THE NEW ZEALAND JOINT REGISTRY

FOURTEEN YEAR REPORT
JANUARY 1999 TO DECEMBER 2012

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EDITORIAL COMMENT

It is our pleasure to present the fourteen year report of the New Zealand Orthopaedic Association's New Zealand Joint Registry.

The total number of registered joint arthroplasties at 31st of December 2012 was 182905 which had been performed on 130985 individual patients of which 19931(15%) have died during the 14 year period. The number of observed component years (ocys) contained within the Registry has now reached almost 900,000. The increase of 17168 registered joints for 2012 compared to the 16710 in 2011 represents an overall annual gain of 2.7% which is over twice the percentage gain in 2011. There were increased registrations for hip (3.6%) knee (1.5%), unicompartmental knee (18%), shoulder (20%) and a 30% fall for elbow primary arthroplasty categories when compared to 2011. As for previous years analyses of revision data has been confined to primary registered arthroplasties.

In this year's report the format of previous years has been followed such that each arthroplasty section is self-contained. This does, however, result in a certain amount of intersection repetition.

There are 85769 hip arthroplasties in the Registry with an overall revision rate of 0.71 per 100 ocys (95% confidence interval; 0.68-0.73) with a 13 year prosthesis survival of 88.54%. The proportion of uncemented arthroplasties has fallen further from 47.10% in 2011 to 44.8% in 2012 with corresponding slight increases in fully cemented and hybrid athroplasties. This is a likely response to KM survival curves which continue to demonstrate better medium term survival for cemented and hybrid hip arthroplasty.

As in previous years the 3 types of hip fixation have been analysed against the four age bands: less than 55 years, 55-64 years, 65-74 years, and greater than 75 years. The data shows that overall the hybrid hip has the lowest revision rate across the 4 age bands and when for the first time bearing surface revision rates are compared across the same age bands the ceramic on plastic and ceramic on ceramic are overall performing the best and the metal on metal the worst.

The KM curves for the 3 types of arthroplasty show that at thirteen years prostheses survival is 88.88%, 87.97% and 89.29% respectively for cemented, uncemented and hybrid hips with a mean of 88.54%. This year we have developed survival curves for the various types of uncemented hip arthroplasty which further illustrate the poorer survival for metal on metal hip arthroplasty.

There are 951 hip prosthesis combinations in the Registry; 678 (71%) have fewer than 10 registered procedures and 300 (32%) one only. The Corail/Pinnacle combination remains currently the most popular but the ExeterV40/ Contemporay combination has accumulated the most component years at 26172 from 5070 primary arthroplasties and has the very low revision rate of 0.44/100 ocys

Revision rates for individual hip component combinations (minimum of 50 primary procedures) assembled in order of numbers of arthroplasties as well as revision rates have been calculated. In addition, tables listing combinations by fixation method have been added to make it easier for readers to determine the combination options used within the 3 types of prosthesis fixation. Five combinations which are still currently being used have revision rates significantly higher ($p<0.05$) than the overall rate of 0.71/100 ocys but none were in the top ten for 2012. Revision rates for the individual femoral and acetabular components have not been included as the data can be misleading because revising a component does not necessarily indicate that it had failed or needed replacing. However, it is worth noting that the revision rate for monoblock stems which have been implanted for an average of 9 years has the very low revision rate of 0.40/100ocys. Conversely the Continuum cup which was the third most popular cup in 2012 and used with nine different stems has a revision rate of 1.56/100ocys. This is an improvement from the 2.00/100ocys noted last year but 47% of the revisions involving the Continuum cup are for dislocation which is twice the overall rate.

This year revision rates for X linked and standard polyethylene have been compared for both metal and ceramic heads. Thus far no significant differences are noted but the ocys for the X linked are well below 50% of those for standard polyethylene.

"The total number of registered joint arthroplasties at 31st of December 2012 was 182905 which had been performed on 130985 individual patients of which 19931(15%) have died during the 14 year period."

KM survival curves for some of the hip combinations with a minimum of 10 years of analysable data have once again been included as well as 5 year survival curves for those combinations with a minimum of 2000 procedures. It is noted that the Exeter combinations are among the better and the Spectron combinations among the poorer survival curves.

The revision rates for the various bearing surfaces used in primary hip arthroplasty i.e. metal on plastic, metal on metal, ceramic on plastic, ceramic on metal, ceramic

on ceramic have once again been analysed with respect to head size. Head sizes >36mm (70% are metal on metal articulation) had a significantly higher revision rate at 2.75 compared to 0.77 for sizes 36mm, 0.65 for 32mm and 0.66/100ocys for =<28mm. These findings are similar to those from other Registries.

There has been a further increase in the number of primary hip revisions with ALVAL (aseptic lymphocytic vascular-associated lesions) listed as the reason for revision. In 2011 the number increased from15 to 72 and in 2012 to 102 and reflects the continuing failure rate of metal on metal hip prosthesis combinations which have >36mm heads. Further increases are anticipated in the coming years.

Overall, however, the hip revision rate noted above and the thirteen year prosthesis survival of 88.54% are among the best for similar national joint registries.

A similar situation applies to knee prostheses with the overall revision rate 0.50/100 ocys, (95% confidence interval; 0.48-0.52) and the thirteen year survival of 94.49%, again among the best for national joint registries. New Zealand surgeons can therefore be justifiably proud of these medium term trends.

As for the 13 year report it was agreed that several variants of basically the same knee prosthesis type eg Nexgen LCS, which are registered separately should be merged into the one group to enable comparable statistical analyses with other prostheses which may have also have variants but are registered as one or 2 prostheses.

The Insall/Burstein, Optetrak, Scorpio and LCS prostheses have significantly higher revision rates than the overall rate of 0.50/100 ocys ($p<0.05$). The Optetrak (32) and LCS (616) were the only ones implanted in 2012.

KM survival curves for six of the cemented knee prostheses with a minimum of 10 years of analysable data have again been included. The Duracon has the highest and the LCS and Nexgen the lowest (but still very good) survival.

Although uncemented knee arthroplasty represents just 4% of all primary knee arthroplasties it has a significantly higher revision rate ($p<0.05$) than either fully cemented or hybrid in which the tibial component is cemented and the femoral component uncemented. Analyses have confirmed that it is the loosening of the uncemented tibial component that is mainly responsible for the increased revision rate. The KM curves for the 3 types of fixation show that the uncemented curve continues to steeply diverge from the other two.

Image guidance (IG), first recorded by the registry in 2005, remains quite popular for primary knee arthroplasty and during 2012 was used in 15% of procedures, the highest annual usage yet. Comparison of revision rates for IG with non IG procedures demonstrates a rate of 0.57 versus 0.50/100 ocys. There is no statistical difference between the two at this early stage.

The analyses comparing revision rates and 10 year survival of fixed versus mobile bearing knees continues to show that fixed bearing have significantly lower revision rates and better 10 year survival than mobile bearing. These findings are also being reported from other Registries.

Again this year we have performed separate analyses for cruciate retaining versus posterior stabilised knee prostheses and have demonstrated that overall there are significantly higher revision rates for posterior stabilised prostheses which is also graphically illustrated with the KM survival graphs.

There are 243 patello-femoral prostheses registered with 36 added in 2012, a 29% decrease on 2011 compared to the 33% increase in 2011. Eighteen (7.4%) have been revised and the revision rate at 2.02/ocys is 4 times that for total knee arthroplasty. All except 3 were revised to a total knee arthroplasty.

With regard to unicompartmental knee arthroplasty there was an 18% increase in unicompartmental registrations for 2012, the largest since 2003. Once again the Oxford uncemented prosthesis was very dominant but although the revision rate compared to the overall mean and several of the other prostheses was significantly lower it had risen compared to 2011.

The minimally invasive approach for the uni-compartmental knee arthroplasty remains popular and in 2012 was used in 30% of procedures.

Once again we have compared the deep infection revision rates within six months of the arthroplasty for primary hip and knee arthroplasty against the theatre environment. Six months has been chosen as infection within this time period is highly likely to have been introduced at the time of surgery. This year's analyses again demonstrate that for primary hip and knee arthroplasty there was an increased risk for revision for deep infection when the primary procedure was carried out in a laminar flow theatre with a space suit compared to a conventional theatre without a space suit (2.4 & 2.8 times respectively for hip and knee). The use of space suits also significantly increases the risk of revision for deep infection in both conventional and laminar flow theatres. There had been no change in the percentage

of arthroplasties performed in laminar flow theatres and the use of space suits in 2012 following the slight drop in 2011.

Body mass index (BMI) data was again analysed for hip and knee patients with the mean BMI border line obesity (29, range 14-61, for hips & 31, range 14-70, for knees). There were significant numbers of morbidly obese (BMI>40) people receiving arthroplasties.

The number of primary ankle arthroplasties increased by 108 in 2012 which was 1 fewer than the previous year and the lowest annual increase since 2008. The Mobility/ Salto ratio was dramatically reversed in 2012 with well over twice the number of Salto prostheses implanted compared to the Mobility. Together they accounted for 102 of the 108 implanted. The KM survival curve for all ankle prostheses demonstrates 90% survival at 7 years.

In the shoulder arthroplasty section, resurfacing arthroplasty has been further divided into partial and total which along with hemi-arthroplasty makes 5 separate arthroplasty groups for analyses with respect to revision rates and Oxford scores. The SMR which is currently the most popular of the prosthesis options has significantly higher revision rates for the conventional, hemi and partial resurfacing versions. The revision rate for the conventional version of the SMR has now risen to 6 times the revision rate of the long established Global prosthesis, 8 times the Global AP and 10 times the Bigliani/Flatow. The SMR conventional total prosthesis analyses do, however, include SMR L2 glenoid data and as reported in the 13 year report it has been withdrawn from the market.

There is also a significantly higher revision rate for Partial Resurfacing prostheses compared to the overall mean and all the other arthroplasty types but the Partial Resurfacing group have a significantly lower mean surgery age compared to the other groups (57 vs >70) indicating their higher use in younger patients.

Conventional total and Resurfacing total shoulder prostheses have significantly higher (better) 6 month post arthroplasty Oxford scores.

With regard to elbow arthroplasty the annual numbers continue to fall and the 23 registered in 2012 is the smallest number since 2003. The revision rate at 1.12/100ocys is lower than for unicompartmental knees and ankles which is a little surprising as most are implanted in persons with rheumatoid arthritis. The Coonrad/Morrey prosthesis continues to reign supreme despite several challenges over the years.

Oxford 12 Questionnaire

More 10 year Oxford scores have been analysed for primary hip and knee arthroplasty. When the various score categories are compared to the 6 month and 5 year outcomes the only significant difference is an increase in the pain category for hips but not for knees. These 10 year scores affirm that the six-month score is indicative of the longer term outcome.

As noted in previous years the statistically significant relationship between the 6 month score and revision within 2 years for primary hips, knees, including unicompartmental and shoulders has again been demonstrated. Furthermore the 5 year score and revision within 2 years of that date demonstrates a similar significant relationship for hip and knee arthroplasty. Once again analyses of hip and knee six month post first revision arthroplasty questionnaire data has been undertaken and it demonstrates a similar relationship between the Oxford score at 6 months and the second revision within 2 years.

In terms of using the Oxford scores as a screening tool for arthroplasty follow up it is worth noting that using 6 month data 70% of hip, 72% of knee and unicompartmental revisions within 2 years would have been captured by monitoring the lowest 30% of the Oxford scores. From the 5 year data, 72% of hip and 62% of knee revisions would have been captured by again monitoring the lowest 30% of the Oxford scores.

Deceased Person's Data.

A deceased person's data is valid in perpetuity for all analyses involving the time interval prior to the person's death e.g. if a person dies 8 years post primary hip replacement their data is always valid for all analyses for that 8 year period. Hence the rider "deceased patients censored at time of death."

Publications and Presentations

Since last year's report further peer reviewed papers based on registry data have been published in, accepted by or submitted to international journals. (see appendix 2)

Alastair Rothwell	*Supervisor*
Toni Hobbs	*Coordinator*
Chris Frampton	*Statistician*

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For the website and other facilities

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- SOUTHERN CROSS HOSPITALS
- WISHBONE TRUST

PARTICIPATING HOSPITALS

We wish to gratefully acknowledge the support of all participating hospitals and especially the coordinators who have taken responsibility for the data forms.

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PROFILE OF THE AVERAGE NEW ZEALAND ORTHOPAEDIC SURGEON

From our analyses the average orthopaedic surgeon performed in 2012*

36
Total hip arthroplasties

with 45% using uncemented,15% fully cemented and 40% hybrid prostheses: has a 88.54% survival at 13 years and a revision rate of 0.71 per 100 component years; 0.46% have been revised for deep infection; 84% at 6 months, 89% at five years and 87% at 10 years had an excellent or good Oxford score.

33
Total knee arthroplasties

with almost all cemented but only 9 with patellae resurfaced; has a 94.49% survival at 13 years and a revision rate of 0.5 per 100 component years; 0.65% have been revised for deep infection; 73% at 6 months, 82% at 5 years and 80% at ten years had an excellent or good Oxford score.

9
Unicompartmental knee arthroplasties

with most cemented; has a 84.21% survival at 10 years and a revision rate of 1.29 per 100 component years; 0.27% have been revised for deep infection; 82% at six months, 88% at 5 years and 85% at ten years had an excellent or good Oxford score.

9
Shoulder arthroplasties

with a 2:1 split between total arthroplasty varieties and hemiarthroplasty; has a 93.08% survival at 9 years and a revision rate of 0.99 per 100 component years; 0.33% have been revised for deep infection; 68% at 6 months and 75% at 5 years had excellent or good Oxford scores.

7
Total ankle arthroplasties

with most uncemented; 90.30% survival at 7 years and a revision rate of 1.33 per 100 component years; 0.42% revised for deep infection; 57% at 6 months and 64% at 5 years had excellent or good Oxford derived scores.

<2
Total elbow arthroplasties

with most likely a cemented Coonrad-Morrey prosthesis; 93.73% survival at 4 years and a revision rate of 1.12 per 100 component years; 1.63% have been revised for deep infection; 70% at 6 months and 89% at 5 years had excellent or good Oxford derived scores.

** averages derived from the number of surgeons recorded performing the above procedures during 2012 and not from the **total pool** of orthopaedic surgeons*

DEVELOPMENT AND IMPLEMENTATION OF THE NEW ZEALAND JOINT REGISTRY

The year 1997 marked 30 years since the first total hip replacement had been performed in New Zealand and as a way of recognising this milestone it was unanimously agreed by the membership of the New Zealand Orthopaedic Association (NZOA) to adopt a proposal by the then President, Alastair Rothwell to set up a National Joint Registry.

New Zealand surgeons had always been heavily dependent upon northern hemisphere teaching, training and outcome studies for developing their joint arthroplasty practice and it was felt that it was more than timely to determine the characteristics of joint arthroplasty practice in New Zealand and compare the outcomes with northern hemisphere counterparts. It was further considered that New Zealand would be ideally suited for a National Registry with its strong and co-operative NZOA membership, close relationship with the implant supply industry and its relatively small population. Advantages of a Registry were seen to be: survivorship of different types of implants and techniques; revision rates and reasons for; infection and dislocation rates, patient satisfaction outcomes, audit for individual surgeons, hospitals, and regions; opportunities for in-depth studies of certain cohorts and as a data base for fund raising for research.

Administrative Network

It was decided that the Registry should be based in the Department of Orthopaedic Surgery, Christchurch Hospital and initially run by three part time staff: a Registry Supervisor (Alastair Rothwell), the Registry Coordinator (Toni Hobbs) and the Registry Secretary (Pat Manning). As all three already worked in the Orthopaedic Department it was a cost effective and efficient arrangement to get the Registry underway.

New Zealand was divided into 19 geographic regions and an orthopaedic surgeon in each region was designated as the Regional Coordinator whose task was to set up and maintain the data collection network within the hospitals for his region.

This network included a Theatre Nurse Coordinator in every hospital in New Zealand who voluntarily took responsibility for supervising the completion, collection and dispatch of the data forms to the Registry.

Data Collection Forms

The clear message from the NZOA membership was to keep the forms for data collection simple and user friendly. The Norwegian Joint Register's form was used as a starting point but a number of changes were made following early trials. The forms are largely if not completely filled out by the operating theatre circulating nurse ready to be checked and signed by the surgeon at the end of the operation.

Data Base

The Microsoft Access 97 data base programme was chosen because it is easy to use, has powerful query functions, can cope with one patient having several procedures on one or more joints over a lifetime and has "add on" provisions. The data base is expected to meet the projected requirements of the Registry for at least 20 years. It can accommodate software upgrades as required.

Patient Generated Outcomes

The New Zealand Registry was one of the first to collect data from patient generated outcomes. The validated Oxford Hip and Knee outcomes questionnaires were chosen to which were added questions relating to dislocation, infection and any other complication that did not require further joint surgery. It was agreed that these questionnaires should be sent to all registered patients six months following surgery and then at five yearly intervals. The initial response rate was between 70 and 75% and this has remained steady over the five year period.

However, because of the large numbers of registered primary hip and knee arthroplasties and on the advice of our statistician, questionnaires have been sent out on a random selection basis since July 2002 to achieve an annual response of 20% for each group. All patients in the other arthroplasty groups including revision arthroplasty are sent the questionnaires.

Funding

Several sources of funding were investigated including contributions from the Ministry of Health, various funding agencies, medical insurance societies and an implant levy payable by surgeons and public hospitals to supplement a grant from the NZOA. In the early years the Registry had a "hand to mouth" existence relying on grants from the NZOA and Wishbone Trust until it received significant annual grants from the Accident Compensation Corporation. From 2002 funding became more reliable with the surgeons paying a $10 levy,

increased to $15 in 2008, for each joint registered from a private hospital, and the Ministry of Health agreeing to pay $72,000 a year as part of the Government Joint Initiative. Since 2005 the Southern Cross Hospitals have contributed $10,000 annually.

Ethical Approval

Application was made to the Canterbury Ethical Committee early in 1998; first for approval for hospital data collection without the need for patient consent and second for the patient generated outcomes using the Oxford 12 questionnaire plus the additional questions. The first part of the application was initially readily approved but the second part required several amendments to patient information and consent forms before approval was obtained.

A reapplication had to be made when the Ethics Committee of a private hospital chain refused to allow their nurses to participate in the project unless there was prior written patient consent. This view was supported by the Privacy Commissioner on the grounds that the Registry data includes patient identification details. The approval process was eventually successful but did delay the New Zealand wide launch.

Surgeon and Hospital Reports

It was agreed that every six months reports were to be generated from the Registry data base for primary and revision hip and knee replacements and to consist of: the number of procedures performed by the individual surgeon or at the hospital; the total number of procedures performed in the region in which the surgeon works; the national total and cumulative totals for each of these categories. Six month and more recently 5 year Oxford 12 scores are also included. Since 2008 each surgeon also receives their individual revision rate for their registered primary arthroplasties, and the reports have become annual rather than six monthly.

Introduction of the Registry

The National Joint Registry was introduced as a planned staged procedure.

Stage I: November 1997 to March 1998

The base administrative structure was established. The data forms and the data base were developed and a trial was performed at Burwood Hospital.

Stage II: April 1998 to June 1998

Further trialling was performed throughout the Christchurch Hospitals and the data forms and information packages were further refined.

Stage III: July 1998 to March 1999

The data collection was expanded into five selected New Zealand regions for trial and assessment.

Also during this time communication networks and the distribution of information packages into the remaining regions of New Zealand were carried out.

Stage IV: April 1st 1999

The National Joint Registry became fully operational throughout New Zealand.

DEVELOPMENT SINCE THE INTRODUCTION OF THE REGISTRY

INCLUSION OF OTHER JOINT REPLACEMENT ARTHROPLASTIES

At the request of the NZOA membership the data base for the Registry was expanded to include total hip replacements for fractured neck of femur, unicompartmental replacements for knees, and total joint replacements for ankles, elbows and shoulders including hemiarthroplasty for the latter. Commencement of this data collection was in January 2000 and this information is included in the annually surgeon and hospital reports.

The validated-Oxford questionnaire was available for the shoulder and was modified, but not validated as a questionnaire for the elbow and ankle joints. All those receiving total arthroplasty of the above joints as well as unicompartmental knee arthroplasty are sent questionnaires with a reply rate of between 70 and 75%. As for hips and knees the questionnaires are sent out 6 months post surgery and then at five yearly intervals.

Monitoring of Data Collection

The aim of the Registry is to achieve a minimum of 90% compliance for all hospitals undertaking joint replacement surgery in New Zealand.

It is quite easy to check the compliance for public hospitals as they are required to make regular returns with details of all joint replacement surgery to the NZ Health Information Service. For a small fee the registered joints from the Registry can be compared against the hospital returns for the same period and the compliance calculated. Any obvious discrepancies are checked out with the hospitals concerned and the situation remedied. It is more difficult with private hospital surgery as they are not required to file electronic returns. However by enlisting the aid of prosthesis supply companies it is possible to check the use of prostheses region by region and any significant discrepancy is further investigated.

Another method is to check data entry for each hospital against the previous corresponding months and if there is an obvious trend change then again this is investigated.

The most recent compliance audit in March 2011 again demonstrated a New Zealand wide public hospital compliance of 98% when compared to NZHIS data

Registered patient deaths are also obtained from the NZHIS.

Data Entry by Scanning

Barcoding of the labels containing all the prosthesis identification data has now become widespread throughout the implant industry and currently staff are able to scan in 84% of hip and 90% of knee prosthesis data directly into the Registry.

All manually entered data is at least double checked for accuracy.

Staffing

Staff has expanded to four mainly part time data entry and secretarial personnel. This is in order to maintain a lag time between receipt and entry of data forms of no more than two months and to free up the Coordinator to cope with the ever increasing numbers of requests for Registry data.

The 2012 Registry staff are; Alastair Rothwell, Supervisor, Toni Hobbs, Coordinator, Pat Manning Secretary, Lynley Diggs, Anne McHugh and Tania Wright data processors.

Use of Registry Data

There have been increasing numbers of requests for information from the Registry from a wide variety of sources including international ones. Great care is taken to protect patient confidentiality at all times and patient details are only released to appropriately accredited personnel and it is emphasised that Ethics Committee approval is required for any research projects involving patient contact.

The NZJR Board has decreed that only data analysed by the Registry's statistician can be released to approved outside agencies.

Registry Board

This Registry Board membership consists of: 5 Orthopaedic Surgeons; Registry Coordinator; Orthopaedic Implant Industry Representative; Arthritis New Zealand Representative; Chief Executive and Secretary NZOA. The main tasks of the Board are to monitor the organisational structure and functions of the Registry, rule on difficult requests for information from the Registry, advise appropriate authorities regarding data from the Registry that could effect the health status of implant patients, encourage and support research and work with the International Society of Arthroplasty Registries.

NUMBER OF JOINTS ANALYSED
1ST JANUARY 1999- 31ST DECEMBER 2012

Numbers of procedures registered

	14 years	13 years	12 years	11 years	10 years	9 years	8 years	1-7 years
Hips, primary	85769	78283	71057	63681	56383	49374	42421	35998
Hips, revision	12731	11596	10463	9445	8405	7360	6383	5485
Knees, primary	64799	58496	52214	46093	40068	34458	28705	23572
Knees, revision	5089	4603	4159	3727	3293	2883	2499	2152
Knees unicompartmental	7388	6621	6035	5452	4826	4284	3709	3129
Shoulders, primary	4784	4083	3505	3013	2498	2044	1641	1277
Shoulders, revision	360	305	255	213	180	139	105	80
Elbows, primary	386	364	331	301	267	227	191	159
Elbows, revision	67	64	56	49	41	36	31	26
Ankles, primary	945	837	728	603	484	377	298	217
Ankles, revision	79	64	50	38	29	26	19	12
Lumbar Disc, primary	142	140	129	111	94	75	59	38
Lumbar Disc, revision	3	3	3	3	-	-	-	-
Lumbar fusion, primary	163	109	-	-	-	-	-	-
Cervical Disc, primary	199	168	122	95	57	31	-	-
Cervical Disc, revision	1	1	1	1	-	-	-	-
TOTAL	**182,905**	**165,737**	**149,027**	**132,510**	**116,625**	**101,314**	**86,061**	**72,159**

Bilateral joint replacements carried out under the same anaesthetic

Bilateral hips

1723 patients (3446 hips) 4% of primary hips

Bilateral knees

2741 patients (5482 knees) 9% of primary knees

Bilateral Unicompartmental knees

605 patients (1210 knees) 16% of unicompartmental knees

Bilateral ankles

2 patients (4 ankles)

Bilateral shoulders

4 patients (8 shoulders)

During the 14 year period 130,985 individual patients were registered of which 19,931 (15%) have died.

*Trainee Surgeons: In the following analyses consultants **took responsibility** for their registrar surgeon procedures.*

PRIMARY HIP ARTHROPLASTY

The fourteen-year report analyses data for the period January 1999 – December 2012. There were 85,769 primary hip procedures registered including 1339 resurfacing arthroplasties. This is an additional 7,481 compared to last year's report.

1999	4114
2000	4715
2001	4932
2002	4830
2003	5058
2004	6029
2005	6320
2006	6430
2007	6962
2008	7004
2009	7306
2010	7367
2011	7221
2012	7481

There was a 3.6% increase in hip registrations for 2012, which reverses the decrease of the previous year.

Data Analysis

Age and sex distribution

The average age for all patients with primary hip arthroplasty was 66.86 years, with a range of 13.43 – 100.95 years.

All hip arthroplasty

	Female	Male
Number	45180	40589
Percentage	52.67	47.33
Mean age	68.34	65.21
Maximum age	100.95	96.97
Minimum age	13.43	15.87
Standard dev.	11.64	11.50

Conventional hip arthroplasty

	Female	Male
Number	44924	39506
Percentage	53.21	46.79
Mean age	68.45	65.57
Maximum age	100.95	96.97
Minimum age	13.43	5.87
Standard dev.	11.58	11.36

Resurfacing hip arthroplasty

	Female	Male
Number	256	1083
Percentage	19.12	80.88
Mean age	50.10	51.90
Maximum age	65.88	75.69
Minimum age	25.72	17.74
Standard dev.	7.17	8.53

A further 102 resurfacing hips were registered during 2012.

2004	21
2005	138
2006	169
2007	188
2008	191
2009	203
2010	185
2011	142
2012	102

The annual decrease continues since the peak in 2009.

Body Mass Index

For the 3 year period 2010 - 2012, there were 11217 BMI registrations for primary hip replacements. The average was 28.68 with a range of 14 – 61 and a standard deviation of 5.51.

Previous operation

None	81964
Internal fixation	1764
Osteotomy	490
Internal fixation for SUFE	173
Arthroscopy/arthrotomy	108
Arthrodesis	72
Open reduction	55
Core decompression	42
Girdlestone	22

Diagnosis

Osteoarthritis	74274
Acute fracture NOF	3067
Avascular necrosis	2685
Developmental dysplasia	2191
Rheumatoid arthritis	1254
Old fracture NOF	1098
Other inflammatory	788
Tumour	404
Post acute dislocation	275
Fracture acetabulum	166

Approach

Posterior	54347
Lateral	23434
Anterior	3500
Minimally invasive	1441
Trochanteric osteotomy	170
Image guided surgery	282

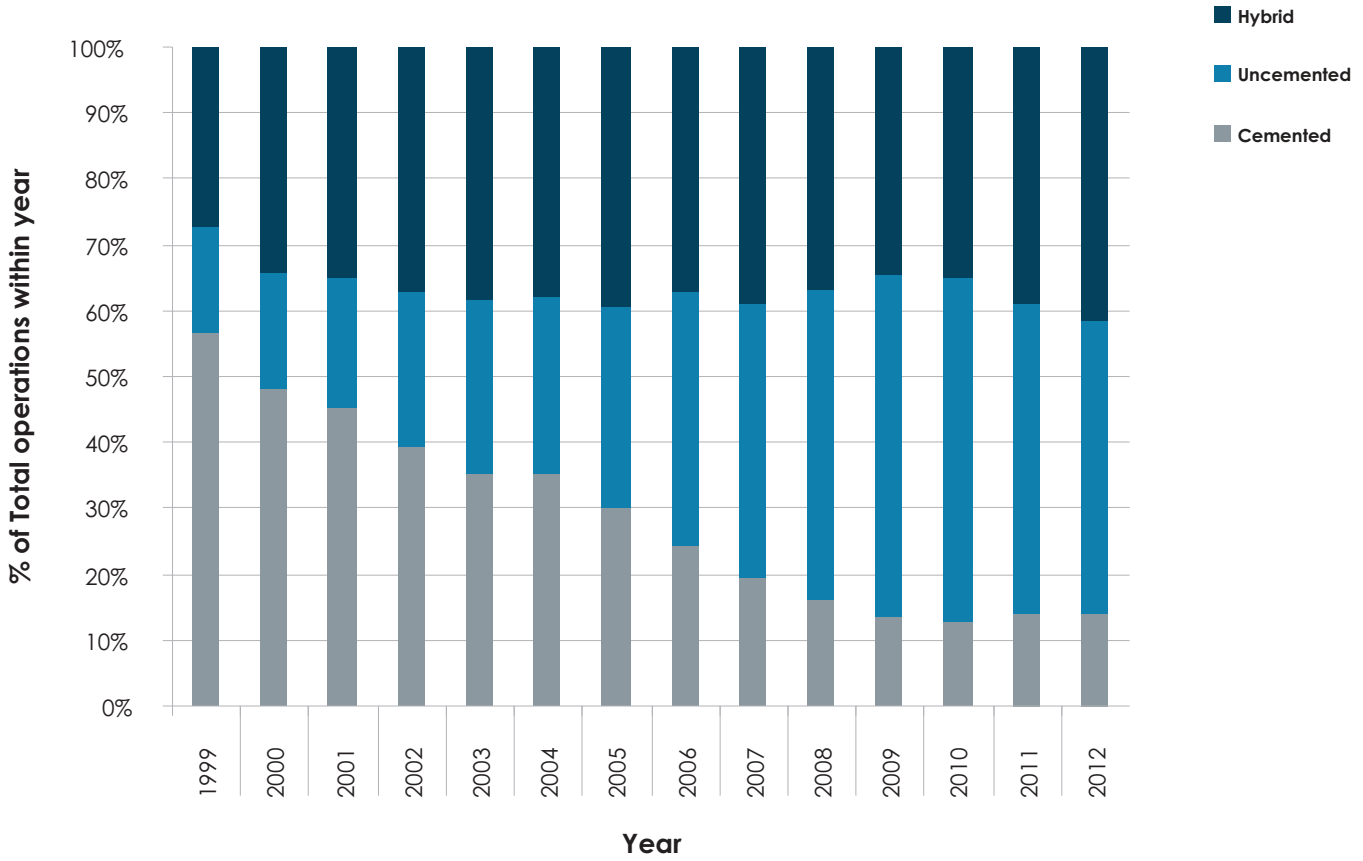
Bone graft

Femoral autograft	210
Femoral allograft	40
Acetabular autograft	707
Acetabular allograft	99
Acetabular synthetic	4

Cement

Femur cemented	54095 (63%)
Antibiotic in cement	33518 (62%)
Acetabulum cemented	22974 (27%)
Antibiotic in cement	13748 (60%)

Cementation Rates by Year



The proportion of uncemented arthroplasties has fallen further from 47.10% in 2011 to 44.8% in 2012 with corresponding slight increases in fully cemented and hybrid athroplasties.

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	82091 (96%)

A cephalosporin was used in 88% of patients.

Operating theatre

Conventional	52434
Laminar flow	31933
Space suits	24380

In 2012, 43% of arthroplasties were performed in laminar flow theatres and 38% with space suits. No change from 2011.

ASA Class

This was introduced with the updated forms at the beginning of 2005.

Definitions

ASA class 1:	A healthy patient
ASA class 2:	A patient with mild systemic disease
ASA class 3:	A patient with severe systemic disease that limits activity but is not incapacitating
ASA class 4:	A patient with an incapacitating systemic disease that is a constant threat to life

For the eight-year period 2005 – 2012, there were 52,408 (93%) primary hip procedures with the ASA class recorded.

ASA	Number	Percentage
1	9222	18
2	30885	59
3	11851	22
4	450	1

Operative time (skin to skin in minutes)

Mean	80
Minimum	24
Maximum	483
Standard deviation	28

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the eight-year period 2005 – 2012.

Consultant	48384
Advanced trainee supervised	4593
Advanced trainee unsupervised	1597
Basic trainee	1314

Prosthesis usage

Conventional primary hips

Top 10 femoral components used in 2012

Exeter V40	2694
Corail	815
Twinsys uncemented	561
CLS	371
Synergy porous	300
MS 30	272
CPT	253
TwinSys cemented	237
Stemsys	217
C-Stem AMT	215

The Stemsys has replaced the Spectron from the 2011 list.

Top 10 acetabular components used in 2012

Pinnacle	1160
RM Pressfit cup	882
Continuum TM	815
Trident	677
R3 porous	499
Tritanium	473
Fitmore	407
Trilogy	373
Contemporary	297
Reflection porous	279

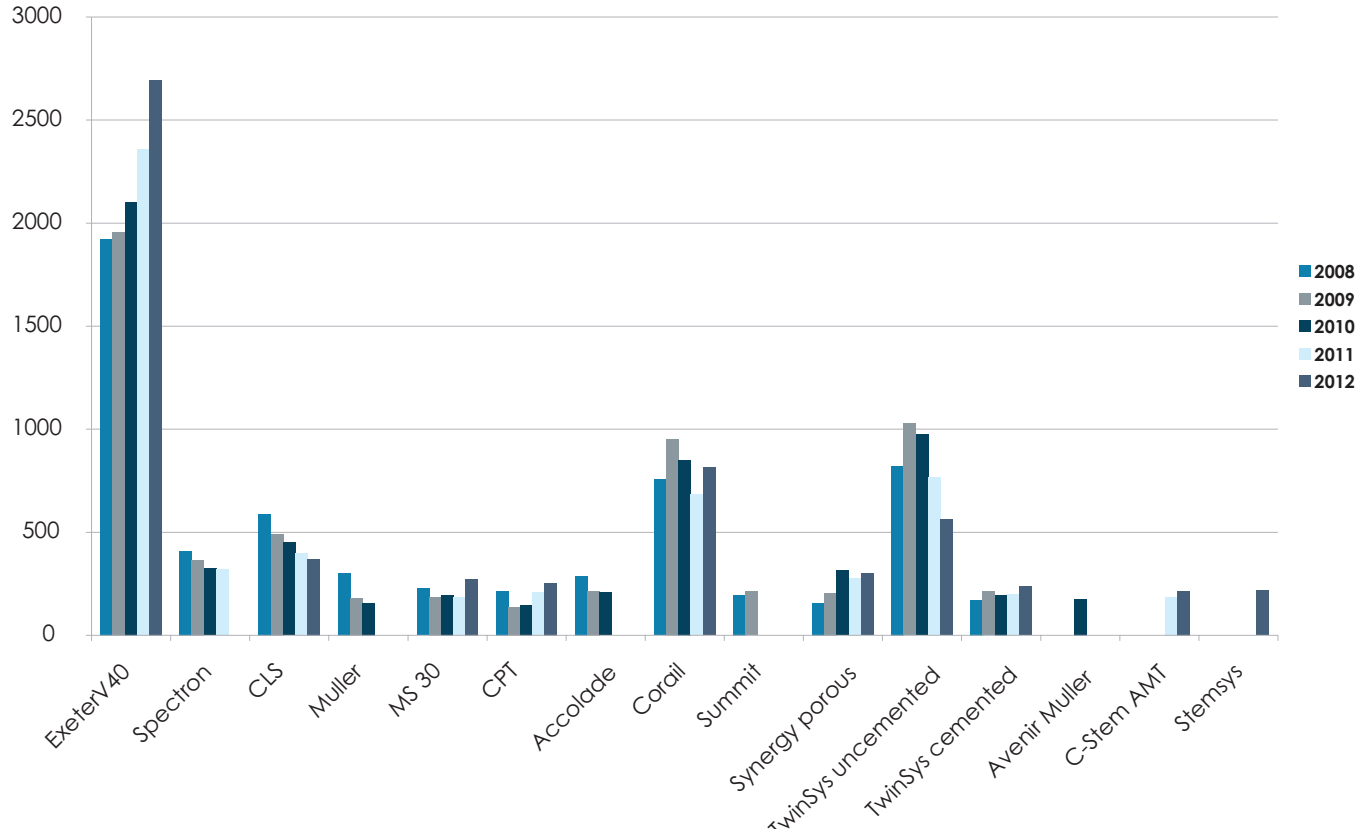
No change in the top 10 for 2012 but the R3 porous swapped places with the Reflection porous.

Top Ten Combinations used in 2012

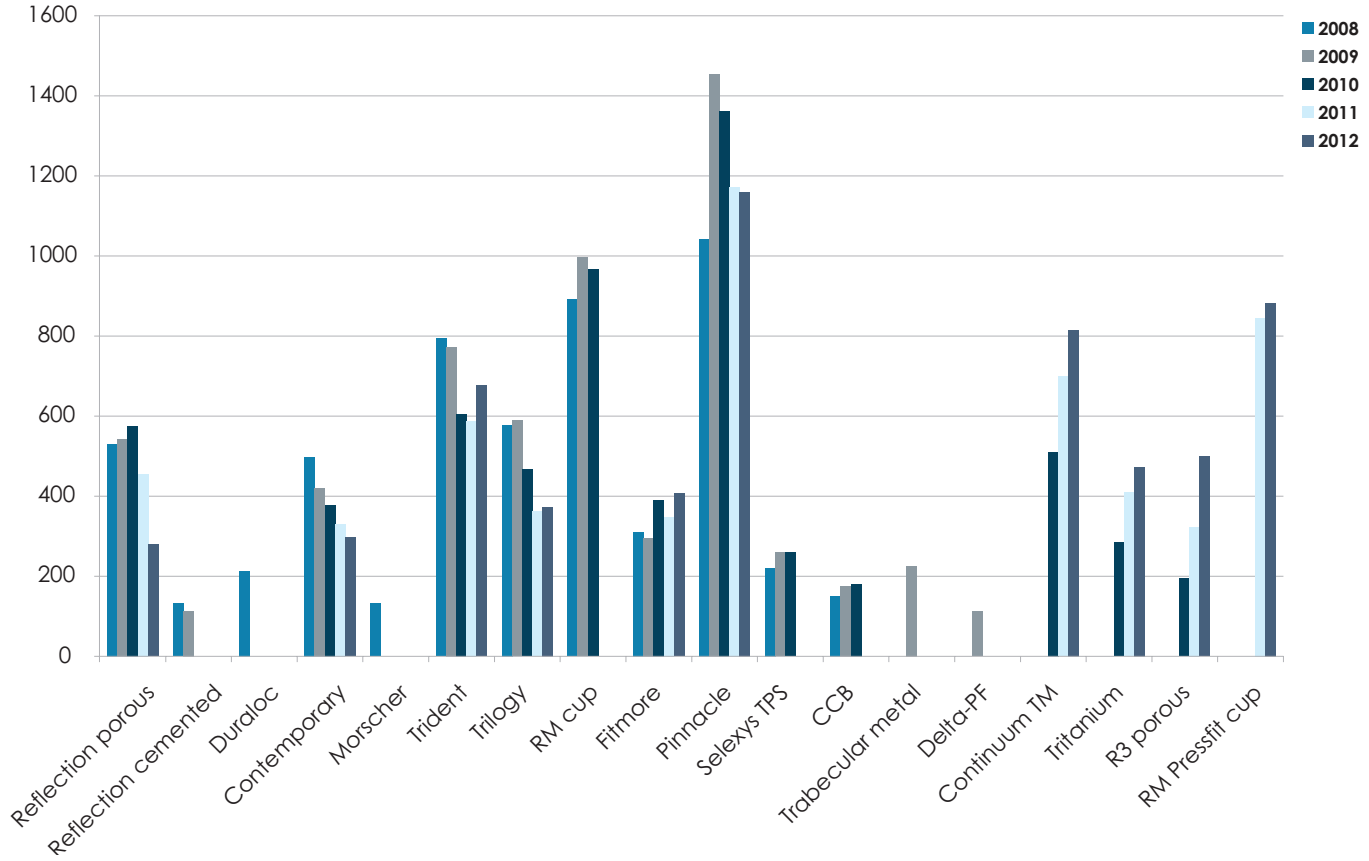
Femu	Acetabulum	
Corail	Pinnacle	636
Exeter V40	Trident	577
TwinSys uncemented	RM Pressfit cup	394
Exeter V40	Tritanium	304
Exeter V40	Contemporary	292
Exeter V40	Continuum TM	279
Exeter V40	Exeter X3	255
Synergy Porous	R3 porous	222
Exeter V40	Trilogy	192
TwinSys cemented	RM Pressfit cup	173

The Exeter V 40/Exeter X 3, Synergy Porous/R3 Porous & Twinsys cemented/RM pressfit have replaced Exeter V 40/Pinnacle, Twinsys uncemented /SelexysTPS & Spectron/Reflection Porous from the 2011 list

Most Used Femoral Components 5 Years 2008 - 2012

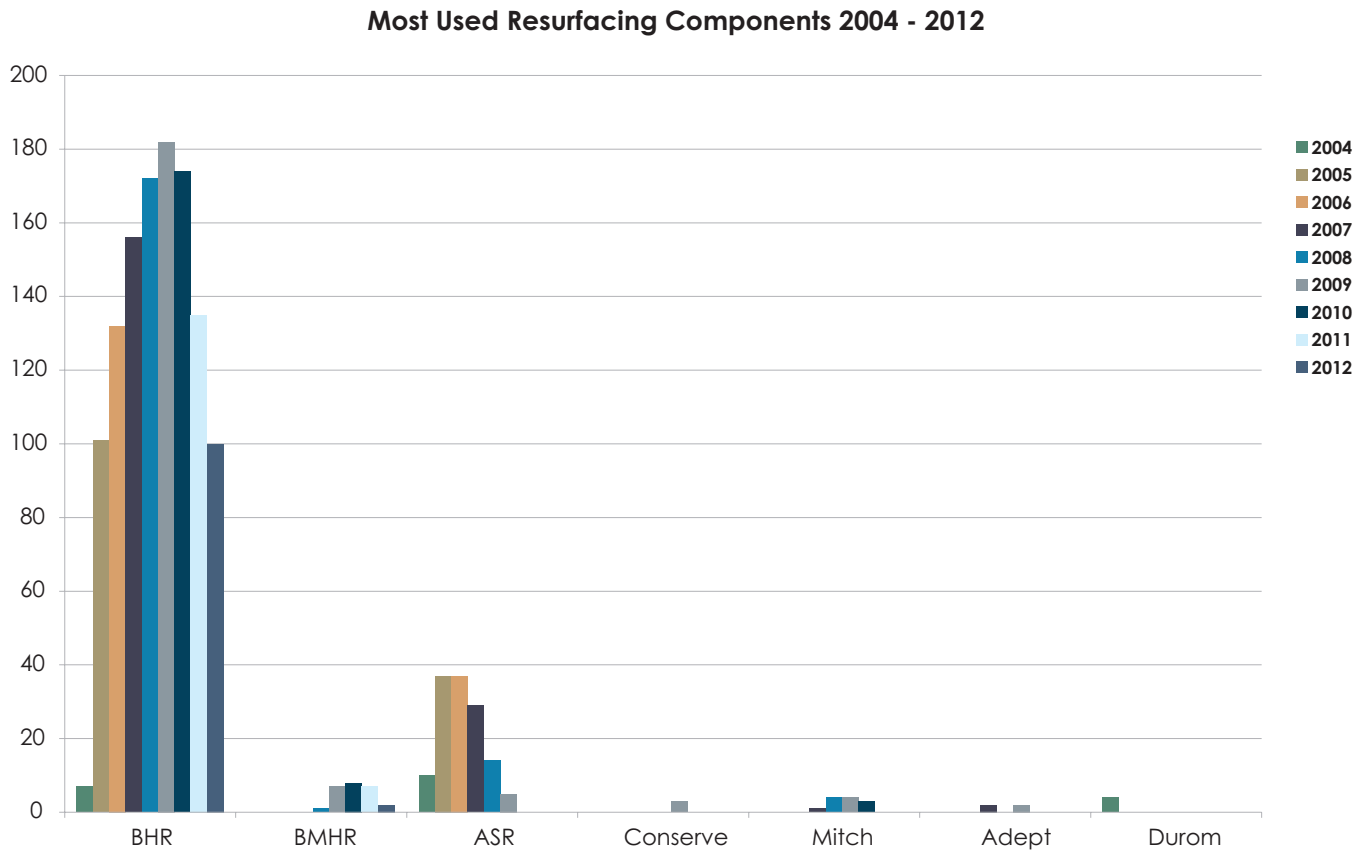


Most Used Acetabular Components 5 Years 2008 - 2012



Resurfacing hips components used in 2012

BHR	100
BMHR	2



Surgeon and Hospital Workload

Surgeons

In 2012, 209 surgeons performed 7,481 total hip replacements, an average of 36 procedures per surgeon.

41 surgeons performed less than 10 procedures and 47 performed more than 50.

Hospitals

In 2012, primary hip replacement was performed in 54 hospitals, 27 public and 27 private.

The average number of total hip replacements per hospital was 139.

REVISION HIP ARTHROPLASTY

Revision is defined by the Registry as a new operation in a previously replaced hip joint during which one of the components are exchanged, removed, manipulated or added. It includes excision arthroplasty and amputation, but not soft tissue procedures. A two-stage procedure is registered as one revision.

Data Analysis

For the fourteen-year period January 1999 – December 2012, there were 12,731 revision hip procedures registered. This is an additional 1,135 compared to last year's report.

The average age for a revision hip replacement was 69.89 years, with a range of 17.52–97.72 years.

Revision hips

	Female	Male
Number	6167	6564
Percentage	48.44	51.56
Mean age	70.05	69.74
Maximum age	97.72	97.17
Minimum age	17.52	25.68
Standard dev.	12.18	10.77

The percentage of revision hips to primary hips is 13 % or a ratio of 1:8

Body Mass Index

For the three year period 2010 - 2012, there were 868 BMI registrations for revision hip replacements. The average BMI was 28.93 with a range of 15- 55 with a standard deviation of 5.79.

REVISION OF REGISTERED PRIMARY HIP ARTHROPLASTIES

This section analyses data for revisions of **registered primary hip arthroplasties f**or the fourteen-year period.

There were 3,319 revisions of the 84,430 primary conventional hip replacements (3.9%) and 67 revisions of the 1339 resurfacing hip replacements (5%), a total of 3,386 revisions.

Conventional hip arthroplasty analyses

Time to revision for conventional hips

Mean	1495 days
Maximum	5019 days
Minimum	0 days
Standard deviation	1322 days

Reason for revision

Dislocation	896
Loosening acetabular component	777
Loosening femoral component	576
Pain	446
Deep infection	390
Fracture femur	318
Wear polyethylene	64
Osteolysis	48
Implant breakage	53
ALVAL*	102

There was often more than one reason listed on the data form and all were entered.

** ALVAL(aseptic lymphocytic vascular-associated lesions) also includes listed revision reasons of metallosis, pseudotumour, hypersensitivity and synovitis. They all relate to metal on metal bearing revisions.*

Analysis by time of the 6 main reasons for revision

Year	Dislocation		Loosening Acetab		Loosening Fem		Deep infection		Pain		Fracture Femur	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
0	335	37.39	73	9.40	40	6.94	90	23.08	21	4.71	109	34.28
1	77	8.59	35	4.50	25	4.34	41	10.51	28	6.28	30	9.43
2	121	13.50	56	7.21	53	9.20	76	19.49	71	15.92	21	6.60
3	81	9.04	56	7.21	49	8.51	53	13.59	54	12.11	24	7.55
4	65	7.25	62	7.98	50	8.68	27	6.92	46	10.31	18	5.66
5	36	4.02	60	7.72	48	8.33	24	6.15	32	7.17	27	8.49
6	45	5.02	53	6.82	49	8.51	17	4.36	35	7.85	19	5.97
7	38	4.24	72	9.27	60	10.42	17	4.36	34	7.62	11	3.46
8	28	3.13	56	7.21	50	8.68	10	2.56	21	4.71	12	3.77
9	27	3.01	58	7.46	36	6.25	11	2.82	21	4.71	11	3.46
10	7	0.78	74	9.52	38	6.60	10	2.56	25	5.61	15	4.72
11	16	1.79	47	6.05	42	7.29	8	2.05	20	4.48	10	3.14
12	8	0.89	37	4.76	21	3.65	3	0.77	22	4.93	7	2.20
13	11	1.23	26	3.35	12	2.08	3	0.77	10	2.24	4	1.26
>13	1	0.11	12	1.54	3	0.52	0	0.00	6	1.35	0	0.00
Total	**896**	**100.00**	**777**	**100.00**	**576**	**100.00**	**390**	**100.00**	**446**	**100.00**	**318**	**100.00**

Resurfaced Hip Analyses

There were 1339 resurfaced hips registered and 67 have been revised.

Time to revision for resurfaced hips

Mean	1172 days
Maximum	2656 days
Minimum	10 days
Standard deviation	766 days

Reason for revision

Pain	18
Loosening acetabulum	11
Fracture femur	10
Deep infection	10
Loosening femoral component	9
Dislocation	1
ALVAL	12

Statistical note

In the tables below there are two statistical terms readers may not be familiar with.

Observed component years

This is the number of registered primary procedures multiplied by the number of years each component has been in place.

Rate/100 component years

This is equivalent to the yearly revision rate expressed as a percentage and is derived by dividing the number of prostheses revised by the observed component years multiplied by 100. It therefore allows for the number of years of post operative follow up in calculating the revision rate. These rates are usually very low and hence more meaningfully recorded per 100 component years rather than per component year. Statisticians consider that this is a more accurate way of deriving a revision rate for comparison when analysing data with widely varying follow up times. It is also important to note the confidence intervals. The closer they are to the estimated revision rate/100 component years, the more precise the estimate is.

Statistical significance

Where it is stated that a difference among results is significant the p value is 0.05 or less. In most of these situations this is because there is no overlap of the confidence intervals (CI's) but sometimes significance can apply in the presence of CI overlap.

Conventional Primary Hip Arthroplasties

No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
84430	469041.8	3319	0.71	0.68	0.73

There are 951 hip prosthesis combinations in the Registry; 678(71%) have fewer than 10 registered procedures and 300 (32%) one only.

The tables below contain the analyses of the 184 combinations that have a minimum of 50 primary registered procedures. As stated above it is important to note the confidence intervals and observed component years in conjunction with the revision rates.

Revisions versus Hip Prostheses Combinations Sorted on Number of Implantations

Minimum of 50 primary registered arthroplasties

Sorted on number of operations

Femoral Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Exeter V40	Trident	5228	23668.1	113	0.48	0.39	0.57
Exeter V40	Contemporary	5070	26171.6	115	0.44	0.36	0.53
Corail	Pinnacle	3835	11241.9	83	0.74	0.59	0.92
TwinSys uncemented	RM Pressfit cup	2950	9141.2	60	0.66	0.50	0.84
Spectron	Reflection cemented	2935	22784.5	190	0.83	0.72	0.96
Spectron	Reflection porous	2745	16254.8	112	0.69	0.57	0.83
CLS	Fitmore	1942	12141.8	56	0.46	0.35	0.60
Accolade	Trident	1865	10919.5	71	0.65	0.51	0.82
Muller	Muller PE cup	1853	14652.6	56	0.38	0.29	0.50
Exeter V40	Trilogy	1825	8227.5	39	0.47	0.34	0.65
CLS	Morscher	1682	14392.2	71	0.49	0.39	0.62
Exeter V40	Exeter	1574	9751.8	43	0.44	0.32	0.59
Exeter	Contemporary	1551	14931.0	131	0.88	0.73	1.04
Exeter	Exeter	1326	12223.5	87	0.71	0.57	0.88
CLS	CLS Expansion	1263	10105.3	82	0.81	0.65	1.01
TwinSys uncemented	Selexys TPS	1191	3909.3	52	1.33	0.99	1.74
MS 30	Fitmore	1176	5650.5	14	0.25	0.14	0.42
Spectron	Duraloc	1153	10241.1	114	1.11	0.92	1.34
Synergy Porous	Reflection porous	1119	5461.2	29	0.53	0.36	0.76
Summit	Pinnacle	1111	4170.3	36	0.86	0.60	1.20
Exeter V40	Pinnacle	1066	2829.2	14	0.49	0.27	0.83
Exeter V40	Duraloc	987	6700.2	52	0.78	0.58	1.02
Muller	RM cup	971	7654.1	54	0.71	0.53	0.92
Exeter V40	RM Pressfit cup	857	2715.3	8	0.29	0.13	0.58
Exeter	Osteolock	836	8426.6	46	0.55	0.40	0.73
MS 30	Morscher	787	6700.7	45	0.67	0.49	0.90
TwinSys cemented	RM Pressfit cup	718	1975.9	12	0.61	0.31	1.06

Femoral Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 Component-years	Exact 95% confidence interval	
Exeter V40	Tritanium	701	914.6	10	1.09	0.52	2.01
CLS	Duraloc	699	6195.2	54	0.87	0.65	1.14
Exeter V40	Continuum TM	683	897.0	11	1.23	0.61	2.19
CCA	CCB	667	3748.8	14	0.37	0.20	0.63
CPT	Trilogy	667	3109.2	32	1.03	0.70	1.45
Exeter V40	Morscher	630	4383.9	25	0.57	0.37	0.84
Elite plus	Duraloc	608	4845.6	68	1.40	1.09	1.78
Exeter V40	Reflection cemented	567	2082.5	9	0.43	0.20	0.82
Synergy Porous	R3 porous	564	886.0	9	1.02	0.46	1.93
Exeter	Duraloc	553	5897.9	49	0.83	0.61	1.10
Exeter	Morscher	551	5991.1	26	0.43	0.28	0.64
CPT	ZCA	526	3997.6	20	0.50	0.31	0.77
C-Stem AMT	Pinnacle	518	1033.7	5	0.48	0.16	1.13
Corail	Duraloc	464	3041.4	20	0.66	0.40	1.02
MS 30	Muller PE cup	462	3472.2	14	0.40	0.22	0.68
Charnley	Charnley	456	3976.0	15	0.38	0.21	0.62
Exeter V40	Exeter X3	431	394.8	2	0.51	0.06	1.83
Muller	Weber	430	3041.4	10	0.33	0.16	0.60
Exeter V40	Reflection porous	402	1702.6	7	0.41	0.17	0.85
CLS	Trilogy	399	1502.0	8	0.53	0.23	1.05
Versys cemented	ZCA	391	2985.1	17	0.57	0.33	0.91
CLS	RM Pressfit cup	365	1285.8	9	0.70	0.32	1.33
Exeter V40	Fitmore	349	1118.7	2	0.18	0.02	0.65
ABGII	Trident	342	2308.3	19	0.82	0.50	1.29
TwinSys uncemented	Delta-PF Cup	331	859.0	1	0.12	0.00	0.65
Charnley	Charnley Cup Ogee	303	2840.9	15	0.53	0.30	0.87
Exeter V40	CCB	303	894.0	2	0.22	0.03	0.81
CLS	Reflection porous	298	1297.1	12	0.93	0.48	1.62
Elite plus	Charnley	298	2907.5	17	0.58	0.34	0.94
S-Rom	Pinnacle	297	1837.1	17	0.93	0.54	1.48
Elite plus	Elite Plus LPW	282	2301.8	11	0.48	0.24	0.86
TwinSys cemented	CCB	282	796.0	2	0.25	0.03	0.91
Versys	Trilogy	272	2649.9	13	0.49	0.26	0.84
Exeter V40	Osteolock	270	2202.6	10	0.45	0.22	0.83
CPT	Continuum TM	269	277.2	4	1.44	0.39	3.69
Spectron	R3 porous	269	352.8	4	1.13	0.31	2.90
Versys cemented	Trilogy	236	1874.5	7	0.37	0.15	0.77
Polarstem uncemented	Reflection porous	235	308.8	5	1.62	0.53	3.78
CBC Stem	RM Pressfit cup	232	841.3	10	1.19	0.57	2.19
C-Stem AMT	Marathon cemented	221	449.0	4	0.89	0.24	2.28

Femoral Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Femoral Stem Press Fit	Continuum TM	215	378.9	6	1.58	0.58	3.45
Exeter	Trilogy	213	2161.2	12	0.56	0.29	0.97
Stemsys	DeltaMotion Cup	213	456.5	1	0.22	0.01	1.22
CPT	Duraloc	212	1816.2	9	0.50	0.23	0.94
Spectron	Morscher	210	2031.1	14	0.69	0.38	1.16
TwinSys uncemented	Trilogy	209	695.8	7	1.01	0.40	2.07
CLS	Continuum TM	198	279.3	2	0.72	0.09	2.59
CLS	Durom	198	1073.7	19	1.77	1.07	2.76
Muller	RM Pressfit cup	194	973.4	2	0.21	0.02	0.74
CLS	Allofit	192	980.8	13	1.33	0.71	2.27
CBC Stem	Expansys shell	183	1005.2	14	1.39	0.76	2.34
Accolade	Pinnacle	180	630.6	2	0.32	0.04	1.15
MS 30	Trilogy	178	676.8	3	0.44	0.09	1.30
H-Max S	Delta-TT Cup	176	182.0	3	1.65	0.34	4.82
Friendly	Delta-PF Cup	159	768.4	2	0.26	0.03	0.94
CLS	Trident	157	1117.1	11	0.98	0.49	1.76
Corail	ASR	156	747.3	57	7.63	5.78	9.88
Trabecular Metal Stem	Continuum TM	153	242.5	6	2.47	0.91	5.39
Accolade	Tritanium	152	201.4	1	0.50	0.01	2.77
Spectron	Mallory-Head	152	1141.7	6	0.53	0.19	1.14
Omnifit	Trident	149	1100.6	11	1.00	0.50	1.79
TwinSys cemented	RM cup	148	755.0	4	0.53	0.14	1.36
CPT	Trident	145	893.6	8	0.90	0.39	1.76
Stemsys	Fixa Ti Por	144	107.0	2	1.87	0.23	6.75
Corail	Reflection porous	140	633.3	1	0.16	0.00	0.88
ABGII	Duraloc	139	1338.3	21	1.57	0.97	2.40
Femoral Stem Press Fit	Trilogy	137	470.0	3	0.64	0.13	1.87
Corail	Ultima	135	871.9	3	0.34	0.07	1.01
CCA	RM Pressfit cup	131	742.2	3	0.40	0.08	1.18
S-Rom	ASR	130	567.7	74	13.03	10.23	16.36
Exeter	CLS Expansion	129	1276.5	8	0.63	0.27	1.23
Avenir Muller uncemented	Continuum TM	128	199.9	5	2.50	0.81	5.84
MS 30	Contemporary	128	873.8	6	0.69	0.25	1.49
Summit	Trilogy	124	515.3	4	0.78	0.21	1.99
Exeter V40	Monoblock Acetabular Cup	123	1008.5	5	0.50	0.16	1.16
Exeter V40	R3 porous	123	133.1	1	0.75	0.02	4.19
Polarstem uncemented	R3 porous	123	124.2	1	0.81	0.02	4.49
TwinSys uncemented	RM cup	122	377.5	2	0.53	0.06	1.91
Exeter	Muller PE cup	119	1165.7	5	0.43	0.14	1.00

Femoral Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
ABG	Duraloc	116	1413.2	15	1.06	0.59	1.75
Exeter V40	Trabecular Metal Shell	115	318.4	6	1.88	0.69	4.10
Accolade	Muller PE cup	114	792.2	1	0.13	0.00	0.70
Synergy Porous	BHR Acetabular Cup	114	522.3	8	1.53	0.66	3.02
CLS	RM cup	113	677.0	12	1.77	0.92	3.10
Exeter	Bio-clad poly	113	1052.7	6	0.57	0.21	1.24
Prodigy	Duraloc	113	1129.6	13	1.15	0.61	1.97
Elite plus	Elite Plus Ogee	110	877.4	4	0.46	0.12	1.17
MS 30	Continuum TM	109	143.5	1	0.70	0.02	3.88
ABGII	Delta-PF Cup	107	745.1	8	1.07	0.46	2.12
CLS	Weill ring	106	1086.0	6	0.55	0.20	1.20
Avenir Muller uncemented	RM cup	105	259.0	1	0.39	0.01	2.15
Basis	Reflection porous	105	318.8	1	0.31	0.01	1.75
Mallory-Head	M2A	105	733.8	8	1.09	0.47	2.15
Exeter V40	Bio-clad poly	103	464.7	2	0.43	0.05	1.55
Summit	Duraloc	101	704.6	5	0.71	0.23	1.66
Avenir Muller uncemented	Pinnacle	99	245.7	2	0.81	0.10	2.94
Corail	Monoblock Acetabular Cup	95	436.7	4	0.92	0.25	2.35
Anthology Porous	BHR Acetabular Cup	93	328.9	5	1.52	0.49	3.55
CPT	Fitmore	93	335.3	5	1.49	0.48	3.48
Exeter V40	Muller PE cup	93	605.7	3	0.50	0.10	1.45
Muller	Duraloc	89	859.5	10	1.16	0.56	2.14
Avenir Muller uncemented	Tritanium	88	148.0	0	0.00	0.00	2.49
Exeter V40	CLS Expansion	88	686.2	0	0.00	0.00	0.54
Summit	ASR	88	415.6	15	3.61	2.02	5.95
Corail	Trilogy	87	151.6	1	0.66	0.02	3.68
H-Max M	Delta-TT Cup	86	187.5	2	1.07	0.13	3.85
TwinSys uncemented	Continuum TM	85	141.0	3	2.13	0.44	6.22
CPT	Monoblock Acetabular Cup	84	553.3	7	1.27	0.51	2.61
Exeter	Trident	84	847.4	0	0.00	0.00	0.44
CLS	Monoblock Acetabular Cup	80	442.1	3	0.68	0.14	1.98
MS 30	RM Pressfit cup	80	401.8	1	0.25	0.01	1.39
Synergy Porous	Delta-PF Cup	80	270.6	0	0.00	0.00	1.36
Corail	Delta-PF Cup	78	457.5	1	0.22	0.01	1.22
Muller	Morscher	78	728.1	3	0.41	0.08	1.20
S-Rom	Ultima	78	847.4	6	0.71	0.26	1.54
Spectron	Fitmore	78	727.8	4	0.55	0.15	1.41
Spectron	Trident	78	579.3	3	0.52	0.11	1.51

Femoral Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
AML MMA	Duraloc	74	714.8	8	1.12	0.48	2.21
CCA	Contemporary	74	683.6	10	1.46	0.70	2.69
CPT	Tritanium	74	145.6	3	2.06	0.42	6.02
Trabecular Metal Stem	Monoblock Acetabular Cup	74	403.3	3	0.74	0.15	2.17
ABG	ABGII	72	844.7	10	1.18	0.57	2.18
Muller	Trident	72	451.7	4	0.89	0.24	2.27
Contemporary	Contemporary	71	729.2	9	1.23	0.56	2.34
H-Max M	Delta-PF Cup	71	173.7	3	1.73	0.36	5.05
Corail	Tritanium	70	75.3	1	1.33	0.03	7.40
Muller	Trilogy	69	311.6	4	1.28	0.35	3.29
Corail	DeltaMotion Cup	68	64.7	0	0.00	0.00	5.70
Spectron	Biomex acet shell porous	68	710.3	1	0.14	0.00	0.78
ABGII	Pinnacle	67	283.6	2	0.71	0.09	2.55
Spectron	Muller PE cup	66	538.5	5	0.93	0.30	2.17
Anthology Porous	R3 porous	65	226.5	0	0.00	0.00	1.63
Stemsys	RM Pressfit cup	65	59.8	1	1.67	0.04	9.31
CLS	Pinnacle	64	213.9	0	0.00	0.00	1.72
Furlong	Furlong	64	452.5	5	1.10	0.36	2.58
Muller	ZCA	63	225.8	1	0.44	0.01	2.47
TwinSys cemented	Selexys TPS	63	132.5	4	3.02	0.82	7.73
CPT	Pinnacle	61	227.9	2	0.88	0.11	3.17
Corail	Continuum TM	60	48.5	2	4.12	0.50	14.9
CLS	Artek	59	539.5	19	3.52	2.12	5.50
CBC Stem	Fitmore	58	272.6	3	1.10	0.23	3.22
Wagner cone stem	Fitmore	57	451.4	3	0.66	0.14	1.94
C-Stem	Elite Plus Ogee	55	408.9	2	0.49	0.06	1.77
MS 30	Duraloc	55	593.2	5	0.84	0.27	1.97
AML	Duraloc	53	554.6	2	0.36	0.04	1.30
C-Stem	Duraloc	53	454.9	4	0.88	0.24	2.25
Exeter V40	Weber	53	380.5	0	0.00	0.00	0.97
Exeter V40	ZCA	53	313.9	1	0.32	0.01	1.77
MS 30	ZCA all-poly cup	52	32.4	0	0.00	0.00	11.39
Muller	CLS Expansion	51	326.1	3	0.92	0.19	2.69
Stemsys	Fixa Agilis	51	15.9	0	0.00	0.00	23.1

Revisions versus Hip Prostheses Combinations Sorted on Descending Revision Rate.

Minimum of 50 primary registered arthroplasties

Femoral Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
*S-Rom	ASR	130	567.7	74	13.03	10.23	16.36
*Corail	ASR	156	747.3	57	7.63	5.78	9.88
Corail	Continuum TM	60	48.5	2	4.12	0.50	14.88
*Summit	ASR	88	415.6	15	3.61	2.02	5.95
*CLS	Artek	59	539.5	19	3.52	2.12	5.50
*#TwinSys cemented	Selexys TPS	63	132.5	4	3.02	0.82	7.73
*#Avenir Muller uncemented	Continuum TM	128	199.9	5	2.50	0.81	5.84
*#Trabecular Metal Stem	Continuum TM	153	242.5	6	2.47	0.91	5.39
TwinSys uncemented	Continuum TM	85	141.0	3	2.13	0.44	6.22
CPT	Tritanium	74	145.6	3	2.06	0.42	6.02
Muller	Continuum TM	83	98.5	2	2.03	0.25	7.34
Exeter V40	Trabecular Metal Shell	115	318.4	6	1.88	0.69	4.10
Stemsys	Fixa Ti Por	144	107.0	2	1.87	0.23	6.75
*CLS	RM cup	113	677.0	12	1.77	0.92	3.10
*CLS	Durom	198	1073.7	19	1.77	1.07	2.76
H-Max M	Delta-PF Cup	71	173.7	3	1.73	0.36	5.05
Stemsys	RM Pressfit cup	65	59.8	1	1.67	0.04	9.31
H-Max S	Delta-TT Cup	176	182.0	3	1.65	0.34	4.82
Polarstem uncemented	Reflection porous	235	308.8	5	1.62	0.53	3.78
Femoral Stem Press Fit	Continuum TM	215	378.9	6	1.58	0.58	3.45
Muller	Trilogy	116	442.5	7	1.58	0.64	3.26
*ABGII	Duraloc	139	1338.3	21	1.57	0.97	2.40
Synergy Porous	BHR Acetabular Cup	114	522.3	8	1.53	0.66	3.02
Anthology Porous	BHR Acetabular Cup	93	328.9	5	1.52	0.49	3.55
CPT	Fitmore	93	335.3	5	1.49	0.48	3.48
CCA	Contemporary	74	683.6	10	1.46	0.70	2.69
CPT	Continuum TM	269	277.2	4	1.44	0.39	3.69
Elite plus	Duraloc	608	4845.6	68	1.40	1.09	1.78
*CBC Stem	Expansys shell	183	1005.2	14	1.39	0.76	2.34
*#TwinSys uncemented	Selexys TPS	1191	3909.3	52	1.33	0.99	1.74
Corail	Tritanium	70	75.3	1	1.33	0.03	7.40
CLS	Allofit	192	980.8	13	1.33	0.71	2.27
CPT	Monoblock Acetabular Cup	84	553.3	7	1.27	0.51	2.61
Contemporary	Contemporary	71	729.2	9	1.23	0.56	2.34
Exeter V40	Continuum TM	683	897.0	11	1.23	0.61	2.19

Femoral Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
CBC Stem	RM Pressfit cup	232	841.3	10	1.19	0.57	2.19
ABG	ABGII	72	844.7	10	1.18	0.57	2.18
Muller	Duraloc	89	859.5	10	1.16	0.56	2.14
Prodigy	Duraloc	113	1129.6	13	1.15	0.61	1.97
Spectron	R3 porous	269	352.8	4	1.13	0.31	2.90
AML MMA	Duraloc	74	714.8	8	1.12	0.48	2.21
*Spectron	Duraloc	1153	10241.1	114	1.11	0.92	1.34
Muller	CLS Expansion	64	361.6	4	1.11	0.30	2.83
Furlong	Furlong	64	452.5	5	1.10	0.36	2.58
CBC Stem	Fitmore	58	272.6	3	1.10	0.23	3.22
Exeter V40	Tritanium	701	914.6	10	1.09	0.52	2.01
Mallory-Head	M2A	105	733.8	8	1.09	0.47	2.15
ABGII	Delta-PF Cup	107	745.1	8	1.07	0.46	2.12
H-Max M	Delta-TT Cup	86	187.5	2	1.07	0.13	3.85
ABG	Duraloc	116	1413.2	15	1.06	0.59	1.75
CPT	Trilogy	667	3109.2	32	1.03	0.70	1.45
Synergy Porous	R3 porous	564	886.0	9	1.02	0.46	1.93
TwinSys uncemented	Trilogy	209	695.8	7	1.01	0.40	2.07
Omnifit	Trident	149	1100.6	11	1.00	0.50	1.79
CLS	Trident	157	1117.1	11	0.98	0.49	1.76
Spectron	Muller PE cup	66	538.5	5	0.93	0.30	2.17
S-Rom	Pinnacle	297	1837.1	17	0.93	0.54	1.48
CLS	Reflection porous	298	1297.1	12	0.93	0.48	1.62
Corail	Monoblock Acetabular Cup	95	436.7	4	0.92	0.25	2.35
CPT	Trident	145	893.6	8	0.90	0.39	1.76
C-Stem AMT	Marathon cemented	221	449.0	4	0.89	0.24	2.28
C-Stem	Duraloc	53	454.9	4	0.88	0.24	2.25
CPT	Pinnacle	61	227.9	2	0.88	0.11	3.17
*Exeter	Contemporary	1551	14931.0	131	0.88	0.73	1.04
CLS	Duraloc	699	6195.2	54	0.87	0.65	1.14
Muller	Trident	76	463.2	4	0.86	0.24	2.21
Summit	Pinnacle	1111	4170.3	36	0.86	0.60	1.20
MS 30	Duraloc	55	593.2	5	0.84	0.27	1.97
*#Spectron	Reflection cemented	2935	22784.5	190	0.83	0.72	0.96
Exeter	Duraloc	553	5897.9	49	0.83	0.61	1.10
ABGII	Trident	342	2308.3	19	0.82	0.50	1.29
Avenir Muller uncemented	Pinnacle	99	245.7	2	0.81	0.10	2.94
CLS	CLS Expansion	1263	10105.3	82	0.81	0.65	1.01
Polarstem uncemented	R3 porous	123	124.2	1	0.81	0.02	4.49

Femoral Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Summit	Trilogy	124	515.3	4	0.78	0.21	1.99
Exeter V40	Duraloc	987	6700.2	52	0.78	0.58	1.02
Exeter V40	R3 porous	123	133.1	1	0.75	0.02	4.19
Trabecular Metal Stem	Monoblock Acetabular Cup	74	403.3	3	0.74	0.15	2.17
Corail	Pinnacle	3835	11241.9	83	0.74	0.59	0.92
CLS	Continuum TM	198	279.3	2	0.72	0.09	2.59
Muller	RM cup	1035	7836.3	56	0.71	0.54	0.93
Exeter	Exeter	1326	12223.5	87	0.71	0.57	0.88
Summit	Duraloc	101	704.6	5	0.71	0.23	1.66
S-Rom	Ultima	78	847.4	6	0.71	0.26	1.54
ABGII	Pinnacle	67	283.6	2	0.71	0.09	2.55
CLS	RM Pressfit cup	365	1285.8	9	0.70	0.32	1.33
MS 30	Continuum TM	109	143.5	1	0.70	0.02	3.88
Spectron	Morscher	210	2031.1	14	0.69	0.38	1.16
Spectron	Reflection porous	2745	16254.8	112	0.69	0.57	0.83
MS 30	Contemporary	128	873.8	6	0.69	0.25	1.49
CLS	Monoblock Acetabular Cup	80	442.1	3	0.68	0.14	1.98
MS 30	Morscher	787	6700.7	45	0.67	0.49	0.90
Wagner cone stem	Fitmore	57	451.4	3	0.66	0.14	1.94
Corail	Trilogy	87	151.6	1	0.66	0.02	3.68
Corail	Duraloc	464	3041.4	20	0.66	0.40	1.02
TwinSys uncemented	RM Pressfit cup	2950	9141.2	60	0.66	0.50	0.84
Accolade	Trident	1865	10919.5	71	0.65	0.51	0.82
Femoral Stem Press Fit	Trilogy	137	470.0	3	0.64	0.13	1.87
Exeter	CLS Expansion	129	1276.5	8	0.63	0.27	1.23
TwinSys cemented	RM Pressfit cup	718	1975.9	12	0.61	0.31	1.06
Elite plus	Charnley	298	2907.5	17	0.58	0.34	0.94
Exeter V40	Morscher	630	4383.9	25	0.57	0.37	0.84
Exeter	Bio-clad poly	113	1052.7	6	0.57	0.21	1.24
Versys cemented	ZCA	391	2985.1	17	0.57	0.33	0.91
Exeter	Trilogy	213	2161.2	12	0.56	0.29	0.97
CLS	Weill ring	106	1086.0	6	0.55	0.20	1.20
Spectron	Fitmore	78	727.8	4	0.55	0.15	1.41
Exeter	Osteolock	836	8426.6	46	0.55	0.40	0.73
CLS	Trilogy	399	1502.0	8	0.53	0.23	1.05
Synergy Porous	Reflection porous	1119	5461.2	29	0.53	0.36	0.76
TwinSys cemented	RM cup	148	755.0	4	0.53	0.14	1.36
TwinSys uncemented	RM cup	122	377.5	2	0.53	0.06	1.91
Charnley	Charnley Cup Ogee	303	2840.9	15	0.53	0.30	0.87
Spectron	Mallory-Head	152	1141.7	6	0.53	0.19	1.14

Femoral Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Spectron	Trident	78	579.3	3	0.52	0.11	1.51
Exeter V40	Exeter X3	431	394.8	2	0.51	0.06	1.83
CPT	ZCA	526	3997.6	20	0.50	0.31	0.77
Accolade	Tritanium	152	201.4	1	0.50	0.01	2.77
Exeter V40	Monoblock Acetabular Cup	123	1008.5	5	0.50	0.16	1.16
CPT	Duraloc	212	1816.2	9	0.50	0.23	0.94
Exeter V40	Muller PE cup	93	605.7	3	0.50	0.10	1.45
Exeter V40	Pinnacle	1066	2829.2	14	0.49	0.27	0.83
CLS	Morscher	1682	14392.2	71	0.49	0.39	0.62
Versys	Trilogy	272	2649.9	13	0.49	0.26	0.84
C-Stem	Elite Plus Ogee	55	408.9	2	0.49	0.06	1.77
C-Stem AMT	Pinnacle	518	1033.7	5	0.48	0.16	1.13
Elite plus	Elite Plus LPW	282	2301.8	11	0.48	0.24	0.86
Exeter V40	Trident	5228	23668.1	113	0.48	0.39	0.57
Exeter V40	Trilogy	1825	8227.5	39	0.47	0.34	0.65
CLS	Fitmore	1942	12141.8	56	0.46	0.35	0.60
Elite plus	Elite Plus Ogee	110	877.4	4	0.46	0.12	1.17
Exeter V40	Osteolock	270	2202.6	10	0.45	0.22	0.83
Muller	Fitmore	53	225.0	1	0.44	0.01	2.48
MS 30	Trilogy	178	676.8	3	0.44	0.09	1.30
Exeter V40	Exeter	1574	9751.8	43	0.44	0.32	0.59
Exeter V40	Contemporary	5070	26171.6	115	0.44	0.36	0.53
Exeter	Morscher	551	5991.1	26	0.43	0.28	0.64
Exeter V40	Reflection cemented	567	2082.5	9	0.43	0.20	0.82
Exeter V40	Bio-clad poly	103	464.7	2	0.43	0.05	1.55
Exeter	Muller PE cup	119	1165.7	5	0.43	0.14	1.00
Muller	Morscher	78	728.1	3	0.41	0.08	1.20
Exeter V40	Reflection porous	402	1702.6	7	0.41	0.17	0.85
CCA	RM Pressfit cup	131	742.2	3	0.40	0.08	1.18
MS 30	Muller PE cup	462	3472.2	14	0.40	0.22	0.68
Avenir Muller uncemented	RM cup	105	259.0	1	0.39	0.01	2.15
Muller	Muller PE cup	1926	14826.8	56	0.38	0.29	0.49
Charnley	Charnley	456	3976.0	15	0.38	0.21	0.62
CCA	CCB	667	3748.8	14	0.37	0.20	0.63
Versys cemented	Trilogy	236	1874.5	7	0.37	0.15	0.77
AML	Duraloc	53	554.6	2	0.36	0.04	1.30
Corail	Ultima	135	871.9	3	0.34	0.07	1.01
Muller	Weber	430	3041.4	10	0.33	0.16	0.60
Exeter V40	ZCA	53	313.9	1	0.32	0.01	1.77

Femoral Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Accolade	Pinnacle	180	630.6	2	0.32	0.04	1.15
Basis	Reflection porous	105	318.8	1	0.31	0.01	1.75
Exeter V40	RM Pressfit cup	857	2715.3	8	0.29	0.13	0.58
Friendly	Delta-PF Cup	159	768.4	2	0.26	0.03	0.94
TwinSys cemented	CCB	282	796.0	2	0.25	0.03	0.91
MS 30	RM Pressfit cup	80	401.8	1	0.25	0.01	1.39
MS 30	Fitmore	1176	5650.5	14	0.25	0.14	0.42
Muller	ZCA	137	436.6	1	0.23	0.01	1.28
Exeter V40	CCB	303	894.0	2	0.22	0.03	0.81
Stemsys	DeltaMotion Cup	213	456.5	1	0.22	0.01	1.22
Corail	Delta-PF Cup	78	457.5	1	0.22	0.01	1.22
Muller	RM Pressfit cup	240	1054.8	2	0.19	0.02	0.68
Exeter V40	Fitmore	349	1118.7	2	0.18	0.02	0.65
Corail	Reflection porous	140	633.3	1	0.16	0.00	0.88
Spectron	Biomex acet shell porous	68	710.3	1	0.14	0.00	0.78
Accolade	Muller PE cup	114	792.2	1	0.13	0.00	0.70
TwinSys uncemented	Delta-PF Cup	331	859.0	1	0.12	0.00	0.65
Avenir Muller uncemented	Tritanium	88	148.0	0	0.00	0.00	2.49
Exeter V40	CLS Expansion	88	686.2	0	0.00	0.00	0.54
Muller	ZCA all-poly cup	88	107.0	0	0.00	0.00	3.45
Exeter	Trident	84	847.4	0	0.00	0.00	0.44
Synergy Porous	Delta-PF Cup	80	270.6	0	0.00	0.00	1.36
Corail	DeltaMotion Cup	68	64.7	0	0.00	0.00	5.70
Anthology Porous	R3 porous	65	226.5	0	0.00	0.00	1.63
CLS	Pinnacle	64	213.9	0	0.00	0.00	1.72
Exeter V40	Weber	53	380.5	0	0.00	0.00	0.97
MS 30	ZCA all-poly cup	52	32.4	0	0.00	0.00	11.39
Stemsys	Fixa Agilis	51	15.9	0	0.00	0.00	23.13

*Those marked with an * in the above table have revision rates significantly higher than the overall rate of 0.71 /100 ocys @ the 95% confidence interval.There are several other combinations with high revision rates but without Statistical significance because of the wide CIs.*

*Those marked with a # as well as an * indicate those combinations used during 2012.*

Revision rates for individual components are no longer being analysed but it is pertinent to note that most of combinations with the Continuum cup (which was the third most popular cup in 2012) had high revision rates although not all were statistically significant, partly as a consequence of relatively few implanted and short follow-up periods leading to wide CIs.

Revisions versus Hip Prostheses Combinations and Fixation Method Sorted on Number of Implantations

Minimum of 100 primary registered arthroplasties

Fully Cemented

Femoral Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Exeter V40	Contemporary	5070	26171.6	115	0.44	0.36	0.53
Spectron	Reflection cemented	2935	22784.5	190	0.83	0.72	0.96
Muller	Muller PE cup	1926	14826.8	56	0.38	0.29	0.49
Exeter V40	Exeter	1574	9751.8	43	0.44	0.32	0.59
Exeter	Contemporary	1551	14931.0	131	0.88	0.73	1.04
Exeter	Exeter	1326	12223.5	87	0.71	0.57	0.88
CCA	CCB	667	3748.8	14	0.37	0.20	0.63
Exeter V40	Reflection cemented	567	2082.5	9	0.43	0.20	0.82
CPT	ZCA	526	3997.6	20	0.50	0.31	0.77
MS 30	Muller PE cup	462	3472.2	14	0.40	0.22	0.68
Charnley	Charnley	456	3976.0	15	0.38	0.21	0.62
Exeter V40	Exeter X3	431	394.8	2	0.51	0.06	1.83
Muller	Weber	430	3041.4	10	0.33	0.16	0.60
Versys cemented	ZCA	391	2985.1	17	0.57	0.33	0.91
Charnley	Charnley Cup Ogee	303	2840.9	15	0.53	0.30	0.87
Exeter V40	CCB	303	894.0	2	0.22	0.03	0.81
Elite plus	Charnley	298	2907.5	17	0.58	0.34	0.94
Elite plus	Elite Plus LPW	282	2301.8	11	0.48	0.24	0.86
TwinSys cemented	CCB	282	796.0	2	0.25	0.03	0.91
C-Stem AMT	Marathon cemented	221	449.0	4	0.89	0.24	2.28
MS 30	Contemporary	128	873.8	6	0.69	0.25	1.49
Exeter	Muller PE cup	119	1165.7	5	0.43	0.14	1.00
Exeter	Bio-clad poly	113	1052.7	6	0.57	0.21	1.24
Elite plus	Elite Plus Ogee	110	877.4	4	0.46	0.12	1.17
Exeter V40	Bio-clad poly	103	464.7	2	0.43	0.05	1.55

Uncemented

Femoral Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Corail	Pinnacle	3835	11241.9	83	0.74	0.59	0.92
TwinSys uncemented	RM Pressfit cup	2950	9141.2	60	0.66	0.50	0.84
CLS	Fitmore	1942	12141.8	56	0.46	0.35	0.60
Accolade	Trident	1865	10919.5	71	0.65	0.51	0.82
CLS	Morscher	1682	14392.2	71	0.49	0.39	0.62
CLS	CLS Expansion	1263	10105.3	82	0.81	0.65	1.01
TwinSys uncemented	Selexys TPS	1191	3909.3	52	1.33	0.99	1.74
Synergy Porous	Reflection porous	1119	5461.2	29	0.53	0.36	0.76
Summit	Pinnacle	1111	4170.3	36	0.86	0.60	1.20
CLS	Duraloc	699	6195.2	54	0.87	0.65	1.14
Synergy Porous	R3 porous	564	886.0	9	1.02	0.46	1.93
Corail	Duraloc	464	3041.4	20	0.66	0.40	1.02
CLS	Trilogy	399	1502.0	8	0.53	0.23	1.05
CLS	RM Pressfit cup	365	1285.8	9	0.70	0.32	1.33
ABGII	Trident	342	2308.3	19	0.82	0.50	1.29
TwinSys uncemented	Delta-PF Cup	331	859.0	1	0.12	0.00	0.65
CLS	Reflection porous	298	1297.1	12	0.93	0.48	1.62
S-Rom	Pinnacle	297	1837.1	17	0.93	0.54	1.48
Versys	Trilogy	272	2649.9	13	0.49	0.26	0.84
Polarstem uncemented	Reflection porous	235	308.8	5	1.62	0.53	3.78
CBC Stem	RM Pressfit cup	232	841.3	10	1.19	0.57	2.19
Femoral Stem Press Fit	Continuum TM	215	378.9	6	1.58	0.58	3.45
Stemsys	DeltaMotion Cup	213	456.5	1	0.22	0.01	1.22
TwinSys uncemented	Trilogy	209	695.8	7	1.01	0.40	2.07
CLS	Continuum TM	198	279.3	2	0.72	0.09	2.59
CLS	Durom	198	1073.7	19	1.77	1.07	2.76
CLS	Allofit	192	980.8	13	1.33	0.71	2.27
CBC Stem	Expansys shell	183	1005.2	14	1.39	0.76	2.34
Accolade	Pinnacle	180	630.6	2	0.32	0.04	1.15
H-Max S	Delta-TT Cup	175	181.5	3	1.65	0.34	4.83
CLS	Trident	157	1117.1	11	0.98	0.49	1.76
Corail	ASR	156	747.3	57	7.63	5.78	9.88
Trabecular Metal Stem	Continuum TM	153	242.5	6	2.47	0.91	5.39
Accolade	Tritanium	152	201.4	1	0.50	0.01	2.77
Stemsys	Fixa Ti Por	144	107.0	2	1.87	0.23	6.75
Corail	Reflection porous	140	633.3	1	0.16	0.00	0.88
BGII	Duraloc	139	1338.3	21	1.57	0.97	2.40

Femoral Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Femoral Stem Press Fit	Trilogy	137	470.0	-	0.64	0.13	1.87
S-Rom	ASR	130	567.7	74	13.03	10.23	16.36
Avenir Muller uncemented	Continuum TM	128	199.9	5	2.50	0.81	5.84
Omnifit	Trident	126	925.2	10	1.08	0.52	1.99
Summit	Trilogy	124	515.3	4	0.78	0.21	1.99
Polarstem uncemented	R3 porous	123	124.2	1	0.81	0.02	4.49
TwinSys uncemented	RM cup	122	377.5	2	0.53	0.06	1.91
ABG	Duraloc	116	1413.2	15	1.06	0.59	1.75
Synergy Porous	BHR Acetabular Cup	114	522.3	8	1.53	0.66	3.02
CLS	RM cup	113	677.0	12	1.77	0.92	3.10
Prodigy	Duraloc	113	1129.6	13	1.15	0.61	1.97
ABGII	Delta-PF Cup	107	745.1	8	1.07	0.46	2.12
CLS	Weill ring	106	1086.0	6	0.55	0.20	1.20
Avenir Muller uncemented	RM cup	105	259.0	1	0.39	0.01	2.15
Mallory-Head	M2A	105	733.8	8	1.09	0.47	2.15
Summit	Duraloc	101	704.6	5	0.71	0.23	1.66

Hybrid

Femoral Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Exeter V40	Trident	5228	23668.1	113	0.48	0.39	0.57
Spectron	Reflection porous	2745	16254.8	112	0.69	0.57	0.83
Exeter V40	Trilogy	1825	8227.5	39	0.47	0.34	0.65
MS 30	Fitmore	1176	5650.5	14	0.25	0.14	0.42
Spectron	Duraloc	1153	10241.1	114	1.11	0.92	1.34
Exeter V40	Pinnacle	1066	2829.2	14	0.49	0.27	0.83
Muller	RM cup	1035	7836.3	56	0.71	0.54	0.93
Exeter V40	Duraloc	987	6700.2	52	0.78	0.58	1.02
Exeter V40	RM Pressfit cup	857	2715.3	8	0.29	0.13	0.58
Exeter	Osteolock	836	8426.6	46	0.55	0.40	0.73
MS 30	Morscher	787	6700.7	45	0.67	0.49	0.90
TwinSys cemented	RM Pressfit cup	718	1975.9	12	0.61	0.31	1.06
Exeter V40	Tritanium	701	914.6	10	1.09	0.52	2.01
Exeter V40	Continuum TM	683	897.0	11	1.23	0.61	2.19
CPT	Trilogy	667	3109.2	32	1.03	0.70	1.45
Exeter V40	Morscher	630	4383.9	25	0.57	0.37	0.84
Elite plus	Duraloc	608	4845.6	68	1.40	1.09	1.78
Exeter	Duraloc	553	5897.9	49	0.83	0.61	1.10

Femoral Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Exeter	Morscher	551	5991.1	26	0.43	0.28	0.64
C-Stem AMT	Pinnacle	518	1033.7	5	0.48	0.16	1.13
Exeter V40	Reflection porous	402	1702.6	7	0.41	0.17	0.85
Exeter V40	Fitmore	349	1118.7	2	0.18	0.02	0.65
Exeter V40	Osteolock	270	2202.6	10	0.45	0.22	0.83
CPT	Continuum TM	269	277.2	4	1.44	0.39	3.69
Spectron	R3 porous	269	352.8	4	1.13	0.31	2.90
Muller	RM Pressfit cup	240	1054.8	2	0.19	0.02	0.68
Versys cemented	Trilogy	236	1874.5	7	0.37	0.15	0.77
Exeter	Trilogy	213	2161.2	12	0.56	0.29	0.97
CPT	Duraloc	212	1816.2	9	0.50	0.23	0.94
Spectron	Morscher	210	2031.1	14	0.69	0.38	1.16
MS 30	Trilogy	178	676.8	3	0.44	0.09	1.30
Friendly	Delta-PF Cup	159	768.4	2	0.26	0.03	0.94
Spectron	Mallory-Head	152	1141.7	6	0.53	0.19	1.14
TwinSys cemented	RM cup	148	755.0	4	0.53	0.14	1.36
CPT	Trident	145	893.6	8	0.90	0.39	1.76
Corail	Ultima	134	866.3	3	0.35	0.07	1.01
CCA	RM Pressfit cup	131	742.2	3	0.40	0.08	1.18
Exeter	CLS Expansion	129	1276.5	8	0.63	0.27	1.23
Exeter V40	Monoblock Acetabular Cup	123	1008.5	5	0.50	0.16	1.16
Exeter V40	R3 porous	123	133.1	1	0.75	0.02	4.19
Muller	Trilogy	116	442.5	7	1.58	0.64	3.26
Exeter V40	Trabecular Metal Shell	115	318.4	6	1.88	0.69	4.10
Accolade	Muller PE cup	114	792.2	1	0.13	0.00	0.70
MS 30	Continuum TM	109	143.5	1	0.70	0.02	3.88
Basis	Reflection porous	105	318.8	1	0.31	0.01	1.75
CPT	Fitmore	93	335.3	5	1.49	0.48	3.48
Muller	Duraloc	89	859.5	10	1.16	0.56	2.14
Exeter V40	CLS Expansion	88	686.2	0	0.00	0.00	0.54
CPT	Monoblock Acetabular Cup	84	553.3	7	1.27	0.51	2.61
Exeter	Trident	84	847.4	0	0.00	0.00	0.44
MS 30	RM Pressfit cup	80	401.8	1	0.25	0.01	1.39
Muller	Morscher	78	728.1	3	0.41	0.08	1.20
Spectron	Fitmore	78	727.8	4	0.55	0.15	1.41
Spectron	Trident	78	579.3	3	0.52	0.11	1.51
Muller	Trident	76	463.2	4	0.86	0.24	2.21
CPT	Tritanium	74	145.6	3	2.06	0.42	6.02

Femoral Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Spectron	Biomex acet shell porous	68	710.3	1	0.14	0.00	0.78
Muller	CLS Expansion	64	361.6	4	1.11	0.30	2.83
TwinSys cemented	Selexys TPS	63	132.5	4	3.02	0.82	7.73
CPT	Pinnacle	61	227.9	2	0.88	0.11	3.17
MS 30	Duraloc	55	593.2	5	0.84	0.27	1.97
C-Stem	Duraloc	53	454.9	4	0.88	0.24	2.25

Revision vs Different Liner/Cup Combinations vs Head size <=28mm or >28mm

CC = ceramic/ceramic; CP = ceramic/polyethylene; MM = metal/metal & MP = metal/polyethylene (Resurfaced hips excluded

Uncemented Cups no Liner

Size	Surfaces	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<=28	CC	0	-	-	-	-	-
<=28	CP	3239	21466.7	129	0.60	0.50	0.71
<=28	MM	1295	10836.0	73	0.67	0.53	0.85
<=28	MP	4449	27514.8	159	0.58	0.49	0.68
>28	CC	374	607.4	2	0.33	0.04	1.19
>28	CP	1003	1726.8	4	0.23	0.06	0.59
>28	MM	1571	7961.7	240	3.01	2.65	3.42
>28	MP	1810	5796.9	37	0.64	0.45	0.88

For head size >28mm the MM articulation had a significantly higher revision rate when compared to the other 3 and MP had a significantly higher revision rate than CP despite overlap of CIs

Uncemented Cups With Liner

Size	Surfaces	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<=28	CC	669	4127.8	38	0.92	0.65	1.26
<=28	CM	16	51.0	1	1.96	0.05	10.93
<=28	CP	5391	34764.1	262	0.75	0.67	0.85
<=28	MM	1485	14234.3	95	0.67	0.54	0.82
<=28	MP	17638	113412.1	847	0.75	0.70	0.80
>28	CC	7134	26141.4	179	0.68	0.59	0.79
>28	CM	445	1236.7	10	0.81	0.39	1.49
>28	CP	3877	11111.2	71	0.64	0.50	0.81
>28	MM	1550	7662.8	74	0.97	0.76	1.21
>28	MP	8744	22207.0	168	0.76	0.65	0.88

For head size >28mm the MM articulation had a significantly higher revision rate when compared to the other 4

Cemented Cups

Size	Surfaces	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<28	CP	458	3207.1	22	0.69	0.43	1.04
<28	MP	18213	128029.5	775	0.61	0.56	0.65
>28	CP	125	440.5	4	0.91	0.25	2.33
>28	MM	9	43.6	1	2.29	0.06	12.78
>28	MP	2487	7028.4	29	0.41	0.28	0.59

No Statistical significance among the groups4

Summary for Revision vs Bearing Surfaces

Surfaces	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
CC	8177	30876.6	219	0.71	0.62	0.81
CM	461	1287.6	11	0.85	0.43	1.53
CP	14093	72716.4	492	0.68	0.62	0.74
MM	5910	40738.5	483	1.19	1.08	1.30
MP	54637	315502.5	2061	0.65	0.63	0.68

The MM articulation has a significantly higher revision rate than CC, CP and MP

Revision vs Monoblock Femoral Stems

No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
1296	11513.9	46	0.40	0.29	0.53

Monoblock stems which have been implanted for an average of 9 years have a very low revision rate

Revision vs Bearing Surface Articulations vs Head size 28mm, 32mm, 36mm & >36mm

Head Size	Surfaces	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
28	CC	669	4127.8	38	0.92	0.65	1.26
	CM	16	51.0	1	1.96	0.05	10.93
	CP	8999	58416.0	404	0.69	0.63	0.76
	MM	2779	25063.7	168	0.67	0.57	0.78
	MP	38171	249029.6	1616	0.65	0.62	0.68
	Total	**50634**	**336689.0**	**2227**	**0.66**	**0.63**	**0.69**
32	CC	2677	12212.5	80	0.66	0.52	0.82
	CP	3517	9963.3	57	0.57	0.43	0.74
	MM	480	2301.0	19	0.83	0.50	1.29
	MP	11741	32381.3	211	0.65	0.57	0.75
	Total	**18415**	**56858.2**	**367**	**0.65**	**0.58**	**0.72**

Head Size	Surfaces	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
36	CC	4132	13418.9	94	0.70	0.57	0.86
	CM	438	1216.1	10	0.82	0.39	1.51
	CP	1488	3315.2	22	0.66	0.42	1.00
	MM	1002	5381.5	50	0.93	0.69	1.22
	MP	1271	2501.8	23	0.92	0.58	1.38
	Total	**8331**	**25833.5**	**199**	**0.77**	**0.67**	**0.89**
>36	CC	699	1117.4	7	0.63	0.25	1.29
	CM	7	20.6	0	0.00	0.00	17.95
	MM	1648	7985.6	246	3.08	2.71	3.49
	MP	19	70.2	0	0.00	0.00	5.25
	Total	**2373**	**9193.9**	**253**	**2.75**	**2.42**	**3.11**

Summary for Revision v Head Size

Head Size	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<=28	54149	369157.3	2447	0.6	0.6	0.7
32	18415	56858.2	367	0.6	0.5	0.7
36	8331	25833.5	199	0.7	0.6	0.9
>36	2373	9193.9	253	2.7	2.4	3.1

Head size > 36 mm (70% are Metal on Metal articulation) has a significantly higher revision rate compared to other 3 sizes and the 36 head size has a significantly higher revision rate than 28mm head size.

Revision Comparison Standard vs Cross linked Polyethelene

Surfaces	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
CC	8177	30876.6	219	0.71	0.62	0.81
CM	461	1287.6	11	0.85	0.43	1.53
CP	14093	72716.4	492	0.68	0.62	0.74
PS	6594	49893.1	358	0.72	0.65	0.80
PX	7499	22823.4	134	0.59	0.49	0.70
MM	5910	40738.5	483	1.19	1.08	1.30
MP	54637	315502.5	2061	0.65	0.63	0.68
PS	34565	241801.3	1571	0.65	0.62	0.68
PX	20072	73701.3	490	0.66	0.61	0.73

PS standard polyethylene; PX crossed polyethylene.

No significant difference at this stage between the two types of polyethylene for both CP and MP bearing surfaces.

Revision vs Age Bands

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
LT55	12672	76407.8	767	1.00	0.93	1.08
55_64	21186	123092.0	1016	0.83	0.78	0.88
65_74	28010	157790.0	1028	0.65	0.61	0.69
GE75	22562	111752.0	508	0.45	0.42	0.50

Each age band has a significantly lower revision rate than the preceding one

Revision vs Age Bands vs Bearing Surfaces

Bearing Surface	Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
CC	LT55	3114	12210.1	100	0.82	0.67	1.00
	55_64	3416	13153.1	83	0.63	0.50	0.78
	65_74	1509	5173.6	34	0.66	0.46	0.92
	GE75	138	339.8	2	0.59	0.07	2.13
CM	LT55	172	474.7	2	0.42	0.05	1.52
	55_64	209	594.1	7	1.18	0.47	2.43
	65_74	71	198.3	2	1.01	0.12	3.64
	GE75	9	20.5	0	0.00	0.00	17.98
CP	LT55	2755	16751.0	140	0.84	0.70	0.99
	55_64	4968	26784.2	169	0.63	0.54	0.73
	65_74	4618	22205.9	142	0.64	0.54	0.75
	GE75	1752	6975.3	41	0.59	0.42	0.80
MM	LT55	2874	21254.6	231	1.09	0.95	1.24
	55_64	2363	15660.1	205	1.31	1.14	1.50
	65_74	634	3642.8	43	1.18	0.85	1.59
	GE75	41	184.8	4	2.16	0.59	5.54
MP	LT55	3506	23554.4	275	1.17	1.03	1.31
	55_64	9786	63094.6	534	0.85	0.78	0.92
	65_74	20277	118974.0	771	0.65	0.60	0.70
	GE75	19772	98365.5	435	0.44	0.40	0.49

Overall the CP and CC are performing the best and the MM the worst of the bearing surfaces over all the age groups. This is further illustrated in the KM curve for uncemented components.

Revision vs Gender

Gender	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
F	44924	249116.8	1586	0.64	0.61	0.67
M	39506	219925.0	1733	0.79	0.75	0.83

Males have a significantly higher revision rate than females.

Revision vs Surgeon Annual Workload

Operations per Year	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
LT10	1168	7429.6	69	0.93	0.72	1.18
10_25	8173	45005.1	381	0.85	0.76	0.94
25_50	39350	216283.4	1575	0.73	0.69	0.77
50_75	20531	112491.2	699	0.62	0.58	0.67
75_100	5630	29747.3	154	0.52	0.44	0.61
GE100	9578	58085.2	441	0.76	0.69	0.83

Those surgeons performing <10 arthroplasties a year have a significantly higher revision rate than those performing between 25 and 100 per year.

Revision vs Approach

Approach	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Anterior	3369	23097.0	156	0.68	0.57	0.79
Posterior	53179	287778.0	2116	0.74	0.70	0.77
Lateral	23109	129404.9	822	0.64	0.59	0.68
Troch	106	574.2	9	1.57	0.72	2.98

The posterior approach has a significantly higher revision rate than the lateral approach.

Revision for Dislocation vs Approach

Approach	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Anterior	3369	23097.0	33	0.14	0.10	0.20
Posterior	53179	287778.0	690	0.24	0.22	0.26
Lateral	23109	129404.9	134	0.10	0.09	0.12
Troch	106	574.2	1	0.17	0.00	0.97

The posterior approach has a significantly higher revision rate for dislocation than the lateral and anterior approaches.

Revision vs Arthroplasty Fixation

Fixation	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Cemented	22321	149098.6	870	0.58	0.55	0.62
Uncemented	30968	148214.7	1313	0.89	0.84	0.94
Hybrid	31141	171728.5	1136	0.66	0.62	0.70

Uncemented hips have a significantly higher revision rate than either fully cemented or hybrid hips.

Revision by Arthroplasty Fixation vs Age Bands

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<55						
Cemented	619	5031.2	87	1.73	1.39	2.13
Uncemented	9188	50851.3	469	0.92	0.84	1.01
Hybrid	2865	20525.3	211	1.03	0.89	1.18
55_64						
Cemented	2260	18123.9	178	0.98	0.84	1.14
Uncemented	11439	57048.1	512	0.90	0.82	0.98
Hybrid	7487	47920.1	326	0.68	0.61	0.76
65_74						
Cemented	8027	59211.5	362	0.61	0.55	0.68
Uncemented	7584	31109.4	259	0.83	0.73	0.94
Hybrid	12399	67469.1	407	0.60	0.55	0.66
GE74						
Cemented	11415	66732.0	243	0.36	0.32	0.41
Uncemented	2757	9205.9	73	0.79	0.62	1.00
Hybrid	8390	35814.1	192	0.54	0.46	0.62

For age band <55 age band uncemented and hybrid hips have a significantly lower revision rate than cemented hips, but there is no significant difference between the first two.

For the 55-64 age band hybrid hips have a significantly lower revision rate than cemented and uncemented hips.

For the 65-74 and >74 age bands both cemented and hybrid hips have significantly lower revision rates than uncemented hips.

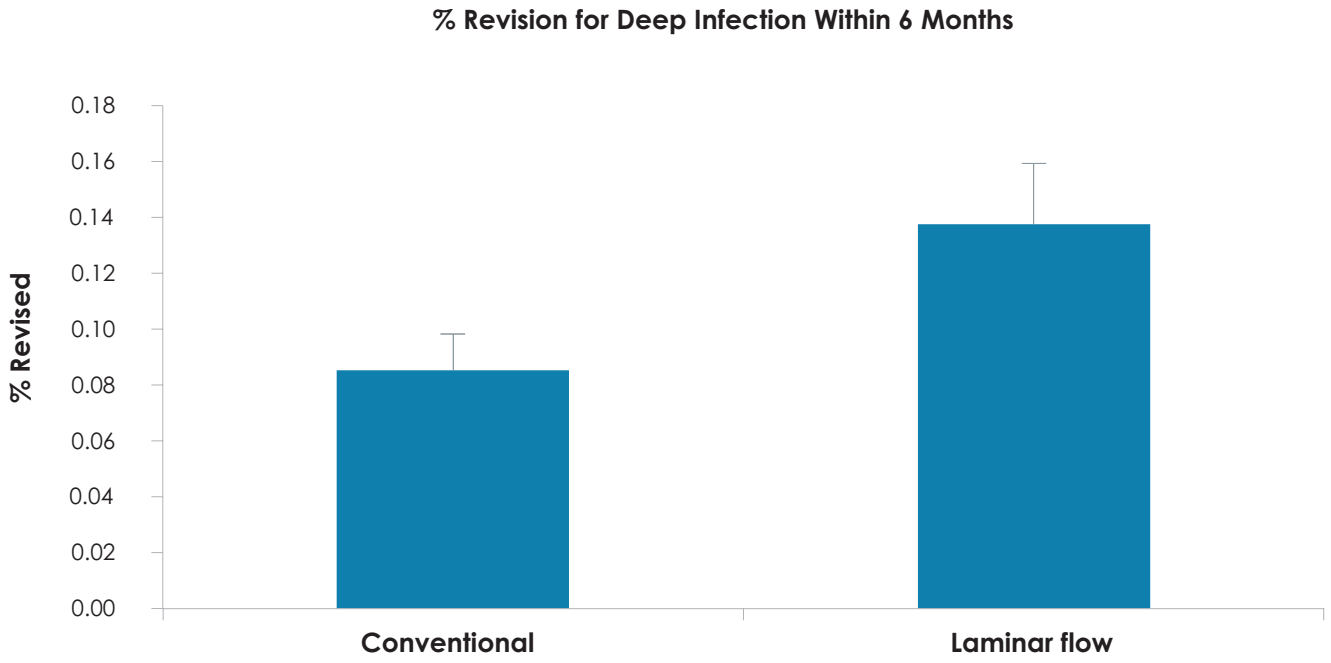
In addition, for the >74 age band, cemented hips have a significantly lower revision rate than hybrid hips.

Revision vs ASA Status

ASA Class	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
1	8813	31491.0	281	0.89	0.79	1.00
2	30108	103768.8	758	0.73	0.68	0.78
3	11774	37685.6	283	0.75	0.67	0.84
4	450	1142.8	10	0.88	0.42	1.61

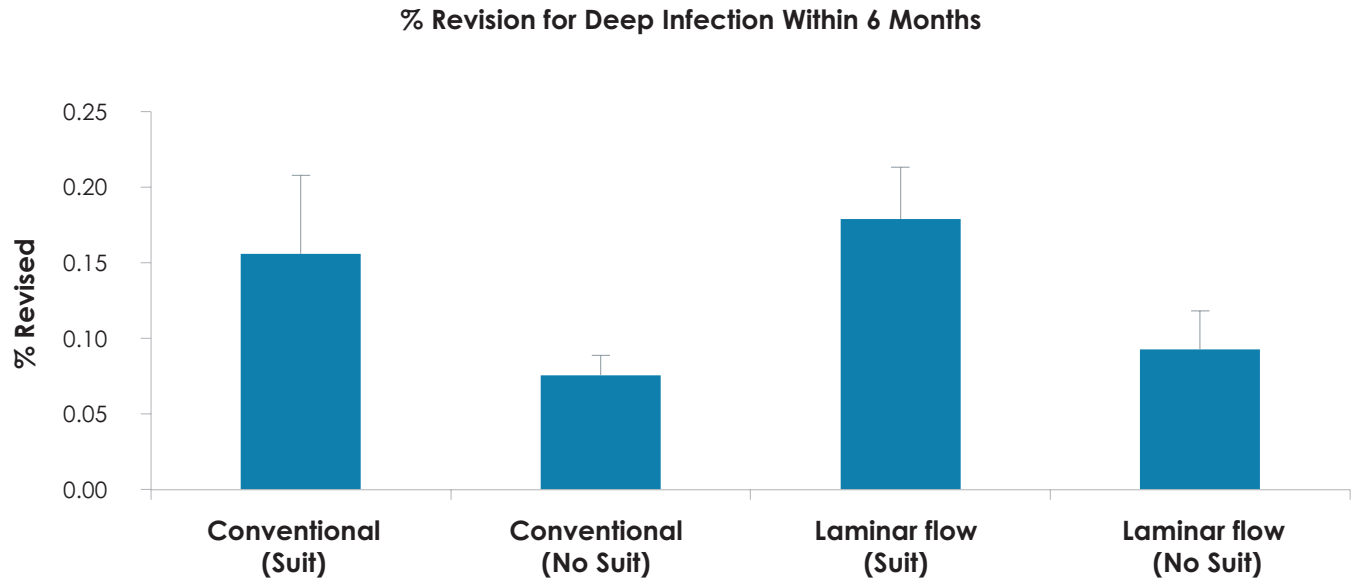
Revision for Deep Infection within 6 months vs Theatre Environment

Theatre	Total Number	Number Revised	Rate/100% component-years	Exact 95% confidence interval	
Conventional	49293	42	1.0	0.01314	1.00
Laminar flow	29092	40	1.38	0.02172	0.78



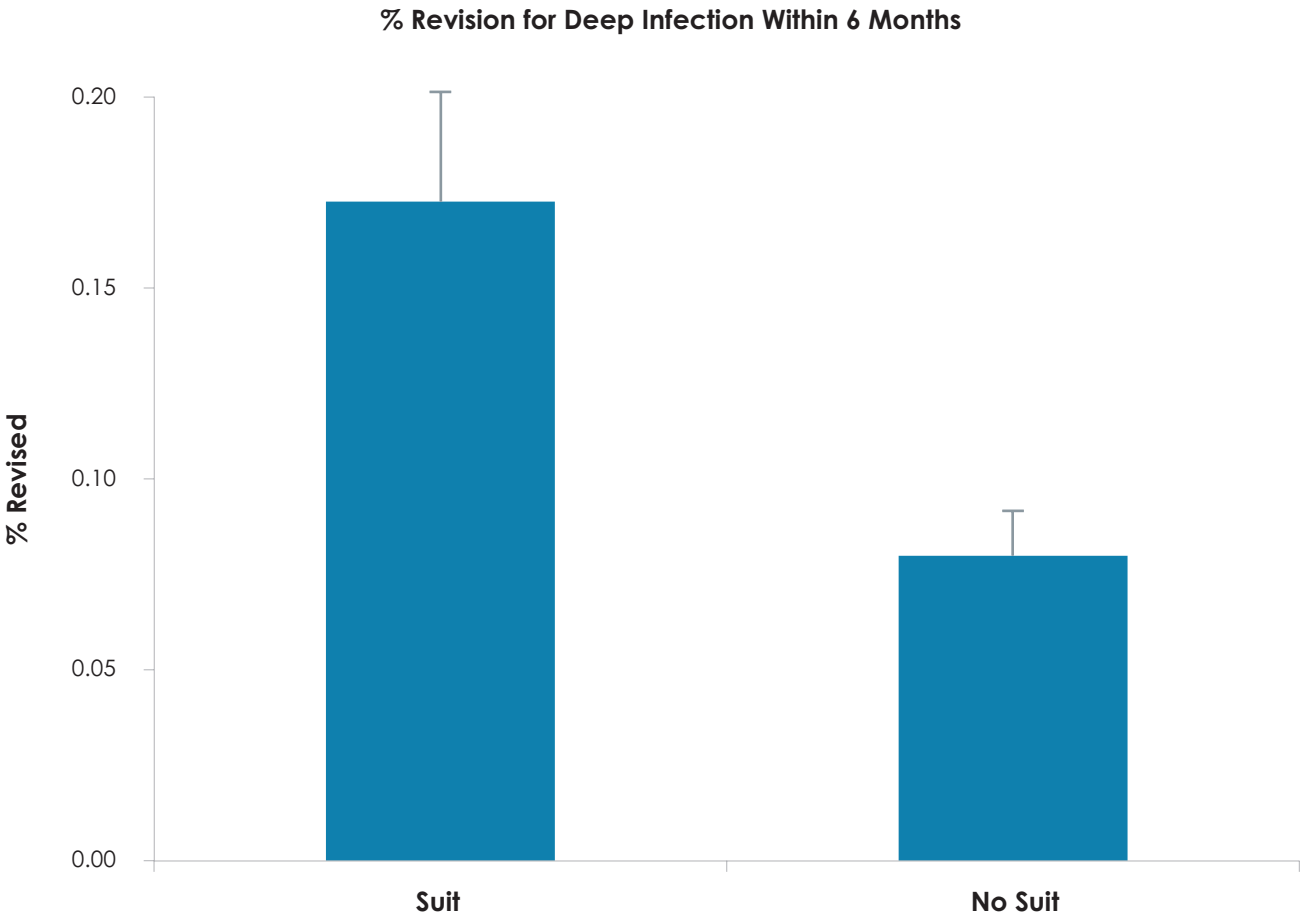
There is a significant difference in revision rates for deep infection within 6 months of surgery between conventional and laminar flow theatres.

		Total Number	Number revised	%	Std Error
Conventional	Suit	5774	9	0.16	0.05
	no suit	43519	33	0.08	0.01
Laminar flow	Suit	15079	27	0.18	0.03
	no suit	14013	13	0.09	0.03



There is a significant difference in the revision rates between conventional/ no suit and laminar flow/suit environments. There is 2.4 times the risk for revision in the latter compared to the former environment.

	Total Number	Number revised	%	Std Error
Suit	20853	36	0.17	0.03
no suit	57532	46	0.08	0.01

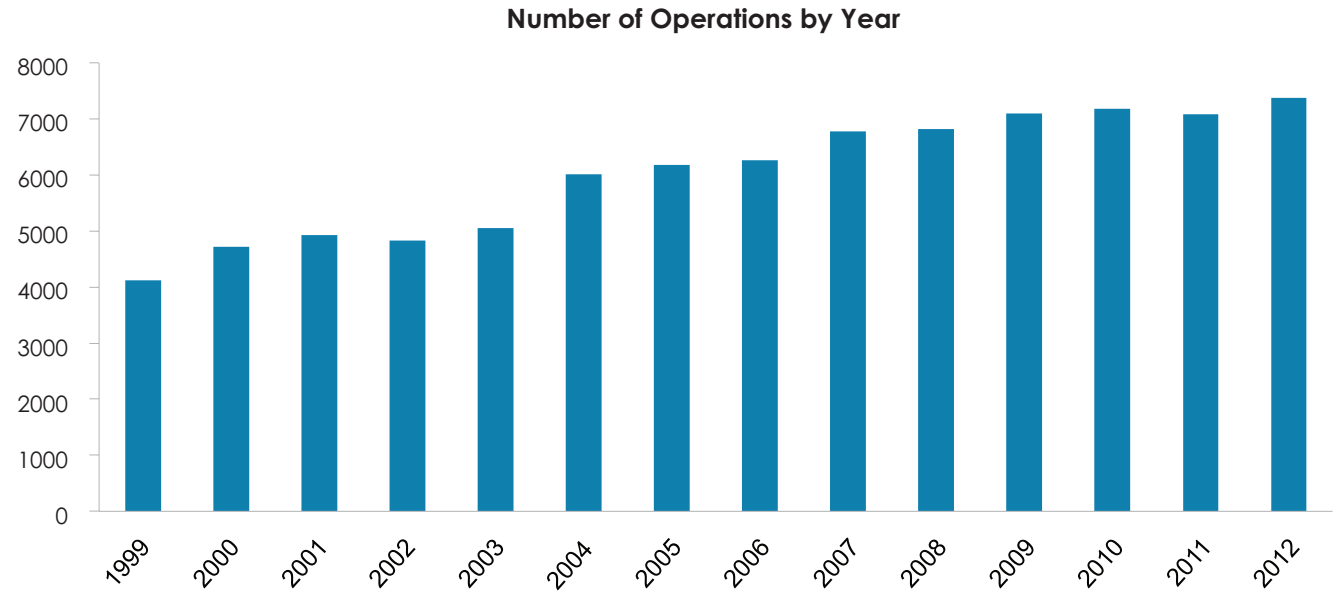


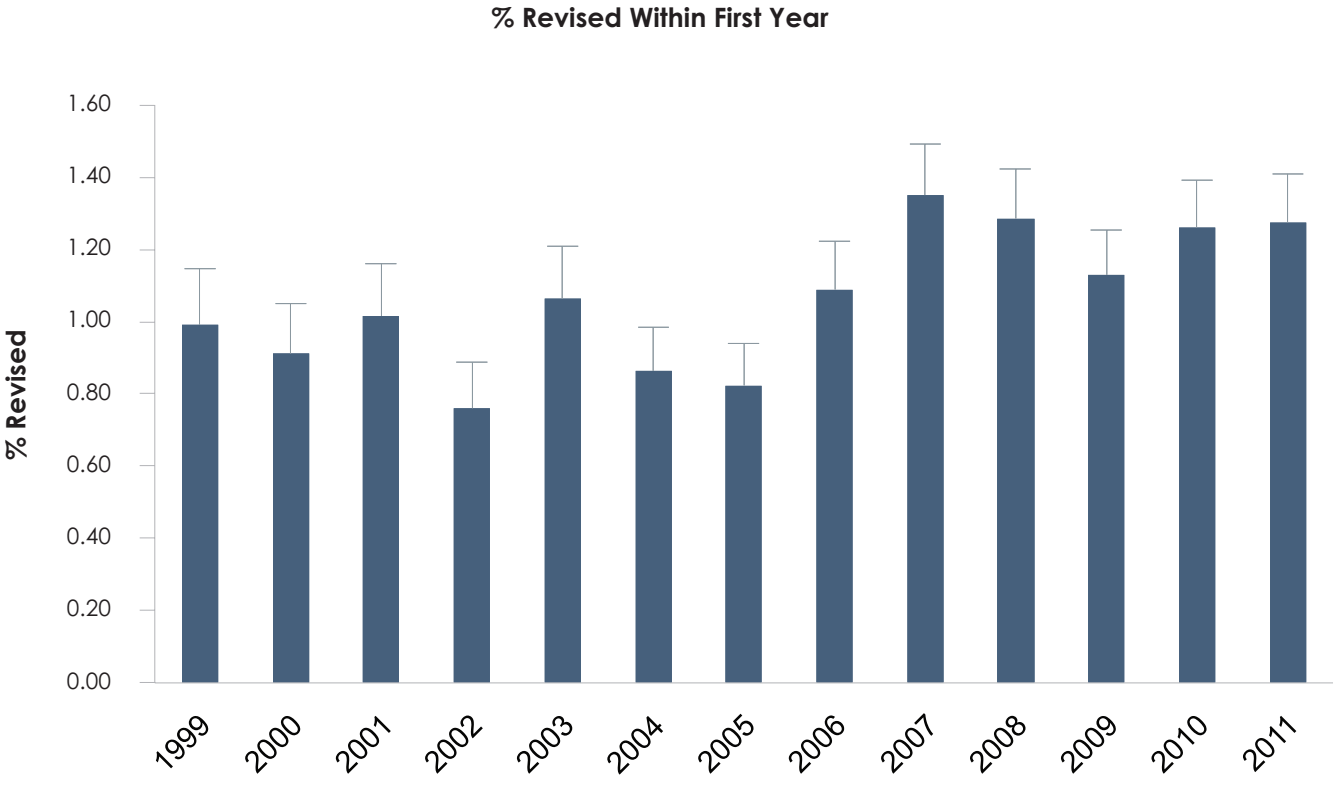
Furthermore there is a significant increase in revision rates (2.2 x) when suits are used in either conventional or laminar flow theatres.

From the above data it would appear that the use of space suits in either theatre environment significantly increases the risk of deep infection within the first 6 months following hip arthroplasty and that there is no advantage to using laminar flow theatres for primary hip arthroplasty

Percentage of hips revised in the first year

The following two bar graphs show that the percentage of hips revised in the first year after arthroplasty slightly rose in 2011.





Resurfacing Arthroplasty
All Patients

No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
1339	5440.9	67	1.23	0.95	1.56

The revision rate for resurfacing arthroplasty is now significantly higher than conventional arthroplasty

Resurfacing Prosthesis vs Revision Rate

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Adept	4	19.1	0	0	0	19.30
ASR	132	784.1	22	2.81	1.76	4.25
BHR	1159	4498.2	41	0.91	0.65	1.24
BMHR	25	59.0	1	1.69	0.04	9.44
Conserve Superfinish	3	10.6	0	0	0	34.81
Durom	4	34.3	0	0	0	10.76
Mitch TRH Resurfacing Head	12	35.6	3	8.42	1.74	24.62

The Mitch TRH has a very significantly higher revision rate but none have been implanted since 2010.

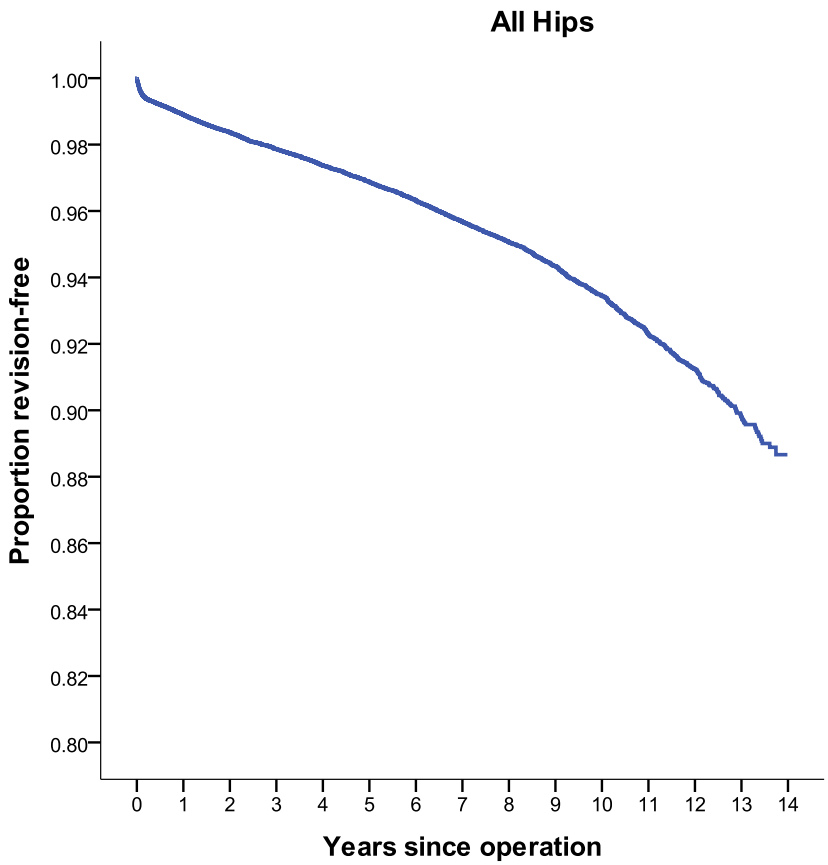
Head Size vs Revision Rate

Head Size	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<=44	97	404.3	16	3.96	2.26	6.43
45-49	299	1309.8	24	1.83	1.17	2.73
50-54	863	3311.9	25	0.75	0.49	1.11
>=55	80	414.9	2	0.48	0.06	1.74

The <=44 mm head has a significantly higher revision rate than head sizes > 49mm and the 45-49mm head has a significantly higher revision rate than head sizes 50-54

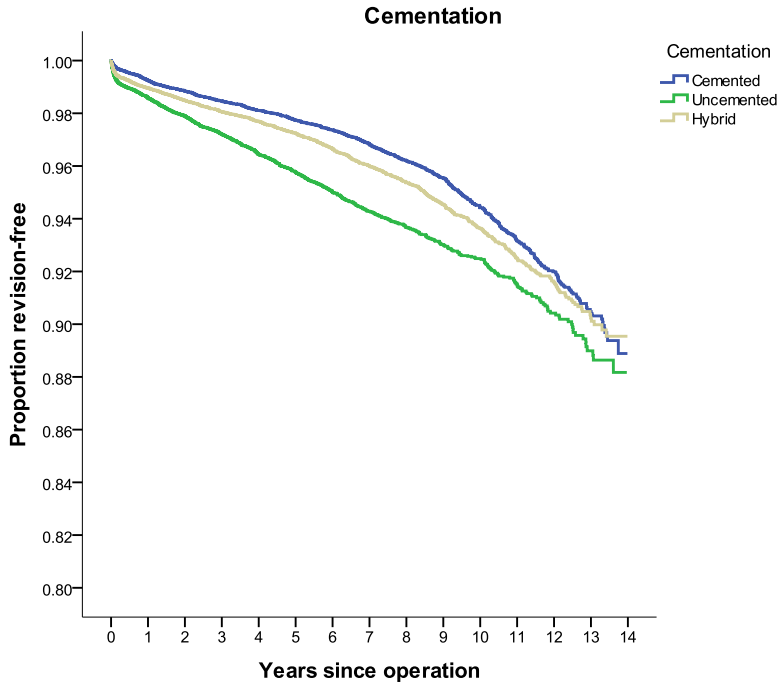
KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the years 1999 – 2012 with deceased patients censored at time of death.



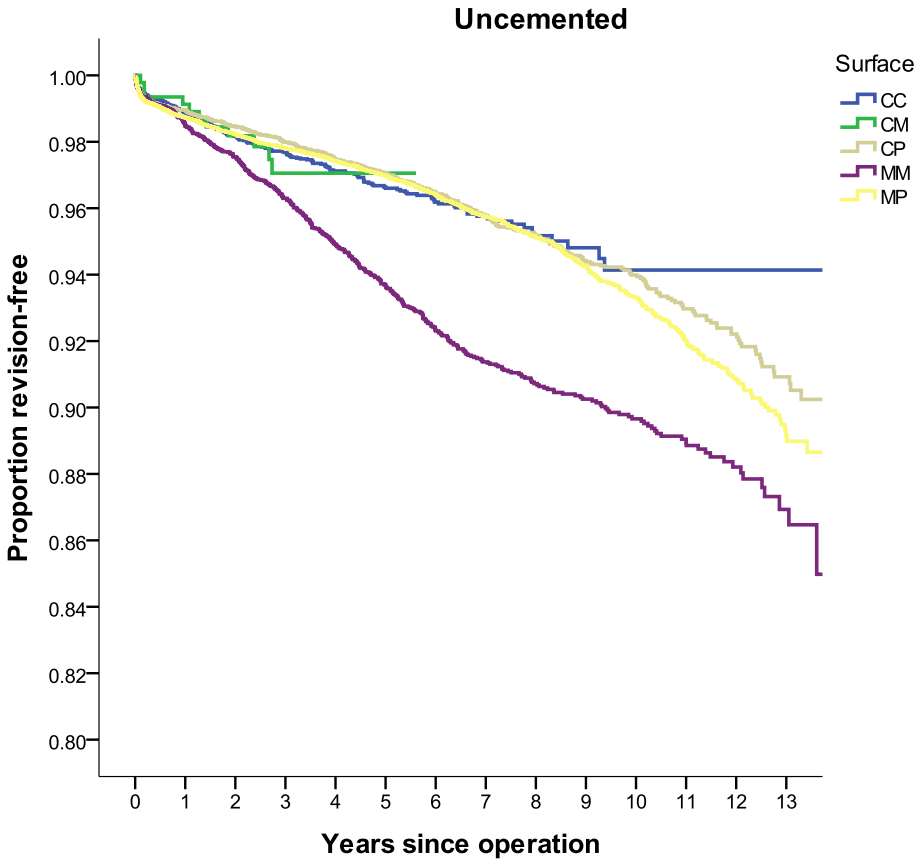
Years	% Revision-free	N
1	98.75	74900
2	98.22	66543
3	97.74	58225
4	97.25	50183
5	96.73	42733
6	96.16	35568
7	95.52	29171
8	94.93	23142
9	94.06	17589
10	93.15	12989
11	92.02	9037
12	90.84	5491
13	88.54	2361

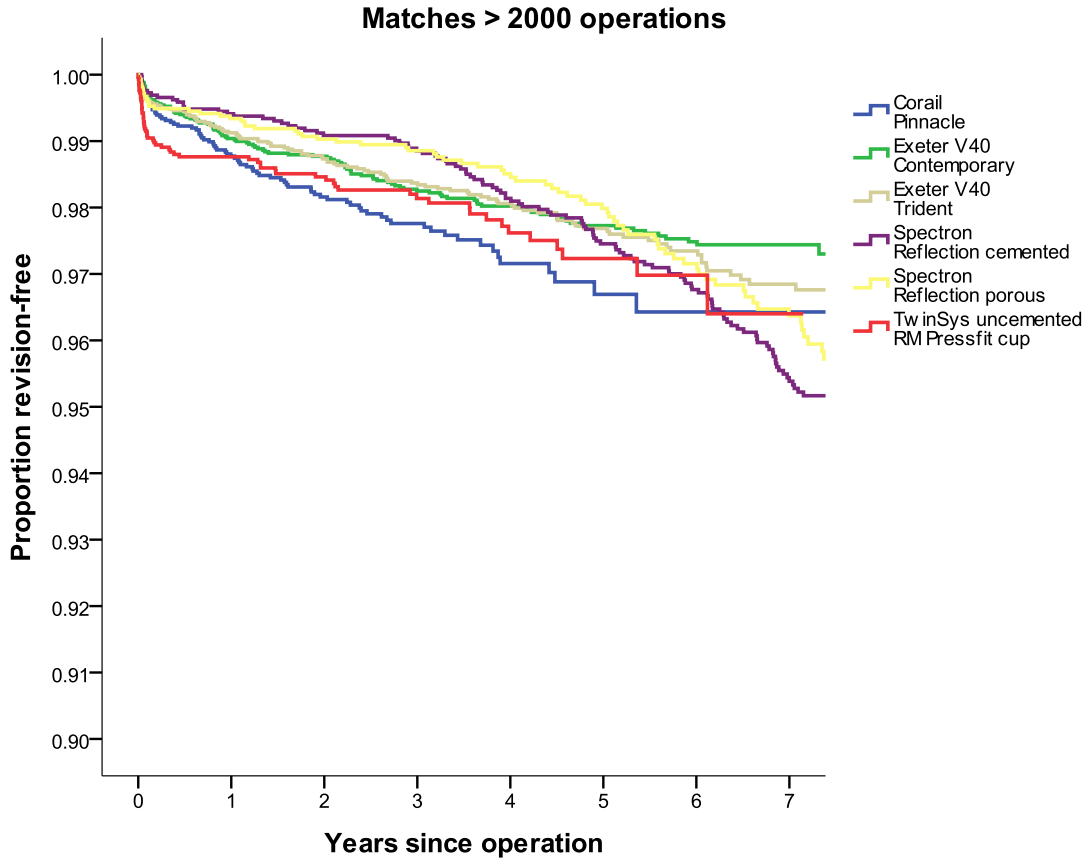
The KM analysis is to13yrs rather than 14 as too few registered hips were revised in 2011.

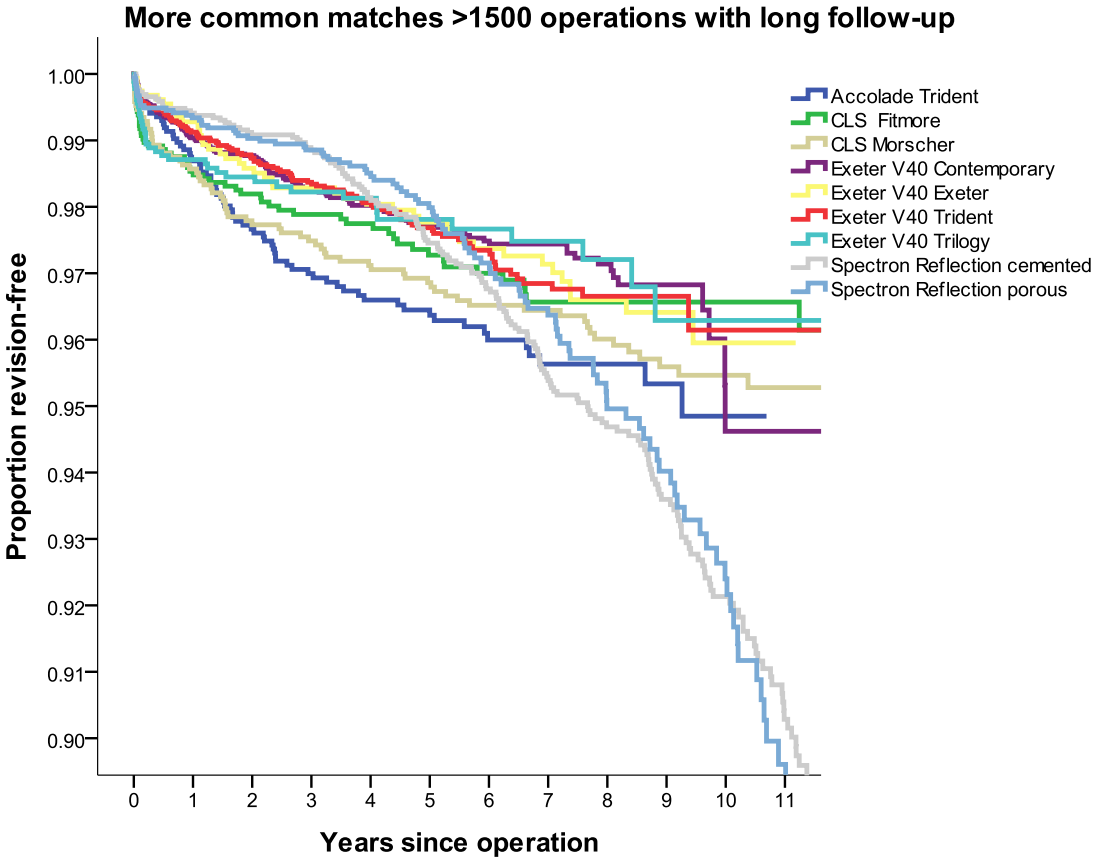


Years	Cemented % Revision-free	Uncemented % Revision-free	Hybrid % Revision-free
1	99.10	98.39	98.85
2	98.74	97.67	98.37
3	98.38	97.03	97.96
4	98.03	96.31	97.55
5	97.64	95.56	97.09
6	97.27	94.81	96.47
7	96.65	94.11	95.85
8	96.08	93.54	95.25
9	95.21	92.80	94.26
10	94.17	92.14	93.33
11	92.90	91.21	92.22
12	91.49	90.18	91.20
13	88.88	87.97	89.29

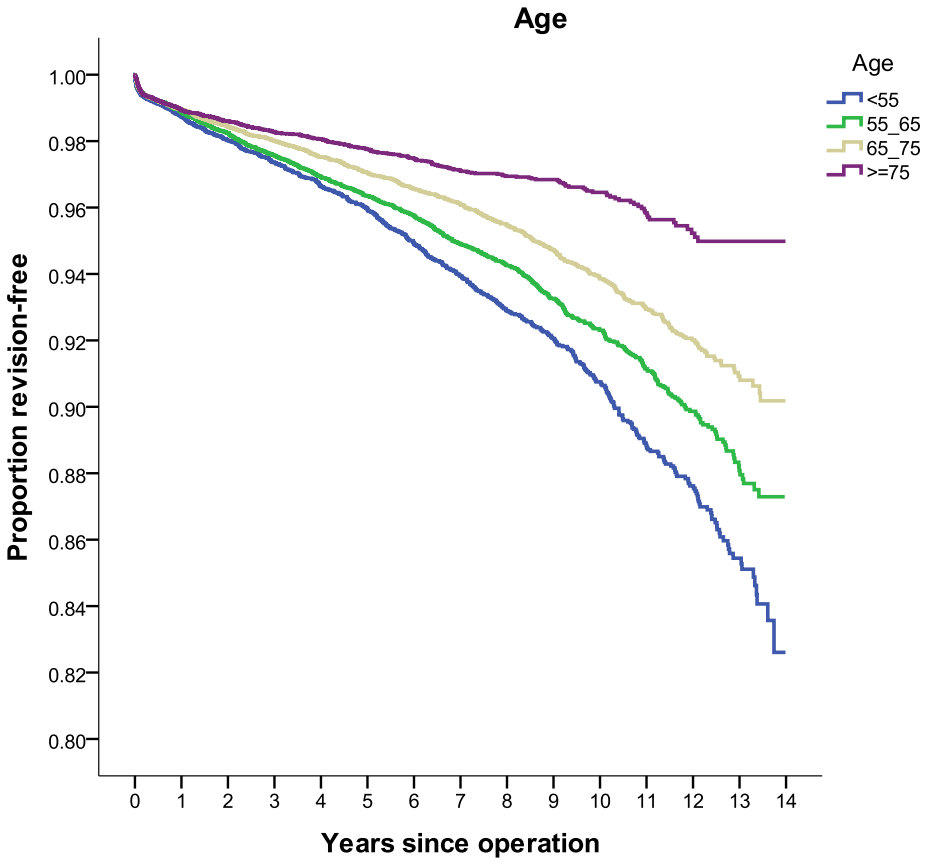
KM Curve for bearing surfaces in Uncemented Hips

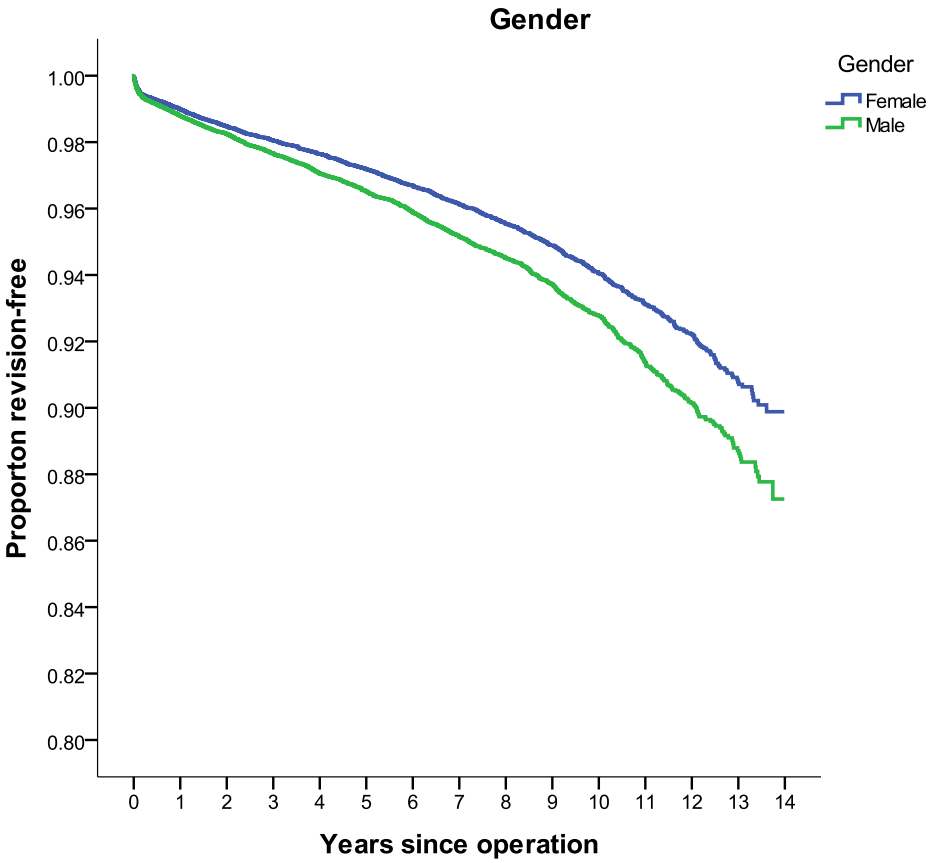


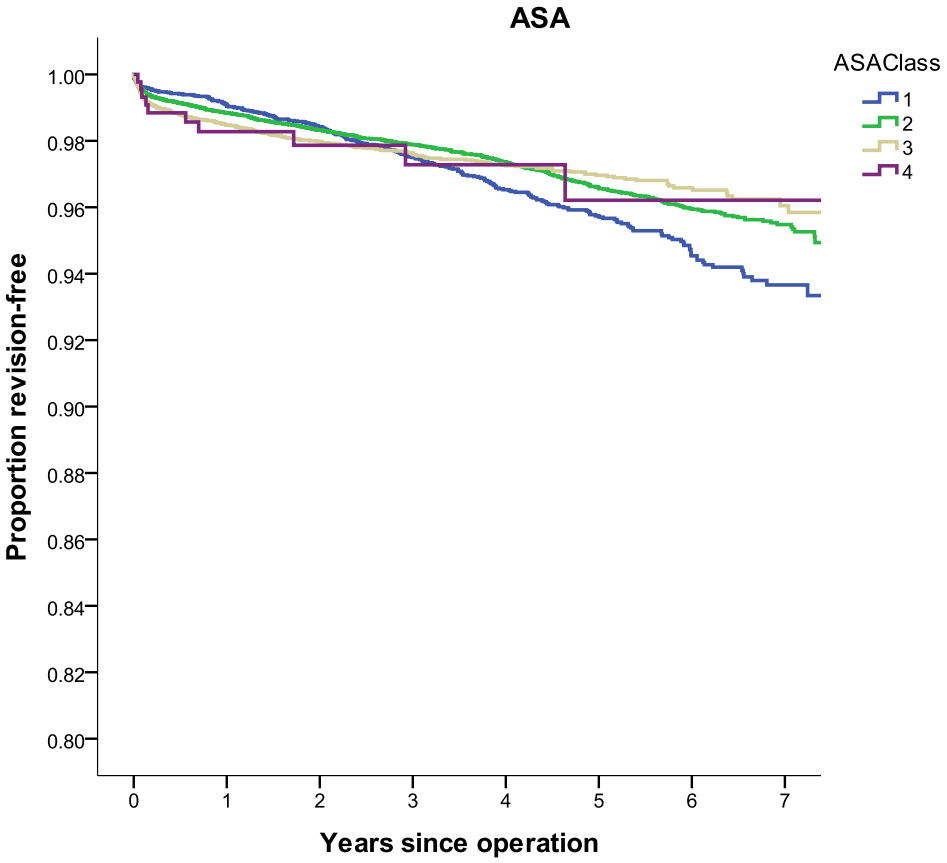


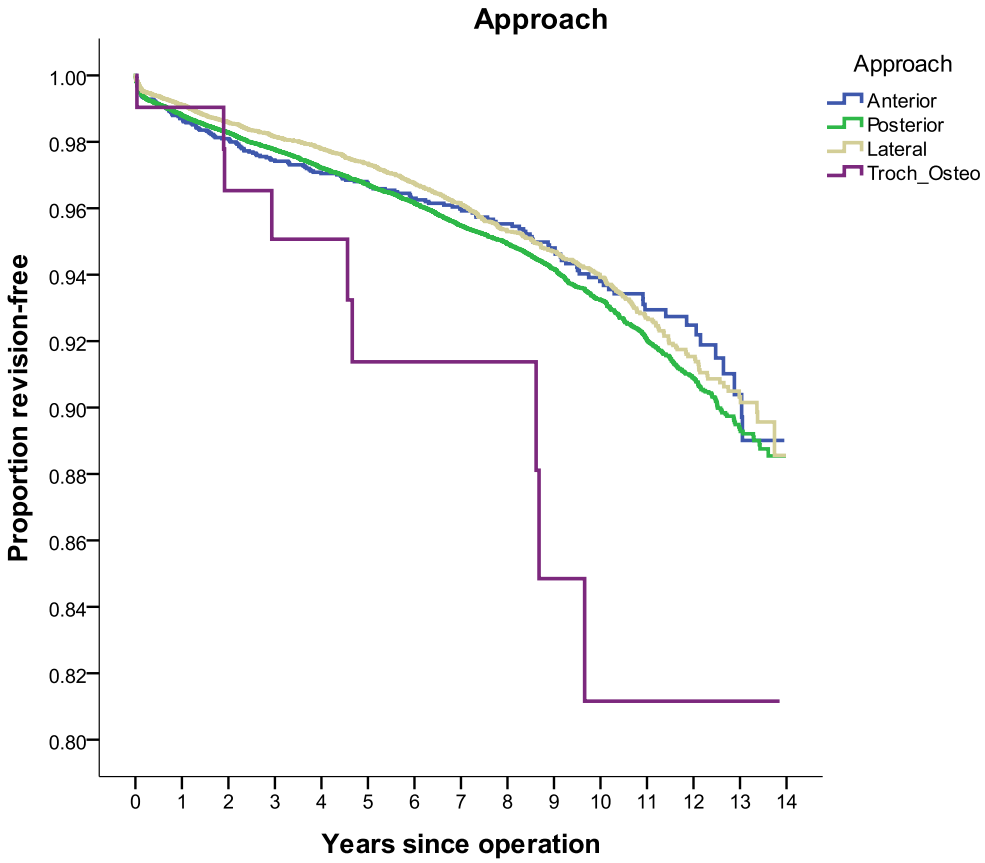


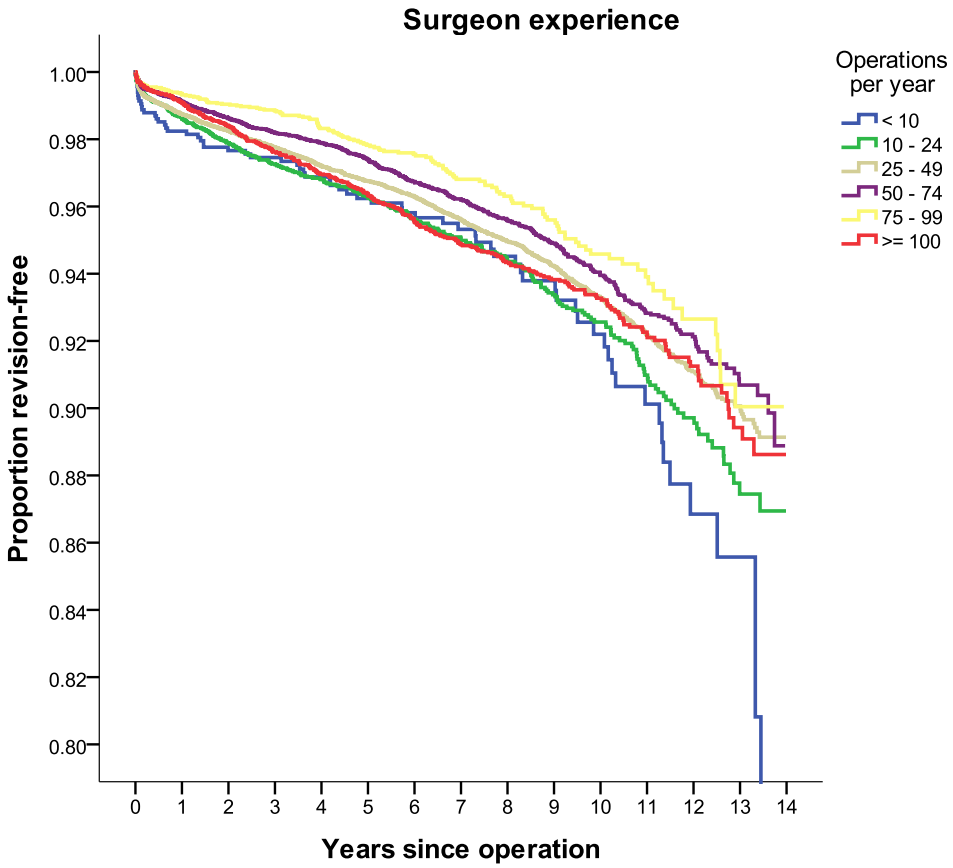
The two that stand out are the Spectron Reflection cemented and the Spectron Reflection porous




Gender
Gender
Female
Male
Proporton revision-free
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
0.82
0.80
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Years since operation


ASA
ASAClass
1
2
3
4
Proportion revision-free
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
0.82
0.80
0 1 2 3 4 5 6 7
Years since operation


Approach
Approach
Anterior
Posterior
Lateral
Troch_Osteo
Proportion revision-free
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
0.82
0.80
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Years since operation


Surgeon experience
Operations per year
< 10
10 - 24
25 - 49
50 - 74
75 - 99
>= 100
Proportion revision-free
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
0.82
0.80
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Years since operation

Re-revisions of conventional hips

Analysis was undertaken of hip re-revisions.

There were 401 registered conventional hip replacements that had been revised twice, 78 that had been revised three times, 21 that had been revised four times and 3 revised 5 times.

Second revision

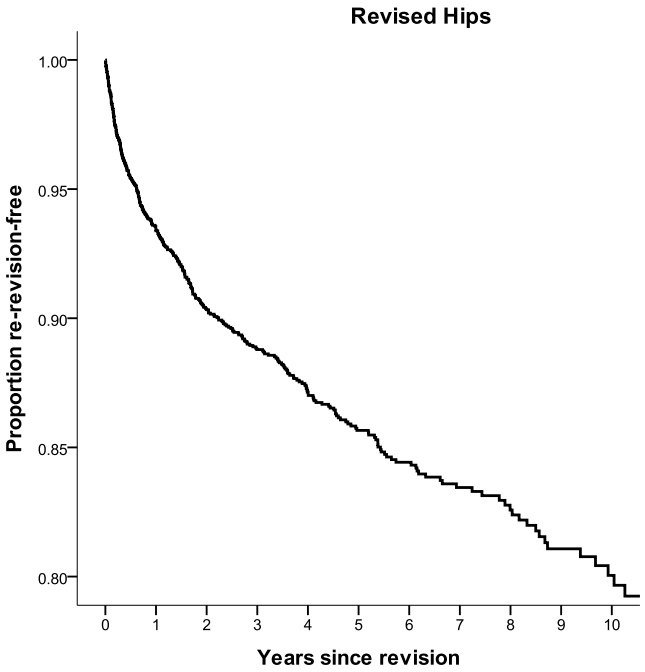
Time between the first and second revisions averaged 668 days, with a range of 1 – 4523 and a standard deviation of 810. This compares to an average of 1495 days between the primary and first revision.

Reason for Second Revision	
Dislocation	130
Deep infection	112
Loosening femoral component	56
Loosening acetabulum component	47
Pain	44
Fracture femur	23

Revision	
Change of head	245
Change of acetabulum	135
Change of liner	175
Change of all	110
Change of femoral	102

Primary Revisions	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
3319	12754.0	401	3.14	2.84	3.47

The re- revision rate is highly significant when compared to the primary revision rate of 0.71 /100 component years



Year	% Re-revision free
1	93.40
2	90.30
3	88.80
4	87.10
5	85.70
6	84.40
7	83.40
8	82.60
9	81.10
10	80.00

Third revision

The average time between second and third revisions for the 78 arthroplasties was 472 days with a range of 1 – 3065 and a standard deviation of 542.

Fourth revision

The average time between the third and fourth revisions for the 21 arthroplasties was 307 days, with a range of 18 – 2122 and a standard deviation of 461 days.

Fifth revision

There were 3 registered. Overall it can be noted that the time between successive revisions steadily decreases.

Re-revisions of resurfacing hip replacements

There have been 12 re-revisions.

The time between the first and second revisions averaged 398 days, with a range of 21 – 1193 and a standard deviation of 376.

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX MONTHS, FIVE YEARS AND TEN YEARS POST SURGERY

Questionnaires at six months post surgery

At six months post surgery a random selection of patients are sent the Oxford-12 questionnaire in order to achieve a response rate of 20% of the total which is deemed to be ample to provide powerful statistical analysis.

The new scoring system as recommended by the original authors has been adopted. (see appendix 1).

There are 12 questions with the scores now ranging from 4 to 0. A score of 48 is the best, indicating normal function. A score of 0 is the worst, indicating the most severe disability.

In addition we have grouped the questionnaire responses according to the classification system published by Kalairajah et al, 2005, (see appendix 1)

This groups each score into four categories;

Category 1	>41	excellent
Category 2	34 – 41	good
Category 3	27 – 33	fair
Category 4	< 27	poor

For the fourteen year period, and as at July 2013, there were 25,494 primary hip questionnaire responses registered six months post surgery.

The mean hip score was 40.59 (standard deviation 7.44, range 48 – 2).

Scoring	> 41	14635
Scoring	34 -41	6857
Scoring	27 -33	2442
Scoring	< 27	1531

At six months post surgery, 84% had an excellent or good score.

Questionnaires at five years post surgery

All patients who had a six month registered questionnaire, and who had not had revision surgery were sent a further questionnaire at 5 years post surgery.

This dataset represents sequential Oxford hip scores for 56,854 individual patients.

At five years post surgery, 89% of these patients achieved an excellent or good score and had a mean of 42.46.

Questionnaires at ten years post surgery

All patients who had a six month registered questionnaire, and who had not had revision surgery were sent a further questionnaire at 10 years post surgery.

This dataset represents sequential Oxford hip scores for 4,633 individual patients.

At ten years post surgery, 87% of these patients achieved an excellent or good score and had a mean of 41.80.

Analysis of the individual questions at six months, five years and ten years post surgery

Analysis of the individual questions showed that the most common persisting six month problem was limping (Q10). However, for the five year and ten year analyses the most common persisting problem was pain Q1).

Percentage scoring 0 or 1 (worst categories) for each question at six-months (25,494), at five years (6,854) and at ten years post surgery (4,633).

		6m	5y	10y
1	Moderate or severe pain from the operated hip	11	11	17
2	Only able to walk around the house or unable to walk before pain becomes severe	4	3	4
3	Extreme difficulty or impossible to get in and out of a car or public transport	2	2	3
4	Extreme difficulty or impossible to put on a pair of socks	9	5	7
5	Extreme difficulty or impossible to do the household shopping on your own	4	3	3
6	Extreme difficulty or impossible to wash and dry yourself	2	1	1
7	Pain interfering greatly or totally with your work	4	3	3
8	Very painful or unbearable to stand up from a chair after a meal	2	1	2
9	Sudden severe pain most or all of the time	2	1	2
10	Limping most or every day	12	8	8
11	Extreme difficulty or impossible to climb a flight of stairs	4	3	5
12	Pain from your hip in bed most or every nights	5	3	4

Revision hip questionnaire responses

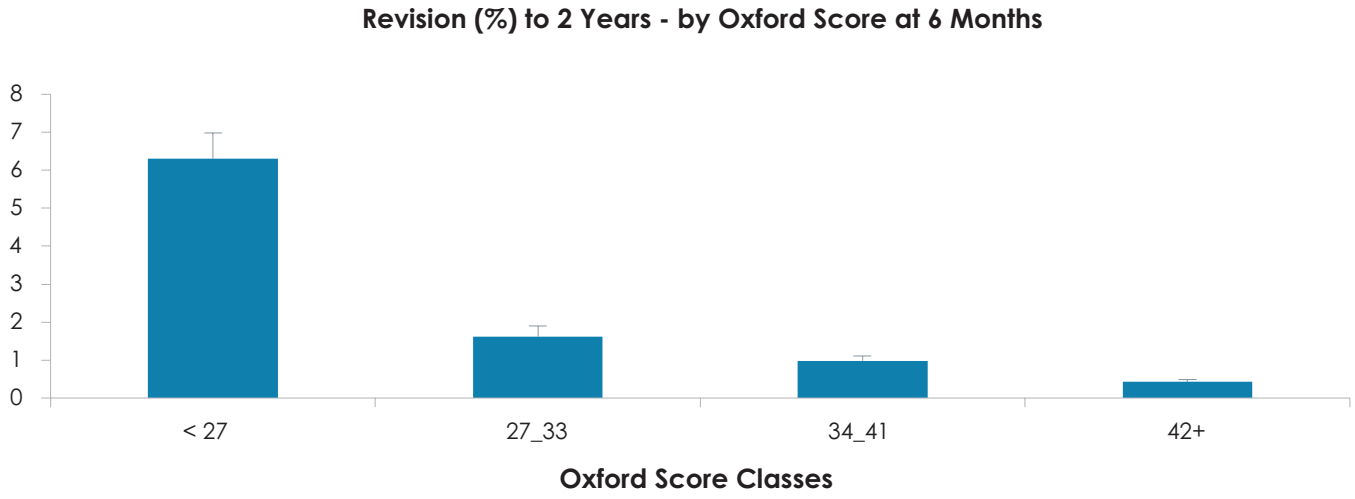
There were 6,377 revision hip responses with 65% achieving an excellent or good score. This group includes all revision hip procedures including revisions of primary arthroplasties performed prior to 1999. The mean revision hip score was 35.70 (standard deviation 9.53, range 48 – 3).

OXFORD 12 SCORE AS A PREDICTOR OF HIP ARTHROPLASTY REVISION

A statistically significant relationship has been confirmed between the Oxford scores at 6 months and 5 years post surgery and arthroplasty revision within two years of the Oxford 12 questionnaire date.

Six month score and revision arthroplasty

By plotting the patients six month scores in the Kalairajah groupings, against the proportion of hips revised for that same group it demonstrates that there is an incremental increase in risk during the next 2 years related to the Oxford score. A patient with a score below 27 has 15 times the risk of a revision within 2 years compared to a person with a score >41



Revision risk versus Kalairajah groupings of Oxford scores within two years of the 6 month score date.

Kalairajah Group	No in Group	No. revised	%	Std error
< 27	1253	79	6.30	0.69
27_33	1978	32	1.62	0.28
34_41	5709	56	0.98	0.13
42+	12374	53	0.43	0.06

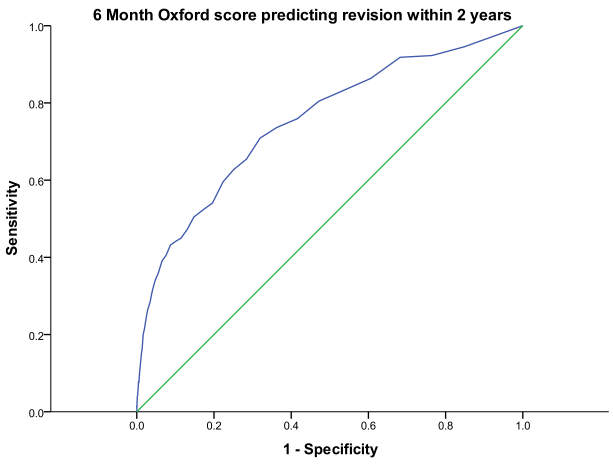
A person with a 6 month Oxford score >42 has a 0.43% risk of revision within two years compared to a 6.30% risk with a score of < 27.

A ROC analysis has demonstrated that a patient with a score less than or equal to 38.5 has 4.6 times the risk of needing a revision within 2 years compared to a person with a score greater than 38.5.

Alternatively the ROC analysis predicted 70% of the revisions within 2 years from just the lowest 30% of Oxford scores.

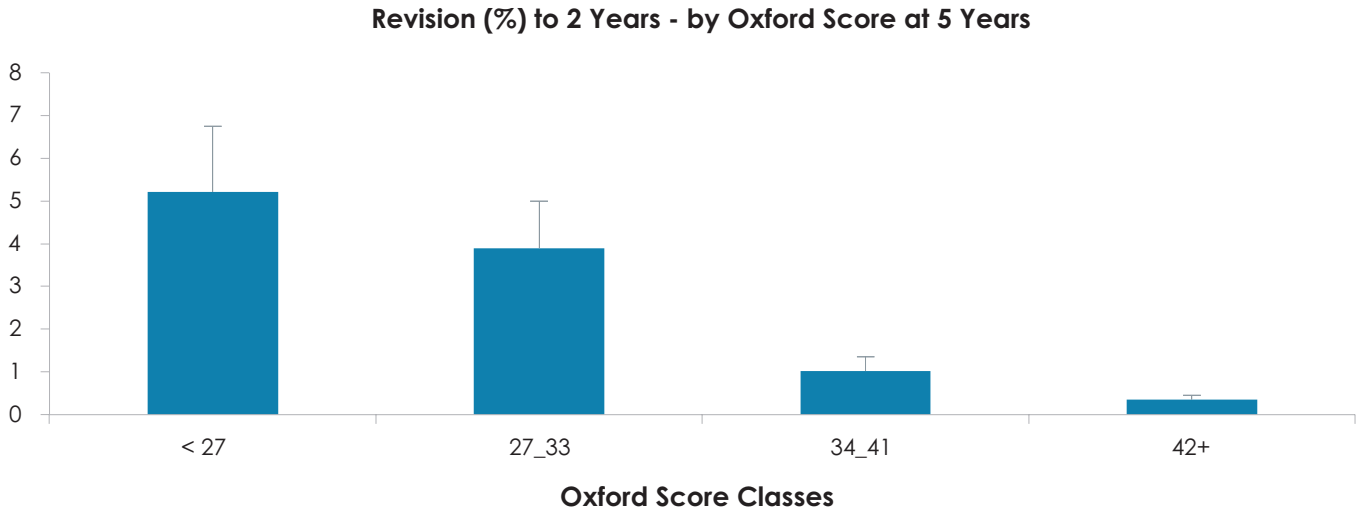
A receiver operating characteristic (ROC) curve is a graphical representation of the tradeoff between the false negative and false positive rates for every possible cutoff.

Equivalently, the ROC curve is the representation of the tradeoffs between sensitivity and specificity. The more the curve climbs towards the upper left corner the better the reliability of the test.



Five year score and revision arthroplasty

As with the six month scores, plotting the patients 5 year scores in the Kalairajah groupings against the proportion of hips revised for that same group demonstrates that there is an incremental increase in risk during the next 2 years related to the Oxford score. A patient with a score below 27 has 15 times the risk of a revision within 2 years compared to a person with a score >4

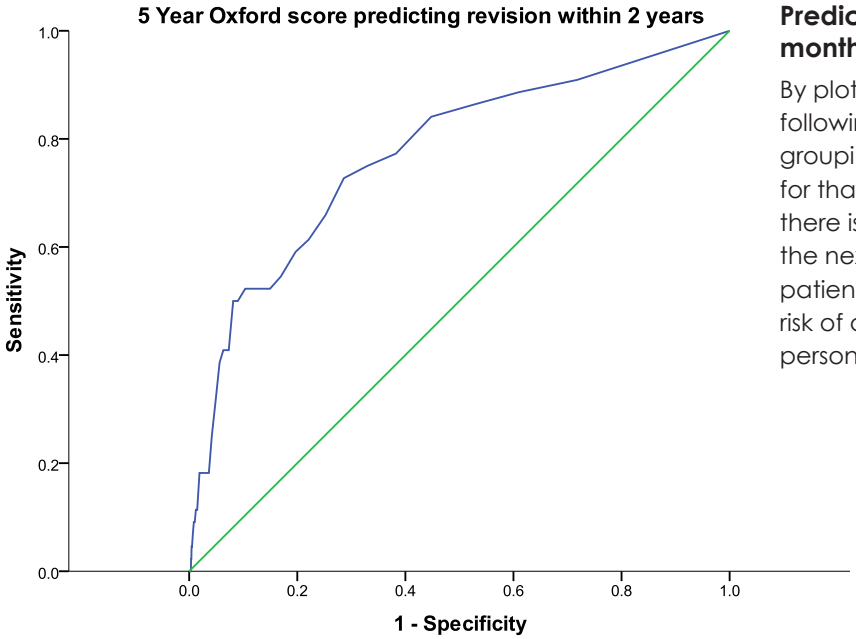


Revision risk versus Kalairajah groupings of Oxford scores within two years of the 5 year score date

Kalairajah Group	No in Group	No. revised	%	Std error
<27	211	11	5.21	1.53
27_33	308	12	3.90	1.10
34_41	881	9	1.02	0.34
42+	3425	12	0.35	0.10

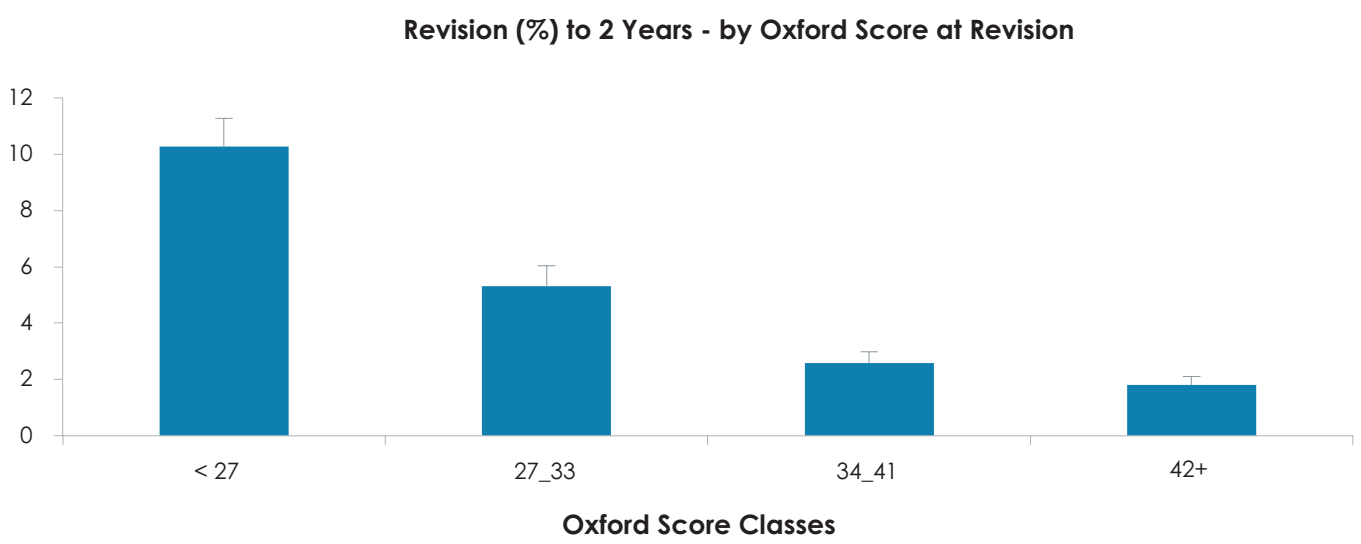
A person with a 5 year Oxford score >42 has a 0.35 % risk of revision within two years compared to a 5.21 % risk with a score < 27. The ROC analysis at 5 years has demonstrated that a patient with a score less than or equal to 41.5 has 6.5 times the risk of needing a revision within 2 years compared to a person with a score greater than 41.5.

Alternatively the ROC analysis predicted 72% of the revisions within 2 years from just the lowest 30% of Oxford scores.



Prediction of second revision from six month score following first revision.

By plotting the patients six month scores following their first revision in the Kalairajah groupings, against the proportion of hips revised for that same group it again demonstrates that there is an incremental increase in risk during the next 2 years related to the Oxford score. A patient with a score below 27 has 6 times the risk of a revision within 2 years compared to a person with a score >41



Second revision risk versus Kalairajah groupings of Oxford scores within two years of the 6 month post first revision score

Kalairajah Group	No in Group	No. revised	%	Std error
< 27	906	93	10.26	1.01
27_33	923	49	5.31	0.74
34_41	1664	43	2.58	0.39
42+	1829	33	1.80	0.31

A person with a 6 month Oxford score >42 has a 1.80% risk of revision within two years compared to a 10.26% risk with a score < 27

PRIMARY KNEE ARTHROPLASTY

The fourteen year report analyses data for the period January 1999 – December 2012. There were 64,799 primary knee procedures registered, an additional 6,303 compared to last year's report.

This includes 243 patello-femoral prostheses with 36 registered in 2012.

1999	2429
2000	3014
2001	3059
2002	2896
2003	3047
2004	4103
2005	5024
2006	5157
2007	5762
2008	5604
2009	6016
2010	6089
2011	6253
2012	6346

There was a 1.5% increase in registrations for 2012 compared to 2011.

Data Analysis

Age and sex distribution

The average age for a knee replacement was 68.40 years, with a range of 8.19 – 100.49 years

All knee arthroplasty

	Female	Male
Number	33562	31237
Percentage	51.79	48.21
Mean age	68.82	68.10
Maximum age	100.49	98.68
Minimum age	10.17	8.19
Standard dev.	9.91	9.41

Conventional knee arthroplasty

	Female	Male
Number	33379	31177
Percentage	51.71	48.29
Mean age	68.78	68.05
Maximum age	100.49	98.68
Minimum age	10.17	8.19
Standard dev.	9.88	9.40

Patello-femoral arthroplasty

	Female	Male
Number	183	60
Percentage	75.31	24.69
Mean age	61.50	60.05
Maximum age	87.75	83.63
Minimum age	31.15	34.11
Standard dev.	11.63	11.97

Body Mass Index

For the three-year period 2010 - 2012, there were 9251 BMI registrations for primary knee replacements. The average was 31.08 (obese) with a range of 14 – 70 and a standard deviation of 6.02.

Previous operation

None	54087
Menisectomy	6702
Osteotomy	1131
Arthroscopy/debridement	1049
Ligament reconstruction	729
Internal fixation for juxtarticular fracture	508
Patellectomy	252
Synovectomy	124
Removal of loose body	42

Diagnosis

Osteoarthritis	61007
Rheumatoid arthritis	1704
Post fracture	688
Other inflammatory	576
Post ligament disruption /reconstruction	407
Avascular necrosis	223
Tumour	68

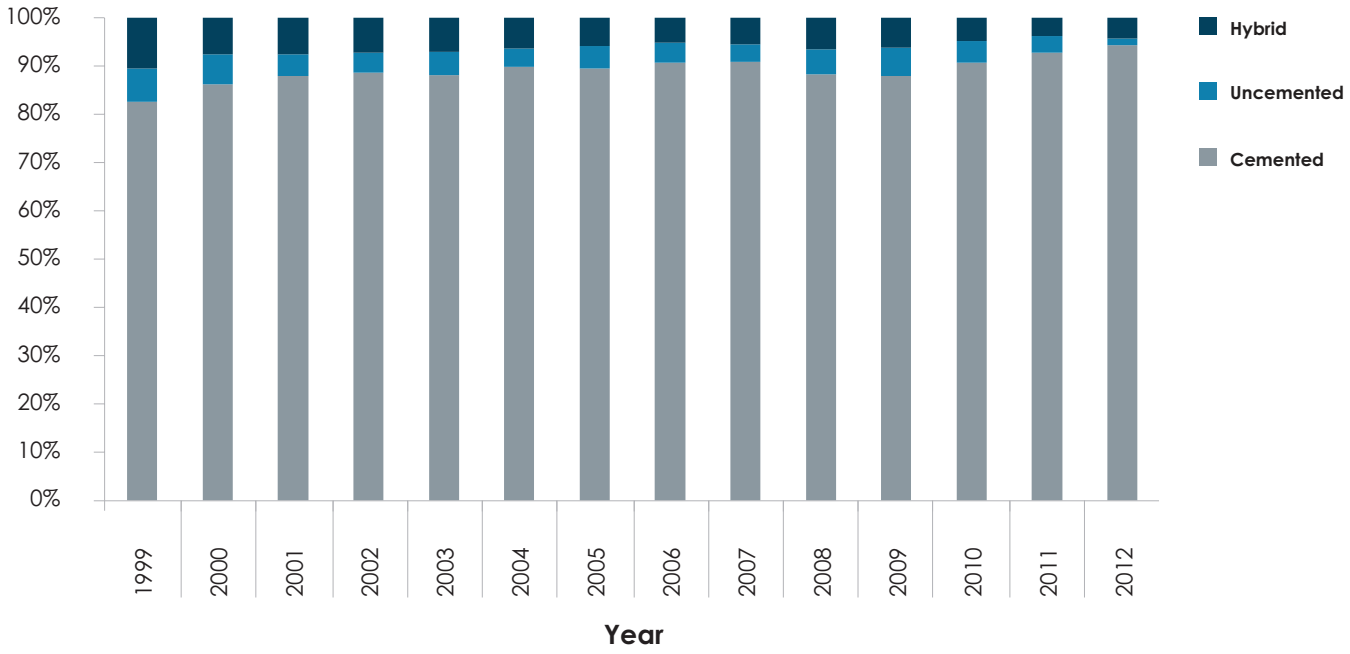
Approach

Medial parapatellar	58623
Other	1588
Lateral parapatellar	1004
Image guided surgery	5529
Minimally invasive surgery	135

Image guided surgery was added to the updated forms at the beginning of 2005 and in 2012 was used for 15% of primary knee arthroplasties, slightly up on 2011

Bone graft

Femoral autograft	118	Tibial autograft	66
Femoral allograft	10	Tibial allograft	17
Femoral synthetic	5	Tibial synthetic	2



A hybrid knee has cemented tibia and uncemented femur.

Cement

Femur cemented	58618	90%
Antibiotic in cement	40115	68%
Tibia cemented	61424	95%
Antibiotic in cement	41530	68%

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	61236	95%

A cephalosporin was used in 86% of arthroplasties.

Operating theatre

Conventional	36552
Laminar flow	27737
Space suits	20575

In 2012, 48% of knee arthroplasties were performed in laminar flow theatres and space suits were used in 40%, similar to 2011

ASA Class

This was introduced with the updated forms at the beginning of 2005. For the eight-year period 2005 – 2012, there were 42,879 (93%) primary knee procedures with the ASA class recorded.

Definitions

ASA class 1: A healthy patient
ASA class 2: A patient with mild systemic disease
ASA class 3: A patient with severe systemic disease that limits activity but is not incapacitating
ASA class 4: A patient with an incapacitating disease that is a constant threat to life

ASA	Number	Percentage
1	4963	12
2	27212	63
3	10507	24
4	197	1

Operative time (skin to skin in minutes)

Mean	84
Minimum	24
Maximum	495
Standard deviation	26

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the eight-year period 2005 – 2012.

Consultant	40249
Advanced trainee supervised	3775
Basic trainee	1083
Advanced trainee unsupervised	995

Prosthesis usage

Patello-femoral prostheses registered

Avon-patello	113
Gender	82
Journey	39
LCS PFJ	6
Mod 3	1
RBK	1
Themis	1

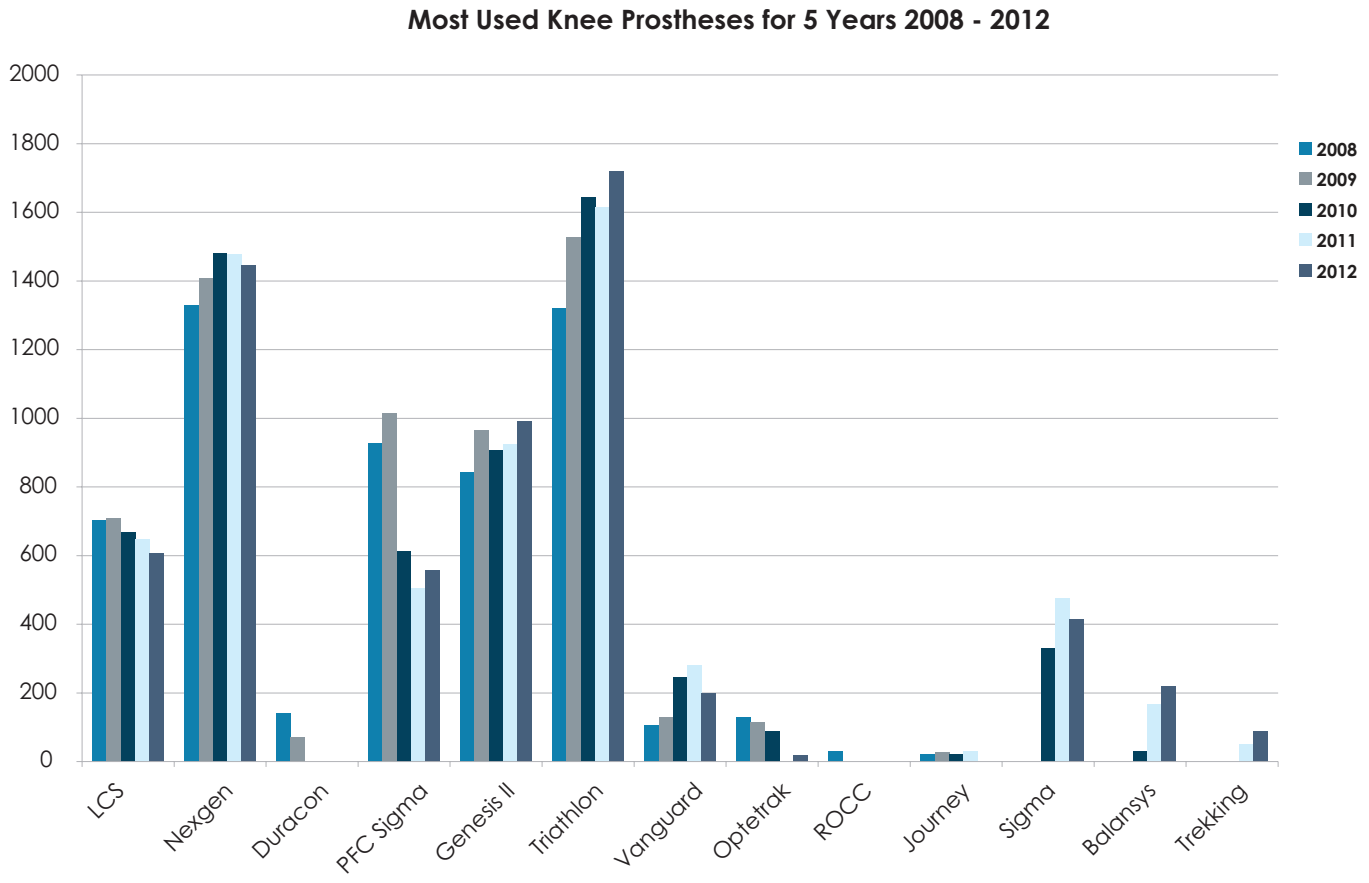
There are 243 patello-femoral procedures registered to 60 surgeons

Conventional primary knees

Top 10 knee prostheses used in 2012

Triathlon	1721
Nexgen	1447
Genesis II	992
LCS	607
PFC Sigma	559
Sigma	416
Balansys	219
Vanguard	201
Trekking	90
Optetrak	19

The same order as for 2011 except that the Optetrak replaces the Journey prosthesis.



Patellar resurfacing

44,471 (69%) of the conventional knee procedures were registered with the patella not resurfaced and 20,085 (31%) with the patella resurfaced.

Surgeon and Hospital Workload

Surgeons

In 2012, 209 surgeons performed 6,346 total knee replacements, an average of 30 procedures per surgeon.

38 surgeons performed less than 10 procedures and 54 performed more than 40.

Hospitals

In 2012 primary knee replacement was performed in 55 hospitals. 27 were public hospitals and 28 were private.

For 2012 the average number of total knee replacements per hospital was 115.

REVISION KNEE ARTHROPLASTY

Revision is defined by the Registry as a new operation in a previously replaced knee joint during which one or more of the components are exchanged, removed, manipulated or added. It includes arthrodesis or amputation, but not soft tissue procedures. A two or more staged procedure is registered as one revision.

Data Analysis

For the fourteen-year period January 1999 – December 2012, there were 5,089 revision knee procedures registered. This is an additional 486 compared to last year's report.

The average age for a revision knee replacement was 69.64 years, with a range of 10.57 – 98.39 years.

Revision knees

	Female	Male
Number	2458	2631
Percentage	48.30	51.70
Mean age	70.02	69.28
Maximum age	95.80	98.39
Minimum age	10.57	15.49
Standard dev.	10.55	10.15

The percentage of revision knees to primary knees is 7% and a ratio of 1:14.

Body Mass Index

For the three-year period 2010 - 2012, there were 441 BMI registrations for revision knee replacements. The average BMI was 31.11 with a range of 15 – 54 and a standard deviation of 5.98.

REVISION OF REGISTERED PRIMARY KNEE ARTHROPLASTIES

This section analyses data for r**evisions of the primary registered knee arthroplasties** for the fourteen-year period.

There were 1,684 revisions of the 64,556 primary conventional knee replacements (2.6%) and 18 revisions of the 243 patello-femoral prostheses (7.4%).

Conventional knee replacement analysis

Time to revision

Mean	1112 days
Maximum	4847 days
Minimum	1 day
Standard deviation	1001 days

Reason for revision

Pain	513
Deep infection	421
Loosening tibial component	393
Patellar resurfacing	392
Loosening femoral component	189
Fracture tibia	30
Loosening patellar component	32
Fracture femur	24

There is often more than 1 listed reason for revision and all are entered

Analyses by time of the 5 main reasons for revision

Reason for revision	Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Loosening tibial	Count	10	22	52	64	58	47	28	36	29	10	15	9	10	3	**393**
	%	2.50	5.60	13.20	16.30	14.80	12.00	7.10	9.20	7.40	2.50	3.80	2.30	2.50	0.80	
Primary Patellar component	Count	10	63	135	68	49	24	7	8	7	7	2	7	4	1	**392**
	%	2.60	16.10	34.40	17.30	12.50	6.10	1.80	2.00	1.80	1.80	0.50	1.80	1.00	0.30	
Deep_ infection	Count	103	64	94	48	45	16	13	15	9	4	5	5	0	0	**421**
	%	24.50	15.20	22.30	11.40	10.70	3.80	3.10	3.60	2.10	1.00	1.20	1.20	0.00	0.00	
Pain	Count	20	70	159	90	59	35	17	18	13	9	5	12	3	3	**513**
	%	3.90	13.60	31.00	17.50	11.50	6.80	3.30	3.50	2.50	1.80	1.00	2.30	0.60	0.60	
Loosening femoral	Count	3	10	27	21	19	30	13	20	19	9	6	6	5	1	**189**
	%	1.60	5.30	14.30	11.10	10.10	15.90	6.90	10.60	10.10	4.80	3.20	3.20	2.60	0.50	

Patello-Femoral Arthroplasty

Revision of patello-femoral knees

Of the 243 registered, 18 have been revised.

Average	1075 days
Maximum	4083 days
Minimum	126 days
Standard deviation	944 days

Reason for revision

Pain	9
Loosening patellar	2
Other	8

Fifteen were revised to total knee replacements, 2 to patellar component revision and 1 to unicompartmental replacement.

Patellar resurfacing

As noted previously, 69 %(40,521) of the 64,556 registered conventional primary knees did not have the patella resurfaced and 31% (20,085) were resurfaced.

Of the group that was not resurfaced, 238 (0.4%) had the patella later resurfaced as the only revision procedure and 154 had the patella resurfaced as part of other component revision.

Statistical note

In the table below there are two statistical terms readers may not be familiar with.

Observed component years

This is the number of registered primary procedures multiplied by the number of years each component has been insitu.

Rate/100 component years

This is equivalent to the yearly revision rate expressed as a percent and is derived by dividing the number of prostheses revised by the observed component years multiplied by 100. It therefore allows for the number of years of post operative follow up in calculating the revision rate. These rates are usually very low and hence more meaningfully recorded per 100 component years rather than per component year. Statisticians consider that this is a more accurate way of deriving a revision rate for comparison when analysing data with widely varying follow up times. It is also important to note the confidence intervals. The closer they are to the estimated revision rate/100 component years, the more precise the estimate is.

Statistical significance

Where it is stated that a difference among results is significant the p value is 0.05 or less. In most of these situations this is because there is no overlap of the confidence intervals (CIs) but sometimes significance can apply in the presence of CI overlap.

All Primary Total Knee Arthroplasties

No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
64556	336757.8	1684	0.50	0.48	0.52

There are 42 types of primary knee prostheses in the Registry of which 16 (37%) have fewer than 10 registrations

Revision Rate of Individual Knee Prostheses Sorted by Number of Arthroplasties

(Minimum of 50 arthroplasties)

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Nexgen	14372	71481.8	381	0.53	0.48	0.59
LCS	12379	82688.2	456	0.55	0.50	0.60
Triathlon	9675	28772.3	125	0.43	0.36	0.51
Genesis II	8961	42464.2	203	0.48	0.41	0.55
PFC Sigma	8283	44698.4	182	0.41	0.35	0.47
Duracon	4213	33785.8	107	0.32	0.26	0.38
Vanguard	1039	2384.8	18	0.75	0.44	1.19
Scorpio	852	6309.6	45	0.71	0.52	0.95
Maxim	822	6778.4	25	0.37	0.24	0.54
Sigma CR150	703	968.1	6	0.62	0.22	1.35
Optetrak	646	2777.1	28	1.01	0.68	1.46
Sigma	538	781.7	4	0.51	0.15	1.31
Balansys	424	459.4	4	0.87	0.24	2.23
AGC	376	3476.5	12	0.34	0.18	0.60
MBK	256	2535.7	12	0.47	0.25	0.83
Insall/Burstein	249	2430.3	45	1.85	1.36	2.48
Advance	157	1326.4	5	0.38	0.12	0.88
Trekking	142	114.3	0	0.00	0.00	3.23
Journey	128	329.8	3	0.91	0.19	2.66
AMK	95	1030.8	1	0.09	0.00	0.54
ROCC	66	324.3	3	0.92	0.19	2.70

Revision Rate of Individual Knee Prostheses Sorted by Revision Rate

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Insall/Burstein	249	2430.3	45	1.85	1.35	2.48
Optetrak	646	2777.1	28	1.01	0.67	1.46
ROCC	66	324.3	3	0.92	0.19	2.70
Journey	128	329.8	3	0.91	0.19	2.66
Balansys	424	459.4	4	0.87	0.24	2.23
Vanguard	1039	2384.8	18	0.75	0.45	1.19
Scorpio	852	6309.6	45	0.71	0.52	0.95
Sigma CR150	703	968.1	6	0.62	0.23	1.35
LCS	12379	82688.2	456	0.55	0.50	0.60
Nexgen	14372	71481.8	381	0.53	0.48	0.59
Sigma	538	781.7	4	0.51	0.14	1.31
Genesis II	8961	42464.2	203	0.48	0.41	0.55
MBK	256	2535.7	12	0.47	0.24	0.83
Triathlon	9675	28772.3	125	0.43	0.36	0.52
PFC Sigma	8283	44698.4	182	0.41	0.35	0.47
Advance	157	1326.4	5	0.38	0.12	0.88
Maxim	822	6778.4	25	0.37	0.24	0.54
AGC	376	3476.5	12	0.34	0.18	0.60
Duracon	4213	33785.8	107	0.32	0.26	0.38
AMK	95	1030.8	1	0.10	0.00	0.54
Trekking	142	114.3	0	0.00	0.00	3.23

The Insall/Burstein, Optetrak, Scorpio and LCS (despite overlap of CIs) prostheses have significantly higher revision rates than the overall rate of 0.50/100 ocys @ the 95% confidence interval. The Optetrak and LCS were the only ones implanted in 2012

As for the 13 year report it was agreed that several variants of basically the same knee prosthesis type eg Nexgen LCS, which are registered separately should be merged into the one group to enable comparable statistical analyses with other prostheses which may also have more than one variant but are registered as one or 2 prostheses.

Revision vs Arthroplasty Fixation

Fixation	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Cemented	58027	298603.4	1430	0.48	0.45	0.50
Uncemented	2760	15935.0	144	0.90	0.76	1.06
Hybrid	3769	22219.4	110	0.50	0.41	0.60

Hybrid Knee: tibia cemented, femur uncemented

Uncemented knees have a significantly higher revision rate than either cemented or hybrid knees. Further analyses have shown that it is loosening of the uncemented tibial component that is responsible for the higher revision rate.

Revision vs Arthroplasty Fixation for Fully Cemented Prostheses Sorted by Revision Rate

Minimum of 50 primary registered arthroplasties

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Nexgen	13681	67899.8	368	0.54	0.49	0.60
Triathlon	9524	28231.1	122	0.43	0.36	0.52
Genesis II	8908	42032.2	200	0.48	0.41	0.55
LCS	8550	59671.8	265	0.44	0.39	0.50
PFC Sigma	7783	42697.5	173	0.41	0.35	0.47
Duracon	3432	27223.4	88	0.32	0.26	0.40
Vanguard	1026	2348.7	18	0.77	0.45	1.21
Scorpio	850	6287.8	45	0.72	0.52	0.96
Maxim	822	6778.4	25	0.37	0.24	0.54
Sigma CR150	703	968.1	6	0.62	0.23	1.35
Sigma	462	624.1	4	0.42	0.36	0.50
Balansys	424	459.4	4	0.87	0.24	2.23
AGC	376	3476.5	12	0.34	0.18	0.60
Optetrak	281	1297.7	18	1.39	0.83	2.19
Insall/Burstein	249	2430.3	45	1.85	1.35	2.48
MBK	247	2451.4	12	0.49	0.25	0.85
Advance	157	1326.4	5	0.38	0.12	0.88
Trekking	142	114.3	0	0.00	0.00	3.23
Journey	128	329.8	3	0.91	0.19	2.66
AMK	95	1030.8	1	0.10	0.00	0.54

Optetrak and Insall/Burstein have significantly higher revision rates than the overall rate of 0.50/100 ocys @ the 95% confidence.

Revision vs Arthroplasty for Hybrid Fixation of Prostheses Sorted by Revision Rate

Minimum of 50 primary registered arthroplasties

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Optetrak	365	1479.4	10	0.68	0.32	1.24
Triathlon	149	534.5	3	0.56	0.12	1.64
LCS	1813	11568.1	64	0.55	0.43	0.71
Nexgen	462	2850.7	8	0.49	0.21	0.97
Genesis II	51	428.6	2	0.47	0.06	1.69
PFC Sigma	493	1973.9	9	0.46	0.21	0.87
Duracon	321	3038.0	13	0.43	0.23	0.73
Sigma	76	157.6	0	0.00	0.00	2.34

There are no significantly higher revision rates than the overall rate of 0.50/100 ocys @ the 95% confidence.

Revision vs Arthroplasty Fixation for Fully Uncemented Prostheses Sorted by Revision Rate

Minimum of 50 primary registered arthroplasties

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
LCS	2016	11448.3	127	1.11	0.93	1.32
Nexgen	229	731.4	5	0.68	0.22	1.59
Duracon	460	3524.5	6	0.17	0.06	0.37

The uncemented LCS prosthesis has a significantly higher revision rate than the overall rate of 0.50/100 ocys @ the 95% confidence and is the reason why the prosthesis has an overall significantly higher revision rate.

Revision Rates for Fixed vs Mobile Bearing Knees

Minimum of 50 primary registered arthroplasties

Prosthesis	Fixed/ Mobile	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
AGC	Fixed	376	3476.5	12	0.35	0.18	0.60
AMK	Fixed	95	1030.8	1	0.10	0.00	0.54
Balansys	Fixed	424	459.4	4	0.87	0.24	2.23
Duracon	Fixed	4207	33727.4	106	0.31	0.26	0.38
Genesis II	Fixed	8961	42464.2	203	0.48	0.41	0.55
Insall/Burstein	Fixed	249	2430.3	45	1.85	1.35	2.48
Journey	Fixed	128	329.8	3	0.91	0.19	2.66
LCS	Mobile	12379	82688.2	456	0.55	0.50	0.60
Maxim	Fixed	822	6778.4	25	0.37	0.24	0.54
MBK	Mobile	247	2451.4	12	0.49	0.25	0.86
Nexgen	Fixed	11759	61505.7	325	0.53	0.47	0.59
Nexgen	Mobile	2285	9081.3	48	0.53	0.39	0.70
PFC Sigma	Fixed	5089	28818.4	112	0.39	0.32	0.47
PFC Sigma	Mobile	3138	15690.0	69	0.44	0.34	0.56
S-Rom	Mobile	3	2.9	0	0.00	0.00	28.44
Scorpio	Fixed	737	5496.1	39	0.71	0.51	0.98
Scorpio	Mobile	104	758.3	4	0.53	0.14	1.35
Sigma	Fixed	171	259.3	3	1.16	0.24	3.38
Sigma	Mobile	350	494.9	1	0.20	0.01	1.13
Sigma CR150	Fixed	144	246.6	3	1.22	0.25	3.55
Sigma CR150	Mobile	559	721.5	3	0.42	0.09	1.22
Trekking	Mobile	142	114.3	0	0.00	0.00	3.23
Triathlon	Fixed	9392	27891.6	123	0.44	0.37	0.53
Triathlon	Mobile	229	751.8	2	0.27	0.03	0.96

Optetrak and Insall/Burstein have significantly higher revision rates than the overall rate of 0.50/100 ocys @ the 95% confidence.

Overall Revision Rates for Fixed vs Mobile Bearing Knee

	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Fixed	42556	214919.6	1004	0.47	0.44	0.50
Mobile	19437	112761.2	595	0.53	0.49	0.57

There is a significantly higher revision rate for mobile bearing knees when compared to fixed bearing knees. It was not possible to determine fixed or mobile categories for all registered knees which accounts for the 2563 shortfall in the total number.

Revision Rates for Cruciate Retaining vs Posterior Stabilised

Prosthesis		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
AGC	PS	28	283.9	2	0.70	0.09	2.545
Balansys	CR	407	452.8	4	0.88	0.24	2.262
Balansys	PS	17	6.6	0	0.00	0.00	56.210
Congruency PS Femoral	PS	1	12.8	0	0.00	0.00	28.77
Genesis II	CR	5001	29078.7	110	0.38	0.31	0.46
Genesis II	PS	3953	13343.4	93	0.70	0.56	0.85
Insall/Burstein	PS	249	2430.3	45	1.85	1.35	2.48
LCS	PS	58	124.2	0	0.00	0.00	2.97
Legion	PS	19	16.8	0	0.00	0.00	21.99
Maxim	CR	657	5346.7	18	0.34	0.20	0.53
Maxim	PS	165	1431.6	7	0.49	0.20	1.01
Nexgen	CR	6346	35563.5	146	0.41	0.35	0.48
Nexgen	PS	7895	35492.4	228	0.64	0.56	0.73
Optetrak	CR	422	1805.3	11	0.61	0.30	1.09
Optetrak	PS	224	971.8	17	1.75	1.20	2.80
PFC Sigma	CR	6289	35314.1	121	0.34	0.28	0.41
PFC Sigma	PS	1861	9145.3	59	0.64	0.49	0.83
Scorpio	CR	739	5571.6	39	0.70	0.50	0.96
Scorpio	PS	111	728.0	6	0.82	0.30	1.79
Sigma	CR	47	90.3	0	0.00	0.00	4.08
Sigma	PS	491	691.4	4	0.58	0.16	1.48
Sigma CR150	CR	703	968.1	6	0.62	0.23	1.35
Trekking	CR	63	52.4	0	0.00	0.00	7.04
Trekking	PS	79	61.9	0	0.00	0.00	5.96
Triathlon	CR	7886	22402.3	93	0.41	0.33	0.51
Triathlon	PS	1779	6356.1	32	0.50	0.34	0.71
Vanguard	CR	773	1868.0	12	0.64	0.33	1.12
Vanguard	PS	264	511.0	6	1.17	0.43	2.56

CR cruciate retaining PS posterior stabalised.

Overall Revision Rates for Cruciate Retaining vs Posterior Stabilised vs Minimally Stabilised Knees

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
CR	29333	138513.8	560	0.40	0.37	0.44
PS	17194	71607.5	499	0.70	0.64	0.76
Minimally stabilised	12634	85339.8	471	0.55	0.50	0.60

The LCS prostheses accounts for 98% of the minimally stabilised.
There is a significantly higher revision rate for posterior and minimally stabilised compared to cruciate retaining knee prostheses.

Revision vs Age Bands

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
LT55	5475	28874.6	283	0.98	0.87	1.10
55_64	17412	91426.1	611	0.67	0.62	0.72
65_74	24423	128525.0	573	0.45	0.41	0.48
GE75	17246	87932.1	217	0.25	0.22	0.28

Each successive age band in ascending order has a significantly lower revision rate

Revision vs Gender

Gender	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
F	33379	177016.4	826	0.47	0.44	0.50
M	31177	159741.4	858	0.54	0.50	0.57

The revision rate for males is significantly higher than for females

Revision by Age Bands vs Arthroplasty Fixation

Cemented	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
LT55	4507	23010.8	202	0.88	0.76	1.01
55_64	15278	78647.8	516	0.66	0.60	0.72
65_74	22271	115964.8	517	0.45	0.41	0.49
GE75	15971	80980.0	195	0.24	0.21	0.28

Each of the age bands has a significantly lower revision rate than the preceding lower age bands.

Uncemented	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
LT55	500	3355.9	57	1.70	1.29	2.20
55_64	953	5799.4	53	0.91	0.68	1.20
65_74	864	4641.8	27	0.58	0.38	0.85
GE75	443	2137.9	7	0.33	0.13	0.67

The youngest age band has a significantly higher revision rate than the other three bands.

Hybrid	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
LT55	468	2507.9	24	0.96	0.61	1.42
55_64	1181	6978.9	42	0.60	0.43	0.81
65_74	1288	7918.5	29	0.37	0.25	0.53
GE75	832	4814.2	15	0.31	0.17	0.51

The youngest age band has a significantly higher revision rate than to two oldest bands.

Revision vs Approach

Approach	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Medial	58371	299167.3	1488	0.50	0.47	0.52
Lateral	994	6102.3	37	0.61	0.43	0.84
Other	1549	9466.1	33	0.35	0.24	0.49

There is no significant difference among the 3 approaches.

Revision vs Image Guidance

Image Guided	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
No	59028	319839.5	1588	0.50	0.47	0.52
Yes	5528	16918.2	96	0.57	0.46	0.69

There is no significant difference between the two groups.

Revision vs Surgeon Annual Output

Operations per year	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
LT10	1498	8991.6	42	0.47	0.34	0.63
10_25	14866	80159.3	460	0.57	0.52	0.63
25_50	30384	161967.7	777	0.48	0.45	0.51
50_75	11284	54647.6	260	0.48	0.42	0.54
75_100	3699	17112.6	71	0.41	0.32	0.52
GE100	2814	13817.8	74	0.54	0.42	0.67

The10-25 output group has a significantly higher revision rate than the 25-50 and the 75-100 output groups.

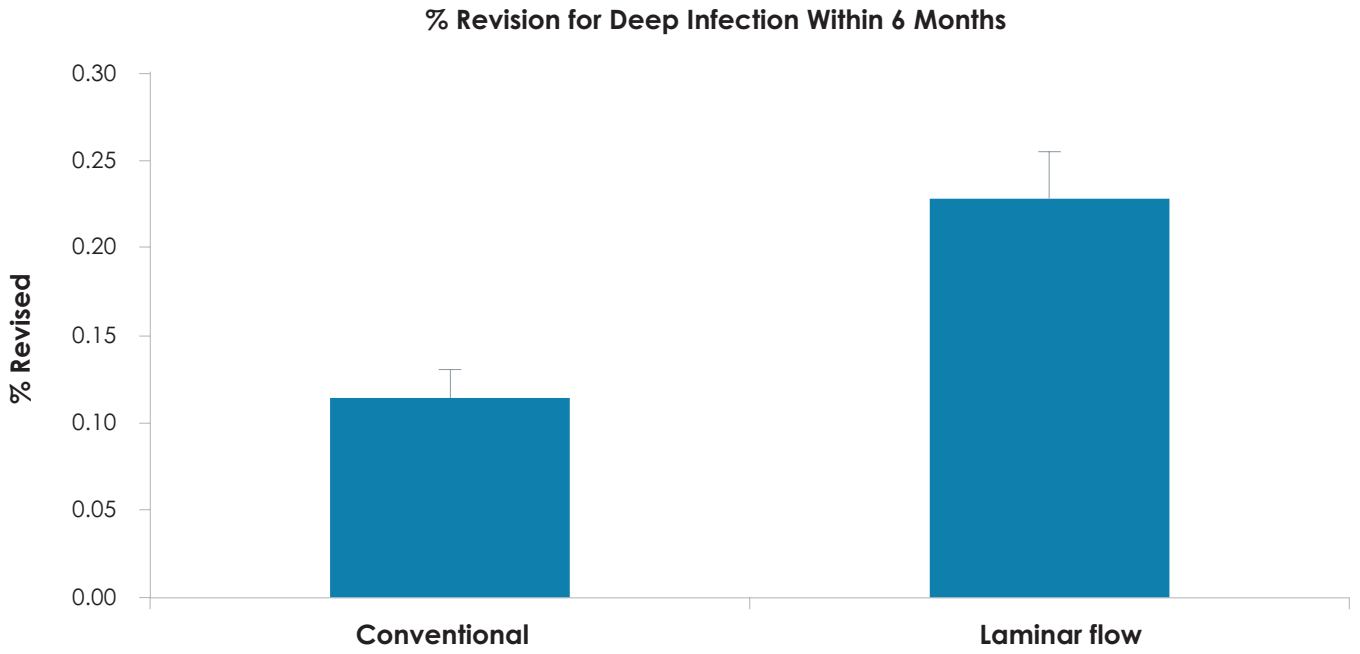
Revision vs ASA Status

ASA Class	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
1	4930	16877.9	103	0.61	0.50	0.74
2	27139	93464.4	516	0.55	0.51	0.60
3	10488	35137.7	203	0.58	0.50	0.66
4	197	620.4	6	0.97	0.35	2.10

There is no significant difference among the 4 classes.

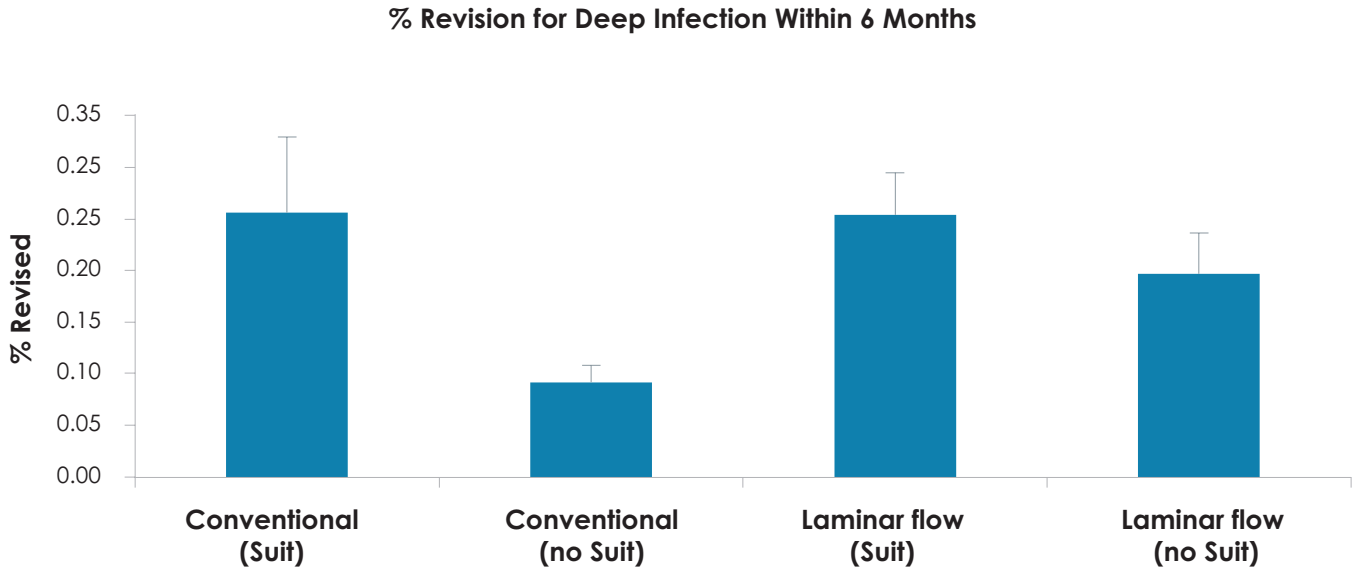
Revision for Deep Infection within 6 months versus Theatre Environment

	Total Number	Number revised	%	Std Error
Conventional	34550	39	0.11	0.02
Laminar flow	25975	59	0.23	0.03



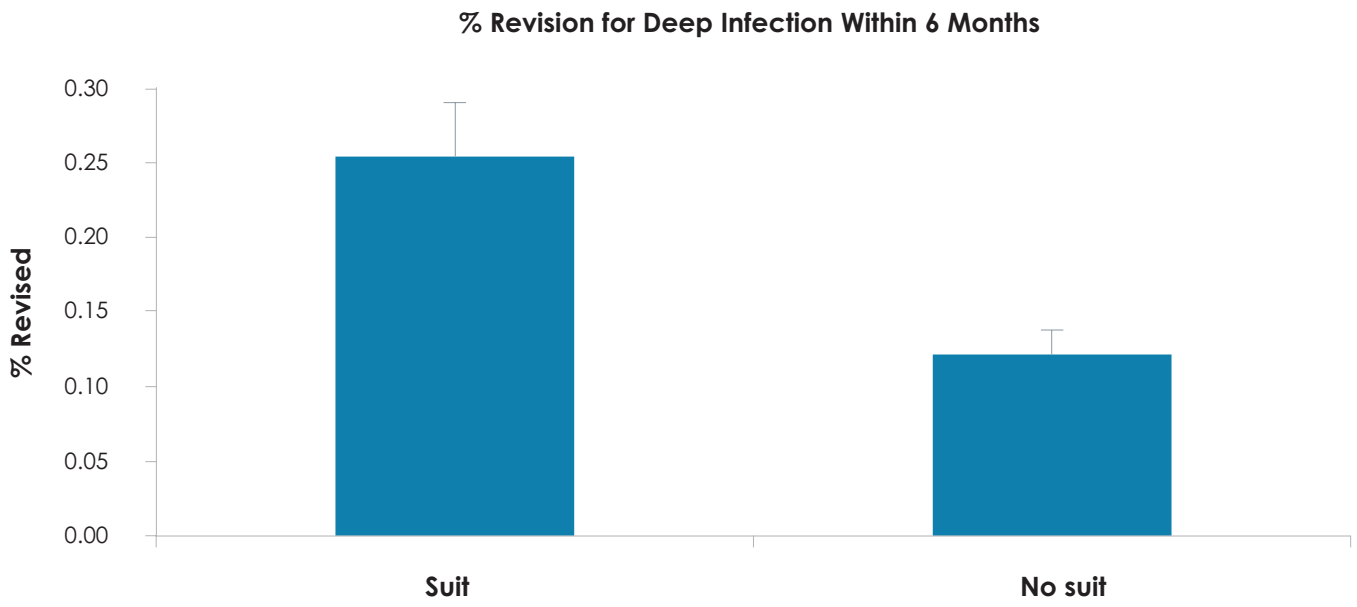
As with hip arthroplasty there is a significant difference in knee revision rates (2x) for deep infection within 6 months of surgery between conventional and laminar flow theatres.

		Total Number	Number revised	%	Std Error
Conventional	Suit	4697	12	0.26	0.07
Conventional	No Suit	29853	27	0.09	0.02
Laminar flow	Suit	14209	36	0.25	0.04
Laminar flow	No Suit	11766	23	0.20	0.04



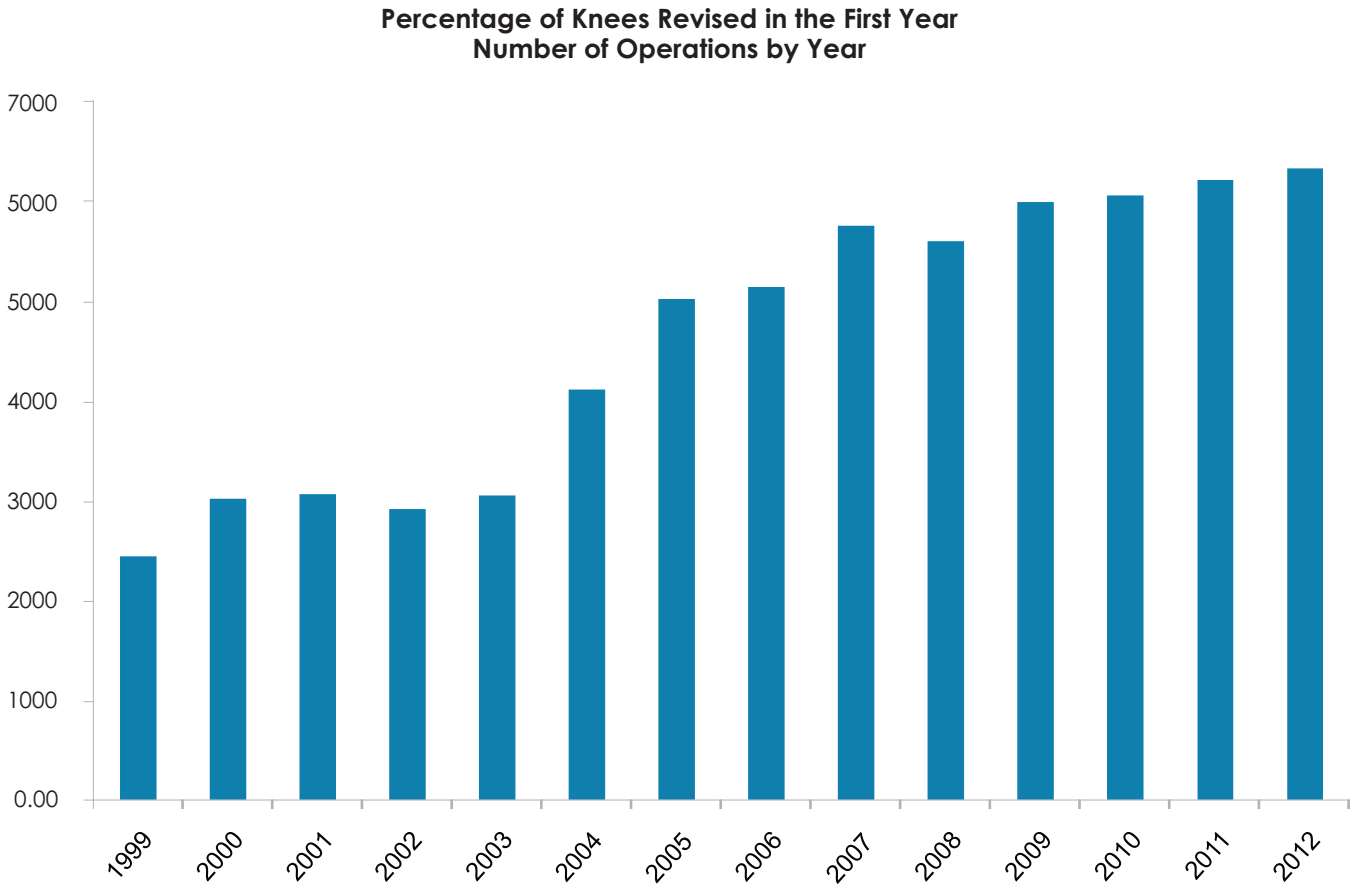
There is a significant difference in the revision rates between conventional/no suit and the conventional/suit (2.8x) and laminar /suit (2.8x) environments.

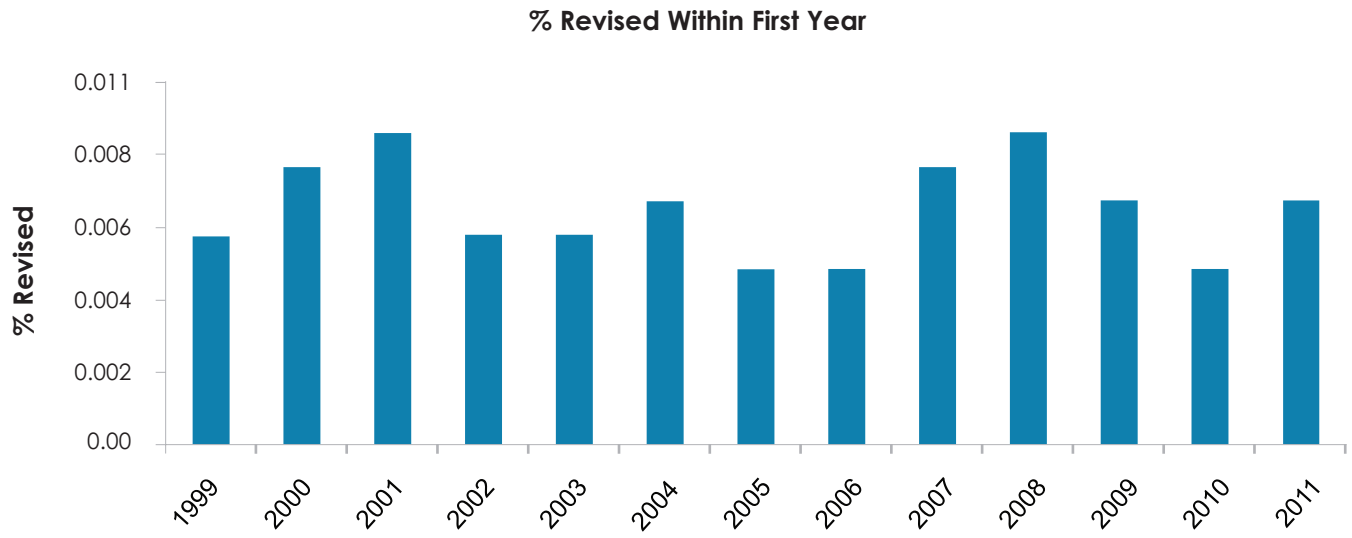
	Total Number	Number revised	%	Std Error
Suit	18906	48	0.25	0.04
no suit	41619	50	0.12	0.02



Furthermore there is a significant increase in revision rates (2.1 x) when suits are used in either conventional or laminar flow theatres.

From the above data it would seem that, similar to hip arthroplasty, the use of space suits significantly increases the risk of deep infection within the first 6 months following the arthroplasty and that there is no advantage to using laminar flow theatres and/or suits.





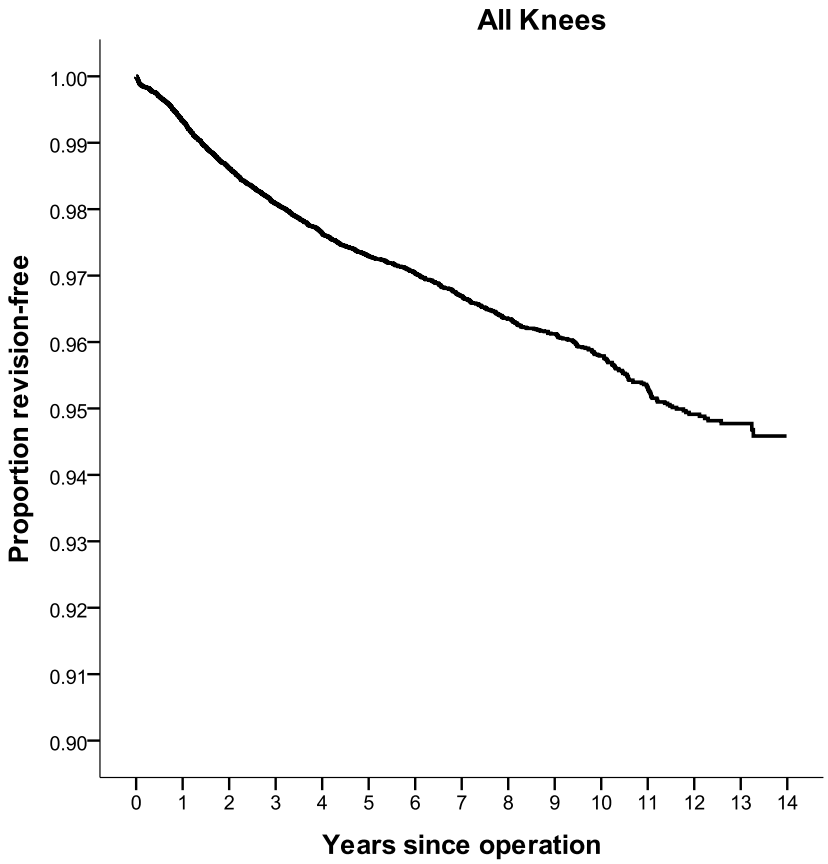
Patello-Femoral knees

No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
243	890.6	18	2.02	1.20	3.19

The revision rate is 4 x that of a primary total knee replacement. 15 were revised to total knees, 2 had patellar revisions and 1 converted to a unicompartment prosthesis.

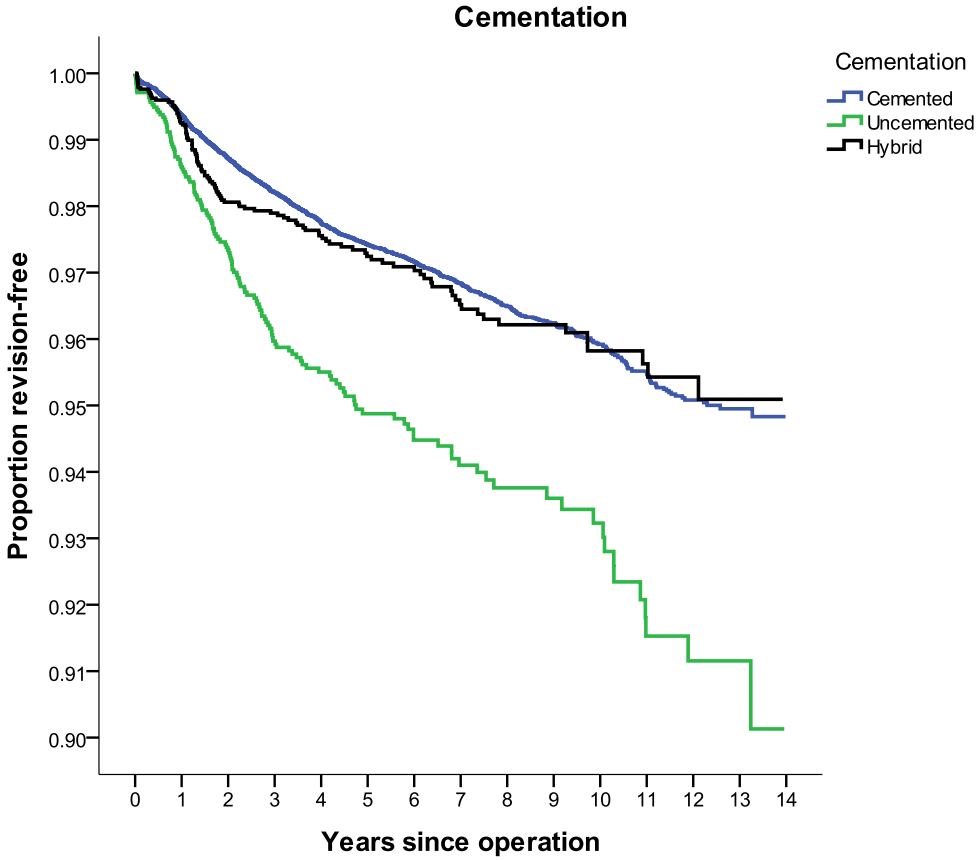
KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for years 1999 – 2012 with deceased patients censored at time of death

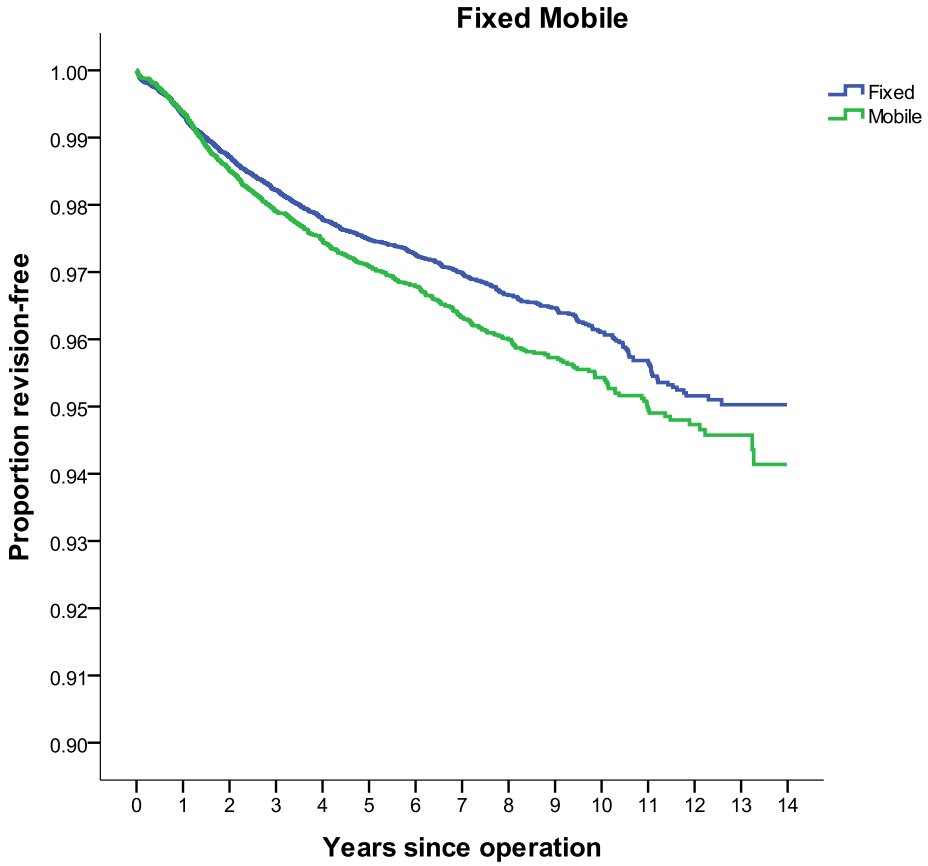


Years	% Revision-free	No in each year
1	99.10	56480
2	98.45	49271
3	97.98	42434
4	97.54	35870
5	97.25	29829
6	96.94	23922
7	96.58	18712
8	96.25	14005
9	96.05	10336
10	95.65	7584
11	95.09	5291
12	94.84	3091
13	94.49	685

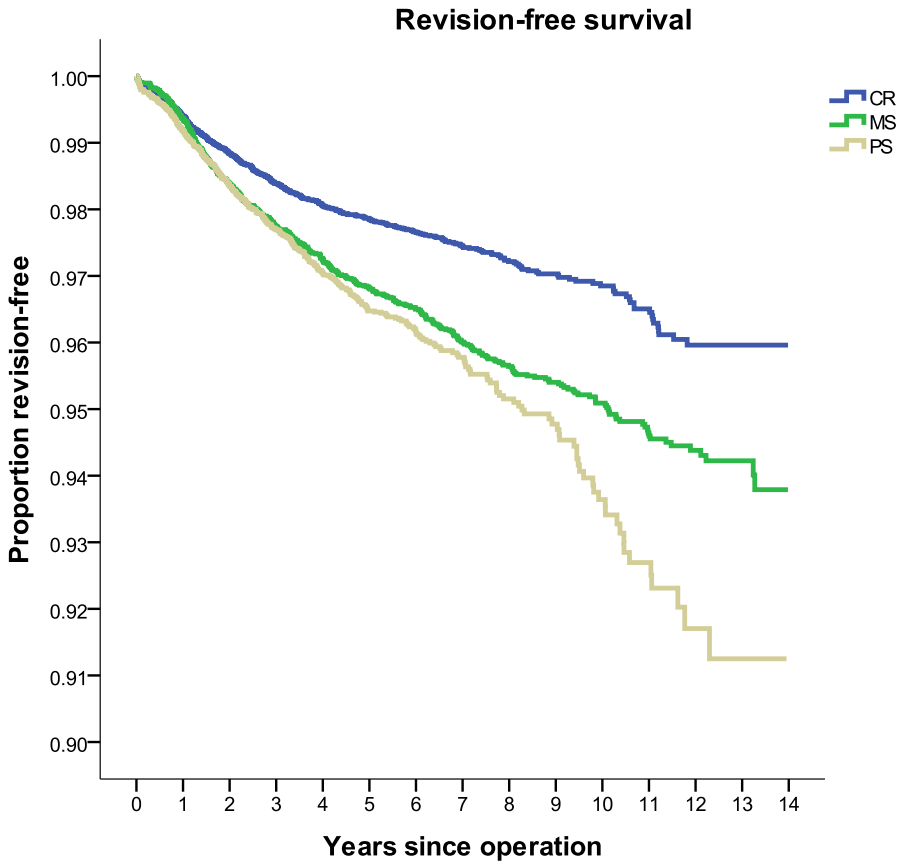
The KM analysis is to 13years rather than 14 as too few registered knees were revised in 2012



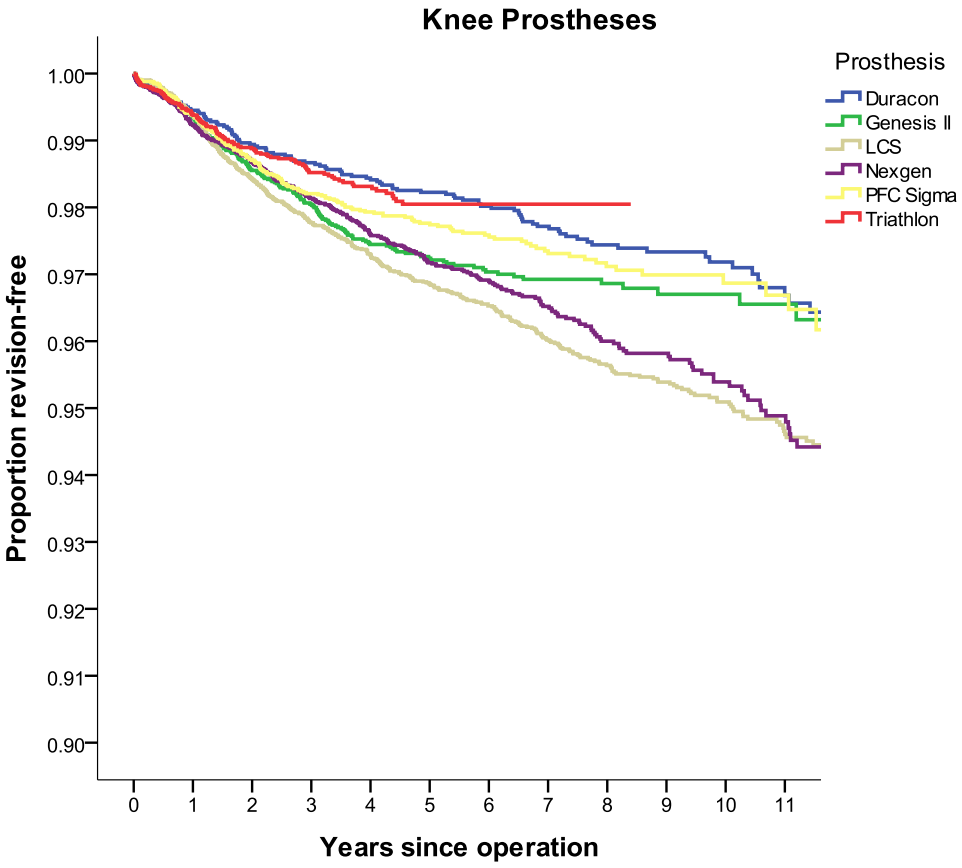
Survival Curve for Fixed vs Mobile Knee Prostheses

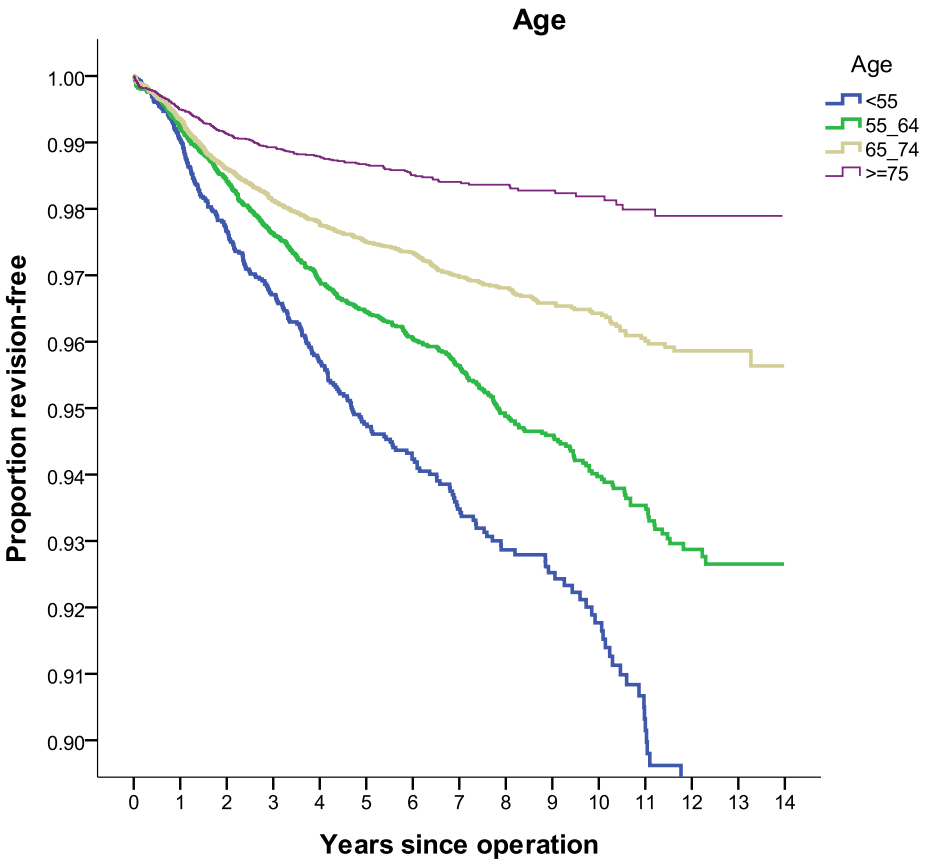


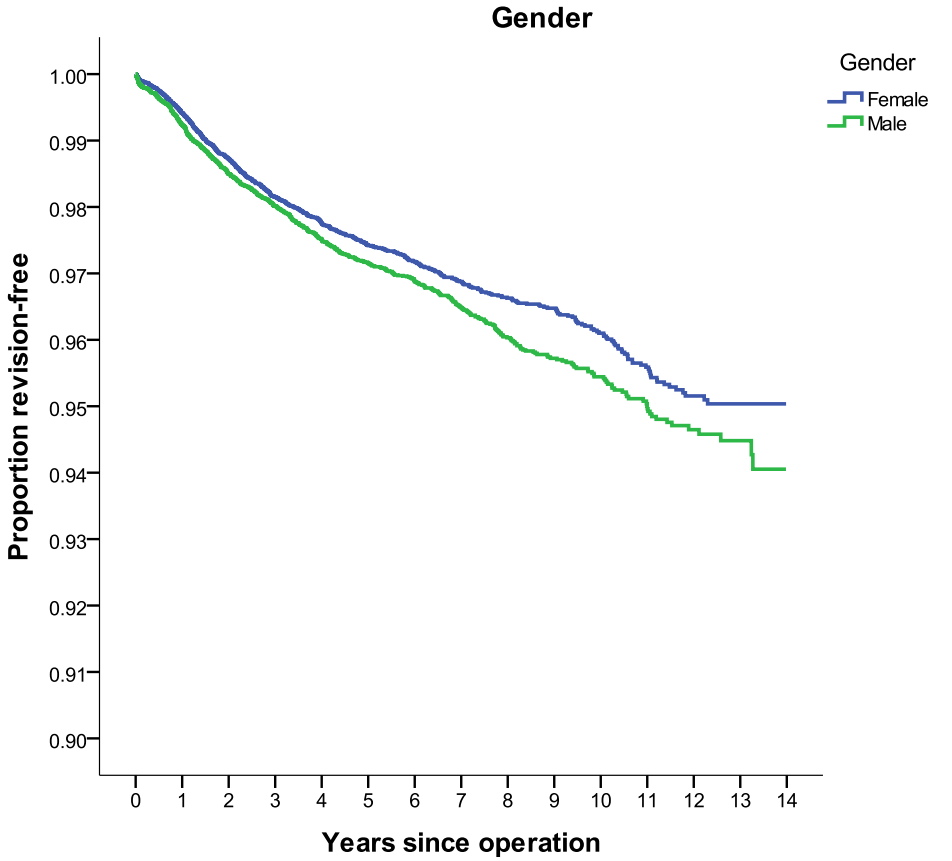
Survival Curve for Cruciate Retaining vs Minimally Stabilised vs Posterior Stabilised Knee Prostheses

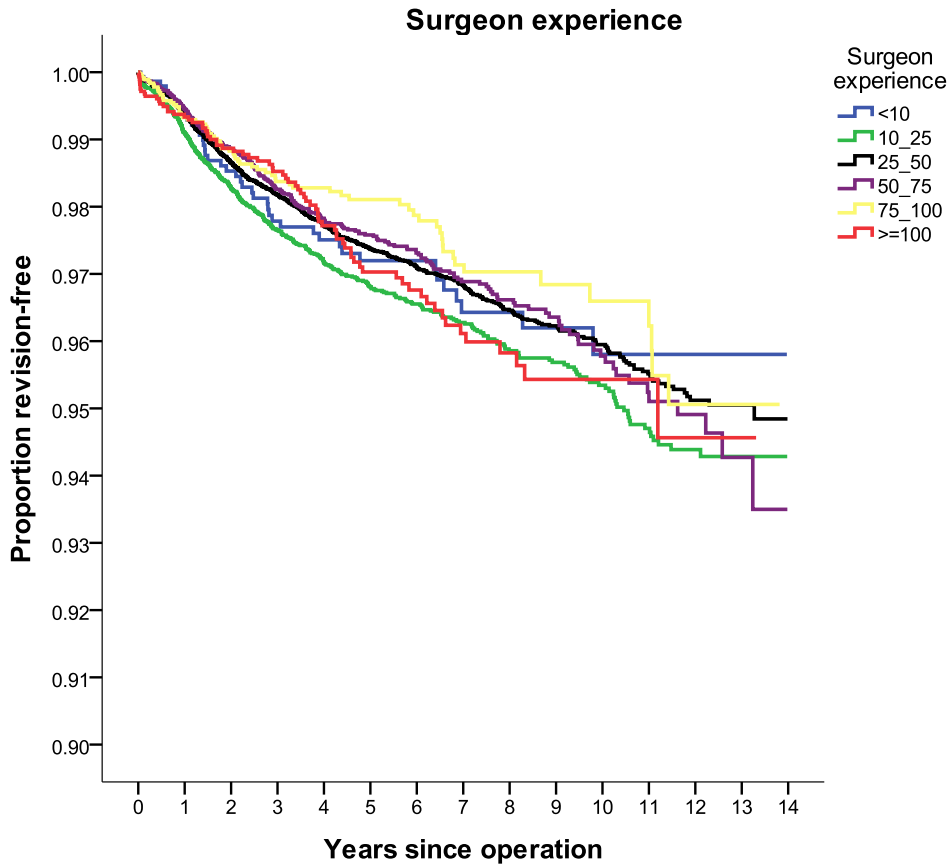


Survival Curve to 10 years for 6 knee prostheses






Gender
Gender
Female
Male
Proportion revision-free
1.00
0.99
0.98
0.97
0.96
0.95
0.94
0.93
0.92
0.91
0.90
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Years since operation


Surgeon experience
Surgeon experience
<10
10_25
25_50
50_75
75_100
>=100
Proportion revision-free
1.00
0.99
0.98
0.97
0.96
0.95
0.94
0.93
0.92
0.91
0.90
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Years since operation

KNEE RE-REVISIONS

Analysis was undertaken of re-revisions.

There were 227 registered primary knee revisions that had been revised twice, 38 that had been revised 3 times, 6 that had been revised 4 times, 2 that had been revised 5 times and 1 that had been revised 6 times.

Second revision

Time between the first and second revision for the 227 knee arthroplasties averaged 754 days, with a range of 2 – 3318 and a standard deviation of 760 days.

This compares to an average of 1,112 days between primary and first revision arthroplasty.

Reason for revision

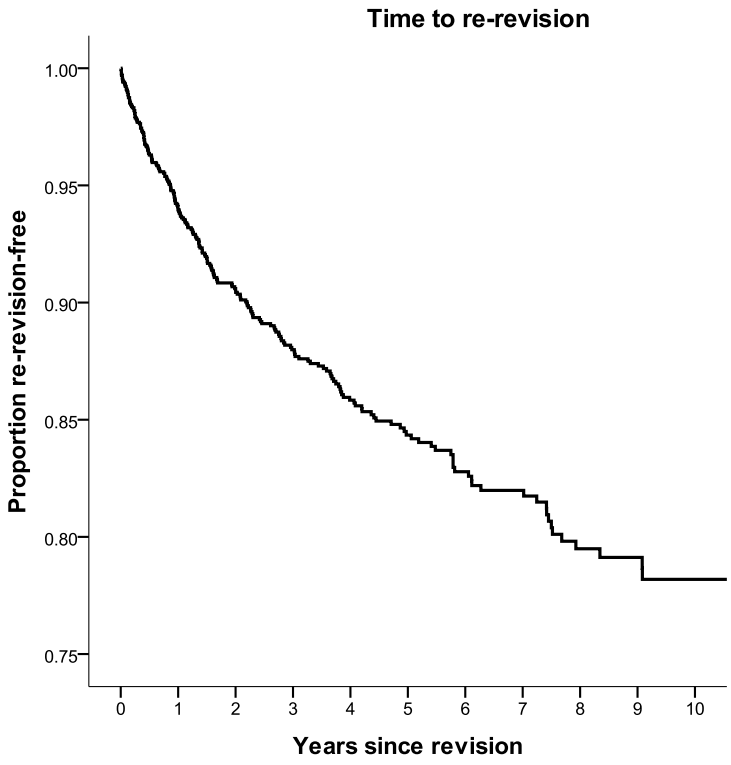
Deep infection	101
Pain	53
Loosening tibial component	39
Loosening femoral component	31
Loosening patellar component	3
Fracture femur	1

Second Revisions

Number of primary revisions	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
1684	6883.6	227	3.30	2.88	3.75

The revision rate is over 6 times that of a primary knee arthroplasty.

Kaplan Meier survival curve for first revision knee arthroplasties



Years	Percentage re-revision free
1	93.96
2	90.60
3	87.99
4	85.83
5	84.34
6	82.78
7	81.74
8	79.49
9	78.86
10	78.86

Third revision

The average time between second and third revisions for the 38 knee arthroplasties was 664 days, with a range of 28 – 2212 and a standard deviation of 578 days.

Fourth revision

The average time between third and fourth revisions for the 6 knee arthroplasties was 366 days, with a range of 23 – 1454 and a standard deviation of 545 days.

Fifth revision

The average time between fourth and fifth revisions for the 2 knee arthroplasties was 353 days.

Sixth revision

The time between fifth and sixth revision for the 1 knee arthroplasty was 162 days.

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX MONTHS, FIVE YEARS AND TEN YEARS POST SURGERY

Questionnaires at six months post surgery

At six months post surgery a random selection of patients are sent the Oxford-12 questionnaire in order to achieve a response rate of 20% of the total which is deemed to be ample to provide powerful statistical analysis.

The new scoring system as recommended by the original authors has been adopted. (see appendix 1)

The scores now range from 4 to 0. A score of 48 is the best, indicating normal function. A score of 0 is the worst, indicating the most severe disability.

In addition we have grouped the questionnaire responses according to the classification system published by Kalairajah et al in 2005. (see appendix 1)

This groups each score into four categories;

Category 1	>41	excellent
Category 2	34 – 41	good
Category 3	27 – 33	fair
Category 4	< 27	poor

For the fourteen-year period and as at July 2013, there were 20,716 primary knee questionnaire responses registered at six months post surgery.

The mean knee score was 37.32 (standard deviation 8.14, range 48 – 1)

Scoring	> 41	7751
Scoring	34 -41	7365
Scoring	27 -33	3243
Scoring	< 27	2357

At six months post surgery, 73% had an excellent or good score.

Questionnaires at five years post surgery

All patients who had a six month registered questionnaire, and who had not had revision surgery were sent a further questionnaire at five year's post surgery.

This dataset represents sequential Oxford knee scores for 6,737 individual patients.

At five years post surgery, 82% of patients achieved an excellent or good score and had a mean of 40.06.

Questionnaires at ten years post surgery

All patients who had a six month registered questionnaire, and who had not had revision surgery were sent a further questionnaire at ten years post surgery.

This dataset represents sequential Oxford knee scores for 3122 individual patients.

At ten years post surgery, 80% of patients achieved an excellent or good score and had a mean of 39.59.

Analysis of the individual questions at six month, five years and ten years post surgery

Analysis of the individual questions showed that the most common persisting problem was difficulty with kneeling (Q4).

Percentage scoring 0 or 1(worst categories) for each question out of the group of 20,716 primary knee responses at six-months, 6,737 at five years and 3,122 at ten years.

		6m	5y	10y
1	Moderate or severe pain from the operated knee	13	8	9
2	Only able to walk around the house or unable to walk before pain becomes severe	5	4	4
3	Extreme difficulty or impossible to get in and out of a car or public transport	4	4	5
4	Extreme difficulty or impossible to kneel down and get up afterwards	42	40	43
5	Extreme difficulty or impossible to do the household shopping on your own	4	4	5
6	Extreme difficulty or impossible to wash and dry yourself	1	1	1
7	Pain interfering greatly or totally with your work	5	4	4
8	Very painful or unbearable to stand up from a chair after a meal	4	2	1
9	Most of the time or always feeling that the knee might suddenly "give way"	2	2	1
10	Limping most or every day	11	7	7
11	Extreme difficulty or impossible to walk down a flight of stairs	7	7	8
12	Pain from your knee in bed most or every nights	10	5	4

As noted in previous years there is little significant change between the six month five and ten year scores which means the six month score is indicative of the medium term outcome. Limp and pain at night tend to diminish over time.

Revision knee questionnaire responses

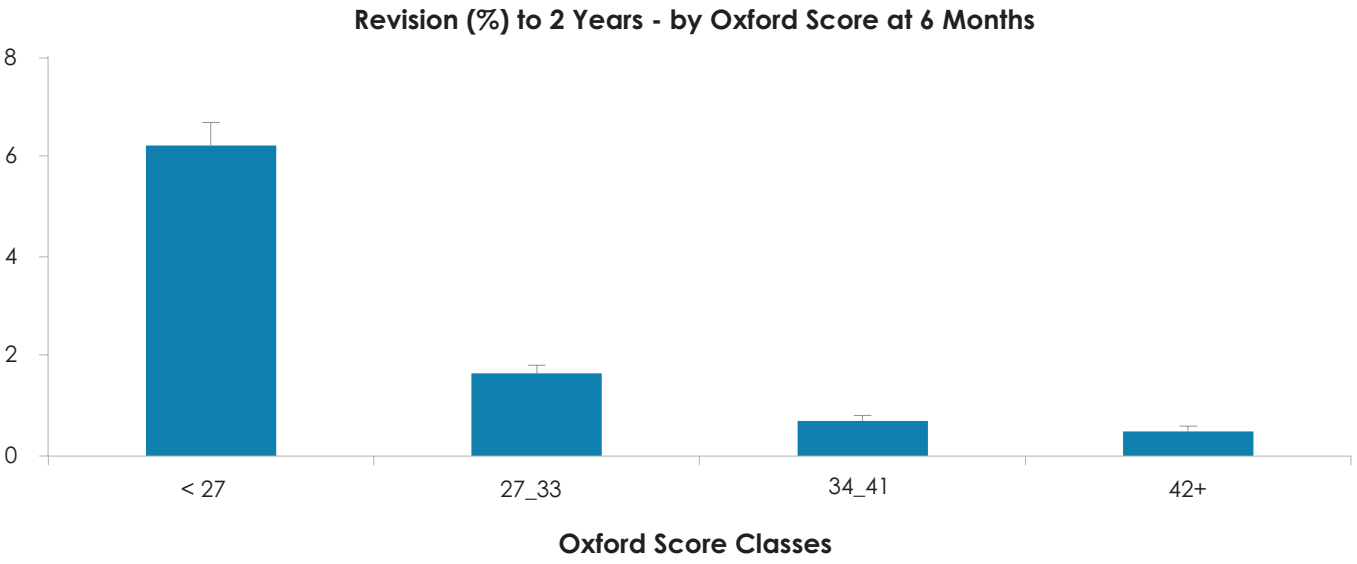
There were 2,637 revision hip responses with 53% achieving an excellent or good score. This group includes all revision knee procedures. The mean revision hip score was 33.00 (standard deviation 10.05), range 48 – 3)

OXFORD 12 SCORE AS A PREDICTOR OF KNEE ARTHROPLASTY REVISION

A statistically significant relationship has been confirmed between the Oxford scores at 6 months and 5 years post surgery and arthroplasty revision within two years of the Oxford 12 questionnaire date.

Six month score and revision arthroplasty

By plotting the patients six month scores in the Kalairajah groupings, against the proportion of knees revised for that same group it demonstrates that there is an incremental increase in risk during the next 2 years related to the Oxford score. A patient with a score below 27 has 13 times the risk of a revision within 2 years compared to a person with a score >41



Revision risk versus Kalairajah groupings of Oxford scores within two years of the 6 month score date

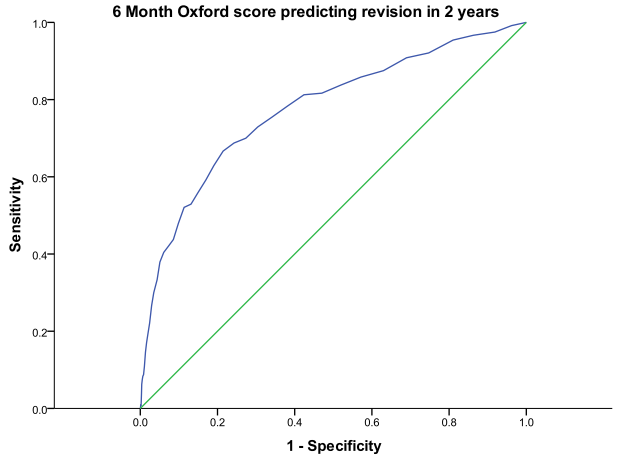
Kalairajah group	No in group	No. revised	%	Std error
< 27	2026	125	6.17	0.53
27_33	2721	43	1.58	0.24
34_41	6013	42	0.70	0.11
42+	6226	30	0.48	0.09

A person with an oxford score >42 has a 0.48 % risk of revision within two years compared to a 6.17% risk with a score of 27 or less

A ROC analysis has demonstrated that a patient with a score less than or equal to 32.5 has 7 times the risk of needing a revision within 2 years compared to a person with a score greater than 32.5.

Alternatively the ROC analysis predicted 72% of the revisions within 2 years from just the lowest 30% of Oxford scores.

ROC curve at six months versus revision within two years

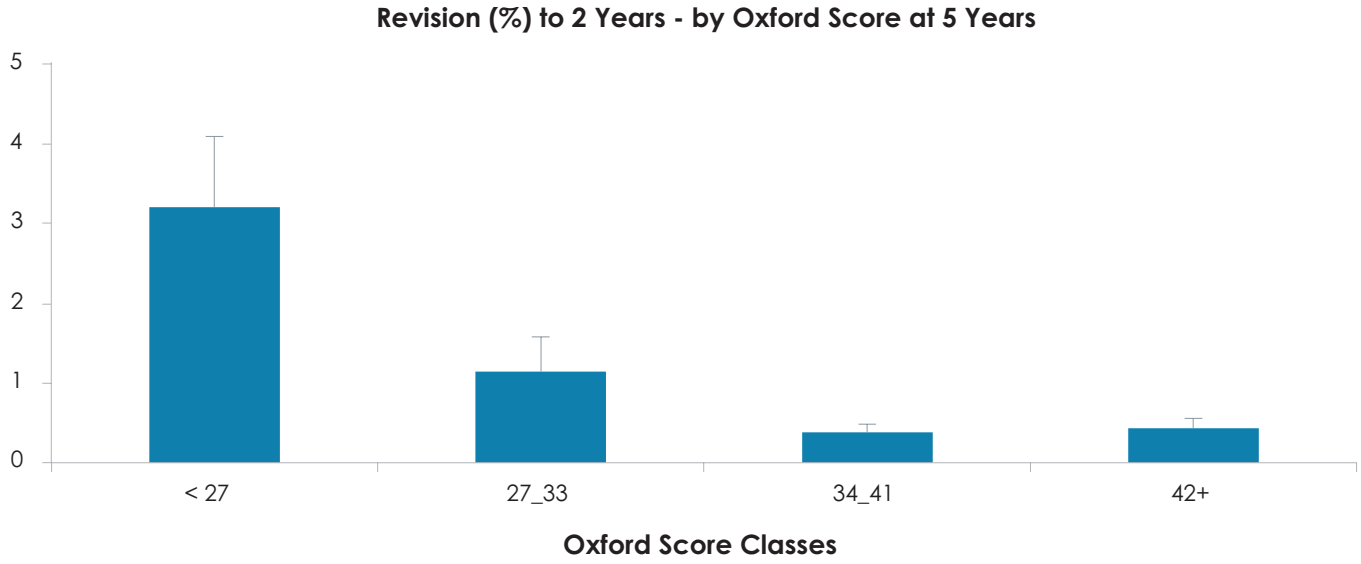


A receiver operating characteristic (ROC) curve is a graphical representation of the tradeoff between the false negative and false positive rates for every possible cutoff.

Equivalently, the ROC curve is the representation of the tradeoffs between sensitivity and specificity. The more the curve climbs towards the upper left corner the better the reliability of the test.

Five year score and revision arthroplasty

As with the six month scores, plotting the patients 5 year scores in the Kalairajah groupings against the proportion of knees revised for that same group demonstrates that there is an incremental increase in risk during the next 2 years related to the Oxford score. A patient with a score below 27 has 10 times the risk of a revision within 2 years compared to a person with a score >41



Revision risk versus Kalairajah groupings of Oxford scores within two years of the 5 year score date.

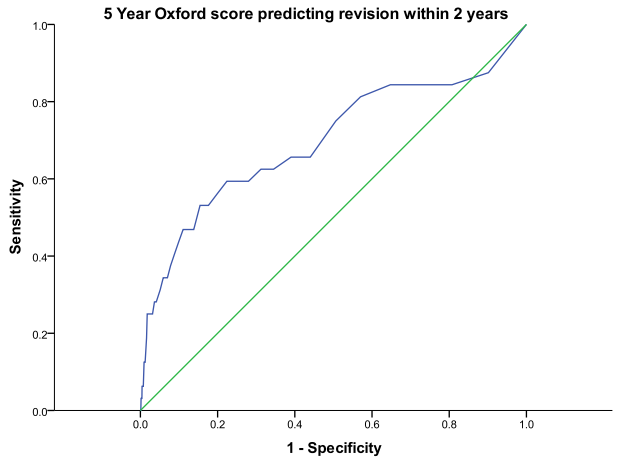
Kalairajah group	No in group	No. revised	%	Std error
< 27	375	12	3.20	0.91
27_33	461	5	1.08	0.48
34_41	1230	4	0.33	0.16
42+	2613	11	0.42	0.13

A person with an Oxford score between 34 & 41 has a 0.33% risk of revision within two years compared to a 3.20% risk with a score of 27 or less

The ROC analysis at 5 years has demonstrated that a patient with a score less than or equal to 35.5 has 5 times the risk of needing a revision within 2 years compared to a person with a score greater than 35.5.

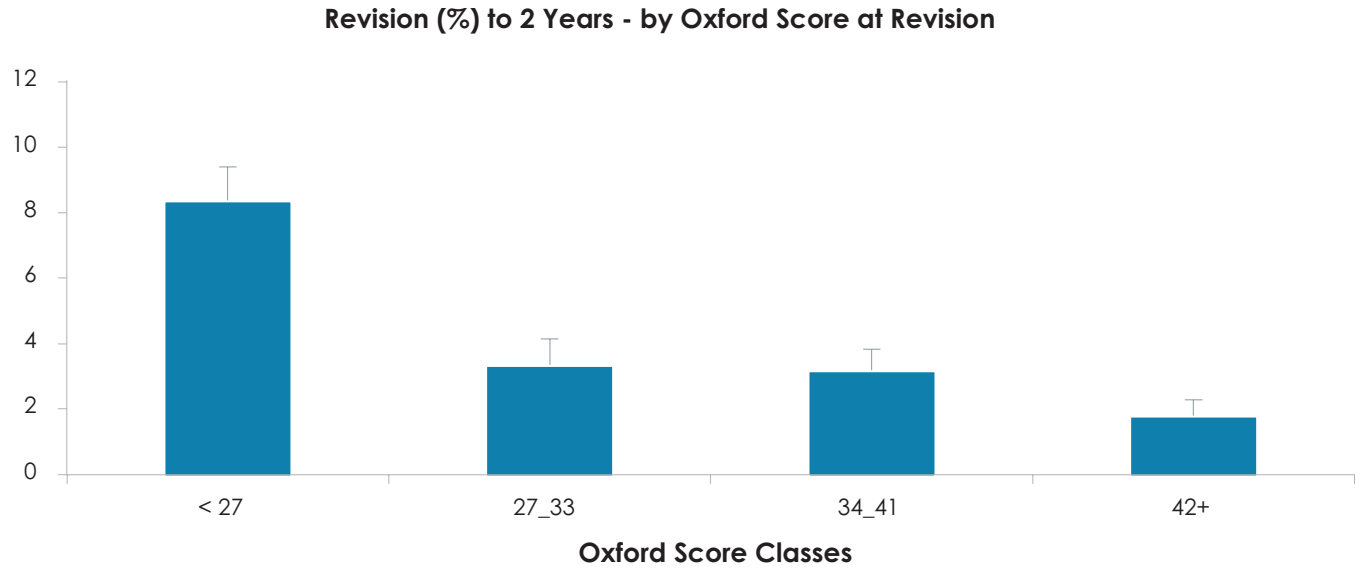
Alternatively the ROC analysis predicted 62% of the revisions within 2 years from just the lowest 30% of Oxford scores.

ROC curve at five years versus revision within two years



Prediction of second revision from six month score following first revision.

By plotting the patients six month scores following their first revision in the Kalairajah groupings, against the proportion of knees revised for that same group it again demonstrates that there is an incremental increase in risk during the next 2 years related to the Oxford score. A patient with a score below 27 has 5 times the risk of a revision within 2 years compared to a person with a score >41



Second revision risk versus Kalairajah groupings of Oxford scores within two years of the 6 month post first revision score date

Kalairajah group	Revision to 2 yrs	No. revised	%	Std error
< 27	620	52	8.39	1.11
27_33	447	15	3.36	0.85
34_41	625	20	3.20	0.70
42+	509	9	1.77	0.58

A person with a 6 month Oxford score >42 has a 1.77% risk of revision within two years compared to a 8.39% risk with a score < 27.

UNICOMPARTMENTAL KNEE ARTHROPLASTY

PRIMARY UNICOMPARTMENTAL KNEE ARTHROPLASTY

The **thirteen year** report analyses data for the period January 2000 – December 2012. There were 7,388 unicompartmental knee procedures registered, an additional 769 compared to last year's report.

2000	340
2001	430
2002	533
2003	634
2004	634
2005	558
2006	584
2007	576
2008	540
2009	628
2010	602
2011	609
2012	720

The discrepancy between the 769 and the 720 in table above is because over the last 3 years a new unicompartmental prosthesis had mistakenly been entered as a total knee arthroplasty.

There was an 18% increase in unicompartmental registrations for 2012, the largest since 2003.

Data Analysis

Age and sex distribution

The average age for a unicompartmental knee replacement was 66.36 years, with a range of 18.28 – 94.71 years.

	Female	Male
Number	3441	3947
Percentage	46.58	53.42
Mean age	66.19	66.51
Maximum age	94.71	93.42
Minimum age	18.28	35.24
Standard dev.	10.17	9.10

Body Mass Index

For the 3 year period 2010 - 2012, there were 1282 BMI registrations for unicompartmental knee replacements. The average was 29.543 with a range of 17 – 49.66 and a standard deviation of 4.86.

Previous operation

None	5860
Menisectomy	1148
Arthroscopy/debridement	330
Internal fixation	27
Osteotomy	25
Ligament reconstruction	29

Diagnosis

Osteoarthritis	7218
Avascular necrosis	56
Post ligament disruption	33
Other inflammatory	20
Rheumatoid arthritis	13
Post fracture	13
Tumour	2

Approach

Medial	5613
Minimally invasive surgery	1766
Other	201
Lateral	158
Image guided surgery	29

Image guided surgery was added to the updated forms at the beginning of 2005, but unlike the total knee arthroplasty, has never become popular. The minimally invasive approach remains steady at 30%.

Cement

Femur cemented	5954	81%
Antibiotic in cement	3731	63%
Tibia cemented	6076	82%
Antibiotic in cement	3818	63%

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	7101	96%

Operating theatre

Conventional	5275
Laminar flow	2034
Space suits	1857

ASA Class

This was introduced with the updated forms at the beginning of 2005.

For the eight year period 2005 – 2012, there were 4,523 (94%) unicompartmental knee procedures with the ASA class recorded.

Definitions

ASA class 1:	A healthy patient
ASA class 2:	A patient with mild systemic disease
ASA class 3:	A patient with severe systemic disease that limits activity but is not incapacitating
ASA class 4:	A patient with an incapacitating disease that is a constant threat to life

ASA	Number	Percentage
1	892	20
2	2903	64
3	717	15
4	411	1

Operative time (skin to skin)	
Mean	78 minutes
Minimum	23 minutes
Maximum	217 minutes
Standard deviation	24 minutes

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised.

The following figures are for the eight year period 2012.

Consultant	4551
Advanced trainee supervised	241
Advanced trainee unsupervised	12
Basic trainee	10

Prosthesis usage

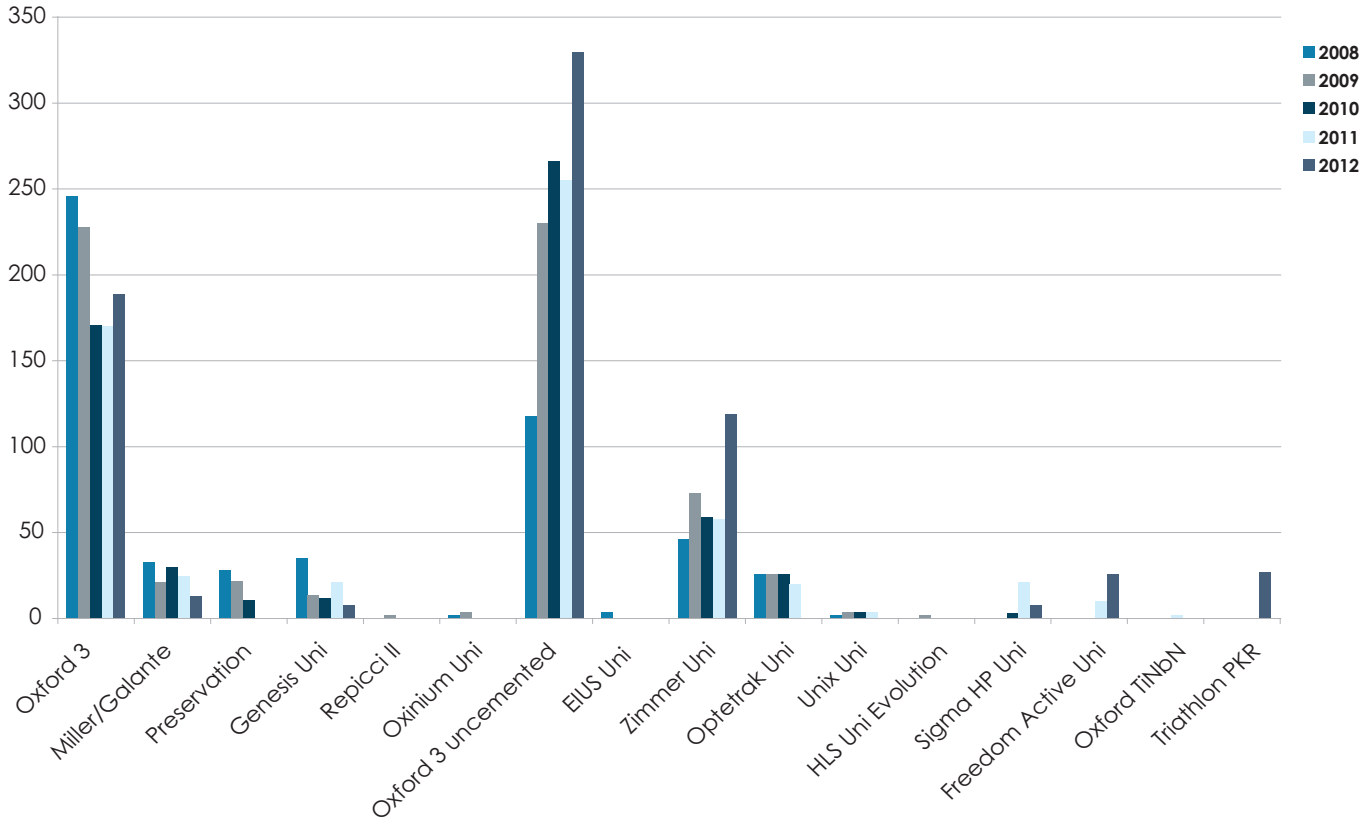
Unicompartmental knee prostheses used in 2012

Oxford 3 uncemented	330
Oxford 3	189
Zimmer Uni	119
Triathlon PKR	27
Freedom Active Uni	26
Miller/Galante	13
Sigma HP Uni	8
Genesis Uni	8

The Oxford 3 uncemented continues its rapid rise in popularity.

The Triathlon PKR is a new unicompartmental prosthesis.

Most Used Unicompartmental Prostheses 2008 - 2012



Surgeon and hospital workload

Surgeons

In 2012, 81 surgeons performed 720 unicompartmental knee replacements, an average of 9 procedures per surgeon.

44 surgeons performed less than 5 procedures and 12 performed more than 15 procedures.

Hospitals

In 2012 unicompartmental knee replacements were performed in 37 hospitals; 20 public and 17 private.

For 2012 the average number of unicompartmental knee replacements per hospital was 20.

REVISION OF REGISTERED PRIMARY UNICOMPARTMENTAL ARTHROPLASTIES

This section analyses the data for revision of unicompartmental knee replacement over the thirteen-year period.

Revision is defined by the Registry as a new operation in a previously partially replaced knee joint during which one or more of the components are exchanged, removed, manipulated or added. It includes arthrodesis or amputation, but not soft tissue procedures. A two or more staged procedure is registered as one revision.

There were 515 revisions of the 7,388 registered unicompartmental knee replacements (7%).

A further 53 had a second revision, 6 a third revision and 1 a fourth revision.

438 of the 515 (85%) were revised to total knee replacements and 77 (15%) were revised to further unicompartmental replacements.

Time to revision

Mean	1318 days
Maximum	4598 days
Minimum	10 days
Standard deviation	1089 days

Reason for revision

Pain	189
Loosening tibial component	107
Loosening femoral component	72
Deep infection	20
Fracture tibia	19
Fracture femur	2

There are sometimes more than 1 reason listed for revision and all are registered.

Analyses by time of the 4 main reasons for revision

Reason for revision	Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Loosening femoral	Count	0	12	17	6	11	4	5	3	6	4	2	1	0	1	72
	%	0.00	16.67	23.61	8.33	15.28	5.56	6.94	4.17	8.33	5.56	2.78	1.39	0.00	1.39	
Loosening tibial	Count	9	17	32	9	7	9	4	9	6	1	3	1	0	0	107
	%	8.40	15.90	29.90	8.40	6.50	8.40	3.70	8.40	5.60	0.90	2.80	0.90	0.00	0.00	
Pain	Count	9	24	56	28	11	21	10	9	10	3	6	2	0	0	189
	%	4.80	12.70	29.60	14.80	5.80	11.10	5.30	4.80	5.30	1.60	3.20	1.10	0.00	0.00	

Statistical note

In the table below there are two statistical terms readers may not be familiar with.

Observed component years

This is the number of registered primary procedures multiplied by the number of years each component has been in place.

Rate/100 component years

This is equivalent to the yearly revision rate expressed as a percent and is derived by dividing the number of prostheses revised by the observed component years multiplied by 100. It therefore allows for the number of years of postoperative follow up in calculating the revision rate. These rates are usually very low and hence are more meaningfully recorded per 100 component years rather than per component year. Statisticians consider that this is a more accurate way of deriving a revision rate for comparison when analysing data with widely varying follow up times. It is also important to note the confidence intervals. The closer they are to the estimated revision rate/100 component years, the more precise the estimate is.

Statistical significance

Where it is stated that a difference among results is significant the p value is 0.05 or less. In most of these situations this is because there is no overlap of the confidence intervals (CIs) but sometimes significance can apply in the presence of CI overlap

All Primary Unicompartmental Knee Arthroplasties

No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
7388	39881.3	515	1.29	1.18	1.41

Revision Rate of Individual Unicompartmental Knee Prostheses Sorted Alphabetically

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
EIUS Uni Knee	22	127.8	0	0.00	0.00	2.89
Freedom Active Uni	36	25.3	1	3.95	0.10	21.99
Genesis Uni	358	2254.0	35	1.55	1.08	2.16
HLS Uni Evolution	1	0.5	1	193.25	4.89	076.74
LCS Uni	6	51.7	2	3.87	0.47	13.98
Miller/Galante	710	5059.5	48	0.95	0.70	1.26
Optetrak Unicondylar Cemented	101	320.1	4	1.25	0.34	3.20
Oxford 3	3626	23042.4	315	1.37	1.22	1.53
Oxford 3 uncemented	1380	3521.2	26	0.74	0.48	1.08
Oxford TiNbN coated	1	1.5	0	0.00	0.00	253.74
Oxinium Uni	33	161.9	10	6.18	2.96	11.36
Preservation	484	3195.7	48	1.50	1.11	1.99
Repicci II	97	901.3	14	1.55	0.85	2.61
Sigma HP Uni	32	41.6	0	0.00	0.00	8.86
Triathlon PKR	74	105.0	2	1.90	0.23	6.88
Unix Uni	14	38.0	1	2.63	0.07	14.66
Zimmer Unicompartmental Knee	413	1033.9	8	0.77	0.33	1.52

The oxinium uni has a very significantly higher revision rate, but despite widely varying revision rates for the other prostheses there are no significant differences because of the relatively small numbers & wide CIs except for the uncemented Oxford Uni which has a significantly lower revision rate than some of the others as well as the overall mean of 1.27/100ocys. No oxinium unis have been registered since 2009.

Revision vs Arthroplasty Fixation

Fixation	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Cemented	5929	35984.3	484	1.35	1.23	1.47
Uncemented	1287	3408.9	28	0.82	0.55	1.19
Hybrid	172	488.1	3	0.61	0.13	1.80

The uncemented unis have a significantly lower revision rate than cemented unis.

Revision vs Age Bands

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
LT55	894	4834.8	84	1.74	1.39	2.15
55_64	2537	13778.5	236	1.71	1.50	1.95
65_74	2471	13733.1	135	0.98	0.82	1.16
GE75	1486	7534.9	60	0.80	0.61	1.02

There are statistically significant higher revision rates for the 2 lower age groups compared to the higher 2.

Revision vs Gender

Gender	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
F	3441	18929.8	260	1.37	1.21	1.55
M	3947	20951.5	255	1.22	1.07	1.38

There is no significant difference in revision rates between males and females.

Revision vs Surgeon Annual Workload

Consultant Number of ops/yr	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<10	3643	20933.3	313	1.50	1.33	1.67
>=10	3728	18865.3	197	1.04	0.90	1.20

Those surgeons performing <10 per year have a significantly higher revision rate.

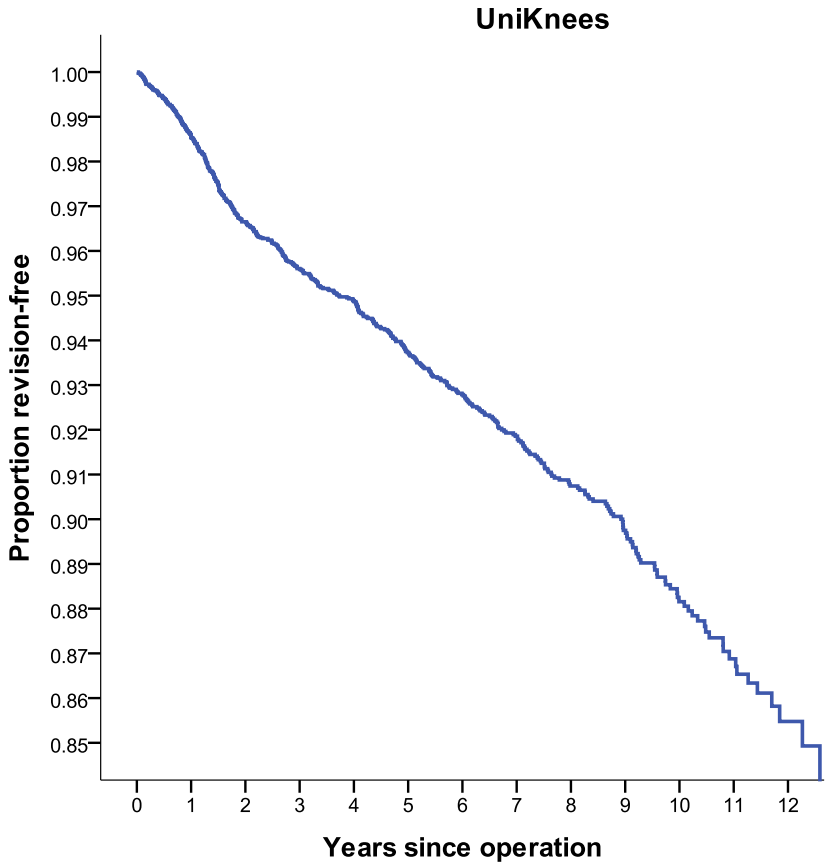
Revision vs Surgical Approach

Approach	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Minimally_Invasive	1766	7864.2	74	0.94	0.74	1.18
Not Minimally_ Invasive	5622	32017.1	441	1.38	1.25	1.51

The minimally invasive technique has a significantly lower revision rate.

KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for years 2000 to 2012 with deceased patients censored at time of death.



Years	% Revision-free	N
1	98.09	6534
2	96.31	5777
3	95.38	5073
4	94.51	4363
5	93.45	3751
6	92.52	3140
7	91.45	2548
8	90.65	2004
9	89.17	1427
10	87.87	908
11	84.21	509

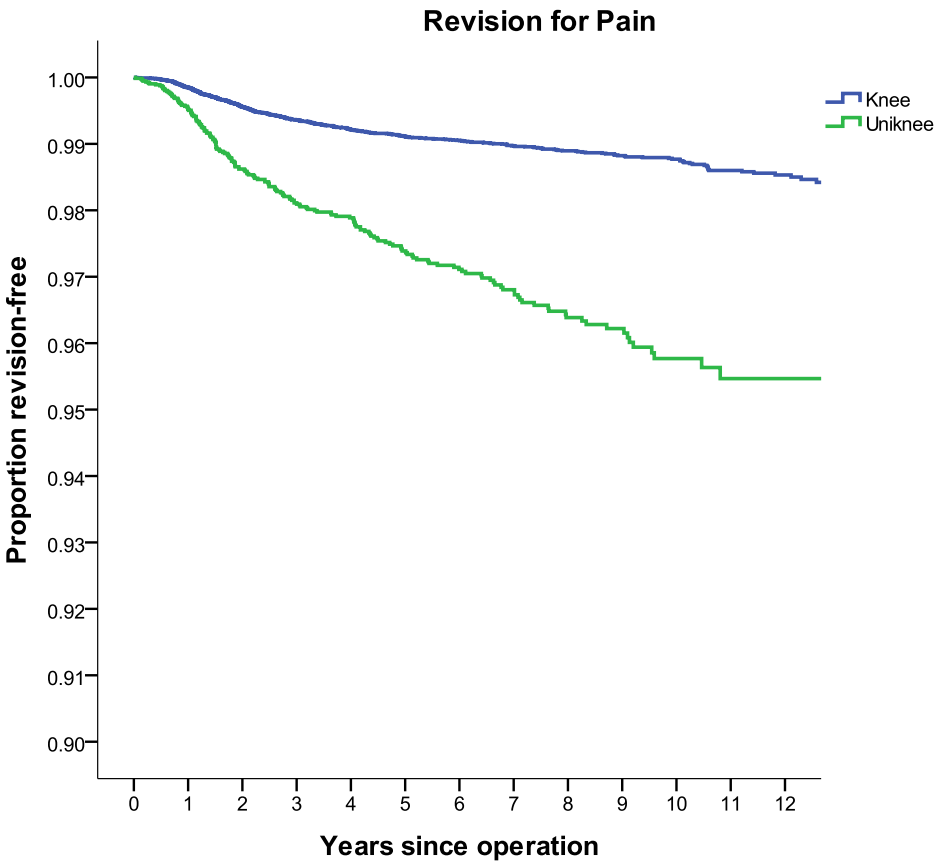
Numbers too few for accurate percentage survival beyond 11 years.

Re Revisions	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Revised to full	438	1972.0	39	1.98	1.41	2.70
Revised to Uni	77	302.1	14	4.63	2.53	7.78

When compared to the primary total knee arthroplasty revision rate of 0.50 @ the 95% confidence interval there is a significantly increased revision rate when a unicompartmental arthroplasty is converted to a total knee arthroplasty. This statistic is even more significant following conversion of a unicompartmental to a further unicompartmental arthroplasty. Further evidence is that the average six month Oxford score following conversion of a unicompartmental to total arthroplasty is similar to that for a revised primary total knee arthroplasty.

Survivorship of Uni-knee revised to Total Knee for pain alone vs revised Total Knee also revised for pain alone

Revision Rate for Re-revisions



	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Uniknees	7388	39881.3	189	0.474	0.409	0.546
Knees	64556	336757.8	513	0.152	0.139	0.166

There is a significantly better survivorship for total knees revised for pain alone than for uniknees revised to total knees for pain alone but overall for both groups the survival at ten years is still very good and may reflect that there is no indication for further revision even if pain persists. This is supported by the six month revision Oxford score mean of 32.88 compared to the six month primary score mean of 37.28.

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX MONTHS, FIVE YEARS AND TEN YEARS POST SURGERY

At six months post surgery all patients are sent the Oxford-12 questionnaire.

The new scoring system as recommended by the original authors has been adopted. (See appendix one)

There are 12 questions, with the scores now ranging from 4 to 0. A score of 48 is the best, indicating normal function. A score of 0 is the worst, indicating the most severe disability.

In addition we have grouped the questionnaire responses according to the classification system published by Kalairajah et al, 2005 (See appendix 1) This groups each score into four categories

Category 1	>41	excellent
Category 2	34 – 41	good
Category 3	27 – 33	fair
Category 4	< 27	poor

For the thirteen year period and as at July 2013, there were 5,041 unicompartmental knee questionnaire responses registered at six months post surgery.

The mean unicompartmental knee score was 39.36 (standard deviation 7.35, range 3 – 48)

Scoring	> 41	2469
Scoring	34 -41	1611
Scoring	27 -33	585
Scoring	< 27	346

At six months post surgery, 84% had an excellent or good score.

At six months post surgery, 82% had an excellent or good score.

Questionnaires at five years post surgery

Patients who had a registered six month questionnaire and who had not had revision surgery were sent a further questionnaire at five year's post surgery.

This dataset represents sequential Oxford knee scores for 1,745 individual patients.

At five years post surgery, 88 % of patients had achieved an excellent or good score and had a mean of 41.32.

Questionnaires at ten years post surgery

All patients who had a six-month registered questionnaire, and who had not had revision surgery were sent a further questionnaire at ten years post surgery.

This dataset represents sequential Oxford knee scores for 524 individual patients.

At ten years post surgery, 85% of patients achieved an excellent or good score and had a mean of 40.79.

Analysis of the individual questions at six months, five years and ten years post surgery

Analysis of the individual questions showed that the most common persisting problem was kneeling (Q4).

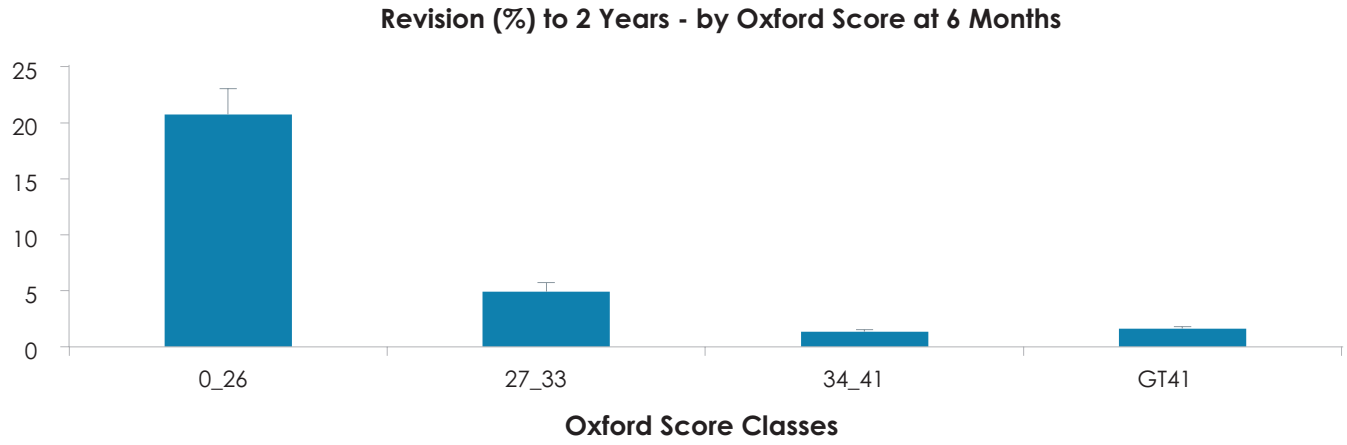
Percentage scoring 0 or 1 for each question out of the group of 5,041 at six months post surgery and 1,745 at five years and 524 at ten years.

		6m	5y	10y
1	Moderate or severe pain from the operated knee	10	8	8
2	Only able to walk around the house or unable to walk before pain becomes severe	3	2	3
3	Extreme difficulty or impossible to get in and out of a car or public transport	2	1	2
4	Extreme difficulty or impossible to kneel down and get up afterwards	31	28	28
5	Extreme difficulty or impossible to do the household shopping on your own	1	1	3
6	Extreme difficulty or impossible to wash and dry yourself	0.5	0.4	0.8
7	Pain interfering greatly or totally with your work	3	3	3
8	Very painful or unbearable to stand up from a chair after a meal	3	2	2
9	Most of the time or always feeling that the knee might suddenly "give way"	2	1	3
10	Limping most or every day	8	5	5
11	Extreme difficulty or impossible to walk down a flight of stairs	3	3	4
12	Pain from your knee in bed most or every nights	7	4	5

OXFORD 12 SCORE AS A PREDICTOR OF UNICOMPARTMENTAL KNEE ARTHROPLASTY REVISION

A statistically significant relationship has been confirmed between the Oxford scores at 6 months and arthroplasty revision within two years of the Oxford 12 questionnaire date.

By plotting the patients six month scores in the Kalairajah groupings, against the proportion of knees revised for that same group it demonstrates that there is an incremental increase in risk during the next 2 years related to the Oxford score. A patient with a score below 27 has 18 times the risk of a revision within 2 years compared to a person with a score 34-41



Revision risk versus Kalairajah groupings of Oxford scores within two years of the 6 month score date

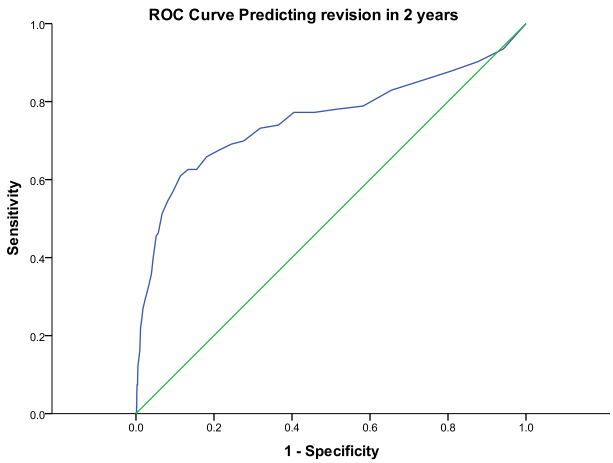
Kalairajah group	Revision to 2 yrs	No. revised	%	Std error
0_26	277	57	20.58	2.43
27-33	501	24	4.79	0.95
34-41	1297	15	1.16	0.30
GT 41	1893	27	1.43	0.27

A person with an oxford score 34-41 has a 1.16 % risk of revision within two years compared to a 20.58% risk with a score of < 27.

A ROC analysis has demonstrated that a patient with a score less than 32 has 10 times the risk of needing a revision within 2 years compared to a person with a score greater or equal to 32

Alternatively the ROC analysis predicted 72% of the revisions within 2 years from just the lowest 30% of Oxford scores.

A receiver operating characteristic (ROC) curve is a graphical representation of the tradeoff between the false negative and false positive rates for every possible cut off. Equivalently, the ROC curve is the representation of the tradeoffs between sensitivity and specificity. The more the curve climbs towards the upper left corner the better the reliability of the test.



ANKLE ARTHROPLASTY

PRIMARY ANKLE ARTHROPLASTY

The **thirteen**-year report analyses data for the period January 2000 – December 2012. There were 945 primary ankle procedures registered, an additional 108 compared to last year's report. This is the lowest annual increase since 2008.

2000	17
2001	28
2002	28
2003	26
2004	48
2005	70
2006	81
2007	79
2008	107
2009	119
2010	125
2011	109
2012	108

Data Analysis

Age and sex distribution

The average age for an ankle replacement was 65.64years, with a range of 32.32 – 90.26 years.

	Female	Male
Number	355	590
Percentage	37.57	62.43
Mean age	63.64	67.02
Maximum age	85.84	90.26
Minimum age	32.32	34.15
Standard dev.	9.50	8.55

Body Mass Index

For the three-year period 2010 - 2012, there were 141 BMI registrations for primary ankle replacements. The average was 27.97 with a range of 17 – 43 and a standard deviation of 4.20.

Previous operation

None	747
Internal fixation for juxtarticular fracture	98
Arthrodesis	28
Osteotomy	18

Diagnosis

Osteoarthritis	692
Post trauma	167
Rheumatoid arthritis	92
Other inflammatory	13
Avascular necrosis	2

Approach

Anterior	825
Anterolateral	34
Other	8

Bone graft

Tibia autograft	37
Tibia allograft	3
Talus autograft	6
Talus allograft	3

Cement

Tibia cemented	15
Antibiotic in cement	7
Talus cemented	7
Antibiotic in cement	4

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	909 (96%)

Operating theatre

Conventional	490
Laminar flow	446
Space suits	181

ASA Class

This was introduced with the updated forms at the beginning of 2005.

For the eight-year period 2005 -2012, there were 696 (87%) primary ankle procedures with the ASA class recorded.

Definitions

ASA class 1:	A healthy patient
ASA class 2:	A patient with mild systemic disease
ASA class 3:	A patient with severe systemic disease that limits activity but is not incapacitating
ASA class 4:	A patient with an incapacitating disease that is a constant threat to life

ASA	Number
1	140
2	432
3	121
4	3

Operative time (skin to skin)

Mean	122 minutes
Standard deviation	37 minutes
Minimum	30 minutes
Maximum	312 minutes

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the eight-year period 2005 -2012.

Consultant	794
Advanced trainee supervised	5

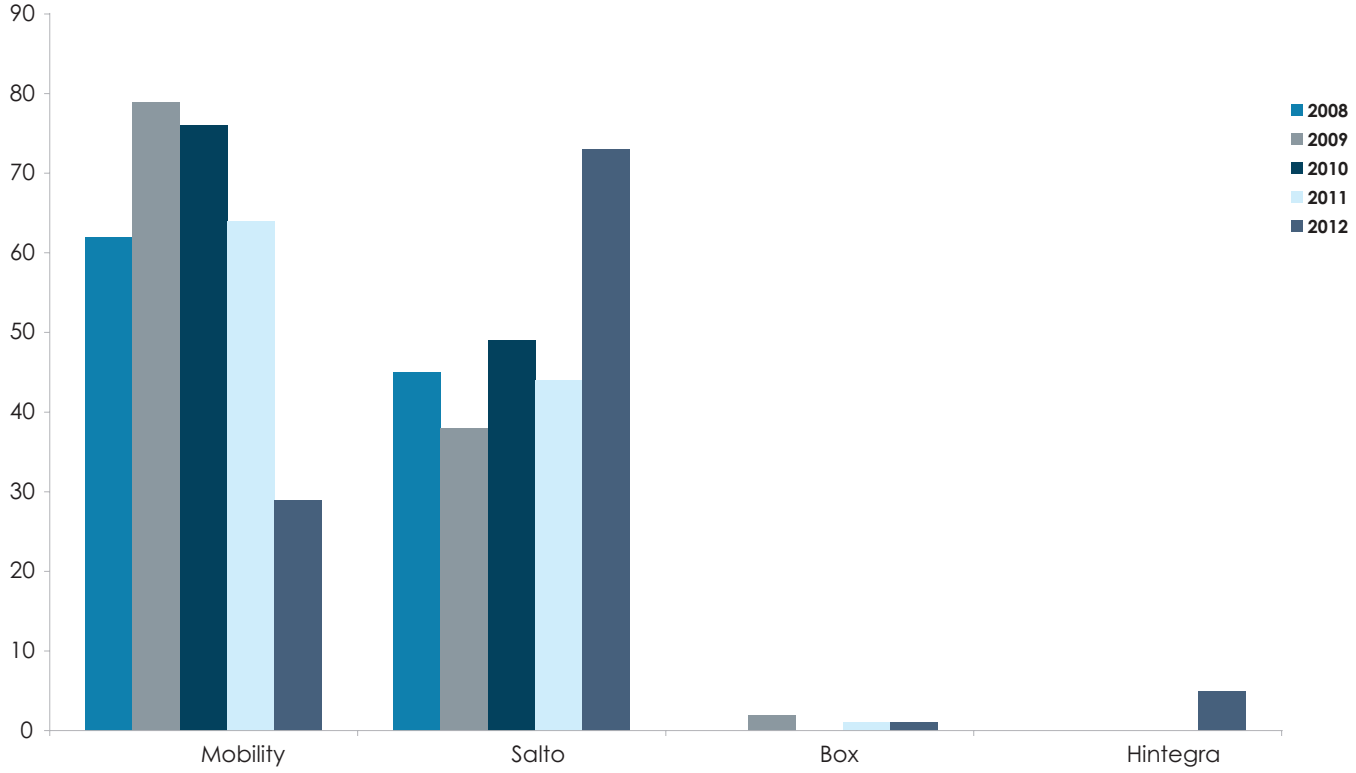
Prosthesis usage

Ankle prostheses used in 2012

Salto	73
Mobility	29
Hintegra	5
Box	1

The popularity of the Salto prosthesis rose dramatically in 2012 at the expense of the Mobility

Most Used Ankle Prostheses 2008 - 2012



Surgeon and hospital workload

Surgeons

In 2012, 16 surgeons performed 108 primary ankle procedures, an average of 7 procedures per surgeon. 2 surgeons performed more than 15 procedures and 3 performed 1 procedure.

Hospitals

In 2012, primary ankle replacement was performed in 23 hospitals. 11 were public and 12 were private.

REVISION ANKLE ARTHROPLASTY

Revision is defined by the Registry as a new operation in a previously replaced ankle joint during which one or more of the components are exchanged, removed, manipulated or added. It includes arthrodesis or amputation, but not soft tissue procedures. A two or more staged procedure is registered as one revision.

Data Analysis

For the thirteen-year period January 2000– December 2012, there were 79 revision ankle procedures registered.

The average age for an ankle revision was 64.27 years, with a range of 40.15 – 83.06.

	Female	Male
Number	28	51
Percentage	35.44	64.56
Mean	61.97	65.53
Maximum age	78.98	83.06
Minimum age	42.13	40.15
Standard dev.	10.84	8.24

REVISION OF REGISTERED PRIMARY ANKLE ARTHROPLASTIES

TThis section analyses data for revisions of primary ankle procedures for the thirteen year period.

There were 53 revisions of the primary group of 945 (5.6%) and 6 re-revisions.

Time to revision

Mean	1248 days
Maximum	3388 days
Minimum	21 days
Standard deviation	871 days

Reason for revision

Pain	27
Loosening talar component	18
Loosening tibial component	11
Deep infection	4

Analyses by time of the main reasons for revision

Reason for revision	Year	0	1	2	3	4	5	6	7	8	9	10	Totall
Loosening Talar component	Count	1	1	0	3	3	5	3	1	0	0	1	18
	%	5.6	5.	0.0	16.7	16.7	27.8	16.7	5.6	0.0	0.0	5.6	
Pain	Count	0	2	7	3	3	5	2	2	1	1	1	27
	%	0.0	7.4	25.9	11.1	11.1	18.5	7.4	7.4	3.7	3.7	3.7	
Loosening Tibial component	Count	0	1	2	1	2	2	0	1	1	1	0	11
	%	0.0	9.1	18.2	9.1	18.2	18.2	0.0	9.1	9.1	9.1	0.0	

Statistical note

In the table below there are two statistical terms readers may not be familiar with.

Observed component years

This is the number of registered primary procedures multiplied by the number of years each component has been in place.

Rate/100 component years

This is equivalent to the yearly revision rate expressed as a percent and is derived by dividing the number of prostheses revised by the observed component years multiplied by 100. It therefore allows for the number of years of post operative follow up in calculating the revision rate. These rates are usually very low and are more meaningfully recorded per 100 component years rather than per component year. Statisticians consider that this is a more accurate way of deriving a revision rate for comparison when analysing data with widely varying follow up times. It is also important to note the confidence intervals. The closer they are to the estimated revision rate/100 component years, the more precise the estimate is.

Statistical significance

Where it is stated that a difference among results is significant the p value is 0.05 or less. In most of these situations this is because there is no overlap of the confidence intervals (CIs) but sometimes significance can apply in the presence of CI overlap

All Primary Ankle Arthroplasties

No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
945.00	3984.6	53	1.33	1.00	1.74

Revision vs Prosthesis Type Sorted in Alphabetical Order

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Agility	119	1005.3	16	1.59	0.91	2.58
Box	4	9.1	0	0.00	0.00	40.47
Hintegra	5	2.5	0	0.00	0.00	149.71
Mobility	443	1590.2	22	1.38	0.87	2.09
Ramses	11	78.7	2	2.54	0.31	9.18
Salto	316	938.8	6	0.64	0.23	1.39
STAR	47	360.0	7	1.94	0.78	4.01

The Salto has a revision rate less than half of the overall revision rate but it is not yet statistically significant

Revision vs Gender

Gender	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Females	355.00	1551.2	19	1.22	0.74	1.91
Males	590.00	2433.4	34	1.40	0.97	1.95

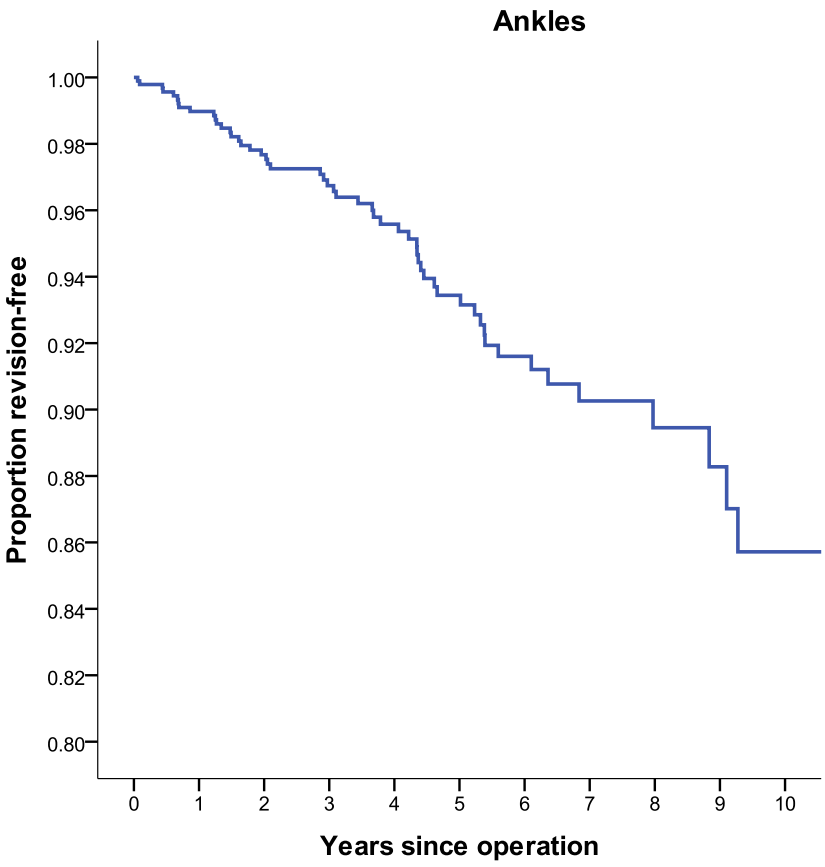
Revision vs Age Bands

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
LT55	105	489.4	10	2.04	0.98	3.76
55_64	329	1496.8	22	1.47	0.92	2.23
65_74	366	1496.4	19	1.27	0.76	1.98
GE74	145	502.0	2	0.40	0.05	1.44

Although the revision rate for >74 is 5x lower than for the < 55 age band it is not yet statistically significant.

KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the 11 years, 2000 to 2012 with deceased patients censored at time of death



Years	% Revision-free	N
1	99.00	820
2	97.70	699
3	96.70	565
4	95.60	439
5	93.20	323
6	91.60	240
7	90.30	177

There are insufficient numbers to give an accurate revision free % beyond 7 years.

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX MONTHS AND FIVE YEARS POST SURGERY

At six month post surgery patients are sent an outcome questionnaire. This is modelled on the Oxford 12 for the hip and is not validated.

The same scoring system has been adopted as recommended by the authors of the Oxford 12 hip questionnaire.

The scores range from 4 to 0. A score of 48 is the best, indicating normal function. A score of 0 is the worst, indicating the most severe disability.

We have grouped the questionnaire responses based on the scoring system published by Kalairajah et al, 2005 (appendix1)This groups each score into four categories;

Category 1	>41	excellent
Category 2	34 – 41	good
Category 3	27 – 33	fair
Category 4	< 27	poor

For the thirteen year period and as at July 2013, there were 721 primary ankle questionnaire responses registered at six months post surgery.

The mean primary ankle score was 33.46 (standard deviation 9.57, range 2 – 48

Scoring	> 41	173
Scoring	34 -41	235
Scoring	27 -33	139
Scoring	< 27	174

At six months post surgery, 57% had an excellent or good score.

Questionnaires at five years post surgery

All patients who had a six-month registered questionnaire, and who had not had revision surgery were sent a further questionnaire at five years post surgery.

At five years post surgery, 64% of 163 patients achieved an excellent or good score.

Analysis of the individual questions

Analysis of the individual questions showed that the main persisting concerns at 6 months pain were, having to use an orthotic insert Q4), limping (Q6), and swelling of the foot (Q10).

Percentage scoring 0 or 1 for each question (721) at six months.

		%
1	Moderate or severe pain from the operated ankle	22
2	Only able to walk around the house or unable to walk before the pain becomes severe	6
3	Extreme difficulty or impossible to walk on uneven ground	14
4	Most of the time or always have to use an orthotic	22
5	Pain greatly or totally interferes with usual work	16
6	Limping most or every day	34
7	Extreme difficulty or impossible to climb a flight of stairs	6
8	Pain from your ankle in bed most or every nights	6
9	Pain from your ankle greatly or totally interferes with usual recreational activities	22
10	Have swelling of your foot most or all of the time	30
11	Very painful or unbearable to stand up from a chair after a meal	6
12	Sudden severe pain from your ankle most or every day	5

Revision ankle questionnaire responses

There were 40 revision ankle responses with 35% achieving an excellent or good score. This group includes all revision ankle responses. The mean revision ankle score was 28.93 (standard deviation 11.10, range 8 – 48).

SHOULDER ARTHROPLASTY

PRIMARY SHOULDER ARTHROPLASTY

The **thirteen-**year report analyses data for the period January 2000 – December 2012. There were 4782 primary shoulder procedures registered, an additional 697 compared to last year's report and represents a 20% increase over 2011 registrations. This is the biggest annual increase to date.

2000	122
2001	162
2002	193
2003	225
2004	280
2005	293
2006	366
2007	400
2008	457
2009	514
2010	494
2011	579
2012	697

Of the 4,782 shoulder registrations, 1,460(31%) are hemi shoulder replacements, 1,898(40%) are conventional total shoulder replacements, 1,171(25%) are reverse shoulder replacements, 174(3.8%) are partial resurfacing shoulder replacements and 79(0.2%) are total resurfacing replacements.

Data Analysis

Age and sex distribution

The average age for all patients with a shoulder arthroplasty was 70.68 years, with a range of 15.63 – 99.36 years.

All shoulder arthroplasty

	Female	Male
Number	3060	1722
Percentage	63.99	36.01
Mean age	72.25	67.89
Maximum age	97.71	99.36
Minimum age	15.63	21.83
Standard dev.	9.95	10.56

Hemiarthroplasty

	Female	Male
Number	976	484
Percentage	66.85	33.15
Mean age	71.68	66.11
Maximum age	97.71	99.36
Minimum age	15.63	25.83
Standard dev.	10.971	2.22

Conventional total shoulder arthroplasty

	Female	Male
Number	1230	668
Percentage	64.81	35.19
Mean age	70.91	67.55
Maximum age	94.62	89.11
Minimum age	26.64	29.38
Standard dev.	8.91	8.38

Reverse shoulder arthroplasty

	Female	Male
Number	744	427
Percentage	63.54	35.46
Mean age	76.53	73.80
Maximum age	96.82	88.25
Minimum age	40.70	49.41
Standard dev.	7.52	7.28

Partial resurfacing arthroplasty

	Female	Male
Number	61	113
Percentage	35.06	64.94
Mean age	57.74	55.76
Maximum age	87.06	86.12
Minimum age	20.70	21.83
Standard dev.	15.22	11.61

Total resurfacing arthroplasty

	Female	Male
Number	49	30
Percentage	62.02	37.98
Mean age	70.11	65.88
Maximum age	85.71	80.55
Minimum age	53.18	45.16
Standard dev.	7.64	8.17

Previous operation

None	4057
Internal fixation forjuxtarticular fracture	120
Previous stabilisation	93
Osteotomy	3

Diagnosis

Osteoarthritis	2600
Cuff tear arthropathy	795
Acute fracture prox. humerus	513
Rheumatoid arthritis	424
Post old trauma	310
Avascular necrosis	152
Post recurrent dislocation	65
Other inflammatory	49

Approach

Deltopectoral	4234
Deltoid split	111
Other	14

Bone graft

Humeral autograft	88
Humeral allograft	17
Humeral synthetic	3
Glenoid autograft	38
Glenoid allograft	9

Cement

Humerus cemented	1325
Antibiotic in cement	799
Glenoid cemented	1301
Antibiotic in cement	891

Systemic antibiotic prophylaxis

Patient number receiving at least one ystemic antibiotic	4478 (94%)

Operating theatre

Conventional	2981
Laminar flow	1740
Space suits	781

ASA Class

This was introduced with the updated forms at the beginning of 2005.

For the eight year period 2005 – 2012 there were 3575 (94%) shoulder procedures with the ASA class recorded.

Definitions

ASA class 1: A healthy patient
ASA class 2: A patient with mild systemic disease
ASA class 3: A patient with severe systemic disease that limits activity but is not incapacitating
ASA class 4: A patient with an incapacitating disease that is a constant threat to life

ASA	Number	Percentage
1	329	9
2	1962	55
3	1247	35
4	37	1

Operative time (skin to skin in minutes)

	Mean	Min	Max	StDev
Hemi	109	30	360	38
Total Sh.	128	53	282	33
Partial R.	96	44	285	36
Total R.	128	83	220	27
Reverse	119	39	272	34

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised.

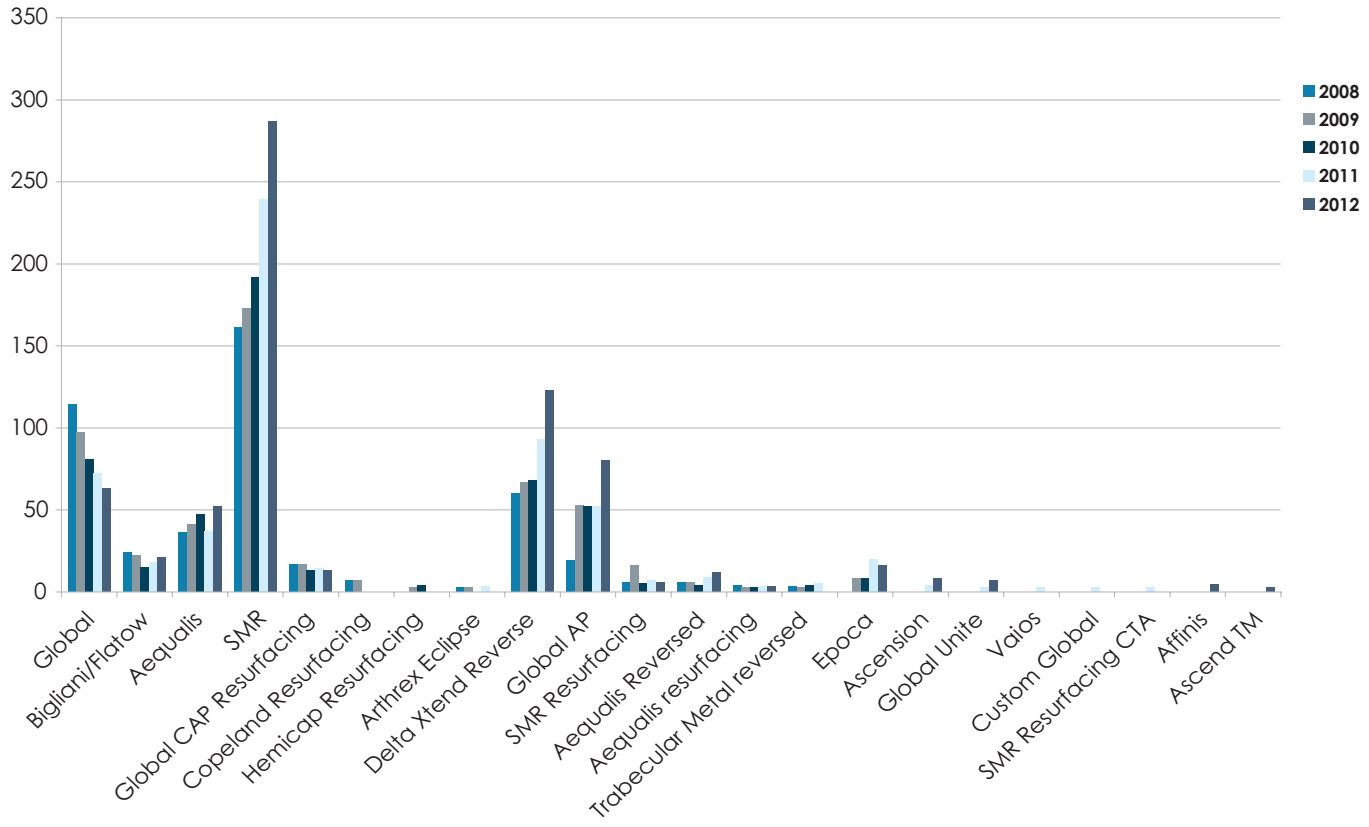
The following figures are for the eight year period 2005 – 2012.

Consultant	3626
Advanced trainee supervised	174
Advanced trainee unsupervised	10
Basic trainee	1

Top 10 shoulder prostheses 2012

SMR	287
Delta Xtend Reverse	123
Global AP	80
Global	63
Aequalis	52
Bigliani/Flatow	21
Epoca	16
Global CAP Resurfacing	13
Aequalis Reversed	12
Ascension	8

Most Used Shoulder Prostheses 2008 - 2012



Surgeon and Hospital Workload

Surgeons

In 2012, 75 surgeons performed 697 shoulder procedures, an average of 9 procedures per surgeon. 9 surgeons performed more than 20 procedures and 13 surgeons performed 1 procedure.

Hospitals

In 2012, shoulder replacement was performed in 49 hospitals. 25 were public and 24 were private.

For 2012 the average number of shoulder replacements per hospital was 14.

REVISION SHOULDER ARTHROPLASTY

Revision is defined by the Registry as a new operation in a previously replaced shoulder joint during which one or more of the components are exchanged, removed, manipulated or added. It includes excision, arthrodesis or amputation, but not soft tissue procedures. A two or more staged procedure is registered as one revision.

Data Analysis

For the thirteen year period January 2000 – December 2012, there were 360 revision shoulder procedures registered.

The average age for a shoulder revision was 67.78 years with a range of 24.05 – 89.68 years.

	Female	Male
Number	203	157
Percentage	56.39	43.61
Mean	69.28	65.85
Maximum age	89.68	88.46
Minimum age	33.20	24.05
Standard dev.	11.15	10.97

REVISION OF REGISTERED PRIMARY SHOULDER ARTHROPLASTIES

This section analyses data for revisions of primary shoulder procedures for the thirteen-year period.

There were 199 revisions of the primary group of 4,782 (4.16%). There were 20 procedures that had been revised twice and 3 that had been revised 3 times.

Time to revision

Mean	758 days
Maximum	3804 days
Minimum	0 days
Standard deviation	767 days

Reason for revision

Pain	53
Dislocation/instability anterior	40
Subacromial cuff impingement/tear	27
Loosening glenoid	23
Deep infection	16
Loosening humeral	7
Instability posterior	6
Subacromial tuberosity impingement.	3
Fracture humerus	2
Loosening both	1

Analysis by time for the 5 main reasons for revision

Reason for revision	Year	0	1	2	3	4	5	6	7	8	9	10	11	Totall
Loosening glenoid	Count	5	4	5	4	1	1	1	0	0	0	2	0	23
	%	21.7	17.4	21.7	17.4	4.3	4.3	4.3	0.0	0.0	0.0	8.7	0	
Dislocation	Count	23	4	6	2	1	1	2	0	0	1	0	0	40
	%	57.5	10.0	15.0	5.0	2.5	2.5	5.0	0.0	0.0	2.5	0.0	0	
Deep infection	Count	3	2	7	3	1	0	0	0	0	0	0	0	16
	%	18.8	12.5	43.8	18.8	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0	
Pain	Count	2	11	15	10	5	5	0	2	0	2	1	0	53
	%	3.8	20.8	28.3	18.9	9.4	9.4	0.0	3.8	0.0	3.8	1.9	0	
Subacromial Cuff impingement	Count	1	4	9	5	3	1	1	0	2	0	1	0	27
	%	3.7	14.8	33.3	18.5	11.1	3.7	3.7	0.0	7.4	0.0	3.7	0	

Statistical note

In the table below there are two statistical terms readers may not be familiar with.

Observed component years

This is the number of registered primary procedures multiplied by the number of years each component has been in place.

Rate/100 component years

This is equivalent to the yearly revision rate expressed as a percent and is derived by dividing the number of prostheses revised by the observed component years multiplied by 100. It therefore allows for the number of years of post operative follow up in calculating the revision rate. These rates are usually very low and hence more meaningfully recorded per 100 component years rather than per component year. Statisticians consider that this is a more accurate way of deriving a revision rate for comparison when analysing data with widely varying follow up times. It is also important to note the confidence intervals. The closer they are to the estimated revision rate/100 component years, the more precise the estimate is.

Statistical significance

Where it is stated that a difference among results is significant the p value is 0.05 or less. In most of these situations this is because there is no overlap of the confidence intervals (CIs) but sometimes significance can apply in the presence of CI overlap

All Total Shoulder Arthroplasties

No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
4782	20095	199	0.99	0.86	1.14

Revision rate of Shoulder Prostheses vs Arthroplasty Type

Operation Type	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Total	1898	8129.5	62	0.76	0.58	0.98
Reverse	1171	3358.8	37	1.10	0.78	1.52
Hemi	1460	7886.9	84	1.07	0.85	1.32
Resurfacing	79	145.0	0	0.00	0.00	2.54
Partial_Resurfacing	174	575.1	16	2.78	1.59	4.52

There is a significantly higher revision rate for Partial Resurfacing compared to the overall mean and all the other arthroplasty types.

Revision Rate of Individual Shoulder Prostheses Sorted on Alphabetical Order

Prosthesis		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Conventional Total	Aequalis	246	1031.7	9	0.87	0.40	1.66
	Affinis	2	5.5	0	0.00	0.00	66.93
	Anatomical	35	323.3	0	0.00	0.00	1.14
	Arthrex Eclipse	1	1.5	0	0.00	0.00	242.33
	Ascend TM	1	0.1	0	0.00	0.00	7091.39
	Bi-Angular	8	62.7	0	0.00	0.00	5.89
	Bigliani/Flatow	233	1447.0	3	0.21	0.04	0.61
	Cofield 2	21	188.6	0	0.00	0.00	1.96
	Delta Xtend Reverse	1	0.9	0	0.00	0.00	413.30
	Epoca Humeral stem	4	9.6	0	0.00	0.00	38.31
	Global	468	2276.2	8	0.35	0.15	0.69
	Global AP	211	411.4	1	0.24	0.01	1.35
	Humeral stem	1	0.3	0	0.00	0.00	1069.34
	Neer 3	2	22.4	0	0.00	0.00	16.46
	Neer II	12	122.3	0	0.00	0.00	3.02
	Osteonics humeral component	49	379.1	4	1.06	0.29	2.70
	SMR	598	1818.4	37	2.03	1.43	2.80
	Univers 3D	5	28.5	0	0.00	0.00	12.95

Prosthesis		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Reverse	Aequalis Reversed	35	93.3	0	0.00	0.00	3.95
	Aequalis Reversed Fracture	6	1.8	0	0.00	0.00	200.80
	Affinis	3	0.6	0	0.00	0.00	650.90
	Delta	55	362.4	2	0.55	0.07	1.99
	Delta Xtend Reverse	432	929.4	12	1.29	0.67	2.26
	SMR	630	1949.1	23	1.18	0.75	1.77
	Trabecular Metal Reverse	9	20.4	0	0.00	0.00	18.05
	Vaios	1	1.7	0	0.00	0.00	216.97
Hemi	Aequalis	123	616.9	6	0.97	0.36	2.12
	Aequalis Reversed	1	1.3	0	0.00	0.00	284.25
	Anatomical	19	181.5	0	0.00	0.00	2.03
	Arthrex Eclipse	2	8.2	0	0.00	0.00	44.97
	Ascend TM	1	0.6	0	0.00	0.00	644.67
	Bi-Angular	19	175.8	2	1.14	0.14	4.11
	Bigliani/Flatow	130	894.0	12	1.34	0.69	2.34
	Bio-modular	1	7.1	1	14.00	0.35	78.03
	Cofield 2	50	444.9	0	0.00	0.00	0.83
	Delta	1	6.3	0	0.00	0.00	58.76
	Delta Xtend Reverse	14	27.9	3	10.75	2.22	31.41
	Global	708	3953.7	38	0.96	0.68	1.32
	Global AP	45	90.5	1	1.11	0.03	6.16
	Global Unite	9	4.7	0	0.00	0.00	78.93
	MRS Humeral	4	12.9	0	0.00	0.00	28.50
	Neer II	24	186.6	0	0.00	0.00	1.98
	Osteonics humeral component	43	330.8	1	0.30	0.01	1.68
	Randelli	1	8.2	0	0.00	0.00	44.82
	SMR	263	927.9	20	2.16	1.32	3.33
	Trabecular Metal Reverse	1	3.2	0	0.00	0.00	114.09
	Univers 3D	1	3.8	0	0.00	0.00	96.59
Total Resurfacing	Aequalis Resurfacing Head	8	18.2	0	0.00	0.00	20.27
	Epoca Head	38	53.7	0	0.00	0.00	6.87
	Global CAP Resurfacing	31	69.8	0	0.00	0.00	5.29
	SMR Resurfacing	2	3.3	0	0.00	0.00	110.99

Prosthesis		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Partial resurfacing	Aequalis Resurfacing Head	1	1.8	0	0.00	0.00	203.22
	Arthrex Eclipse	3	5.9	2	33.71	4.08	121.77
	Ascension	12	9.2	0	0.00	0.00	40.23
	Copeland Resurfacing	19	75.4	2	2.65	0.32	9.58
	Custom Global Cap	1	1.4	0	0.00	0.00	261.12
	Epoca Head	10	16.1	1	6.19	0.16	34.50
	Global CAP Resurfacing	81	336.8	6	1.78	0.65	3.88
	Global Humeral Head	1	0.2	0	0.00	0.00	1548.69
	Hemicap Resurfacing	6	22.9	0	0.00	0.00	16.08
	SMR Resurfacing	34	88.3	3	3.40	0.70	9.92
	SMR Resurfacing CTA	6	16.9	2	11.82	1.43	42.69

There are widely varying revision rates most of which do not reach Statistical significance except for the SMR which has a significantly higher revision rate for the conventional, hemi and partial resurfacing(SMR CTA) versions, the Delta Xtend Reverse for the hemi version, the Bigliani for the hemi version and the Arthrex Eclipse for partial resurfacing.

The SMR conventional total prosthesis analyses includes L2 glenoid data and as was noted in the 13 year report it has been withdrawn from the market.

Revision vs Glenoid Fixation

	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Cemented	1258	6127.63	27	0.44	0.29	0.64
Uncemented	640	2001.83	35	1.75	1.22	2.43

The uncemented glenoids have a significantly higher revision rate. However the fact that a glenoid component had been entered as revised does not necessarily mean it had failed or had to be replaced.

Revision vs Age Bands

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
LT55	330	1581.9	32	2.02	1.38	2.86
55_64	908	3945.5	57	1.44	1.09	1.87
65_74	1747	7478.6	69	0.92	0.72	1.17
GE75	1797	7089.3	41	0.58	0.42	0.78

The <55 age band has a significantly increased revision rate compared to the 65-74 and >75 age bands.

Revision vs Prosthesis Group vs Age Bands

Prosthesis	Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Conventional Total	LT55	91	412.61	10	2.42	1.16	4.46
	55_64	436	1762.03	18	1.02	0.61	1.61
	65_74	829	3585.57	24	0.67	0.43	1.00
	GE75	542	2369.22	10	0.42	0.20	0.78
Reverse	LT55	8	20.04	2	9.98	1.21	36.04
	55_64	112	347.51	6	1.73	0.63	3.76
	65_74	387	1121.88	15	1.34	0.75	2.21
	GE75	664	1869.35	14	0.75	0.41	1.26
Hemi	LT55	155	900.77	13	1.44	0.77	2.47
	55_64	282	1599.04	30	1.88	1.27	2.68
	65_74	460	2598.57	24	0.92	0.59	1.37
	GE75	563	2788.50	17	0.61	0.36	0.98
Resurfacing	LT55	3	6.60	0	0.00	0.00	55.84
	55_64	23	48.16	0	0.00	0.00	7.66
	65_74	37	58.19	0	0.00	0.00	6.34
	GE75	16	32.07	0	0.00	0.00	11.50
Partial_resurfacing	LT55	73	241.85	7	2.89	1.16	5.96
	55_64	55	188.70	3	1.59	0.33	4.65
	65_74	34	114.41	6	5.24	1.92	11.41
	GE75	12	30.09	0	0.00	0.00	12.26

Revision vs Gender

Gender	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
F	3060	13087.5	115	0.88	0.73	1.05
M	1722	7007.7	84	1.20	0.96	1.48

There is no significant difference between the two groups.

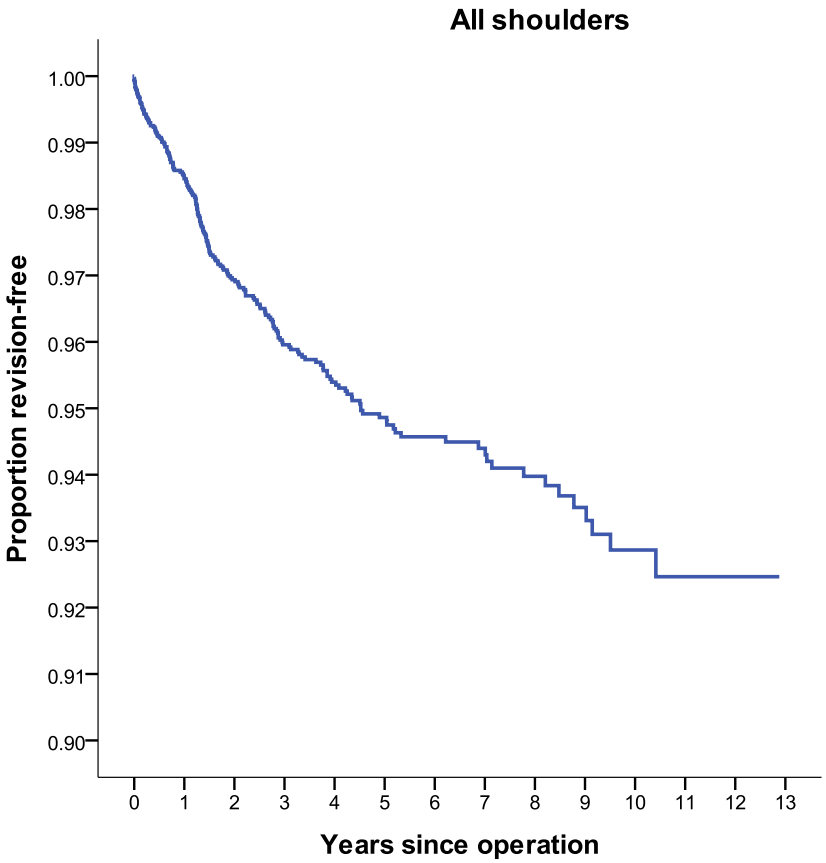
Revision vs Surgeon Annual Workload

Consultant Number of ops/yr	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<10	2187	9213.0	103	1.12	0.91	1.36
>=10	2550	10653.2	94	0.88	0.71	1.08

There is no significant difference between the two groups.

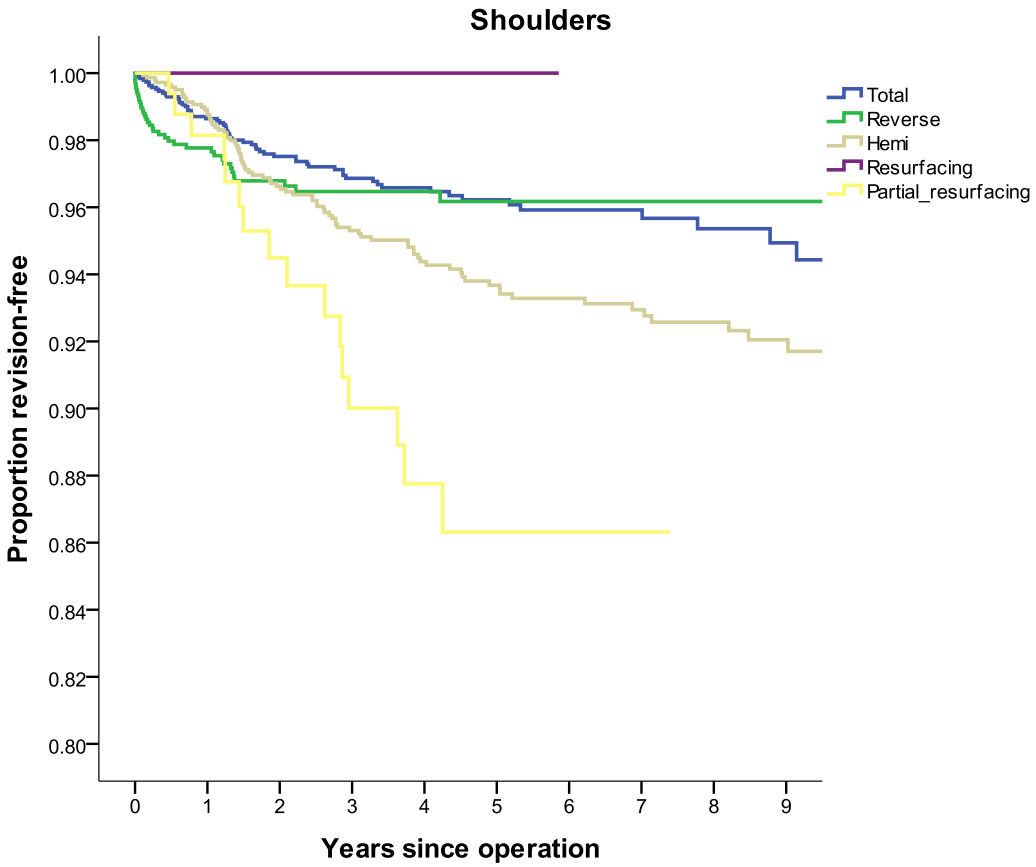
KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the years 2000 – 2012 with deceased patients censored at time of death.



Years	% Revision-free	N
1	98.05	3963
2	96.70	3280
3	95.89	2719
4	95.26	2161
5	94.63	1695
6	94.49	1286
7	94.09	963
8	93.82	714
9	93.08	476

There are insufficient numbers to give an accurate revision free % beyond 9 years.



PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX MONTHS AND FIVE YEARS POST SURGERY

Questionnaires at six months post surgery

At six months post surgery patients are sent the Oxford12 questionnaire.

The new scoring system has been adopted as recommended by the original authors.

The scores now range from 4 to 0. A score of 48 is the best, indicating normal function. A score of 0 is the worst, indicating the most severe disability.

We have grouped the questionnaire responses based on the scoring system as published by Kalairajah et al, in 2005. (see appendix 1)

This groups each score into four categories;

Category 1	>41	excellent
Category 2	34 – 41	good
Category 3	27 – 33	fair
Category 4	< 27	poor

For the thirteen-year period and as at July 2013, there were 3,240 shoulder questionnaire responses registered at six months post surgery.

The mean shoulder score was 36.16 (standard deviation 9.66, range 2 – 48)

Scoring > 41	1178
Scoring 34 - 41	1010
Scoring 27 - 33	502
Scoring <27	550

At six months post surgery, 68% had an excellent or good score.

6 Month Oxford Scores for the Different Arthroplasty Types

Operation types	No of patients	Mean Score	Std. Error	Lower Bound	Upper Bound
Conventional Total	1382	39.61	0.219	39.18	40.04
Reverse	806	35	0.34	34.34	35.67
Hemi	902	31.68	0.333	31.03	32.34
Total Resurfacing	62	40.66	0.702	39.26	42.07
Partial_Resurfacing	88	35.18	0.959	33.28	37.09
Total	**3240**	**36.16**	**0.17**	**35.82**	**36.49**

Conventional Total and Resurfacing total shoulder arthroplasties have significantly higher (better) 6 month scores.

Questionnaires at five year's post surgery

All patients who had a six month registered questionnaire, and who had not had revision surgery were sent a further questionnaire at five year post surgery.

This dataset represents sequential Oxford shoulder scores for 820 individual patients.

At five years post surgery, 76% of these patients achieved an excellent or good score and had a mean of 39.03.

Analysis of the individual questions

Analysis of the individual questions showed that there were persisting concerns with pain, brushing hair (Q7) and hanging clothes in a wardrobe Q9).

Percentage scoring 0 or 1 for each question out of the group of 3,240 at six months and 820 at five years.

		6mth	5yr
1	The worst pain from the shoulder is severe or unbearable	17	11
2	Usually have moderate or severe pain from the operated shoulder	20	12
3	Extreme difficulty or impossible to get in and out of a car or public transport	3	2
4	Extreme difficulty or impossible to use a knife and fork at the same time	4	2
5	Extreme difficulty or impossible to do the household shopping on your own	7	6
6	Extreme difficulty or impossible to carry a tray containing a plate of food across a room	8	6
7	Extreme difficulty or impossible to brush or comb hair with the operated arm	17	12
8	Extreme difficulty or impossible to dress yourself because of your operated shoulder	7	4
9	Extreme difficulty or impossible to hang clothes in a wardrobe using operated arm	16	12
10	Extreme difficulty or impossible to wash and dry under both arms	9	5
11	Pain from operated shoulder greatly or totally interfering with usual work	13	10
12	Pain from shoulder in bed most or every nights	15	10

Revision shoulder questionnaire responses

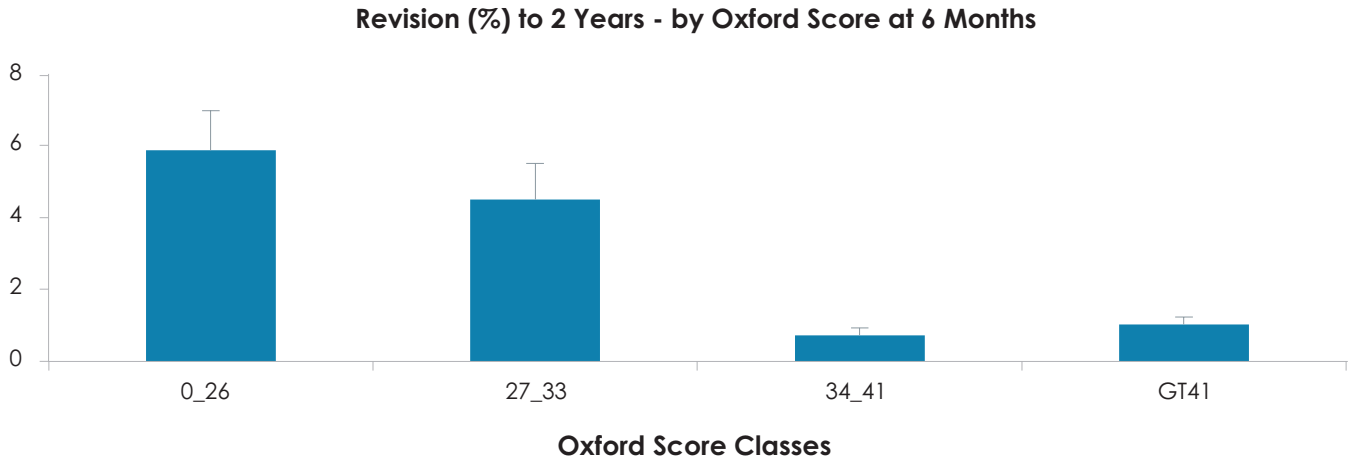
There were 197 revision shoulder responses with 49% achieving an excellent or good score. This group includes all revision shoulder responses. The mean revision shoulder score was 31.24 (standard deviation 10.42, range 3 – 48).

OXFORD 12 SCORE AS A PREDICTOR OF SHOULDER ARTHROPLASTY REVISION

A statistically significant relationship has been confirmed between the Oxford scores at 6 months and arthroplasty revision within two years of the Oxford 12 questionnaire date.

Six month score and revision arthroplasty

By plotting the patients six month scores in the Kalairajah groupings, against the proportion of shoulders revised for that same group it demonstrates that there is an incremental increase in risk during the next 2 years related to the Oxford score. A patient with a score below 27 has 9 times the risk of a revision within 2 years compared to a person with a score 34-41

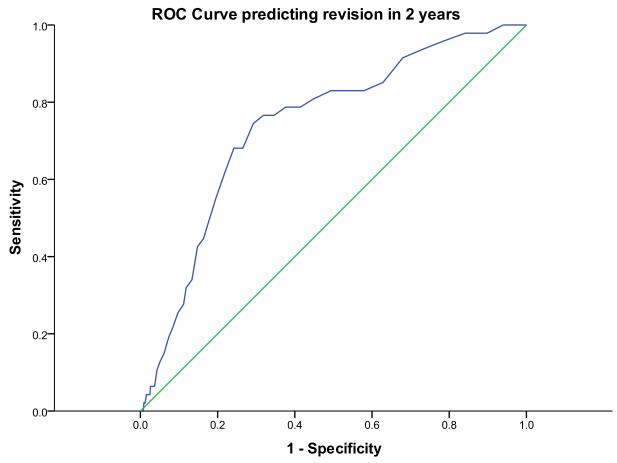


Revision risk versus Kalairajah groupings of Oxford scores within two years of the 6 month score date

Kalairajah group	No in group	No. revised	%	Std error
0-26	366	21	5.74	1.22
27-33	342	15	4.39	1.11
34-41	658	4	0.61	0.30
GT 41	791	7	0.88	0.33

A person with an Oxford score >42 has a 0.88 % risk of revision within two years compared to a 5.74% risk with a score of 27 or less

A ROC analysis has demonstrated that a patient with a score less than or equal to 33 has 7 times the risk of needing a revision within 2 years compared to a person with a score greater than 33.



A receiver operating characteristic (ROC) curve is a graphical representation of the trade off between the false negative and false positive rates for every possible cut off. Equivalently, the ROC curve is the representation of the trade offs between sensitivity and specificity. The more the curve climbs towards the upper left corner the better the reliability of the test.

ELBOW ARTHROPLASTY

PRIMARY ELBOW ARTHROPLASTY

The thirteen-year report analyses data for the period January 2000 – December 2012. There were 386 primary elbow procedures registered, an additional 23 compared to last year's report but a 30% reduction compared to 2011 and the lowest annual increase since 2003.

2000	17
2001	29
2002	32
2003	23
2004	28
2005	30
2006	31
2007	36
2008	40
2009	34
2010	30
2011	33
2012	23

Data Analysis

Age and sex distribution

The average age for an elbow replacement was 66.03 years, with range of 15.16 – 92.41 years.

	Female	Male
Number	302	84
Percentage	78.24	21.76
Mean age	66.46	64.50
Maximum age	92.41	91.73
Minimum age	36.38	15.16
Standard dev.	11.85	13.73

Previous operation

None	329
Internal fixation for juxtarticular fracture	17
Synovectomy+-removal radial head	12
Debridement	9
Osteotomy	2
Ligament reconstruction	1
Interposition arthroplasty	1

Diagnosis

Rheumatoid arthritis	218
Post fracture	106
Osteoarthritis	47
Other inflammatory	7
Post dislocation	5
Post ligament disruption	4

Approach

Posterior	240
Medial	79
Lateral	27

Bone graft

Humeral autograft	28
Humeral allograft	3
Humeral synthetic	1
Ulnar autograft	2

Cement

Humerus cemented	362	
Antibiotic in cement	260	(72%)
Ulna cemented	341	
Antibiotic in cement	241	(71%)
Radius cemented	21	
Antibiotic in cement	20	(95%)

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	359	(93%)

Operating theatre

Conventional	267
Laminar flow	116
Space suits	56

ASA Class

This was introduced with the updated forms at the beginning of 2005.

For the eight-year period 2005 – 2012, there were 235 (91%) primary elbow procedures with the ASA class recorded.

Definitions

ASA class 1:	A healthy patient
ASA class 2:	A patient with mild systemic disease
ASA class 3:	A patient with severe systemic disease that limits activity but is not incapacitating
ASA class 4:	A patient with an incapacitating disease that is a constant threat to life

ASA	Number
1	8
2	108
3	1114
4	5

Operative time (skin to skin)

Mean	138 minutes
Maximum	255 minutes
Minimum	29 minutes
Standard dev	34 minutes

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised.

The following figures are for the eight- year period 2005 – 2012.

Consultant	252
Advanced trainee supervised	6
Advanced trainee unsupervised	3

Surgeon and hospital workload

In 2012, 13 surgeons performed 23 primary elbow procedures.

Hospitals

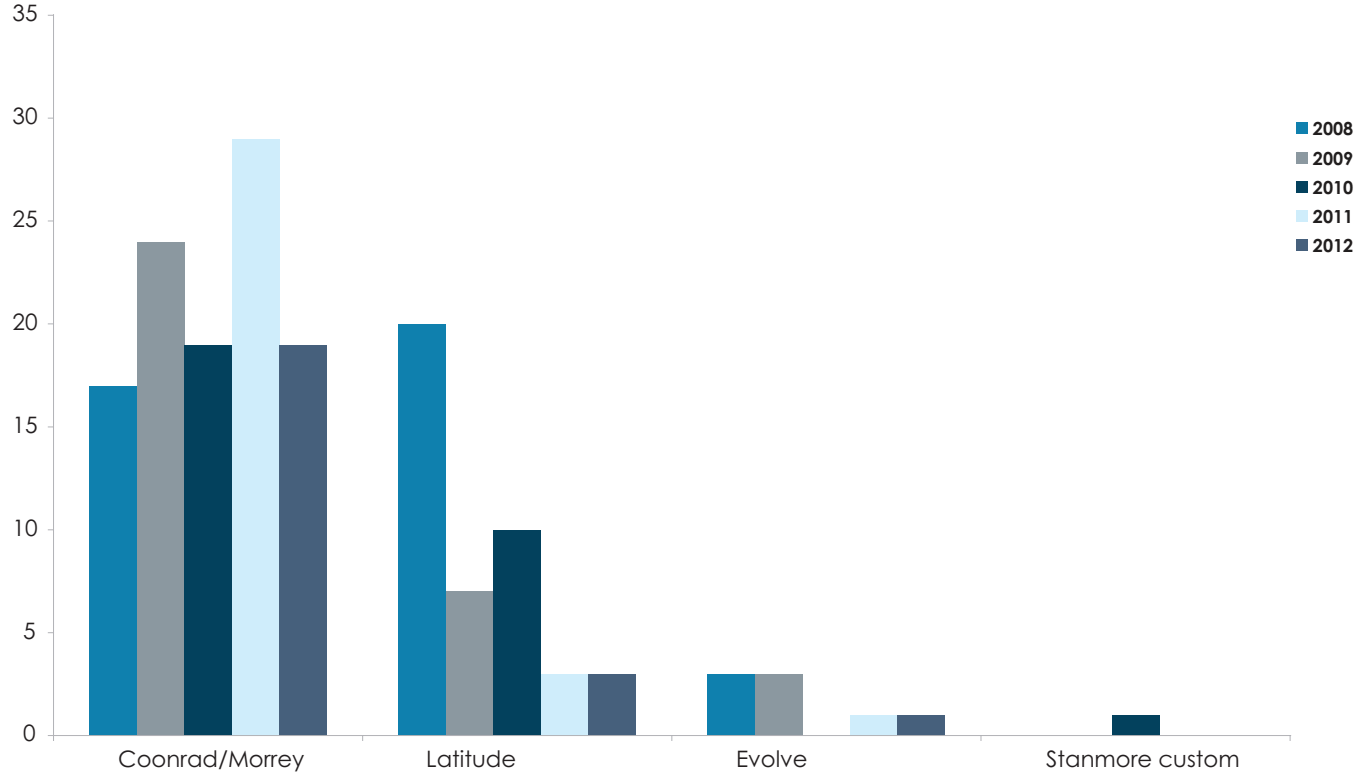
In 2012, primary elbow replacement was performed in 13 hospitals. 11 were public and 2 were private.

Prosthesis usage

Elbow prostheses used in 2012

Coonrad/Morrey	19
Latitude	3
Evolve	1

Most Used Elbow Prostheses 2008 - 2012



REVISION ELBOW ARTHROPLASTY

Revision is defined by the Registry as a new operation in a previously replaced elbow joint during which one or more of the components are exchanged, removed, manipulated or added. It includes arthrodesis or amputation, but not soft tissue procedures. A two or more staged procedure is registered as one revision.

Data Analysis

For the thirteen-year period January 2000 – December 2012, there were 67 revision elbow procedures registered. This is an additional 3 compared to last year's report.

The average age for a revision elbow replacement was 65.03 years, with a range of 30.97 – 88.95 years.

	Female	Male
Number	48	19
Percentage	71.64	28.36
Mean	64.83	65.54
Maximum age	88.95	84.17
Minimum age	42.23	30.97
Standard dev.	9.26	12.56

REVISION OF REGISTERED PRIMARY ELBOW ARTHROPLASTIES

This section analyses data for revisions of primary elbow procedures for the thirteen-year period January 2000 – December 2012.

There were 22 revisions of the primary group of 386 (5.8%).

There were 3 that had been revised twice and 1 that had been revised 3 times.

Time to revision

Mean	1076 days
Maximum	3912 days
Minimum	62 days
Standard deviation	951days

Reason for revision

Loosening humeral component	7
Loosening ulnar component	5
Deep infection	6
Pain	3
Loosening radial head component	2
Fracture humerus	1
Fracture ulna	1

Analysis by time for the 3 main reasons for revision

Reason for revision	Year	0	1	2	3	4	5	6	7	8	9	10	11	Total
Loosening humeral	Count	0	0	2	2	2	0	0	0	0	0	0	1	7
	%	0.00	0.00	28.60	28.60	28.60	0.00	0.00	0.00	0.00	0.00	0.00	14.30	100.00
Loosening Ulna	Count	0	0	0	3	1	0	0	0	0	0	0	1	5
	%	0.00	0.00	0.00	60.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	100.00
Deep Infection	Count	0	0	3	1	0	0	0	1	0	1	0	0	6
	%	0.00	0.00	50.00	16.70	0.00	0.00	0.00	16.70	0.00	16.70	0.00	0	100.00

Statistical note

In the table below there are two statistical terms readers may not be familiar with.

Observed component years

This is the number of registered primary procedures multiplied by the number of years each component has been in place.

Rate/100 component years

This is equivalent to the yearly revision rate expressed as a percent and is derived by dividing the number of prostheses revised by the observed component years multiplied by 100. It therefore allows for the number of years of post operative follow up in calculating the revision rate. These rates are usually very low, hence more meaningfully recorded per 100 component years rather than per component year. Statisticians consider that this is a more accurate way of deriving a revision rate for comparison when analysing data with widely varying follow up times. It is also important to note the confidence intervals. The closer they are to the estimated revision rate/100 component years, the more precise the estimate is.

Statistical significance

Where it is stated that a difference among results is significant the p value is 0.05 or less. In most of these situations this is because there is no overlap of the confidence intervals (CIs) but sometimes significance can apply in the presence of CI overlap.

All Primary Total Elbow Replacements

No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
386	1970.0	22	1.12	0.70	1.69

Revision Rate of Individual Prostheses Sorted in Alphabetic Order

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Acclaim	16	105.4	4	3.80	1.03	9.72
Coonrad/Morrey	277	1472.7	9	0.61	0.28	1.16
Evolve Stem	8	25.4	0	0.00	0.00	14.54
Kudo	18	122.3	3	2.45	0.00	7.17
Latitude	65	235.0	6	2.55	0.94	5.56
Sorbie Questor	1	6.8	0	0.00	0.00	54.09
Stanmore custom implant	1	2.4	0	0.00	0.00	151.56

Although not statistically significant the Coonrad Morrey has a much lower revision rate than most of the other prostheses.

Revision vs Gender

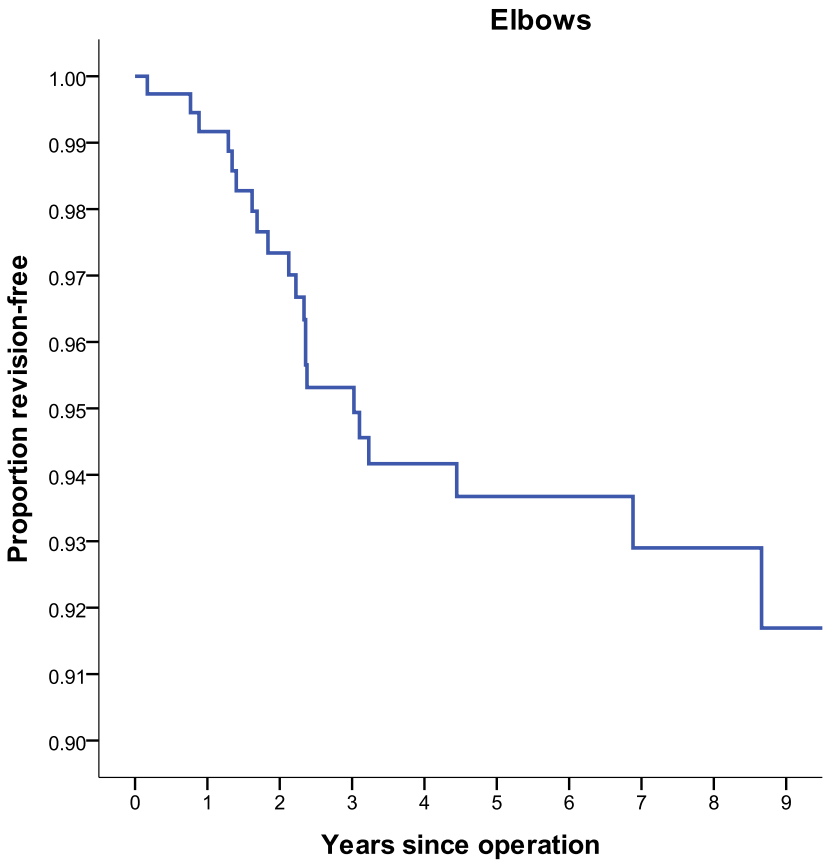
Gender	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Females	302	1629.2	14	0.86	0.47	1.44
Males	84	340.8	8	2.35	1.01	4.63

Revision vs Age Bands

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
LT55	72	417.7	4	0.96	0.26	2.45
55_64	107	575.8	8	1.39	0.60	2.74
65_74	108	515.0	8	1.55	0.67	3.06
GE75	99	461.5	2	0.43	0.05	1.57

KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses for the years 2000 to 2012 with deceased patients censored at time of death.



Years	% Revision-free	N
1	99.20%	345
2	97.30%	299
3	94.90%	253

There are insufficient numbers to give an accurate revision free % beyond 3 years.

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX-MONTHS POST SURGERY

Questionnaires at six months post surgery

At six month post surgery patients are sent an outcome questionnaire. This is modelled on the Oxford 12 for the hip and is not validated.

The same scoring system has been adopted as recommended by the authors of the Oxford 12 hip questionnaire.

The scores range from 4 to 0. A score of 48 is the best, indicating normal function. A score of 0 is the worst, indicating the most severe disability.

We have grouped the questionnaire responses based on the scoring system published by Kalairajah et al, 2005 (appendix1)

This groups each score into four categories:

Category 1	>41	excellent
Category 2	34 – 41	good
Category 3	27 – 33	fair
Category 4	< 27	poor

For the thirteen-year period and as at July 2013, there were 270 primary elbow responses registered at six months post surgery.

The mean primary elbow score was 37.17 (standard deviation 9.80, range 7 – 48)

Scoring	> 41	123
Scoring	34 - 41	66
Scoring	27 - 33	37
Scoring	<27	44

At six months post surgery, 70% had an excellent or good score.

Questionnaires at five-years post surgery

All patients who had a six-month registered questionnaire, and who had not had revision surgery were sent a further questionnaire at five years post surgery.

At five years post surgery, 89% of 55 achieved an excellent or good score.

Analysis of the individual questions

Analysis of the individual questions showed that significant percentages of patients scored poorly for over half the questions.

Percentage scoring 0 or 1 for each question at six months out of 270 responses.

		6mth
1	The worst pain from the elbow is severe or unbearable	11
2	Extreme difficulty or impossible to dress yourself because of your operated elbow	6
3	Extreme difficulty or impossible to lift a teacup safely with your operated arm	7
4	Extreme difficulty or impossible to get your hand to your mouth	4
5	Extreme difficulty or impossible to carry the household shopping with your operated arm	6
	17	6
6	Extreme difficulty or impossible to carry a tray containing a plate of food across a room	13
7	Extreme difficulty or impossible to brush or comb hair with the affected arm	14
8	Usually have moderate or severe pain from the operated elbow	13
9	Extreme difficulty or impossible to hang clothes in a wardrobe using operated arm	9
10	Extreme difficulty or impossible to wash and dry under both arms	10
11	Pain from operated elbow greatly or totally interfering with usual work or hobbies	13
12	Pain from elbow in bed most or every nights	7

Revision shoulder questionnaire responses

There were 32 revision elbow responses with 63% achieving an excellent or good score. This group includes all revision elbow responses. The mean revision elbow score was 35.91 (standard deviation 8.42, range 16 – 48).

LUMBAR DISC REPLACEMENT

PRIMARY LUMBAR DISC REPLACEMENT

This report analyses data for the **eleven**-year period January 2002 – December 2012. There were 142 primary lumbar disc replacements registered to 10 surgeons.

2002	1
2003	3
2004	18
2005	16
2006	21
2007	16
2008	19
2009	17
2010	18
2011	11
2012	2

Data Analysis

The average age for a lumbar disc replacement was 40.21 years, with a range of 24.07 – 62.19 years.

	Female	Male
Number	69	73
Percentage	48.59	51.41
Mean age	40.27	40.16
Maximum age	62.19	60.71
Minimum age	24.07	27.19
Standard dev.	8.69	7.44

Disc replacement levels

L3/4	19
L4/5	100
L5/S1	31

Fusion levels

L3/4	2
L4/5	11
L5/S1	51

Previous operation

Discectomy	27
L3/4	0
L4/5	13
L5/S1	16
Fusion	10
ALIF	1
L3/4	0
L4/5	4
L5/S1	11

Diagnosis

Degenerative disc disease

L3/4	11
L4/5	59
L5/S1	78
Other	3

Annular tear MRI scan

L3/4	13
L4/5	66
L5/S1	26
Other	1

Discogenic pain on discography

L3/4	19
L4/5	83
L5/S1	63
Other	1

Approach

Retroperitoneal midline	130
Retroperitoneal lateral	2
Transperitoneal	2
Other- mini open horizontal	1

Intraoperative complications

Damage to major veins	12
Subsidence	1

Systemic antibiotic prophylaxis

Patient number receiving systemic antibiotic prophylaxis	114

Operating theatre

Conventional	81
Laminar flow	60
Spacesuits	2

Operative time (skin to skin)

Mean	139 minutes
Standard deviation	43 minutes
Minimum	49 minutes
Maximum	276 minutes

Surgeon grade

Consultant	142

REVISION OF REGISTERED PRIMARY LUMBAR DISC REPLACEMENTS

This section analyses data for revisions of primary lumbar disc replacements for the **eleven**-year period.

The figures are the same as last three years. There have been no further revisions or re- revisions registered.

There were 2 revisions of the primary group of 142 lumbar disc replacements (1.4%) and 1 re-revision.

Time to revision

Mean	457 days
Maximum	672 days
Minimum	242 days

Reason for revision

Pain	2
Loss of spinal alignment	1

Oswestry Disability Index

There are 10 sections. For each section, the total score is 5: if the first statement is marked the score = 0; if the last statement is marked, the score = 5. Intervening statements are scored according to rank.

If more than one box is marked in each section, take the highest score.

If all 10 sections are completed, the score is calculated as follows:

Example:
16 (total scored)/50(total possible score) x 100 = 32%

Pre operative scores

Modified Roland and Morris	n = 117
Mean	15
Maximum	66
Minimum	1
Standard deviation	7
Oswestry Disability Index	n = 44
Mean	57
Maximum	82
Minimum	30
Standard deviation	13

Post operative score

Oswestry Disability Index	n =24
Mean	23
Maximum	58
Minimum	0
Standard deviation	17

CERVICAL DISC REPLACEMENT

This report analyses data for the **nine**-year period January 2004 – December 2012. There were 199 primary cervical disc replacements registered to 17 surgeons.

2004	1
2005	13
2006	14
2007	13
2008	25
2009	32
2010	24
2011	46
2012	31

Data Analysis

The average age for a cervical disc replacement was 44.21 years, with a range of 24.92 – 65.76 years.

	Female	Male
Number	86	113
Percentage	43.22	56.78
Mean age	45.37	43.32
Maximum age	65.76	59.35
Minimum age	27.73	24.92
Standard dev.	7.82	7.39

Disc replacement levels

C3/4	9
C4/5	16
C5/6	111
C6/7	90
C7T1	1
Other	1

Previous operation

Foraminotomy	7
Adjacent level fusion	15
Adjacent level disc arthroplasty	1
Discectomy	3
Other	3

Diagnosis

Acute disc prolapse	145
Chronic spondylosis	15
Neck pain	9
Degenerative disc disease	14
Myelopathy	3
Other	6

Approach

Anterior right	137
Anterior left	20
Smith Robinson	1

Intra operative complications

Equipment failure	1
Removal of implant	1
Tear jugular vein	1

Systemic antibiotic prophylaxis

Patient number receiving systemic antibiotic prophylaxis	147

Operating theatre

Laminar flow	98
Conventional	99
Spacesuits	1

Operative time (skin to skin)

Mean	127 minutes
Standard deviation	55 minutes
Minimum	36 minutes
Maximum	302 minutes

Surgeon grade

Consultant	199

Revision Cervical disc replacement

There was 1 revision cervical disc replacement registered.

There were no revisions of the 199 primary cervical disc replacements.

Neck Disability Index Scoring

There are 10 sections. For each section, the total score is 5: if the first statement is marked the score = 0; if the last statement is marked, the score = 5. Intervening statements are scored according to rank.

If more than one box is marked in each section, take the highest score.

If all 10 sections are completed, the score is calculated as follows:

Example:
16 (total scored)/50(total possible score) x 100 = 32%

If one section is missed (or not applicable) the score is calculated:

Example:
16 (total scored)/45(total possible score) x 100 = 35.5%

0 is the best score and 100 is the worst score.

Pre operative score

Neck Disability Index	n = 97
Mean	46
Maximum	92
Minimum	2
Standard deviation	19

Post operative score

Neck Disability Index	n = 96
Mean	23
Maximum	72
Minimum	0
Standard deviation	19

APPENDIX 1 - OXFORD 12 QUESTIONNAIRE REFERENCES

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PROSTHESIS INVENTORY HIPS		
	Femoral Components	**Acetabular Components**
DE PUY	Elite Plus	Charnley
	Summit	Duraloc
	Charnley	Pinnacle
	Corail	
	C-Stem	
	Trilock	
	Proxima	
	Silent	
	S-Rom	
	ASR	
STRYKER	Accolade	Trident
	Exeter V40	Exeter
	ABGII	Contemporary
	Securfit	Tritanium
	TM Stem	
	ML Taper Stem	
	Avenir Muller	
	TM Modular	
	TM Revision	
ZIMMER		
	CLS	CLS
	CPT	Fitek
	MS30	Fitmore
	Versys	Morscher
	Muller	ZCA
	Duron	Osteolock
		Trilogy
		Continuum

SMITH & NEPHEW	Spectron	Reflection cemented
	Basis	Polar cup cemented
	CPCS	
	Synergy Porous	BHR porous
	BHR resurfacing	R3 porous
	Anthology Porous	Reflection porous
	Emperion Porous	Polar Cup uncemented
	SL Plus	EP Fit uncemented
	Echelon Porous	
	Polar Stem	
MATHY'S	Twinsys	RM
	CBC	Selexys
	CCA	CCB
BIOMET	Bi-Metric	Exceed Ringloc X Exceed ABT

KNEES		
BIOMET	AGC	
	Maxim	
	Vanguard	
De Puy	LCS	
	PFC Sigma	
	LCS PFJ	
	S-Rom – Noiles	
Global Orthopaedics	MBK	
Smith & Nephew	Genesis II	
	Genesis II Oxinium	
	Journey	
	Legion	
STRYKER	Duracon	
	Scorpio	
	Triathlon	
	Avon Patello	
ZIMMER	Insall Burstein	
	Nexgen	
ORTHOTEC	Optetrak	
	Themis	
ADVANCED SURGICAL TECHNOLOGIES	Advance	
MATHYS	Balansys	

UNI COMPARTMENTAL KNEES		
BIOMET	Oxford Cemented Oxford Cementless	
	Repicci II	
Zimmer	Miller/Galante	
	Zimmer Uni	
De Puy	Preservation	
	Sigma Partial	
Smith & Nephew	Genesis	
	Oxinium	
STRYKER	EIUS Uni	

SHOULDERS		
DEPUY	Global	
	Delta	
Orthotec	SMR	
Surgico	Hemicap Resurfacing	
REM Systems	Aequalis	
Zimmer	Bigliani/Flatow	
	Neer	
Biomet	Copeland Resurfacing	
	Comprehensive primary Comprehensive reverse	
Smith & Nephew		

ANKLES		
DEPUY	Agility	
	Mobility	
Orthotec	Ramses	
REM Systems	Salto	
Surgico	SBI Star	

ELBOWS		
ZIMMER	Coonrad/Morrey	
DEPUY	Acclaim	
Biomet	Kudo Discovery Elbow	
REM Systems	Latitude	

DO NOT PLACE IN PATIENT NOTES TO BE RETAINED IN THEATRE SUITE

NEW ZEALAND JOINT REGISTRY
Primary Replacement Hip
Free Phone 0800-274-989 **Total Hip Arthroplasty ❑** **Resurfacing Arthroplasty ❑**
31.05.2010

.....

Patient Name:

Address:

Consultant: .....

[If different from patient label]

Side:..... **

Hospital: .....

Town/City

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT

- ❑ None
- ❑ Internal fixation for juxtarticular fractures
- ❑ Osteotomy
- ❑ Arthrodesis
- ❑ Other: .....

DIAGNOSIS

- ❑ Osteoarthritis
- ❑ Rheumatoid arthritis
- ❑ Other inflammatory
- ❑ Acute fracture NOF
- ❑ Developmental dysplasia/dislocation
- ❑ Old fracture NOF
- ❑ Post acute dislocation
- ❑ Avascular necrosis
- ❑ Tumour
- ❑ Other: Name: .....

APPROACH ❑ **Image guided surgery** ❑ **Minimally invasive surgery**

❑ **Anterior** ❑ **Posterior** ❑ **Lateral** ❑ **Trochanteric osteotomy**

FEMUR

Please do not fold

ACETABULUM

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - FEMUR

- ❑ Allograft
- ❑ Autograft
- ❑ Synthetic

BONE GRAFT - ACETABULUM

- ❑ Allograft
- ❑ Autograft
- ❑ Synthetic

FEMORAL HEAD

Please do not fold

AUGMENTS

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

❑ **Femur** ❑ **Acetabulum** ❑ **Antibiotic brand:**
.....

❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

Name: .....ASA Class: 1 2 3 4 (please circle one)

OPERATING THEATRE

❑ **Conventional** ❑ **Laminar flow or similar** ❑ **Space suits**

SKIN TO SKIN TIME *mins* **Start skin.....** **Finish skin.....**

PRIMARY OPERATING SURGEON

❑ **Consultant** ❑ **Adv Trainee Unsupervised** ❑ **Adv Trainee Supervised** **Year.....** ❑ **Basic Trainee**

*****NB*** ***If bilateral procedure two completed forms are required***

DO NOT PLACE IN PATIENT NOTES **TO BE RETAINED IN THEATRE SUITE**

NEW ZEALAND JOINT REGISTRY
Revision Elbow Joint

Free Phone 0800-274-989 **07.04.2005**

.....

Side:..... **

Patient Name:

Address:

Consultant: .....
[If different from patient label]
Hospital: .....
Town/City: .....

Tick Appropriate Boxes

REASON FOR REVISION

- ❑ **Loosening humeral component**
- ❑ **Loosening ulnar component**
- ❑ **Loosening radial head component**
- ❑ **Pain**
- ❑ **Deep infection**
- ❑ **Fracture humerus**
- ❑ **Fracture ulna**
- ❑ **Dislocations**
- ❑ **Other Name: .....**

Date Index Operation: ..... **If re-revision - Date previous revision: .....**

REVISION

- ❑ **Change of humeral component**
- ❑ **Change of ulnar component**
- ❑ **Change of radial head component**
- ❑ **Change of all components**
- ❑ **Removal of components**
- ❑ **Other Name: .....**

APPROACH

❑ **Medial** ❑ **Lateral** ❑ **Posterior**

HUMERUS

Please do not fold

ULNA

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

❑ **Allograft**
❑ **Autograft** ❑ **Synthetic**

BONE GRAFT - ULNA

❑ **Allograft**
❑ **Autograft** ❑ **Synthetic**

RADIAL HEAD

Please do not fold

AUGMENTS

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

❑ **Humerus** ❑ **Ulna** ❑ **Radius** ❑ **Antibiotic brand: .....**

❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

Name ..... **ASA Class: 1 2 3 4 (please circle one)**

OPERATING THEATRE

❑ **Conventional** ❑ **Laminar flow or similar** ❑ **Space suits**

SKIN TO SKIN TIME *mins* **Start skin.....** **Finish skin.....**

PRIMARY OPERATING SURGEON

❑ **Adv Trainee Unsupervised**
❑ **Consultant** ❑ **Adv Trainee Supervised** **Year.....** ❑ **Basic Trainee**

*****NB If bilateral procedure two completed forms are required***

DO NOT PLACE IN PATIENT NOTES TO BE RETAINED IN THEATRE SUITE

NEW ZEALAND JOINT REGISTRY
Primary Cervical Disc Replacement

Free Phone 0800-274-989 **14.08.2008**

Patient Name:

Address:

Consultant: .....
[If different from patient label]
Hospital: .....
Town/City:.....

Tick Appropriate Boxes **ACC** **Q** **ACC Claim**

No: .....

LEVELS OF DISC REPLACEMENT

.....

- ❑ C3/4 ❑ C6/7
- ❑ C4/5 ❑ C7/T1
- ❑ C5/6 Other .....

PRE OP PATIENT SCORE
(NECK DISABILITY INDEX)

PREVIOUS OPERATION

- ❑ Foreminotomy ❑ Adjacent Level Disc Arthroplasty
- ❑ Adjacent Level Fusion ❑ Other.....

DIAGNOSIS

- ❑ Acute Disc Prolapse
- ❑ Chronic Spondylosis
- ❑ Neck Pain
- ❑ Other .....

APPROACH

❑ Anterior Right ❑ Anterior Left ❑ Other

.....

IMPLANTS

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

INTRAOPERATIVE COMPLICATIONS

.....

.....

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

❑ Yes ❑ No

OPERATIVE THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

SKIN TO SKIN TIME *mins* **Start skin.....** **Finish skin.....**

PRIMARY OPERATING SURGEON

❑ Adv Trainee Unsupervised

❑ Consultant ❑ Adv Trainee Supervised **Year .....** ❑ Basic Trainee

DO NOT PLACE IN PATIENT NOTES TO BE RETAINED IN THEATRE SUITE

NEW ZEALAND JOINT REGISTRY
Revision Cervical Disc Replacement

Free Phone 0800-274-989
14.08.2008

.....

Patient Name:

Address:

Consultant: .....
If different from patient label]
Hospital:

LEVEL OF REVISION
.....

❑ **C3/4** ❑ **C6/7**
❑ **C4/5** ❑ **C7/T1**
❑ **C5/6** ❑ **Other:**

Town/City: .....

Tick Appropriate Boxes

ACC Q ACC Claim No: .....

REASON FOR REVISION

❑ **Dislocation of component**
❑ **Failure of component**
❑ **Infection**
❑ **Pain (Neck)**
❑ **Adjacent level surgery**
❑ **Additional decompression required**
❑ **Heterotopic calcification**
❑ **Other: Name: .....**

Date Index Operation: .....

If re-revision - Date previous revision: ...

REVISION

❑ **Replace disc prosthesis (same)**
❑ **Replace disc prosthesis (different)**
❑ **Removal only**
❑ **Other: .....**

Fuse

APPROACH ❑ **Image guided surgery** ❑ **Minimally invasive surgery**
❑ **Anterior** ❑ **Posterior** ❑ **Lateral** ❑ **Trochanteric**

Osteotomy

IMPLANTS

Please do not fold

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

Please do not fold

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

SYSTEMIC ANTIBIOTIC PROPHYLAXIS
Name .....

OPERATING THEATRE

❑ **Conventional** ❑ **Laminar flow or similar** ❑ **Space suits**

SKIN TO SKIN TIME *mins* **Start skin.....** **Finish skin.....**

PRIMARY OPERATING SURGEON

❑ **Consultant** ❑ **Adv Trainee Unsupervised** ❑ **Adv Trainee Supervised** **Year.....** ❑ **Basic Trainee**

DO NOT PLACE IN PATIENT NOTES TO BE RETAINED IN THEATRE SUITE

NEW ZEALAND JOINT REGISTRY
Primary Lumbar Disc Replacement

Free Phone 0800-274-989
14.08.2008

.....

Patient Name:

Address:

Consultant: .....
[If different from patient label]
Hospital: .....

Town/City.....

Tick Appropriate Boxes

ACC aACC Claim No. .....

DISC REPLACEMENT Levels

❑ **L3/4**
❑ **L4/5**
❑ **L5/S1**

FUSION Levels

❑ **L3/4**
❑ **L4/5**
❑ **L5/S1**

PRE OP PATIENT SCORE

Modified Roland and Morris

Total number of "Yes" responses.....

Oswestry Score

Percentage score

Other .....

PREVIOUS OPERATION

❑ **Discectomy** ❑ **L3/4** ❑ **L4/5** ❑ **L5/S1** ❑ **Other .....**
❑ **Other .....** ❑ **L3/4** ❑ **L4/5** ❑ **L5/S1**

DIAGNOSIS

1. Degenerative Disc disease ❑ **L3/4** ❑ **L4/5** ❑ **L5/S1** ❑ **Other .....**
(plain x-ray changes present)
2. Annular tear MRI scan ❑ **L3/4** ❑ **L4/5** ❑ **L5/S1** ❑ **Other .....**
(normal plain x-ray)
3. Discogenic pain on discography ❑ **L3/4** ❑ **L4/5** ❑ **L5/S1** ❑ **Other .....**

APPROACH

Retroperitoneal midline abdominal wall incision ❑ **Transperitoneal**
❑ **Retroperitoneal lateral abdominal wall incision** ❑ **Other .....**

IMPLANTS

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

INTRAOPERATIVE COMPLICATIONS

.....

❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**
Yes ❑ **No** ❑

OPERATIVE THEATRE

❑ **Conventional** ❑ **Laminar flow or similar** ❑ **Space suits**

SKIN TO SKIN TIME *mins* **Start skin .....** **Finish skin .....**

PRIMARY OPERATING SURGEON

❑ **Consultant** ❑ **Adv Trainee** **Year.....** ❑ **Basic Trainee**

DO NOT PLACE IN PATIENT NOTES TO BE RETAINED IN THEATRE SUITE

NEW ZEALAND JOINT REGISTRY
Revision Lumbar Disc Replacement

Free Phone 0800-274-989
14.08.2008

.....

Patient Name:

Address:

Consultant: .....
[If different from patient label]
Hospital: .....
Town/City: .....

Tick Appropriate Boxes **ACC Q ACC Claim No: .....**

REASON FOR REVISION

- ❑ **Loosening of components**
- ❑ **Dislocation of articulating core**
- ❑ **Loss of spinal alignment**
- ❑ **Pain**
- ❑ **Deep infection**
- ❑ **Fracture of vertebra**
- ❑ **Removal of components**
- ❑ **Other: Name: .....**

Date Index Operation: ..... **If re-revision - Date previous revision: .....**

REVISION

- ❑ **Change of TDR components**
- ❑ **Change to Anterior Fusion**
- ❑ **Change of articulating core**
- ❑ **In-situ posterior instrumented fusion**

APPROACH

Retroperitoneal midline abdominal wall incision
- ❑ **Retroperitoneal lateral abdominal wall incision**
- ❑ **Posterior Approach for in-situ fusion**
- ❑ **Transperitoneal**
- ❑ **Other .....**

NEW DISC REPLACEMENT Levels	**NEW FUSION Levels**	**PRE OP PATIENT SCORE**
		Modified Roland and Morris
❑ **L3/4**	❑ **L3/4**	**Total number of "Yes" responses.....**
❑ **L4/5**	❑ **L4/5**	***Oswestry Score***
❑ **L5/S1**	❑ **L5/S1**	**Percentage score**

Other .....

IMPLANTS

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

INTRAOPERATIVE COMPLICATIONS

.....

.....

❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**
Yes ❑ **No** ❑

OPERATIVE THEATRE

❑ **Conventional** ❑ **Laminar flow or similar** ❑ **Space suits**

SKIN TO SKIN TIME *mins* **Start skin .....** **Finish skin .....**

PRIMARY OPERATING SURGEON

❑ **Consultant** ❑ **Adv Trainee** **Year.....** ❑ **Basic Trainee**

DO NOT PLACE IN PATIENT NOTES TO BE RETAINED IN THEATRE SUITE

NEW ZEALAND JOINT REGISTRY
Revision Hip Joint

Free Phone 0800-274-989
07.04.2005

.....

Side:..... **

Patient Name:

Address:

Consultant: .....
[If different from patient label]
Hospital: .....
Town/City: .....

Tick Appropriate Boxes

REASON FOR REVISION

- ❑ Loosening acetabular component
- ❑ Loosening femoral component
- ❑ Dislocation
- ❑ Pain
- ❑ Previous hemiarthroplasty
- ❑ Deep infection
- ❑ Fracture femur
- ❑ Removal of components
- ❑ Other: Name: .....

Date Index Operation: .....

If re-revision - Date previous revision: .....

REVISION

- ❑ Change of femoral component
- ❑ Change of acetabular component
- ❑ Change of head
- ❑ Change of liner
- ❑ Change of all components

APPROACH ❑ Image guided surgery ❑ Minimally invasive surgery

❑ Anterior ❑ Posterior ❑ Lateral ❑ Trochanteric osteotomy

FEMUR

Please do not fold

bar-coded label

ACETABULUM

Please do not fold

bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - FEMUR

❑ Allograft ❑ Synthetic
❑ Autograft

BONE GRAFT - ACETABULUM

❑ Allograft ❑ Synthetic
❑ Autograft

FEMORAL HEAD

Please do not fold

AUGMENTS

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

❑ Femur ❑ Acetabulum ❑ Antibiotic brand: .....

❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**
Name ..... ASA Class: 1 2 3 4 (please circle one)

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

SKIN TO SKIN TIME *mins* Start skin..... Finish skin.....

PRIMARY OPERATING SURGEON

❑ Adv Trainee Supervised
❑ Consultant ❑ Adv Trainee Supervised Year..... ❑ Basic Trainee

*****NB If bilateral procedure two completed forms are required***

NEW ZEALAND JOINT REGISTRY
Primary Replacement Knee
Free Phone 0800-274-989 ❑ Total Knee Arthroplasty ❑ Unicompartmental ❑ Patellofemoral
31.05.2010

.....

Patient Name:

Address:

Consultant: .....
[If different from patient label]
Hospital: .....
Town/City:.....

Side:..... **

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT

❑ None
❑ Internal fixation for juxtarticular fracture
❑ Ligament reconstruction
❑ Menisectomy
❑ Synovectomy
❑ Osteotomy
❑ Other: Name: .....
.....

DIAGNOSIS

❑ Osteoarthritis
❑ Rheumatoid arthritis
❑ Other inflammatory
❑ Tumour
❑ Post fracture
❑ Post ligament disruption/reconstruction
❑ Avascular necrosis
❑ Other: Name:
.....

APPROACH ❑ Image guided surgery ❑ Minimally invasive surgery
❑ Medial parapatellar ❑ Lateral parapatellar ❑ Other

FEMUR

Please do not fold

TIBIA

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - FEMUR

❑ Allograft
❑ Autograft ❑ Synthetic

BONE GRAFT - TIBIA

❑ Allograft
❑ Autograft ❑ Synthetic

PATELLA

Please do not fold

AUGMENTS

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

❑ Femur ❑ Tibia ❑ Patella ❑ Antibiotic brand: .....

❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**
Name ..... ASA Class: 1 2 3 4 (please circle one)

OPERATING THEATRE
❑ Conventional ❑ Laminar flow or similar ❑ Space suits

SKIN TO SKIN TIME *mins* **Start skin.....** **Finish skin.....**

PRIMARY OPERATING SURGEON
❑ Adv Trainee Unsupervised
❑ Consultant ❑ Adv Trainee Supervised **Year.....** ❑ Basic Trainee

*****NB If bilateral procedure two completed forms are required***

DO NOT PLACE IN PATIENT NOTES TO BE RETAINED IN THEATRE SUITE

NEW ZEALAND JOINT REGISTRY
Revision Knee Joint

Free Phone 0800-274-989

07.04.2005

.....

Side:..... **

Patient Name:

Address:

Consultant: .....
[If different from patient label]

Hospital: .....

Town/City:.....

Tick Appropriate Boxes

SON FOR REVISION

- ❑ Loosening femoral component
- ❑ Loosening tibial component
- ❑ Loosening patellar component
- ❑ Pain
- ❑ Previous Unicompartmental
- ❑ Deep infection
- ❑ Fracture femur
- ❑ Fracture tibia
- ❑ Other details: .....

Index Operation: .....

If re-revision - Date previous revision: .....

SION

- ❑ Change of femoral component
- ❑ Change of tibial component
- ❑ Change of tibial polyethylene only
- ❑ Change of all components
- ❑ Change of patellar component ❑ Removal of components
- ❑ Addition of patellar component ❑ Other

APPROACH ❑ Image guided surgery ❑ Minimally invasive surgery

❑ Medial parapatellar ❑ Lateral parapatellar ❑ Other

FEMUR

Please do not fold

TIBIA

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT – FEMUR

- ❑ Allograft
- ❑ Autograft ❑ Synthetic

BONE GRAFT – TIBIA

- ❑ Allograft
- ❑ Autograft ❑ Synthetic

PATELLA

Please do not fold

AUGMENTS

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

❑ Femur ❑ Tibia ❑ Patella ❑ Antibiotic brand: .....

❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

Name ..... ASA Class: 1 2 3 4 (please circle one)

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

SKIN TO SKIN TIME *mins* Start skin..... Finish skin.....

PRIMARY OPERATING SURGEON

❑ Consultant ❑ Adv Trainee Supervised Year..... ❑ Adv Trainee Unsupervised ❑ Basic Trainee

*****NB If bilateral procedure two completed forms are required***

DO NOT PLACE IN PATIENT NOTES TO BE RETAINED IN THEATRE SUITE

NEW ZEALAND JOINT REGISTRY
Primary Replacement Shoulder
0800-274-989 ❑ **Total shoulder Arthroplasty** ❑ **Hemiarthroplasty** ❑ **Reverse Shoulder**
06.05.2009

.....

Side:..... **

Patient Name:

Address:

Consultant: .....
[If different from patient label]
Hospital: .....
Town/City.....

Tick Appropriate Boxes

VIOUS OPERATION ON INDEX JOINT

- ❑ **None**
- ❑ **Internal fixation for juxtarticular fracture**
- ❑ **Previous stabilisation**
- ❑ **Osteotomy**
- ❑ **Arthrodesis**
- ❑ **Other: Name: .....**

GNOSIS

- ❑ **Rheumatoid arthritis**
- ❑ **Osteoarthritis**
- ❑ **Other inflammatory**
- ❑ **Acute fracture proximal humerus**
- ❑ **Post recurrent dislocation**
- ❑ **Avascular necrosis**
- ❑ **Cuff tear arthropathy**
- ❑ **Post old trauma**
- ❑ **Other: Name: .....**

APPROACH

❑ **Deltopectoral** ❑ **Other : specify**

HUMERUS

Please do not fold

GLENOID

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

❑ **Allograft**
❑ **Autograft** ❑ **Synthetic**

BONE GRAFT - GLENOID

❑ **Allograft**
❑ **Autograft** ❑ **Synthetic**

HUMERAL HEAD

Please do not fold

AUGMENTS

Please do not fold

STICK ALL LABELS ON REVERSE SIDE

CEMENT

❑ **Humerus** ❑ **Glenoid** ❑ **Antibiotic brand: .....**

❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**
Name: ..... ASA Class: 1 2 3 4 (please circle one)

OPERATING THEATRE

❑ **Conventional** ❑ **Laminar flow or similar** ❑ **Space suits**

SKIN TO SKIN TIME *mins* **Start skin.....** **Finish skin.....**

PRIMARY OPERATING SURGEON

❑ **Consultant** ❑ **Adv Trainee Unsupervised** ❑ **Adv Trainee Supervised** **Year.....** ❑ **Basic Trainee**

*****NB*** ***If bilateral procedure two completed forms are required***

DO NOT PLACE IN PATIENT NOTES TO BE RETAINED IN THEATRE SUITE

NEW ZEALAND JOINT REGISTRY
Revision Shoulder

Free Phone 0800-274-989
07.04.2005

.....

Side:..... **

Patient Name:

Address:

Consultant: .....
[If different from patient label]
Hospital: .....
Town/City:.....

Tick Appropriate Boxes

REASON FOR REVISION

- ❑ Loosening glenoid component
- ❑ Loosening humeral component
- ❑ Loosening both components
- ❑ Dislocation/instability anterior
- ❑ Instability posterior
- ❑ Subacromial tuberosity impingement
- ❑ Subacromial cuff impingement/tear
- ❑ Fracture humerus
- ❑ Deep infection
- ❑ Pain
- ❑ Other: Name: .....

Date Index Operation: ..... **If re-revision - Date previous revision: .....**

REVISION

- ❑ Change of head only
- ❑ Change of humeral component
- ❑ Change of glenoid component
- ❑ Change of liner (glenoid non cemented)
- ❑ Change of all components
- ❑ Remove glenoid
- ❑ Remove humerus
- ❑ Removal of components
- ❑ Other Specify: .....

APPROACH

- ❑ Deltopectoral
- ❑ Other: specify

HUMERUS

Please do not fold

GLENOID

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

- ❑ Allograft
- ❑ Synthetic
- ❑ Autograft

BONE GRAFT - GLENOID

- ❑ Allograft
- ❑ Synthetic
- ❑ Autograft

HUMERAL HEAD

Please do not fold

AUGMENTS

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

- ❑ Humerus
- ❑ Glenoid
- ❑ Antibiotic brand: .....

- ❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

Name ..... ASA Class: 1 2 3 4 (please circle one)

OPERATING THEATRE

- ❑ Conventional
- ❑ Laminar flow or similar
- ❑ Space suits

SKIN TO SKIN TIME *mins* **Start skin.....** **Finish skin.....**

PRIMARY OPERATING SURGEON

- ❑ Adv Trainee Unsupervised
- ❑ Consultant
- ❑ Adv Trainee Supervised Year.....
- ❑ Basic Trainee

****NB If bilateral procedure two completed forms are required***

DO NOT PLACE IN PATIENT NOTES TO BE RETAINED IN THEATRE SUITE

NEW ZEALAND JOINT REGISTRY
Primary Replacement Ankle

Free Phone 0800-274-989
31.05.2010

.....

BMI:.....

Side:..... **

Patient Name:

Address:

Consultant: .....
[If different from patient label]
Hospital: .....
Town/City.....

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT

- ❑ None
- ❑ Internal fixation for juxtarticular fractures
- ❑ Osteotomy
- ❑ Arthrodesis
- ❑ Other: Name: .....

DIAGNOSIS

- ❑ Osteoarthritis
- ❑ Rheumatoid arthritis
- ❑ Other inflammatory
- ❑ Post trauma
- ❑ Avascular necrosis talus
- ❑ Other: Name:

.....

APPROACH

❑ Anterior ❑ Anterio-lateral ❑ Other

TIBIA

Please do not fold

TALUS

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - TIBIA

- ❑ Allograft
- ❑ Autograft ❑ Synthetic

BONE GRAFT - TALUS

- ❑ Allograft
- ❑ Autograft ❑ Synthetic

AUGMENTS

Please do not fold

FUSION DISTAL TFJ

STICK ALL LABELS ON REVERSE SIDE

CEMENT

❑ Tibia ❑ Talus ❑ Antibiotic Brand:

.....

❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

Name: ..... **ASA Class: 1 2 3 4 (please circle one)**

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

SKIN TO SKIN TIME *mins* **Start skin.....** **Finish skin.....**

PRIMARY OPERATING SURGEON

Consultant ❑ Adv Trainee Unsupervised ❑ Adv Trainee Supervised **Year.....** ❑ Basic Trainee

*****NB*** ***If bilateral procedure two completed forms are required***

DO NOT PLACE IN PATIENT NOTES **TO BE RETAINED IN THEATRE SUITE**

NEW ZEALAND JOINT REGISTRY
Revision Ankle Joint

Free Phone 0800-274-989 **07.04.2005**

.....

Side:..... **

Patient Name:

Address:

Consultant: .....
[If different from patient label]
Hospital:.....
Town/City: .....

Tick Appropriate Boxes

REASON FOR REVISION

- ❑ **Loosening talar component**
- ❑ **Loosening tibial component**
- ❑ **Dislocation**
- ❑ **Pain**
- ❑ **Deep infection**
- ❑ **Fracture talus**
- ❑ **Fracture tibia**
- ❑ **Dislocations**
- ❑ **Other details: .....**

Date Index Operation: ..... **If re-revision - Date previous revision: .....**

REVISION

- ❑ **Change of talar component**
- ❑ **Change of tibial component**
- ❑ **Change of polyethylene only**
- ❑ **Change of all components**
- ❑ **Removal of components**
- ❑ **Other Name: .....**

APPROACH

❑ **Anterior** ❑ **Anterio-lateral** ❑ **Posterior**

TIBIA

Please do not fold

TALUS

Please do not fold

STICK ALL LABELS ON REVERSE SIDE

BONE GRAFT - TIBIA

- ❑ **Allograft**
- ❑ **Autograft** ❑ **Synthetic**

BONE GRAFT - TALUS

- ❑ **Allograft**
- ❑ **Autograft** ❑ **Synthetic**

AUGUMENTS

Please do not fold

FUSION DISTAL TFJ

Yes ❑ No ❑

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

❑ **Talus** ❑ **Tibia** ❑ **Antibiotic brand: .....**

❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

Name ..... **ASA Class: 1 2 3 4 (please circle one)**

OPERATING THEATRE

❑ **Conventional** ❑ **Laminar flow or similar** ❑ **Space suits**

SKIN TO SKIN TIME *mins* **Start skin.....** **Finish skin.....**

PRIMARY OPERATING SURGEON

❑ **Consultant** ❑ **Adv Trainee Unsupervised** ❑ **Adv Trainee Supervised Year.....** ❑ **Basic Trainee**

*****NB If bilateral procedure two completed forms are required***

DO NOT PLACE IN PATIENT NOTES TO BE RETAINED IN THEATRE SUITE

NEW ZEALAND JOINT REGISTRY
Primary Replacement Elbow

Free Phone 0800-274-989
07.04.2005

.....

Patient Name:

Address:

Consultant: .....
[If different from patient label]
Hospital: .....
Town/City:.....

Side:..... **

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT

- ❑ None
- ❑ Internal fixation for juxtarticular fracture
- ❑ Ligament reconstruction
- ❑ Interposition arthroplasty
- ❑ Debridement
- ❑ Synovectomy ± removal radial head
- ❑ Osteotomy
- ❑ Other: Name: .....

DIAGNOSIS

- ❑ Rheumatoid arthritis
- ❑ Osteoarthritis
- ❑ Other inflammatory
- ❑ Post dislocation
- ❑ Post fracture
- ❑ Post ligament disruption
- ❑ Other: Name: .....

APPROACH

❑ Medial ❑ Lateral ❑ Posterior

HUMERUS

Please do not fold

ULNA

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

- ❑ Allograft
- ❑ Autograft
- ❑ Synthetic

BONE GRAFT - ULNA

- ❑ Allograft
- ❑ Autograft
- ❑ Synthetic

RADIAL HEAD

Please do not fold

AUGMENTS

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

❑ Humerus ❑ Ulna ❑ Radius ❑ Antibiotic brand: .....

❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

Name ..... **ASA Class: 1 2 3 4 (please circle one)**

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

SKIN TO SKIN TIME *mins* **Start skin.....** **Finish skin.....**

PRIMARY OPERATING SURGEON

- ❑ Consultant
- ❑ Adv Trainee Unsupervised
- ❑ Adv Trainee Supervised Year.....
- ❑ Basic Trainee

*****NB If bilateral procedure two completed forms are required***

TOTAL HIP REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:** .....
Patient Address: ..... **Operating Surgeon:**.....
..... **Date of Surgery**.....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please circle the number which best describes yourself **OVER THE LAST 4 WEEKS**

Please circle the SIDE on which you had your surgery performed Left Right

How would you describe the pain you usually had from your operated on hip?
4 None
3 Very mild
2 Mild
1 Moderate
0 Severe

For how long have you been able to walk before the pain from your operated on hip becomes severe? (with or without a stick)
4 No pain/more than 30 minutes
3 16 to 30 minutes
2 5 to 15 minutes
1 Around the house only
0 Unable to walk because of severe pain

Have you had any trouble getting in and out of a car or using public transport because of your operated on hip?
4 No trouble at all
3 Very little trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

4 Have you been able to put on a pair of socks, stockings or tights?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you do the household shopping on your own?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Have you had any trouble with washing and drying yourself (all over) because of your operated on hip?
4 No trouble at all
3 Very little trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

How much has pain from your operated on hip interfered with your usual work (including housework)?
4 Not at all
3 A little bit
2 Moderately
1 Greatly
0 Totally

After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your operated on hip?
4 Not at all painful
3 Slightly painful
2 Moderately painful
1 Very painful
0 Unbearable

Have you had any sudden, severe pain - 'shooting', 'stabbing' or 'spasms' - from the affected operated on hip?
4 No days
3 Only 1 or 2 days
2 Some days
1 Most days
0 Every day

Have you been limping when walking, because of your operated on hip?
4 Rarely/never
3 Sometimes or just at first
2 Often, not just at first
1 Most of the time
0 All of the time

Have you been able to climb a flight of stairs?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Have you been troubled by pain from your operated on hip in bed at night?
4 No nights
3 Only 1 or 2 nights
2 Some nights
1 Most nights
0 Every night

ditional Information

e you at any time been hospitalised because:

	Yes	No	Approx Date
artificial joint dislocated?	~	~	.
joint became infected?	~	~	.....

or any other reason related to the artificial joint:.....
.....
pital admitted to:.....

□ I wish to receive a progress report on the study. **NB:** If there are reasons other than the operation which would stop you doing one of the tasks listed; try to answer the question from the joint replacement aspect alone.

TOTAL HIP REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:** .....

Patient Address: ..... **Operating Surgeon:**.....

..... **Date of Surgery**.....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please circle the number which best describes yourself **OVER THE LAST 4 WEEKS**

Please circle the SIDE on which you had your surgery performed Left Right

How would you describe the pain you usually had from your operated on hip?

4 None
3 Very mild
2 Mild
1 Moderate
0 Severe

For how long have you been able to walk before the pain from your operated on hip becomes severe? (with or without a stick)

4 No pain/more than 30 minutes
3 16 to 30 minutes
2 5 to 15 minutes
1 Around the house only
0 Unable to walk because of severe pain

Have you had any trouble getting in and out of a car or using public transport because of your operated on hip?

4 No trouble at all
3 Very little trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

4 Have you been able to put on a pair of socks, stockings or tights?

4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you do the household shopping on your own?

4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Have you had any trouble with washing and drying yourself (all over) because of your operated on hip?

4 No trouble at all
3 Very little trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

How much has pain from your operated on hip interfered with your usual work (including housework)?

4 Not at all
3 A little bit
2 Moderately
1 Greatly
0 Totally

After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your operated on hip?

4 Not at all painful
3 Slightly painful
2 Moderately painful
1 Very painful
0 Unbearable

Have you had any sudden, severe pain - 'shooting', 'stabbing' or 'spasms' - from the affected operated on hip?

4 No days
3 Only 1 or 2 days
2 Some days
1 Most days
0 Every day

Have you been limping when walking, because of your operated on hip?

4 Rarely/never
3 Sometimes or just at first
2 Often, not just at first
1 Most of the time
0 All of the time

Have you been able to climb a flight of stairs?

4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Have you been troubled by pain from your operated on hip in bed at night?

4 No nights
3 Only 1 or 2 nights
2 Some nights
1 Most nights
0 Every night

litional Information

e you at any time been hospitalised because:

	Yes	No	Approx Date
artificial joint dislocated?	~	~	.
joint became infected?	~	~.....	

or any other reason related to the artificial joint:.....

.....

pital admitted to:.....

□ I wish to receive a progress report on the study. **NB:** If there are reasons other than the operation which would stop you doing one of the tasks listed; try to answer the question from the joint replacement aspect alone.

REVISION HIP REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:** .....

Patient Address: ..... **Operating Surgeon:**.....

..... **Date of Surgery:**.....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please circle the number which best describes yourself **OVER THE LAST 4 WEEKS**

Please circle the SIDE on which you had your surgery performed Left Right

How would you describe the pain you usually had from your operated on hip?
4 None
3 Very mild
2 Mild
1 Moderate
0 Severe

For how long have you been able to walk before the pain from your operated on hip becomes severe? (with or without a stick)
4 No pain/more than 30 minutes
3 16 to 30 minutes
2 5 to 15 minutes
1 Around the house only
0 Unable to walk because of severe pain

Have you had any trouble getting in and out of a car or using public transport because of your operated on hip?
4 No trouble at all
3 Very little trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

Have you been able to put on a pair of socks, stockings or tights?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you do the household shopping on your own?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Have you had any trouble with washing and drying yourself (all over) because of your operated on hip?
4 No trouble at all
3 Very little trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

How much has pain from your operated on hip interfered with your usual work (including housework)?
4 Not at all
3 A little bit
2 Moderately
1 Greatly
0 Totally

After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your operated on hip?
4 Not at all painful
3 Slightly painful
2 Moderately painful
1 Very painful
0 Unbearable

Have you had any sudden, severe pain - 'shooting', 'stabbing' or 'spasms' - from the affected operated on hip?
4 No days
3 Only 1 or 2 days
2 Some days
1 Most days
0 Every day

) Have you been limping when walking, because of your operated on hip?
4 Rarely/never
3 Sometimes, or just at first
2 Often, not just at first
1 Most of the time
0 All of the time

Have you been able to climb a flight of stairs?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

? Have you been troubled by pain from your operated on hip in bed at night?
4 No nights
3 Only 1 or 2 nights
2 Some nights
1 Most nights
0 Every night

dditional Information

ave you at any time been hospitalised because:

	Yes	No	Approx Date
The artificial joint dislocated?	~	~	
The joint became infected?	~	~.....	

or for any other reason related to the artificial joint.....

.....

.....

ospital admitted to:.....

□ I wish to receive a progress report on the study. **NB:** If there are reasons other than the operation which would stop you doing one of the tasks listed; try to answer the question from the joint replacement aspect alone.

TOTAL KNEE REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:** .....
Patient Address: ..... **Operating Surgeon:**.....
..... **Date of Surgery:** .....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please circle the number which best describes yourself **OVER THE LAST 4 WEEKS**

Please circle the SIDE on which you had your surgery performed Left Right

How would you describe the pain you usually have from your operated on knee?
4 None
3 Very mild
2 Mild
1 Moderate
0 Severe

For how long have you been able to walk before the pain from your operated on knee becomes severe? (with or without a stick)
4 No pain/more than 30 minutes
3 16 to 30 minutes
2 5 to 15 minutes
1 Around the house only
0 Unable to walk because of severe pain

Have you had any trouble getting in and out of a car or using public transport because of your operated on knee?
4 No trouble at all
3 Very little trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

Could you kneel down and get up again afterwards on your operated knee?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you do the household shopping on your own?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Have you had any trouble with washing and drying yourself (all over) because of your operated on knee?
4 No trouble at all
3 Very little trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

How much has pain from your operated on knee interfered with your usual work (including housework)?
4 Not at all
3 A little bit
2 Moderately
1 Greatly
Totally

After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your operated on knee?
4 Not at all painful
3 Slightly painful
2 Moderately painful
1 Very painful
0 Unbearable

Have you felt that your operated on knee might suddenly "give way" or let you down?
4 Rarely/never
3 Sometimes, or just at first
2 Often, not just at first
1 Most of the time
0 All of the time

Have you been limping when walking, because of your operated on knee?
4 Rarely/never
3 Sometimes, or just at first
2 Often, not just at first
1 Most of the time
0 All of the time

Could you walk down one flight of stairs?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Have you been troubled by pain from your operated on knee in bed at night?
4 No nights
3 Only 1 or 2 nights
2 Some nights
1 Most nights
0 Every night

Additional Information

ve you at any time been hospitalised because:

s No Approx Date

e artificial joint dislocated? ~ ~.....

e joint became infected? ~ .

for any other reason related to the artificial joint:

.....

.....

ospital admitted to:

.....

□ I wish to receive a progress report on the study. **NB:** If there are reasons other than the operation which would stop you doing one of the tasks listed; try to answer the question from the joint replacement aspect alone.

REVISION KNEE REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:** .....

Patient Address: ..... **Operating Surgeon:**.....

..... **Date of Surgery:**.....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please circle the number which best describes yourself **OVER THE LAST 4 WEEKS**

Please circle the SIDE on which you had your surgery performed Left Right

How would you describe the pain you usually have from your operated on knee?

4 None
3 Very mild
2 Mild
1 Moderate
0 Severe

For how long have you been able to walk before the pain from your operated on knee becomes severe? (with or without a stick)

4 No pain/more than 30 minutes
3 16 to 30 minutes
2 5 to 15 minutes
1 Around the house only
0 Unable to walk because of severe pain

Have you had any trouble getting in and out of a car or using public transport because of your operated on knee?

4 No trouble at all
3 Very little trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

Could you kneel down and get up again afterwards?

4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you do the household shopping on your own?

4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Have you had any trouble with washing and drying yourself (all over) because of your operated on knee?

4 No trouble at all
3 Very little trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

How much has pain from your operated on knee interfered with your usual work (including housework)?

4 Not at all
3 A little bit
2 Moderately
1 Greatly
0 Totally

After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your operated on knee?

4 Not at all painful
3 Slightly painful
2 Moderately painful
1 Very painful
0 Unbearable

Have you felt that your operated on knee might suddenly "give way" or let you down?

4 Rarely/never
3 Sometimes, or just at first
2 Often, not just at first
1 Most of the time
0 All of the time

) Have you been limping when walking, because of your operated on knee?

4 Rarely/never
3 Sometimes, or just at first
2 Often, not just at first
1 Most of the time
0 All of the time

Could you walk down one flight of stairs?

4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

? Have you been troubled by pain from your operated on knee in bed at night?

4 No nights
3 Only 1 or 2 nights
2 Some nights
1 Most nights
0 Every night

Additional Information

ave you at any time been hospitalised because:

	Yes	No	Approx Date
ıe artificial joint dislocated?			~
ıe joint became infected?			~

or for any other reason related to the artificial joint: .....

.....

.....

Hospital admitted to:.....

□ I wish to receive a progress report on the study. **NB:** If there are reasons other than the operation which would stop you doing one of the tasks listed; try to answer the question from the joint replacement aspect alone.

TOTAL ANKLE REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:**.....
Patient Address: ..... **Operating Surgeon:**.....
..... **Date of Surgery:**.....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please **circle the number** which best describes yourself **OVER THE LAST 4 WEEKS**

Please circle the SIDE on which you had your surgery performed Left Right

How would you describe the pain you usually have from your operated on ankle?
4 None
3 Very mild
2 Mild
1 Moderate
0 Severe

For how long have you been able to walk before the pain from your operated on ankle becomes severe?
4 No pain up to 30 minutes
3 16 to 30 minutes
2 5 to 15 minutes
1 Around the house only
0 Unable to walk at all because of severe pain

Have you been able to walk on uneven ground?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 Extreme difficulty
0 No impossible

Have you had to use an orthotic (shoe insert), heel lift, or special shoes?
4 Never
3 Occasionally
2 Often
1 Most of the time
0 Always

How much has pain from your ankle interfered with your usual work (including housework and hobbies)?
4 Not at all
3 A little bit
2 Moderately
1 Greatly
0 Totally

Have you been limping when walking because of your operated on ankle?
4 No days
3 Only one or two days
2 Some days
1 Most days
0 Every day

Have you been able to climb a flight of stairs?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 Impossible

Have you been troubled by pain from your operated on ankle in bed at night?
4 No nights
3 Only one or two nights
2 Some nights
1 Most nights
0 Every night

How much has pain from your operated on ankle interfered with your usual recreational activities?
4 Not at all
3 A little bit
2 Moderately
1 Greatly
0 Totally

Have you had swelling of your foot?
4 None at all
3 Occasionally
2 Often
1 Most of the time
0 All the time

After a meal (sat at a table) how painful has it been for you to stand up from a chair because of your operated on ankle?
4 Not at all painful
3 Slightly painful
2 Moderately painful
1 Very painful
0 Unbearable

Have you had any sudden severe pain – shooting, stabbing or spasms from your operated on ankle?
4 No days
3 Only 1 or 2 days
2 Some days
1 Most days
0 Every day

Additional Information

e you at any time been hospitalised because:

	No	Approx Date
artificial joint dislocated?	~	.....
joint became infected?	~	.....

or for any other reason related to the artificial joint:.....

.....

..

pital admitted to.....

□ I wish to receive a progress report on the study. **NB:** If there are reasons other than the operation which would stop you doing one of the tasks listed; try to answer the question from the joint replacement aspect alone

REVISION ANKLE REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:**.....
Patient Address: ..... **Operating Surgeon:** .....
..... **Date of Surgery:**.....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please circle the number which best describes yourself **OVER THE LAST 4 WEEKS**

Please circle the SIDE on which you had your surgery performed Left Right

How would you describe the pain you usually have from your operated on ankle?
4 None
3 Very mild
2 Mild
1 Moderate
0 Severe

For how long have you been able to walk before the pain from your operated on ankle becomes severe?
4 No pain up to 30 minutes
3 16 to 30 minutes
2 5 to 15 minutes
1 Around the house only
0 Unable to walk at all because of severe pain.

Have you been able to walk on uneven ground?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 Extreme difficulty
0 No impossible.

Have you had to use an orthotic (shoe insert), heel lift, or special shoes?
4 Never
3 Occasionally
2 Often
1 Most of the time
0 Always

How much has pain from your ankle interfered with your usual work (including housework and hobbies)?
4 Not at all
3 A little bit
2 Moderately
1 Greatly
0 Totally

Have you been limping when walking because of your operated on ankle?
4 No days
3 Only one or two days
2 Some days
1 Most days
0 Every day

Have you been able to climb a flight of stairs?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 Impossible

Have you been troubled by pain from your operated on ankle in bed at night?
4 No nights
3 Only one or two nights
2 Some nights
1 Most nights
0 Every night

How much has pain from your operated on ankle interfered with your usual recreational activities?
4 Not at all
3 A little bit
2 Moderately
1 Greatly
0 Totally

Have you had swelling of your foot?
4 None at all
3 Occasionally
2 Often
1 Most of the time
0 All the time

After a meal (sat at a table) how painful has it been for you to stand up from a chair because of your operated on ankle?
4 Not at all painful
3 Slightly painful
2 Moderately painful
1 Very painful
0 Unbearable

Have you had any sudden severe pain – shooting, stabbing or spasms from your operated on ankle?
4 No days
3 Only 1 or 2 days
2 Some days
1 Most days
0 Every day

Additional Information

e you at any time been hospitalised because:

	No	Approx Date
artificial joint dislocated?	~	~ .....
joint became infected?	~	~ .....

or for any other reason related to the artificial joint:.....

pital admitted to: .....

□ I wish to receive a progress report on the study. **NB:** If there are reasons other than the operation which would stop you doing one of the tasks listed, try to answer the question from the joint replacement aspect alone.

TOTAL SHOULDER REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:** .....
Patient Address: ..... **Operating Surgeon:**.....
..... **Date of Surgery:**.....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please **circle the number** which best describes yourself **OVER THE LAST 4 WEEKS** **Which is your dominant arm? Left Right**

Please circle the SIDE on which you had your surgery performed Left Right

How would you describe the ***worst*** pain you have had from your operated on shoulder?
4 None
3 Mild
2 Moderate
1 Severe
0 Unbearable

How would you describe the pain you ***usually*** have from your operated on shoulder?
4 None
3 Very mild
2 Mild
1 Moderate
0 Severe

Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?
4 No trouble at all
3 A little bit of trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

Have you been able to use a knife and fork at the same time?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you do the household shopping on your own?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you carry a tray containing a plate of food across a room?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you brush/comb your hair with the operated on arm?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, Impossible

Have you had any trouble dressing yourself because of your operated on shoulder?
4 No trouble at all
3 A little bit of trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

Could you hang your clothes up in a wardrobe – using the operated on arm?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Have you been able to wash and dry yourself under both arms?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

How much has pain from your operated on shoulder interfered with your usual work hobbies or recreational activities (including housework)?
4 Not at all
3 A little bit
2 Moderately
1 Greatly
0 Totally

Have you been troubled by pain from your operated on shoulder in bed at night?
4 No nights
3 Only 1 or 2 nights
2 Some nights
1 Most nights
0 Every night

Additional Information

e you at any time been hospitalised because:

	Yes	No	Approx Date
artificial joint dislocated?		~	.....
joint became infected?		~	.....

or any other reason related to the artificial joint:.....

.....

pital admitted to:.....

□ I wish to receive a progress report on the study. **NB:** If there are reasons other than the operation which would stop you doing one of the tasks listed; try to answer the question from the joint replacement aspect alone.

REVISION SHOULDER REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:** .....
Patient Address: ..... **Operating urgeon:**.....
..... **Date of Surgery:**.....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please circle the number which best describes yourself **OVER THE LAST 4 WEEKS** **Which is your dominant arm?**

Left **Right**

Please circle the SIDE on which you had your surgery performed **Left** **Right**

How would you describe the ***worst*** pain you have had from your operated on shoulder?
4 None
3 Mild
2 Moderate
1 Severe
0 Unbearable

How would you describe the pain you ***usually*** have from your operated on shoulder?
4 None
3 Very mild
2 Mild
1 Moderate
0 Severe

Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?
4 No trouble at all
3 A little bit of trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

Have you been able to use a knife and fork at the same time?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you do the household shopping on your own?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you carry a tray containing a plate of food across a room?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you brush/comb your hair with the operated on arm?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, Impossible

Have you had any trouble dressing yourself because of your operated on shoulder?
4 No trouble at all
3 A little bit of trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

Could you hang your clothes up in a wardrobe – using the operated on arm?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Have you been able to wash and dry yourself under both arms?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

How much has pain from your operated on shoulder interfered with your usual work hobbies or recreational activities (including housework)?
4 Not at all
3 A little bit
2 Moderately
1 Greatly
0 Totally

Have you been troubled by pain from your operated on shoulder in bed at night?
4 No nights
3 Only 1 or 2 nights
2 Some nights
1 Most nights
0 Every night

Additional Information

e you at any time been hospitalised because:

	Yes	No	Approx Date
artificial joint dislocated?	~	~	.....
joint became infected?	~	~	.....

or any other reason related to the artificial joint:.....

.....

pital admitted to: .....

□ I wish to receive a progress report on the study. **NB:** If there are reasons other than the operation which would stop you doing one of the tasks listed; try to answer the question from the joint replacement aspect alone.

TOTAL ELBOW REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:**.....
Patient Address: ..... **Operating Surgeon:** .....
..... **Date of Surgery:**.....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please circle the number which best describes yourself **OVER THE LAST 4 WEEKS** **Which is your dominant arm?** **Left** **Right**

Please circle the SIDE on which you had your surgery performed **Left** **Right**

How would you describe the ***worst*** pain you have had from your operated on elbow?
4 None
3 Mild
2 Moderate
1 Severe
0 Unbearable

Have you had any trouble dressing yourself because of your operated on elbow?
4 No trouble at all
3 A little bit of trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

Can you lift a teacup safely with your operated on arm?
4 No trouble at all
3 A little bit of trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

Have you been able to get your hand to your mouth?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you carry the household shopping with your operated on arm?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you carry a tray containing a plate of food across a room?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you brush/comb your hair with the affected arm?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, Impossible

How would you describe the pain you ***usually*** have from your operated on elbow?
4 None
3 Very mild
2 Mild
1 Moderate
0 Severe

Could you hang your clothes up in a wardrobe – using the operated on arm?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Have you been able to wash and dry yourself under both arms?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

How much has pain from your operated on elbow interfered with your usual work hobbies or recreational activities (including hobbies and housework)?
Not at all
3 A little bit
2 Moderately
1 Greatly
0 Totally

Have you been troubled by pain from your operated on elbow in bed at night?
4 No nights
3 Only 1 or 2 nights
2 Some nights
1 Most nights
0 Every night

Additional Information

e you at any time been hospitalised because:

	No	Approx Date
artificial joint dislocated?	~	.....
joint became infected?	~	.....

or any other reason related to the artificial joint:

pital admitted to: .....

□ I wish to receive a progress report on the study. **NB:** If there are reasons other than the operation which would stop you doing one of the tasks listed; try to answer the question from the joint replacement aspect alone.

REVISION ELBOW REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:** .....

Patient Address: ..... **Operating Surgeon:** .....

..... **Date of Surgery:**.....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please circle the number which best describes yourself **OVER THE LAST 4 WEEKS** **Which is your dominant arm?**

Left **Right**

Please circle the SIDE on which you had your surgery performed **Left** **Right**

How would you describe the ***worst*** pain you have had from your operated on elbow?

4 None
3 Mild
2 Moderate
1 Severe
0 Unbearable

Have you had any trouble dressing yourself because of your operated on elbow?

4 No trouble at all
3 A little bit of trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

Can you lift a teacup safely with your operated on arm?

4 No trouble at all
3 A little bit of trouble
2 Moderate trouble
1 Extreme difficulty
0 Impossible to do

Have you been able to get your hand to your mouth?

4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you carry the household shopping with your operated on arm?

4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you carry a tray containing a plate of food across a room?

4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Could you brush/comb your hair with the affected arm?

4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, Impossible

How would you describe the pain you ***usually*** have from your operated on elbow?

4 None
3 Very mild
2 Mild
1 Moderate
0 Severe

Could you hang your clothes up in a wardrobe – using the operated on arm?

4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

Have you been able to wash and dry yourself under both arms?

4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible

How much has pain from your operated on elbow interfered with your usual work hobbies or recreational activities (including hobbies and housework)?

Not at all
3 A little bit
2 Moderately
1 Greatly
0 Totally

Have you been troubled by pain from your operated on elbow in bed at night?

4 No nights
3 Only 1 or 2 nights
2 Some nights
1 Most nights
0 Every night

Additional Information

e you at any time been hospitalised because:

	No	Approx Date
artificial joint dislocated?	~	.....
joint became infected?	~	.....

or for any other reason related to the artificial joint:.....

.....

pital admitted to:.....

□ I wish to receive a progress report on the study. **NB:** If there are reasons other than the operation which would stop you doing one of the tasks listed; try to answer the question from the joint replacement aspect alone.

The New Zealand Joint Registry Fourteen Year Report (January 1999 - December) 2012

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