

Dunbar M J, Robertsson O, Ryd L, Lidgren L.
Appropriate Questionnaires for Knee Arthroplasty.
J Bone Joint Surg [Br] 2001;83-B:339-44.

Knutson K.
Arthroplasty and its complications.
Osteoarthritis. Ed. by Kenneth D. Brandt, Michael Doherty and Stefan Lomander.
Oxford University Press, 2nd ed. 2001.

Lindstrand A, Robertsson O, Lewold S, Toksvig-Larsen S.
The patella in total knee arthroplasty: resurfacing or non-resurfacing of patella.
Knee Surg Sports Traumatol Arthrosc. 2001;9 Suppl 1:S21-3.

Robertsson O, Knutson K, Lewold S and L Lidgren.
The Swedish Knee Arthroplasty Register 1975-1997: an update with special emphasis on 41,223 knees operated on in 1988-1997.
Acta Orthop Scand. 2001 Oct;72(5):503-13.

Robertsson O, Knutson K, Lewold S and L Lidgren.
The routine of surgical management reduces failure after unicompartmental knee arthroplasty.
J Bone Joint Surg [Br] 2001;83-B:45-9.

Robertsson O, MJ. Dunbar.
Patient satisfaction compared with general health and disease-specific questionnaires in knee arthroplasty patients.
J Arthroplasty. 2001 Jun;16(4):476-82.

Dunbar MJ, O Robertsson, L Ryd and L Lidgren.
Translation and validation of the Oxford-12 item knee score for use in Sweden.
Acta Orthop Scand 2000 Jun;71(3):268-74

Robertsson O, G Scott and MAR Freeman.
Ten-year survival of the cemented Freeman-Samuelson primary knee arthroplasty. Data from the Swedish Knee Arthroplasty Register and the Royal London Hospital.
J Bone Joint Surg Br 2000 May;82(4):506-7.

Robertsson O, Lewold S, Knutson K and L Lidgren.
The Swedish Knee Arthroplasty Project.
Acta Orthop Scand 2000 Jun;71(1):7-18.

Robertsson O, M Dunbar, K Knutson and L Lidgren.
Past incidence and future need for knee arthroplasty in Sweden. A report from the Swedish Knee Arthroplasty Register regarding the affect of past and future population changes on the number of arthroplasties performed.
Acta Orthop Scand, 71(4): 376-80, 2000.

Robertsson O, MJ Dunbar, K Knutson and L Lidgren.
Patient satisfaction after knee arthroplasty: a report on 27,372 knees operated on between 1981 and 1995 in Sweden.
Acta Orthop Scand 2000 Jun;71(3):262-7

Robertsson O.
Unicompartmental arthroplasty. Results in Sweden 1986-1995.
Orthopäde 2000 Jun;29 Suppl 1:S6-8

Sandmark H, Hogstedt C, Vingard E.
Primary osteoarthrosis of the knee in men and women as a result of lifelong physical load from work.
Scand J Work Environ Health. 2000 Feb;26(1):20-5.

Lidgren L and LS Lohmander.
Knäartros [Arthrosis of the knee].
Socialstyrelsens faktadatabas, : 1999.

Robertsson O, L Borgquist, K Knutson, S Lewold and L Lidgren.
Use of unicompartmental instead of tricompartmental prostheses for unicompartmental arthrosis in the knee is a cost-effective alternative. 15,437 primary tricompartmental prostheses were compared with 10,624 primary medial or lateral unicompartmental prostheses.
Acta Orthop Scand, 70(2): 170-5, 1999.

Robertsson O, M Dunbar, K Knutson, S Lewold and L Lidgren.
Validation of the Swedish Knee Arthroplasty Register: a postal survey regarding 30,376 knees operated on between 1975 and 1995.
Acta Orthop Scand, 70(5): 467-72, 1999.

Robertsson O, MJ Dunbar, K Knutson, S Lewold and L Lidgren.
The Swedish Knee Arthroplasty Register: 25 Years Experience.
Bulletin Hospital for Joint Diseases, 58(3): 133-8, 1999.

Sandmark H, C Högstedt, S Lewold and E Vingard.
Osteoarthrosis of the knee in men and women in association with overweight, smoking, and hormone therapy.
Ann Rheum Dis, 58(3): 151-5, 1999.

Sandmark H, Vingard .
Sports and risk for severe osteoarthrosis of the knee.
Scand J Med Sci Sports 1999 Oct;9(5):279-84

Knutson K and L Lidgren.
Arthroplasty and its complications.
Osteoarthritis, : 1998.

Lewold S, O Robertsson, K Knutson and L Lidgren.
Revision of unicompartmental knee arthroplasty: outcome in 1,135 cases from the Swedish Knee Arthroplasty study.
Acta Orthop Scand, 69(5): 469-74, 1998.

Blunn GW, AB Joshi, RJ Minns, L Lidgren, P Lilley, L Ryd, E Engelbrecht and PS Walker.
Wear in retrieved condylar knee arthroplasties. A comparison of wear in different designs of 280 retrieved condylar knee prostheses.
J Arthroplasty, 12(3): 281-90, 1997.

Knutson K, S Lewold, L Lidgren and O Robertsson.
Knie-TEP Revisionseingriffe. Lösungsmöglichkeiten bei Beschwerden nach Implantation einer Knieendoprothese
Georg Thieme verlag 1997 ISBN 3-13-104711-9: 107-12

Robertsson O, K Knutson, S Lewold, S Goodman and L Lidgren.
Knee arthroplasty in rheumatoid arthritis. A report from the Swedish Knee Arthroplasty Register on 4,381 primary operations 1985-1995.
Acta Orthop Scand, 68(6): 545-53, 1997.

Robertsson O, K Knutson, S Lewold, S Goodman and L Lidgren.
Selected Scientific Exhibits - Knee arthroplasty in rheumatoid arthritis.
Archives of the American Academy of Orthopaedic Surgeons, 1(1): 44-50, 1997.

Stenström S, A Lindstrand and S Lewold.
Unicompartmental knee arthroplasty with special reference to the Swedish Knee Arthroplasty Register.
Cahiers d´enseignement de la SOFCOT, : 159-62, 1997.

Lewold S, H Olsson, P Gustafson, A Rydholm and L Lidgren.
Overall cancer incidence not increased after prosthetic knee replacement: 14,551 patients followed for 66,622 person-years.
Int J Cancer, 68(1): 30-3, 1996.

Toksvig-Larsen S, L Ryd, A Stentström, F Dansgard, K Jonsson, O Robertsson and A Lindstrand.
The Porous-Coated Anatomic total knee experience. Special emphasis on complications and wear.
J Arthroplasty, 11(1): 11-7, 1996.

Lewold S, S Goodman, K Knutson, O Robertsson and L Lidgren.
Oxford meniscal bearing knee versus the Marmor knee in unicompartmental arthroplasty for arthrosis. A Swedish multicenter survival study.
J Arthroplasty, 10(6): 722-31, 1995.

Knutson K, S Lewold, O Robertsson and L Lidgren.
The Swedish knee arthroplasty register. A nation-wide study of 30,003 knees 1976-1992.
Acta Orthop Scand, 65(4): 375-86, 1994.

Lidgren L.
Low virulent bacteria in joint implant infection.
Zentralblatt für Bakteriologie, Suppl 27: 363-7, 1994.

Lewold S, K Knutson and L Lidgren.
Reduced failure rate in knee prosthetic surgery with improved implantation technique.
Clin Orthop, (287): 94-7, 1993.

Blunn GW, AB Joshi, PA Lilley, E Engelbrecht, L Ryd, L Lidgren, K Hardinge, E Nieder and PS Walker.
Polyethylene wear in unicondylar knee prostheses. 106 retrieved Marmor, PCA, and St Georg tibial components compared.
Acta Orthop Scand, 63(3): 247-55, 1992.

Lindstrand A, A Stenstrom and S Lewold.
Multicenter study of unicompartmental knee revision. PCA, Marmor, and St Georg compared in 3,777 cases of arthrosis.
Acta Orthop Scand, 63(3): 256-9, 1992.

Bengtson S and K Knutson
The infected knee arthroplasty. A 6-year follow-up of 357 cases.
Acta Orthop Scand, 62(4): 301-11, 1991.

Odenbring S, N Egund, K Knutson, A Lindstrand and ST Larsen.
Revision after osteotomy for gonarthrosis. A 10-19-year follow-up of 314 cases.
Acta Orthop Scand, 61(2): 128-30, 1990.

Bengtson S, K Knutson and L Lidgren.
Treatment of infected knee arthroplasty.
Clin Orthop, (245): 173-8, 1989.

Bengtson S, A Carlsson, M Relander, K Knutsson and L Lidgren.
Prothèse du genou exposèe - traitement. [An exposed knee prosthesis--treatment].
Rev Chir Orthop Reparatrice Appar Mot, 74(Suppl 2): 322-3, 1988.

Bengtson S, L Borgquist and L Lidgren.
Cost analysis of prophylaxis with antibiotics to prevent infected knee arthroplasty.
Bmj, 299(6701): 719-20, 1989.

Bengtson S, A Carlsson, M Relander, K Knutson and L Lidgren.
Treatment of the exposed knee prosthesis.
Acta Orthop Scand, 58(6): 662-5, 1987.

Bengtson S, G Blomgren, K Knutson, A Wigren and L Lidgren.
Hematogenous infection after knee arthroplasty.
Acta Orthop Scand, 58(5): 529-34, 1987.

Rööser B, T Boegard, K Knutson, U Rydholm and L Lidgren.
Revision knee arthroplasty in rheumatoid arthritis.
Clin Orthop, (219): 169-73, 1987.

Bengtson S, K Knutson and L Lidgren.
Revision of infected knee arthroplasty.
Acta Orthop Scand, 57(6): 489-94, 1986.

Knutson K, A Lindstrand and L Lidgren.
Survival of knee arthroplasties. A nation-wide multicentre investigation of 8000 cases.
J Bone Joint Surg [Br], 68(5): 795-803, 1986.

Rosenqvist R, B Bylander, K Knutson, U Rydholm, B Rooser, N Egund and L Lidgren.
Loosening of the porous coating of bicompartmental prostheses in patients with rheumatoid arthritis.
J Bone Joint Surg [Am], 68(4): 538-42, 1986.

Knutson K, A Lindstrand and L Lidgren.
Arthrodesis for failed knee arthroplasty. A report of 20 cases.
J Bone Joint Surg [Br], 67(1): 47-52, 1985.

Knutson K, B Tjörnstrand and L Lidgren.
Survival of knee arthroplasties for rheumatoid arthritis.
Acta Orthop Scand, 56(5): 422-5, 1985.

Rydholm U, T Boegard and L Lidgren.
Total knee replacement in juvenile chronic arthritis.
Scand J Rheumatol, 14(4): 329-35, 1985.

Tjörnstrand B and L Lidgren.
Fracture of the knee endoprosthesis. Report of three cases of tibial component failure.
Acta Orthop Scand, 56(2): 124-6, 1985.

Boegard T, H Brattström and L Lidgren.
Seventy-four Attenborough knee replacements for rheumatoid arthritis. A clinical and radiographic study.
Acta Orthop Scand, 55(2): 166-71, 1984.

Knutson K, B Bodelind and L Lidgren.
Stability of external fixators used for knee arthrodesis after failed knee arthroplasty.
Clin Orthop, (186): 90-5, 1984.

Knutson K, L Hovelius, A Lindstrand and L Lidgren.
Arthrodesis after failed knee arthroplasty. A nationwide multicenter investigation of 91 cases.
Clin Orthop, (191): 202-11, 1984.

Knutson K, I Leden, G Sturfelt, I Rosen and L Lidgren.
Nerve palsy after knee arthroplasty in patients with rheumatoid arthritis.
Scand J Rheumatol, 12(3): 201-5, 1983.

Knutson K and L Lidgren.
Arthrodesis after infected knee arthroplasty using an intramedullary nail. Reports of four cases.
Arch Orthop Trauma Surg, 100(1): 49-53, 1982.

Blader S, K Knutson and V Surin.
[Swedish experience with total endoprostheses of the knee (author's transl)].
Acta Chir Orthop Traumatol Cech, 48(3): 234-41, 1981.

Knutson K, G Jonsson, J Langer Andersen, H Larusdottir and L Lidgren.
Deformation and loosening of the tibial component in knee arthroplasty with unicompartmental endoprostheses.
Acta Orthop Scand, 52(6): 667-73, 1981.

Goodman S and L Lidgren.
Polyethylene wear in knee arthroplasty. A review.
Acta Orthop Scand, 63(3): 358-64, 1992.

Jonsson G, K Knutson, L Lidgren and A Lindstrand.
Knäartrodes [Knee joint arthrodesis].
Läkartidningen, 77(22): 2115-7, 1980.

The Swedish Knee Arthroplasty Register

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