

# THE NEW ZEALAND JOINT REGISTRY

SIXTEEN YEAR REPORT JANUARY 1999 TO DECEMBER 2014



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# CONTENTS

Editorial Comment	4
Acknowledgments	8
Participating Hospitals and Coordinators	9
Profile of Average New Zealand Orthopaedic Surgeon	11
Development and Implementation of the New Zealand Registry	12
Development since the Introduction of the Registry	14
Category Totals	15
Hip Arthroplasty	16
Knee Arthroplasty	75
Unicompartmental Knee Arthroplasty	106
Ankle Arthroplasty	115
Shoulder Arthroplasty	121
Elbow Arthroplasty	134
Lumbar Disc Replacement	140
Cervical Disc Replacement	142
Appendices:	
- Appendix 1 - Oxford 12 Questionnaire References	143
- Appendix 2 - Publications	144
- Appendix 3 - Prosthesis Inventory	145
- Appendix 4 - Data forms	149
- Appendix 5 - Oxford 12 Questionnaire forms	164

# EDITORIAL COMMENT

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

This year's report contains updated data in the same format as the previous report as well as some new tables and KM survival data.

The total number of registered joint arthroplasties at 31st of December 2014 was 219,856, which had been performed on 154,220 individual patients, of which 26,973 (17%) have died during the 16 year period. Primary hip arthroplasty registrations have broken through the 100,000 barrier.

The number of observed component years (ocys) contained within the Registry is now well in excess of one million. The increase of 19,040 registered joints for 2014 compared to the 18,046 in 2013 represents an overall annual gain of 5.5%, which is similar to the percentage gain in 2013. There were increased registrations for hip (8.2%), knee (4.3% including a 30% increase for patello-femoral replacements), ankle (1.7%) shoulder (7.2%) elbow (18%) and a fall for unicompartmental knee (1.9%) replacements, when compared to 2013 registrations.

As for previous years, analyses of revision data has been confined to primary registered arthroplasties.

It is of interest that the proportion of knees to hips has increased slightly further in 2014 to 47% from 46% in 2013 and furthermore, whereas the yearly number of registered hips has doubled since 1999, the yearly number of knees has tripled during the same period. The mean BMIs are 31.2 (knees) and 28.81 (hips). There are significant numbers of morbidly obese (BMI>40) people receiving 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.

# **Hip Arthroplasty**

There are 101,833 primary hip arthroplasties in the Registry with an overall revision rate of 0.73 per 100 ocys (95% confidence interval; 0.70 -0.75) with a 15 year prosthesis survival of 87.3% (cemented 89.5%; uncemented and hybrid 87.0%). The proportion of uncemented arthroplasties has slightly fallen from 45.7% in 2013 to 44.8% in 2014, the lowest since 2007. The KM survival curves continue to demonstrate better longer term survival for fully cemented arthroplasties.

There are 1001 (976 in 2013) hip prosthesis combinations in the Registry but only 202 with 50 or more registrations.

As in previous years, the three 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 four age bands. When the bearing surface revision rates are compared, the metal on metal have twice the revision rate of the ceramic on ceramic, ceramic on plastic and metal on plastic. The ceramic on plastic bearing surface continues to increase in popularity and rose to 28% of total in 2014. It is noteworthy that no metal on metal hip arthroplasties were registered in 2014 for head size > 28mm. The use of head sizes >/= to 36mm continues to fall and in 2014 constituted just 21% of total.

The use of cross linked polyethylene continues its upward trend, making up 87.4% of the total polyethylene in 2014.

Survival curves for the various types of uncemented hip arthroplasties dramatically illustrate the poorer survival for metal on metal hip arthroplasty.

The Corail/Pinnacle combination remains currently the most popular but the ExeterV40/ Trident combination has accumulated the most component years at 34,056 from 6,712 primary arthroplasties and has the very low revision rate of 0.46/100 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 three types of prosthesis fixation. There is also a new table of prosthesis combinations based on the femoral component which should make it easier for readers to find specific combinations. Four combinations (seven in 2013) which are still currently being used have revision rates significantly higher (p<0.05) than the overall rate of 0.73/100 ocys but only the Exeter V40/Continuum combination had significant numbers (332) implanted in 2014. It is also worth noting that the revision rate for monoblock stems which have been implanted for an average of 10 years is very low at 0.44/100 ocys.

This year revision rates for X linked and standard polyethylene have been compared for both metal and ceramic heads. It was found that ceramic/plastic with standard polyethylene has a significantly higher revision rate compared to the cross linked variety whereas there was no difference for the two metal/plastic combinations.

KM survival curves for some of the hip combinations with a minimum of 1,500 arthroplasties and 10 years of analysable data have once again been included as well as 12 year survival curves for those combinations with a minimum of 2,000 procedures. It is noted that the Exeter combinations, except for Exeter/Contemporary, are among the better and the Spectron combinations among the poorer survival curves. Note the excellent survival of the Muller/Muller combination.



"This year's report contains updated data in the same format as the previous report as well as some new tables and KM survival data."

Again this year the survival of minor (defined as replacement of liners, bearings, heads, patellae) versus major (defined as replacement of acetabulae, femoral, or tibial components +/- minor components) revisions for both hips and knees have been compared. As was shown last year, the revision rate after a major revision is significantly better than for a minor revision for both hips and knees, thus suggesting that some minor revisions should have been full revisions.

There has been a further increase in the number of primary hip revisions with ALVAL (aseptic lymphocytic vascular-associated lesions), or similar, listed as the reason for revision. In 2011 the number increased from15 to 72; in 2012 to 102; in 2013 to 146; and in 2014 to 182. This reflects the continuing failure rate of metal on metal hip prosthesis combinations which have >36mm heads. This is reflected in the ASA analyses which show for the first time that there is a higher revision rate for ASA 1 compared to ASA 2. It is worth noting in this context that 49% of the conventional ASR prostheses have been revised.

Other analyses introduced last year, including yearly stacked graphs to demonstrate changes over the last 15 years of head size, bearing surfaces, polyethylene and reasons for revision, have again been included, as well as survival curves for the five main reasons for revision and also for cemented/ uncemented stems and cups.

New this year are KMs for the different head sizes, for the different bearing surfaces and for cross linked vs standard polyethylene. All three graphically illustrate different survival trends.

Resurfacing hip arthroplasty registrations continue to flatten off and in 2014 were 89 compared to 90 in 2013. The revision rate has fallen slightly to 1.28/100 ocys.

# The Best and the Worst Combinations

From the 16 years of accumulated data it is possible to recommend the generic component combinations which currently should provide the best long term survival. These are: acetabulum – cemented; bearing surfaces - ceramic head with X linked polyethylene liner; head size 32 mm; stem cemented. Conversely the component combinations to avoid are: acetabulum - uncemented metal; bearing surfaces - metal on metal; head size >= 36mm; stem - uncemented.

# **Knee Arthroplasty**

78,542 primary knee arthroplasties have been registered totalling 456,154 ocys with the overall revision rate 0.49/100 ocys, (95% confidence interval; 0.47-0.51) and the excellent fifteen year survival of 93.68%.

As was done for recent annual reports several variants of basically the same knee prosthesis type e.g. Nexgen LCS, which are registered separately, have been merged into the one group to enable comparable statistical analyses with other prostheses which may have also had variants but are registered as one or two prostheses.

There are 48 different types of knee prostheses in the Registry with 19(40%) having less than 10 registrations.

The Triathlon remains as the current most popular with over twice the number of registrations in 2014 compared to second placed Nexgen. Calculation of revision rates for individual prostheses with a minimum of 50 arthroplasties shows that among the bigger usage numbers the Duracon has the lowest revision rate of 0.30/100ocys. The Nexgen has the biggest number of registrations at 16,950 and 9,8021 ocys.

For fully cemented knees, the Insall/Burstein, Scorpio and Optetrak prostheses have significantly higher revision rates than the overall rate of 0.49 /100 ocys @ the 95% confidence but none of them were implanted in 2014 except for two Scorpio prostheses. For fully uncemented knees the LCS has a significantly higher revision rate.

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. The KM curves for the three 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 2014 was used in 18% of procedures - the highest annual usage yet. Comparison of revision rates for IG with non IG procedures demonstrates a rate of 0.51 versus 0.49/100 ocys. There is no statistical difference between the two at this early stage. The analyses comparing revision rates and 15 year survival of fixed versus mobile bearing knees continue to show that there is no longer a significantly higher revision rate for mobile bearings and the survival curves beyond 10 years are superimposed.

Again this year, separate analyses for cruciate retaining versus posterior stabilised knee prostheses demonstrate that overall there are significantly higher revision rates for posterior stabilised prostheses. This is also graphically illustrated with the KM survival graphs.

There are 356 patello-femoral prostheses registered, with 64 added in 2014, compared to 5% in 2013. This represents a 30% increase. Thirty (8.4%) have been revised and the revision rate at 2.12/100 ocys is four times that for total knee arthroplasty. All except four were revised to a total knee arthroplasty.

# Unicompartmental knee arthroplasty

There are 8,826 registered primary unicompartmental prostheses with a total of 53,350 ocys, a mean revision rate of 1.25/100 ocys and a 13 year survival of 84.1%. Pain is the main reason for revision in almost 50% of cases.

Once again the Oxford uncemented prosthesis was very dominant, accounting for more than the total of all the others in 2014. It also continues to have a low revision rate at 0.68/100 ocys. However, the lowest revision rate is currently the Zimmer unicompartmental prosthesis at 0.58/100 ocys. Both of these prostheses have a mean implantation time of three years compared to 7.5 years for the Oxford 3, which for many years was the most popular unicompartmental replacement but has a current revision rate of 1.39/100 ocys.

The minimally invasive approach for the unicompartmental knee arthroplasty was a little less popular in 2014 when it was used in 25% of procedures, compared to 31% in 2013.

# Ankle arthroplasty

There are 1,160 primary registered ankle prostheses with a total of 5,642 ocys, a mean revision rate of 2.13/100 ocys and a nine year survival of 83%. The big increase in the number of revision procedures in 2014 (51) was due to the Registry receiving a considerable number of back dated revision forms obtained through the Foot and Ankle Society after the discovery that a significant number of revision procedures had not been recorded in the Registry. This resulted in an increase in the revision rate from 1.42 in 2013 to the current 2.13/100 ocys. The retrospectively registered revisions were spread proportionately among the various ankle prostheses.

There were 102 primary ankle arthroplasties registered in 2014 which was 11(10.7%) fewer than the previous year. The Salto prosthesis totally overshadowed all others, accounting for 94% of the 2014 registrations. It also has by far the lowest revision rate with a mean implantation time of 3.3 years.

# Shoulder arthroplasty

There are 6,331 registered primary shoulder prostheses with a total of 29,122 ocys, a mean revision rate of 1.06/100 ocys and a 10 year survival of 91.6%. There were 801 shoulder prostheses within 5 different categories registered during 2014, the highest number ever.

There was no further addition to the Humeral Sphere category and the stack graph demonstrates the evolution over time of the six categories.

With regard to revision rates, there is a significantly higher revision rate for Partial Resurfacing compared to the overall mean and Conventional Total, Reverse and Hemi arthroplasty. This is also graphically illustrated in the KMs for the six different prosthesis categories. Revision rates also vary greatly among the large number of registered prostheses within the different categories but it is noteworthy that the conventional SMR, which for some years has been among the most popular of the prosthesis options, has six times the revision rate of the long established Global and the Bigliani/Flatow and 12 times that of the Global AP conventional total prostheses. The SMR conventional total prosthesis analyses do, however, include SMR L2 glenoid data which, because of its high failure rate, was withdrawn in 2011.

Conventional total and resurfacing head categories have significantly better six month and five year Oxford scores.

# **Elbow arthroplasty**

There are 435 registered primary elbow prostheses with a total of 2,524 ocys, a mean revision rate of 1.11/100 ocys and a five year survival of 93.4%. Numbers registered in 2014 increased by 26, an increase of four over 2013, which arrested the annual decline from 2009. The Coonrad Morrey prosthesis continues to be the most popular with 23 of the 26 implanted.

# **Deep Infection**

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 & 2.7 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 has been no change in the percentage of arthroplasties performed in laminar flow theatres nor in the use of space suits in 2014 compared to 2013.



# 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 six month and five 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.

For the first time, 15 year scores have been analysed. For the 680 hip scores available for analysis, 87% had excellent/ good scores which compares well with the 84% at 6 months post - primary arthroplasty. Similar findings occur with the 470 available 15 year knee scores, with 79% excellent/good compared to 73% at 6 months post primary arthroplasty.

For revision arthroplasty scores at 6 months just 65% (hip) and 54% (knee) were excellent/good.

As noted in previous years, the statistically significant relationship between the six month, five and ten year scores and revision within two years of the score date for primary hips, knees (including unicompartmental) and shoulders has again been demonstrated. In addition, revision within two years of 10 year Oxford scores demonstrates a similar significant relationship for hip and knee arthroplasty.

This year Receiver Operating Curves (ROC) have not been generated as they do not add to the information obtained from the bar graphs. Instead, because of the large number of recorded 6 month Oxford scores the score groupings have been further broken down to demonstrate an even more convincing relationship between score and risk of revision within two years.

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 six months and the second revision within two years.

# **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 eight years post primary hip replacement their data is always valid for all analyses for that eight 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 as well multiple podium presentations (see Appendix 2).

Alastair Rothwell Toni Hobbs Chris Frampton	Supervisor Coordinator Statistician

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- ORTHOPAEDIC SURGEONS
- 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.

# HOSPITALS AND CONTACTS

# **Public Hospitals**

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**Burwood Hospital** Christchurch 8083 Contact: Diane Darley

Christchurch Hospital Christchurch 8140 Contact: Kirsty Harrison

Dunedin Hospital Dunedin 9016 Contact: Jennifer Larsen

**Elective Surgery Centre** Takapuna 0740 Contact: Alannah Domigan

**Gisborne Hospital** Gisborne 4010 Contact: Candice Dowell

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Hawkes Bay Hospital Hastings 4120 Contact: Jacqueline Cornish

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Kenepuru Hospital Porirua 5240 Contact: Tracey Doyle

Manukau Surgery Centre Auckland 2104 Contact: Amanda Ellis

Masterton Hospital Masterton 5840 Contact: Lisa Manihera

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Taranaki Base Hospital New Plymouth 4342 Contact: Allison Tijsen

Tauranga Hospital Tauranga 3143 Contact: David Nyhoff

Timaru Hospital Timaru 7940 Contact: Jenny Hyland

Waikato Hospital Hamilton 3204 Contact: Lorraine Granger

Wairau Hospital Blenheim 7240 Contact: Monette Johnston

Wellington Hospital Newtown 6242 Contact: Zoe Perkins/Scott Morgan

Whakatane Hospital Whakatane 3158 Contact: Karen Burke

**Whanganui Hospital** Whanganui Contact: Susan Slight

**Whangarei Area Hospital** Whangarei 0140 Contact: Helen Harris

### **Private Hospitals**

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**Belverdale Hospital** Wanganui 4500 Contact: Jane Young

**Bidwill Trust Hospital** Timaru 7910 Contact: Kay Taylor

**Boulcott Hospital** Lower Hutt 5040 Contact: Karen Hall

Bowen Hospital Wellington 6035 Contact: Pam Kohnke **Braemar Private Hospital** Hamilton 3204 Contact: Phyllis Lee

Chelsea Hospital Gisborne 4010 Contact: Debbie Gooden

**Crest Hospital** Palmerston North 4440 Contact: Susan Wright

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# PROFILE OF THE AVERAGE NEW ZEALAND ORTHOPAEDIC SURGEON\*

# From our analyses, in 2014 the average orthopaedic surgeon performed

**Total hip** arthroplasties Total knee arthroplasties **Unicompartmental** knee arthroplasties Shoulder arthroplasties **Total ankle** arthroplasties Total elbow arthroplasties

with 45% using uncemented, 12% fully cemented and 43% hybrid prostheses; has a 87.3% survival at 15 years and a revision rate of 0.73 per 100 component years; 0.5% have been revised for deep infection; 84% at six months, 89% at 5 years and 87% at 10 and 15 years had an excellent or good Oxford score.

with almost all cemented but only 11 with patellae resurfaced; has a 93.68% survival at 15 years and a revision rate of 0.49 per 100 component years; 0.74% have been revised for deep infection; 73% at six months, 83% at 5 years, 81% at 10 years and 79% at 15 years had an excellent or good Oxford score.

with most cemented; has an 84.1% survival at 13 years and a revision rate of 1.25 per 100 component years; 0.28% have been revised for deep infection; 82% at six months, 88% at 5 years and 83% at ten years had an excellent or good Oxford score.

with a 3:1 split between total arthroplasty varieties and hemiarthroplasty; has a 91.6% survival at 10 years and a revision rate of 1.06 per 100 component years; 0.33% have been revised for deep infection; 69% at six months, 78% at 5 years and 73% at 10 years had excellent or good Oxford scores.

mostly uncemented; 83.1% survival at 9 years and a revision rate of 2.13 per 100 component years; 2.13% revised for deep infection; 58% at six months and 69% at 5 years had excellent or good Oxford derived scores.

most likely a cemented Coonrad-Morrey prosthesis; 93.4% survival at four years and a revision rate of 1.11 per 100 component years; 1.6% have been revised for deep infection; 69% at six months and 88% at five years had excellent or good Oxford derived scores.

\* Averages derived from the number of surgeons recorded performing the above procedures during 2014 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 these; 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 database for fundraising 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 that 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 database 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 database 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 and questions were added to these, 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 number 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 database 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; and the national total and cumulative totals for each of these categories. Six month and, more recently, five 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 database 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 database 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 annual surgeon and hospital reports.

The validated Oxford questionnaire was available for the shoulder and derived, but not validated, questionnaires developed for the elbow and ankle joints. All persons receiving total arthroplasty of the above joints, as well as unicompartmental knee arthroplasties, are sent questionnaires with a reply rate of between 70 and 75%. As for hips and knees, the questionnaires are sent out six 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. In addition any change in the pattern of returns from private hospitals is checked.

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 2015 again demonstrated a New Zealand-wide public hospital compliance of > 95% 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

The staff has expanded to three part-time data entry personnel. They maintain a lag time between receipt and entry of data forms of no more than six weeks. It has been necessary to employ temporary staff during busy periods eg posting out the patient questionnaires.

The 2015 Registry staff are: Alastair Rothwell, Supervisor; Toni Hobbs, Coordinator; Lynley Diggs, Anne McHugh and Shona Tredinnick, Data Processors.

# Use of Registry Data

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

# **Registry Board**

This Registry Board membership consists of: five 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 affect the health status of implant patients, encourage and support research and collaborate with the International Society of Arthroplasty Registries.

# NUMBER OF JOINTS ANALYSED 1<sup>st</sup> JANUARY 1999- 31<sup>st</sup> DECEMBER 2014

Numbers of procedures registered								
Procedure	16 years	15 years	14 years	13 years	12 years	11 years	10 years	1-9 years
Hip, primary	101,835	93,491	85,780	78,289	71,069	63,702	56,396	49,392
Knee, primary	78,898	71,506	64,812	58,452	52,196	46,107	40,091	34,487
Hip, revision	15,083	13,954	12,713	11,593	10,462	9,451	8,414	7,362
Knee, unicompartmental	8,826	8,114	7,388	6,668	6,059	5,457	4,829	4,289
Shoulder, primary	6,331	5,530	4,783	4,085	3,506	3,012	2,498	2,041
Knee, revision	6,122	5,580	5,092	4,608	4,160	3,732	3,297	2,888
Ankle, primary	1,160	1,058	945	837	728	603	484	377
Shoulder, revision	502	436	360	306	256	214	180	139
Elbow, primary	435	409	387	363	330	300	266	226
Cervical disc, primary	268	224	200	168	122	98	66	41
Ankle, revision	161	141	116	94	69	56	44	38
Lumbar disc, primary	151	149	142	140	129	111	94	75
Elbow, revision	78	70	67	64	56	49	41	36
Lumbar disc, revision	4	3	3	3	3	3	1	1
Cervical disc, revision	2	1	1	1	1	1		
TOTAL	219,856	200,666	182,789	165,671	149,146	132,896	116,701	101,392

# Bilateral joint replacements carried out under the same anaesthetic

### **Bilateral hips**

1,973 patients (3,946 hips) 4% of primary hips

#### **Bilateral knees**

3,261 patients (6,522 knees) 8% of primary knees

#### **Bilateral Unicompartmental knees**

716 patients (1,432 knees) 16% of unicompartmental knees

#### **Bilateral ankles**

2 patients (4 ankles)

### **Bilateral shoulders**

4 patients (8 shoulders)

During the 16 year period, 154,220 individual patients were registered, of which 26,973 (17%) have died.

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

# HIP ARTHROPLASTY

# **PRIMARY HIP ARTHROPLASTY**

The **sixteen**-year report analyses data for the period January 1999 – December 2014. There were 101,833 primary hip procedures registered including 1,518 resurfacing arthroplasties. This is an additional 8,344 compared to last year's report which is double the number registered in 1999.

1999	4,114
2000	4,715
2001	4,932
2002	4,830
2003	5,058
2004	6,029
2005	6,320
2006	6,430
2007	6,962
2008	7,004
2009	7,306
2010	7,367
2011	7,220
2012	7,491
2013	7,711
2014	8,344

There was an 8.2% increase in hip registrations for 2014 which is nearly three times that of 2013.

# Data Analysis

### Age and sex distribution

The average age for all patients with primary hip arthroplasty was 66.92 years, with a range of 13.43 – 100.95 years.

### All hip arthroplasty

	Female	Male
Number	53,672	48,161
Percentage	52.71	47.29
Mean age	68.38	65.29
Maximum age	100.95	99.62
Minimum age	13.43	15.86
Standard dev.	11.57	11.51

#### Conventional hip arthroplasty

	Female	Male
Number	53,414	46,901
Percentage	53.25	46.75
Mean age	68.45	65.65
Maximum age	100.95	97.62
Minimum age	13.43	15.86
Standard dev.	11.52	11.36

#### Resurfacing hip arthroplasty

Female	Male
258	1,260
17.00	83.00
50.07	51.84
65.88	75.69
	258 17.00 50.07

Minimum age	25.72	17.74
Standard dev.	7.15	8.57

A further 89 resurfacing hips were registered during 2014.

2004	21
2005	38
2006	169
2007	188
2008	191
2009	203
2010	185
2011	142
2012	102
2013	90
2014	89

### Body Mass Index

For the five year period 2010 - 2014, there were 22,115 BMI registrations for primary hip replacements. The average was 28.81 with a range of 14 – 62 and a standard deviation of 5.56.

#### **Previous operation**

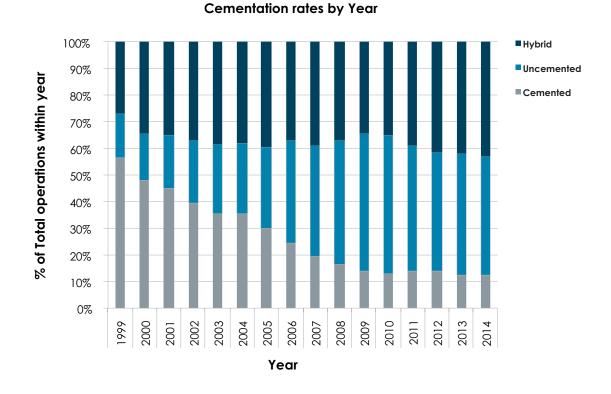
Image guided surgery

· · · · · · · · · · · · · · · · · · ·	
None	97,534
Internal fixation	1,975
Osteotomy	554
Arthrodesis	80
Diagnosis	
Osteoarthritis	88,738
Acute fracture NOF	3,705
Avascular necrosis	3,142
Developmental dysplasia	2,536
Rheumatoid arthritis	1,388
Old fracture NOF	1,270
Other inflammatory	791
Tumour	476
Post-acute dislocation	301
Approach	
Posterior	65,279
Lateral	26,927
Anterior	3,844
Minimally invasive	1,638
Trochanteric osteotomy	188

Image guided surgery was added to the updated forms at the beginning of 2005, but there continues to be little interest in the technique. The minimally invasive approach has also waned after a surge in 2008.

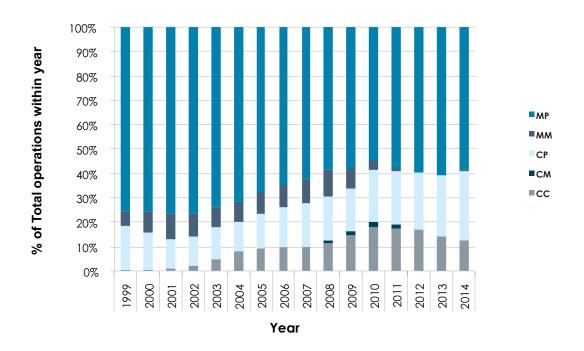
430





#### Comparison of proportions of cemented vs uncemented vs hybrid by year

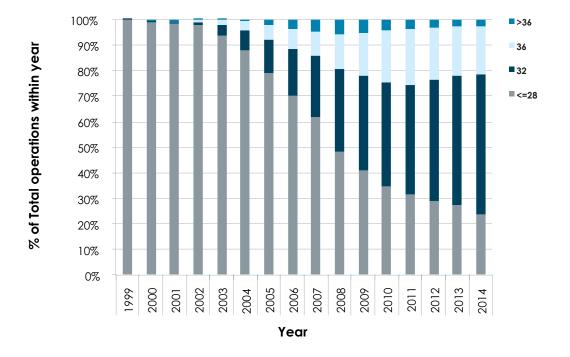
Comparison of different bearing surface usage over time



Surface Type by Year

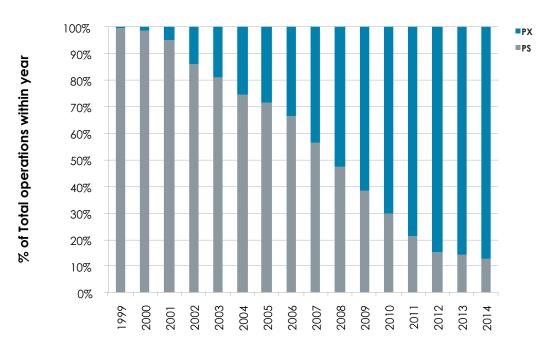
CC = ceramic/ceramic; CP = ceramic/polyethylene; CM = ceramic/metal; MM = metal/metal & MP = metal/polyethylene

#### Comparison of head size usage over time



Head Size by Year

Comparison usage of standard vs cross linked polyethylene over time



Polyethylene by Year

PS = standard & PX = cross linked polyethylene



#### Bone graft

Femoral autograft	224
Femoral allograft	42
Femoral synthetic	6
Acetabular autograft	814
Acetabular allograft	111
Acetabular synthetic	4

#### Cement

Femur cemented	62,918 (62%)
Antibiotic in cement	40,454 (64%)
Acetabulum cemented	4,990 (25%)
Antibiotic in cement	15,315 (61%)

#### Systemic antibiotic prophylaxis

Patient number receiving at least	
one systemic antibiotic:	97,617 (96%)

A cephalosporin was used in 87% of patients.

#### Operating theatre

Conventional	61,508
Laminar flow	38,670
Space suits	29,649

In 2014, 42% of arthroplasties were performed in laminar flow theatres, and 33% with space suits, both 1% lower than in 2013.

### **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

ASA	Number	Percentage
1	11,718	17
2	40,384	59
3	15,535	23
4	562	1

For the ten-year period 2005 – 2014, there were 68,199 (95%) primary hip procedures with the ASA class recorded.

#### Operative time (skin to skin in minutes)

Mean

79 minutes

#### Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the ten-year period 2005 – 2014.

Consultant	62,349
Advanced trainee supervised	5,985
Advanced trainee unsupervised	2,044
Basic trainee	1,598

#### Prosthesis usage

#### Conventional primary hips

#### Top 10 femoral components used in 2014

Exeter V40	3,138
Corail	1,136
Twinsys uncemented	432
Stemsys	336
C-Stem AMT	302
CPT	289
Synergy porous	277
MS 30	273
Twinsys cemented	267
CLS	265

The only change from 2013 is that the C-Stem AMT has returned at the expense of the Polarstem uncemented.

#### Top 10 acetabular components used in 2014

Pinnacle	1,609
RM Pressfit cup	1,057
Continuum TM	1,015
Trident	962
R3 porous	683
Tritanium	496
Fitmore	387
Contemporary	319
Exeter X3	316
Trilogy	256

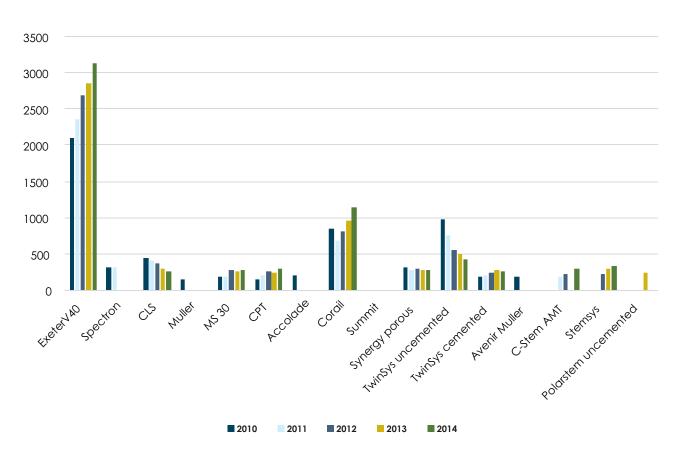
The only change from 2013 is that the Exeter X3 has replaced the Reflection Porous.

#### Top Ten Combinations used in 2014

Corail / Pinnacle	929
Exeter V40 / Trident	797
TwinSys uncemented / RM Pressfit cup	397
Exeter V40 / Tritanium	342
Exeter V40 / Continuum TM	332
Exeter V40 / Exeter X3	311
Exeter V40 / Contemporary	304
Synergy Porous / R3 porous	255
Polarstem uncemented / R3 porous	226
C-Stem AMT / Pinnacle	216

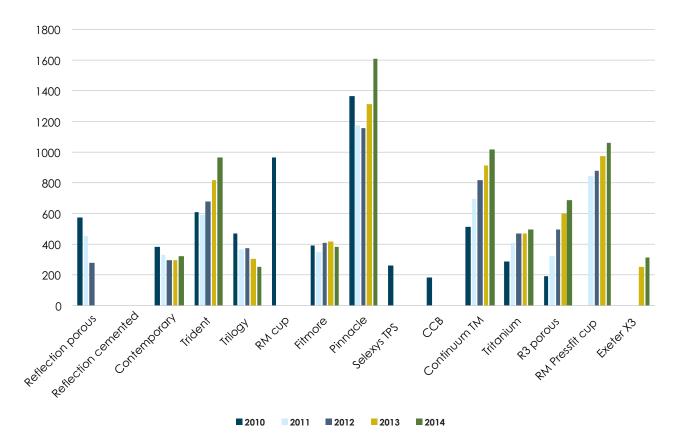
The Polarstem uncemented / R3 porous and the C-Stem AMT / Pinnacle have replaced the

Exeter V 40/ RM Pressfit and the TwinSys cemented / R M Pressfit respectively from the 2013 list.



#### Most Used Femoral Components 5 years 2010- 2014

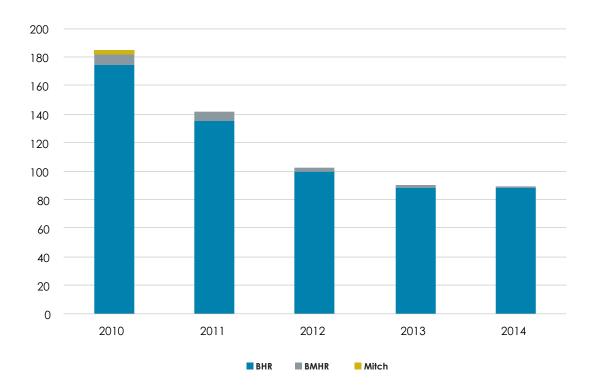
Most used acetabular components 5 years 2010 - 2014





#### Resurfacing hips components used in 2014

BHR	88
BMHR	1



## Resurfacing Components 5 years 2010-2014

# Surgeon and Hospital Workload

### Surgeons

In 2014, 214 surgeons performed 8,344 total hip replacements, an average of 39 procedures per surgeon.

40 surgeons performed less than 10 procedures and 61 performed more than 50.

### Hospitals

In 2014, primary hip replacement was performed in 51 hospitals, 27 public and 24 private.

# **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 is 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 sixteen-year period January 1999 – December 2014, there were 15,082 revision hip procedures registered. This is an additional 1,128 compared to last year's report.

The average age for a revision hip replacement was 69.95 years, with a range of 17.52–100.28 years.

#### **Revision hips**

-		
	Female	Male
Number	7,287	7,795
Percentage	48.32	51.68
Mean age	70.15	69.76
Maximum age	100.28	97.17
Minimum age	17.52	25.68
Standard dev.	12.13	10.82

The percentage of revision hips to primary hips is 15% and the ratio is 1:8.

### **Body Mass Index**

For the five year period 2010 - 2014, there were 1,626 BMI registrations for revision hip replacements. The average BMI was 28.88 with a range of 15-55 and a standard deviation of 5.60.

# Revision of Registered Primary Hip Arthroplasties

This section analyses data for revisions of **registered primary** hip arthroplasties for the sixteen year period.

There were 4,475 revisions of the 100,315 primary conventional hip replacements (4.5%) and 104 revisions of the 1,518 resurfacing hip replacements (6.8%), a total of 4,579 revisions.

#### Conventional hip arthroplasty analyses Time to revision for conventional hips

· · · · · · · · · · · ·	
Mean	1,764 days
Maximum	5,755 days
Minimum	0 days
Standard deviation	1,510 days
Reason for revision	
Dislocation	1078
Loosening acetabular component	1016
Loosening femoral component	773
Pain	631
Deep infection	514
Fracture femur	448
ALVAL*	182
High blood level of metal ions	28

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.



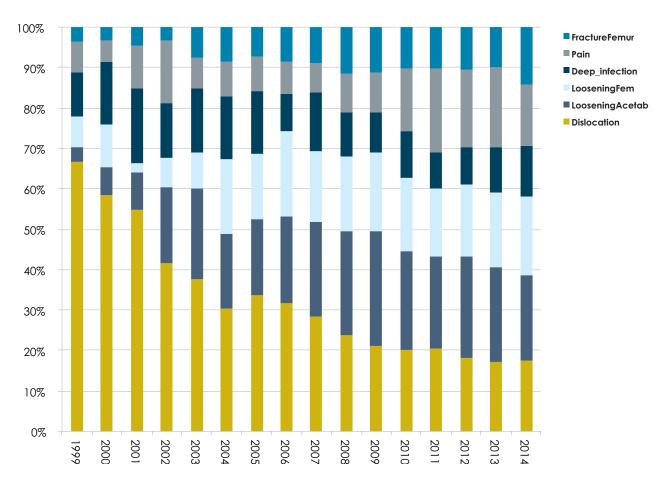
Years	Disloc	ation	Loose Aceta	•	Loosenin	ig Femur	Deep in	fection	Pain		Fracture Femur	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
0	481	44.60	122	12.00	76	9.80	191	37.20	58	9.20	172	38.40
1	135	12.50	66	6.50	61	7.90	82	16.00	76	12.00	26	5.80
2	93	8.60	63	6.20	59	7.60	57	11.10	70	11.10	30	6.70
3	75	7.00	74	7.30	58	7.50	37	7.20	57	9.00	24	5.40
4	45	4.20	62	6.10	58	7.50	26	5.10	50	7.90	34	7.60
5	54	5.00	68	6.70	58	7.50	21	4.10	54	8.60	22	4.90
6	47	4.40	81	8.00	72	9.30	21	4.10	52	8.20	16	3.60
7	32	3.00	71	7.00	67	8.70	15	2.90	35	5.50	20	4.50
8	34	3.20	79	7.80	48	6.20	18	3.50	38	6.00	21	4.70
9	16	1.50	87	8.60	48	6.20	19	3.70	34	5.40	21	4.70
10	21	1.90	63	6.20	58	7.50	13	2.50	32	5.10	20	4.50
11	14	1.30	59	5.80	44	5.70	5	1.00	36	5.70	12	2.70
12	15	1.40	48	4.70	35	4.50	4	0.80	18	2.90	15	3.30
13	8	0.70	49	4.80	19	2.50	3	0.60	11	1.70	6	1.30
14	5	0.50	16	1.60	9	1.20	1	0.20	6	1.00	9	2.00
15	3	0.30	8	0.80	3	0.40	1	0.20	4	0.60	0	0.00
Total	1078	100.00	1016	100.00	773	100.00	514	100.00	631	100.00	448	100.00

### Analysis by time of the 6 main reasons for revision

Analyses of percentages of the 6 main reasons for revision by year

	Dislocation	Loosening Acetabulum	Loosening Femur	Deep infection	Pain	Fracture Femur
	%	%	%	%	%	%
1999	54.50	3.00	6.10	9.10	6.10	3.00
2000	61.80	7.30	10.90	16.40	5.50	3.60
2001	56.00	9.50	2.40	19.00	10.70	4.80
2002	44.90	20.20	7.90	14.60	16.90	3.40
2003	42.30	25.40	10.00	17.70	8.50	8.50
2004	33.80	20.90	20.30	17.60	9.50	9.50
2005	34.10	19.20	16.20	15.60	9.00	7.20
2006	32.70	22.00	21.50	9.80	7.90	8.90
2007	29.50	24.30	18.30	14.90	7.50	9.30
2008	24.90	26.70	19.50	11.20	10.00	12.20
2009	22.20	29.60	20.50	10.10	10.40	11.80
2010	21.60	25.80	19.60	12.20	16.60	10.90
2011	20.70	22.70	17.00	8.80	20.70	10.40
2012	17.30	23.90	16.70	8.70	18.40	9.90
2013	15.90	21.90	17.20	10.30	18.50	9.10
2014	15.60	18.80	17.20	11.10	13.30	12.70

NB each year column does not add up to 100% as often more than one cause for revision is listed and there are other reasons for revision other than the 6 above listed in the registry.



NB each year column does not add up to 100% as often more than one cause for revision is listed and there are other reasons for revision other than the 6 above listed in the registry.

# **Resurfaced Hip Analyses**

There were 1,518 resurfacing hips registered and 104 have been revised.

#### Time to revision for resurfaced hips

Mean Maximum Minimum Standard deviation	1,568 days 3,668 days 10 days 939 days
Reason for revision	
Pain	30
Loosening acetabulum	14
Deep infection	13
Loosening femoral component	12
Fracture femur	10
Dislocation	1

### Statistical note

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

#### i) Observed component years

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

#### ii) 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, hence it is expressed 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 (Cl's) but sometimes significance can apply in the presence of Cl overlap.



### Conventional Primary Hip Arthroplasties All Primary Total Hip Arthroplasties

No. Ops.	Observed comp. Yrs	Number Revised	Rate/100- component-years	Exact 95% confidence interval		
100,315	616,736.2	4,475	0.73	0.70	0.75	

There are 1,001 (976 in 2013) hip prosthesis combinations in the Registry; 726 (72%) have 10 or fewer registered procedures and 322 (32%) one only.

The tables below contain the analyses of the 202 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

Exter V40frident6.7.123.4.410.21.1880.0.440.0.390.0.54Exter V40Contemporary5.66634.056.41.1440.420.3.60.0.60CorollPinnocle5.53219.990.01.4120.7.10.6.00.6.8Twinšys uncementedRM Prestfi cup3.7.3515.116.59.00.0.600.6.80.7.3SpectronReflection porous2.7.5520.599.51.5130.0.730.6.20.6.8Exter V40Tilogy2.1.0011.676.90.530.0.400.6.90.6.9CLSFilmore2.0.9015.854.48.000.0.90.6.90.6.9AccoladeTrident1.8.6214.246.07.90.0.500.0.400.6.9Muler PE cup1.6.8314.530.05.650.0.90.0.500.6.1Exter V40Karser1.6.3311.950.35.660.0.70.0.50.6.1SummitPinnocle1.4.631.6.34.71.6.20.0.40.0.20.1.7SummitPinnacle1.4.105.06.22.0.90.0.40.0.20.0.7Exter V40Pinnacle1.4.241.4.240.4.20.0.40.0.20.0.7SummitPinnacle1.4.631.1.950.31.6.80.0.40.0.50.6.1Exter V40Pinnacle1.4.631.6.34.71.6.20.0.40.0.20.1.7Exter V40Pinnacle1.4.101.4.631	Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
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SpectronReflection cemented2,9482,5725.12520,5910,7310,8481,11SpectronReflection porous2,75520,599.51,510,730,620,864Exter V40Trilogy2,19011,676.9530,450,340,50CLSFilmore2,09015,854.48000,500,400,63AccoladeTident1,86714,246.0790,550,440,69Muller DE cup1,6331,503.0570,390,300,51CLSMorscher1,63511,950.35640,470,350,61Exter V40Exter1,63511,950.35640,470,350,61Exter V40Filmore1,4708,018.1270,340,220,49SummitPinacle1,4305,062.32,630,470,320,73Exter V40Filmore1,4345,062.32,630,490,320,73Exter V40Filmore1,3422,904.70,550,440,320,73Exter V40Continuum TM1,3142,794.23,250,670,440,49Exter V40Continuum TM1,3422,794.21,250,470,420,42Exter V40Continuum TM1,3422,794.21,250,470,420,44ClSContinuum TM1,3422,794.21,281,020,460,42Exter V40<	Corail	Pinnacle	5,532	19,990.0	142	0.71	0.60	0.84
LendCementedLend <t< td=""><td>TwinSys uncemented</td><td>RM Pressfit cup</td><td>3,735</td><td>15,116.5</td><td>90</td><td>0.60</td><td>0.48</td><td>0.73</td></t<>	TwinSys uncemented	RM Pressfit cup	3,735	15,116.5	90	0.60	0.48	0.73
Exeter V40Trilogy2.19011.676.9530.450.340.59CLSFitmore2.09015.854.48000.0500.400.63AccoladeTrident1.86714.246.0790.550.440.69Muller PE cup1.69314.530.0570.390.300.51CLSMorscher1.68217.317.88440.490.390.60Exeter V40Exeter1.63511.950.35660.470.320.61Exeter V40Exeter1.63511.950.35660.470.320.61SummitPinnacle1.4978.018.1270.340.220.49SummitPinnacle1.4335.062.32.550.490.320.73Exeter V40Pinnacle1.4342.906.72.050.641.35Exeter V40Continuum TM1.3142.794.2351.250.84Exeter V40Continuum TM1.3432.794.2350.1250.64Exeter V40RM Pressit cup1.2316.158.6791.280.120.44Synergy PorousRefection porous1.1433.621.21.381.163.420.120.64Synergy PorousRefection porous1.1631.645.81.110.240.120.640.44Synergy PorousRefection porous1.1631.645.41.381.180.460.450.46Sy	Spectron		2,945	25,725.1	252	0.98	0.86	1.11
CLSFinore2.09015.8548800.000.040.03AccoladeTident1.86714.246.790.550.440.69MullerMuller PE cup1.69314.530.570.390.300.51CLSMorscher1.68217.317.88440.0490.390.60Exter V40Exter1.63511.950.5660.0470.390.61ExterContemporary1.5116.334.71580.0270.821.13MS 30Fitnore1.4478.018.1270.340.220.49SummitPinacle1.4335.062.32.050.490.320.73Exter V40Pinacle1.4345.062.32.050.490.320.73Exter V40Pinacle1.3432.906.72.050.641.35Exter V40Continum TM1.3142.794.2350.150.040.14CLSExpansion1.2331.21019.050.070.440.94CLSContinum TM1.3432.794.2350.1250.040.14CLSContinum TM1.2316.158.6790.460.420.45Exter V40RM Pressit cup1.2414.653.81.110.240.120.46Synergy PorousRefection porous1.1621.658.41.031.1680.460.320.64Synergy PorousRiderin porous <t< td=""><td>Spectron</td><td>Reflection porous</td><td>2,755</td><td>20,599.5</td><td>151</td><td>0.73</td><td>0.62</td><td>0.86</td></t<>	Spectron	Reflection porous	2,755	20,599.5	151	0.73	0.62	0.86
AccoladeTrident1,86714,246.07790.550.440.69MullerMuller PE cup1,69314,530.0570.390.300.51CLSMorscher1,68217,317.88.840.490.390.60Exeter V40Exeter1,65511,950.3560.470.350.61ExeterContemporary1,51516,334.71580.970.821.13MS 30Fitmore1,4978,018.12.770.340.220.49SummitPinnacle1,4135,062.32.050.490.320.73Exeter V40Fitnore1,3142,906.72.050.490.320.73Exeter V40Continuum TM1,3142,794.23.50.630.640.35Exeter V40Continuum TM1,3142,794.23.50.690.440.94CLSCLS Expansion1,2331,210.19.50.790.640.94Exeter V40RM Pressfit cup1,2434,6331.110.420.120.44CLSCLS Expansion1,2316,158.67.91.1280.140.44Synergy PorousReflection porous1,1531,645.41.381.180.991.40Synergy PorousRM Pressfit cup1,1631,645.41.381.180.991.40Synergy PorousRM Pressfit cup1,1633,621.12.1620.661.51	Exeter V40	Trilogy	2,190	11,676.9	53	0.45	0.34	0.59
MullerMuller PE cup1,69314,530570.390.300.51CLSMorscher1,68217,317.88.840.490.390.60Exeter V40Exeter1,63511,950.35.650.4.70.350.61ExeterContemporary1,55116,334.71580.9.70.821.1.3MS 30Fitmore1,4978,018.12.70.340.220.49SummitPinacle1,4135,062.32.050.490.721.2.1Exeter V40Pinacle1,1342,906.72.050.6.70.6.80.73Exeter V40Titanium1.3.242,906.72.0.50.6.70.6.80.73Exeter V40Continuum TM1.3.142,790.23.00.6.70.6.80.73Exeter V40Continuum TM1.2.341.2.109.00.6.70.6.40.9.8Exeter V40Continuum TM1.2.342.794.23.550.7.90.6.40.9.8Exeter V40Separsinon1.2.631.2.109.50.6.70.6.40.9.8Exeter V40Separsinon1.2.242.794.23.51.0.20.6.70.6.4Exeter V40Separsinon1.2.631.2.109.50.6.70.6.40.9.8Exeter V40Separsinon1.2.241.2.631.1.51.0.20.6.70.6.40.9.4Exeter V40Separsinon1.2.451.2.61.0.61.0	CLS	Fitmore	2,090	15,854.4	80	0.50	0.40	0.63
CLSMorscher1.68217,317.8840.490.390.60Exeter V40Exeter1.63311,950.3560.470.350.61ExeterContemporary1.55116,334.71580.970.821.13MS 30Fitmore1.4978.018.12.70.340.220.49SummitPinnacle1.4606.577.66.220.940.721.21Exeter V40Pinnacle1.4335.062.32.550.490.320.73Exeter V40Fitmore1.3742.906.72.720.930.611.33Exeter V40Continuum TM1.3742.906.72.900.670.540.82Exeter V40Continuum TM1.3142.794.23.51.250.871.74CLSCLS Expansion1.2431.2101.19.50.790.640.020.64Exeter V40RM Pressfit cup1.1244.653.81.110.240.120.44CLSCLS Expansion1.1244.653.81.110.240.120.64Synergy PorousReflection porous1.1627.613.63.50.460.320.64Synergy PorousReflection porous1.1651.1645.41.381.180.991.40TwinSys cementedRM Pressfit cup1.0633.621.12.141.580.360.86Synergy PorousR3 porous1.1633.621.12.121.	Accolade	Trident	1,867	14,246.0	79	0.55	0.44	0.69
Exeter V40ExeterInterim (Contemporary)Interim (Con	Muller	Muller PE cup	1,693	14,530.0	57	0.39	0.30	0.51
ExeterContemporary1,55116,334.711580.0970.821.13MS 30Fitmore1.4978.018.1270.340.220.49SummitPinnacle1.4606.577.6620.940.721.21Exeter V40Pinnacle1.1435.062.32.250.490.320.73Exeter V40Pinnacle1.1342.906.72.070.930.611.35Exeter V40Tritanium1.3742.906.72.070.630.611.35Exeter V40Continuum TM1.3142.794.2351.250.871.74CLSCLS Expansion1.2631.2101950.790.640.94Exeter V40RM Pressfit cup1.2474.653.81.110.240.120.42Synergy PorousReflection porous1.1627.613.6350.460.320.64Synergy PorousR3 porous1.1633.621.11.211.650.360.360.36MullerRM cup1.083.621.12.1482.51.020.661.51	CLS	Morscher	1,682	17,317.8	84	0.49	0.39	0.60
MS 30         Filmore         1,497         8,018.1         27         0.34         0.22         0.49           Summit         Pinnacle         1,460         6,577.6         62         0.94         0.72         1.21           Exeter V40         Pinnacle         1,413         5,062.3         2.5         0.49         0.32         0.73           Exeter V40         Tritanium         1,374         2,906.7         2.72         0.93         0.61         1.35           Exeter V40         Tritanium         1,374         2,906.7         2.79         0.63         0.64         0.82           Exeter V40         Continuum TM         1,314         2,794.2         3.5         1.25         0.87         1.74           CLS         Continuum TM         1,314         2,794.2         3.5         1.02         0.64         0.82           Exeter V40         Continuum TM         1,243         1,210.1         9.5         0.79         0.64         0.94           Keter V40         RM Pressift cup         1,247         4,653.8         1.1         0.12         0.64         0.42           Synergy Porous         Reflection porous         1,162         7,613.6         3.5         0.46	Exeter V40	Exeter	1,635	11,950.3	56	0.47	0.35	0.61
SummitPinnacleIndexA ConstructionA ConstructionA ConstructionA ConstructionA ConstructionA ConstructionA 	Exeter	Contemporary	1,551	16,334.7	158	0.97	0.82	1.13
Exeter V40         Pinnacle         1,413         5,062.3         25         0.09         0.32         0.73           Exeter V40         Tritanium         1,374         2,906.7         27         0.93         0.61         1.35           Exeter V40         Exeter         Exeter         1,326         13.420.2         90         0.67         0.54         0.82           Exeter V40         Continuum TM         1.314         2,794.2         35         1.25         0.87         1.74           CLS         Continuum TM         1.314         2,794.2         35         1.25         0.87         1.74           Exeter V40         Continuum TM         1.314         2,794.2         35         0.67         0.64         0.82           Exeter V40         ClS Expansion         1.263         1.2101.1         95         0.79         0.64         0.96           Exeter V40         RM Pressfit cup         1.231         6.158.6         79         1.28         1.02         1.60           Synergy Porous         Reflection porous         1.162         7,613.6         35         0.46         0.32         0.64           Synergy Porous         RM Pressfit cup         1.060         3.621.1	MS 30	Fitmore	1,497	8,018.1	27	0.34	0.22	0.49
Exeter V40         Tritanium         1,374         2,906.7         27         0,93         0,61         1,355           Exeter         Exeter         Exeter         1,326         13,420.2         90         0,67         0,54         0,82           Exeter V40         Continuum TM         1,314         2,794.2         35         1,25         0,87         1,74           CLS         Continuum TM         1,314         2,794.2         35         1,25         0,87         1,74           Exeter V40         ClS Expansion         1,263         1,2101.1         95         0,79         0,64         0,96           Exeter V40         RM Pressfit cup         1,243         4,653.8         11         0,24         0,12         0,42           Exeter V40         RM Pressfit cup         1,247         4,653.8         11         0,24         0,12         0,42           IvinSys uncemented         Selexys TPS         1,231         6,158.6         79         1,28         1,02         1,60           Synergy Porous         Reflection porous         1,163         11,665.4         138         1,18         0,99         1,40           Synergy Porous         R3 porous         10,08         2,448.2 <td>Summit</td> <td>Pinnacle</td> <td>1,460</td> <td>6,577.6</td> <td>62</td> <td>0.94</td> <td>0.72</td> <td>1.21</td>	Summit	Pinnacle	1,460	6,577.6	62	0.94	0.72	1.21
ExeterExeterExeterIndex Particular <th< td=""><td>Exeter V40</td><td>Pinnacle</td><td>1,413</td><td>5,062.3</td><td>25</td><td>0.49</td><td>0.32</td><td>0.73</td></th<>	Exeter V40	Pinnacle	1,413	5,062.3	25	0.49	0.32	0.73
Exeter V40Continuum TM1,3142,794.2351.260.871.74CLSCLS Expansion11,2631,2101.1950.790.640.96Exeter V40RM Pressfit cup11,2474,653.81110.240.120.42TwinSys uncementedSelexys TPS11,2316,158.67911.281.021.60Synergy PorousReflection porous11,1627,613.6350.460.320.64SpectronDuraloc11,15311,665.41.381.180.991.40Synergy PorousRM Pressfit cup11,0983,621.1210.580.360.89Synergy PorousRM pressfit cup11,0602,448.2251.020.641.51MullerRM cup1.019,159.37,10.780.610.98	Exeter V40	Tritanium	1,374	2,906.7	27	0.93	0.61	1.35
CLS         CLS Expansion         1.263         1.2101.1         95         0.79         0.64         0.96           Exeter V40         RM Pressft cup         1.247         4.653.8         11         0.24         0.12         0.42           TwinSys uncemented         Selexys TPS         1.231         6.158.6         79         1.28         1.02         1.60           Synergy Porous         Reflection porous         1.162         7.613.6         35         0.46         0.32         0.64           Spectron         Duraloc         1.153         11.665.4         138         1.18         0.99         1.40           Synergy Porous         RM Pressft cup         1.098         3.621.1         21         0.58         0.36         0.89           Synergy Porous         RM pressft cup         1.098         3.621.1         21         0.58         0.36         0.89           Synergy Porous         R3 porous         1.060         2.448.2         25         1.02         0.66         1.51           Muller         RM cup         1.013         9.159.3         7.1         0.78         0.61         0.98	Exeter	Exeter	1,326	13,420.2	90	0.67	0.54	0.82
Exeter V40RM Pressfit cup1,2474,653.8110.240.120.42TwinSys uncementedSelexys TPS1,2316,158.6791.281.021.60Synergy PorousReflection porous1,1627,613.6350.460.320.64SpectronDuraloc1,15311,665.41381.180.991.40TwinSys cementedRM Pressfit cup1,0693,621.1210.580.360.89Synergy PorousR3 porous1,0602,448.2251.020.661.51MullerRM cup1,0139,159.3710.780.610.98	Exeter V40	Continuum TM	1,314	2,794.2	35	1.25	0.87	1.74
TwinSys uncementedSelexys TPS1,2316,158.6791.281.021.60Synergy PorousReflection porous1,1627,613.6350.460.320.64SpectronDuraloc1,15311,665.41381.180.991.40TwinSys cementedRM Pressfit cup1,0683,621.1210.580.360.89Synergy PorousR3 porous1,0602,448.2251.020.661.51MullerRM cup1,0139,159.3710.780.610.98	CLS	CLS Expansion	1,263	1,2101.1	95	0.79	0.64	0.96
Synergy Porous         Reflection porous         1,162         7,613.6         35         0.46         0.32         0.64           Spectron         Duraloc         1,153         11,665.4         138         1.18         0.99         1.40           TwinSys cemented         RM Pressfit cup         1,098         3,621.1         21         0.58         0.36         0.89           Synergy Porous         R3 porous         1,060         2,448.2         25         1.02         0.66         1.51           Muller         RM cup         1,013         9,159.3         71         0.78         0.61         0.98	Exeter V40	RM Pressfit cup	1,247	4,653.8	11	0.24	0.12	0.42
Spectron         Duraloc         1,153         11,665.4         138         1.18         0.99         1.40           TwinSys cemented         RM Pressfit cup         1,098         3,621.1         21         0.58         0.36         0.89           Synergy Porous         R3 porous         11,060         2,448.2         25         1.02         0.66         1.51           Muller         RM cup         1,013         9,159.3         71         0.78         0.61         0.98	TwinSys uncemented	Selexys TPS	1,231	6,158.6	79	1.28	1.02	1.60
TwinSys cemented         RM Pressfit cup         1,098         3,621.1         21         0.58         0.36         0.89           Synergy Porous         R3 porous         1,060         2,448.2         25         1,02         0.66         1,51           Muller         RM cup         1,013         9,159.3         71         0.78         0.61         0.98	Synergy Porous	Reflection porous	1,162	7,613.6	35	0.46	0.32	0.64
Synergy Porous         R3 porous         1,060         2,448.2         25         1.02         0.66         1.51           Muller         RM cup         1,013         9,159.3         71         0.78         0.61         0.98	Spectron	Duraloc	1,153	11,665.4	138	1.18	0.99	1.40
Muller         RM cup         1,013         9,159.3         71         0.78         0.61         0.98	TwinSys cemented	RM Pressfit cup	1,098	3,621.1	21	0.58	0.36	0.89
	Synergy Porous	R3 porous	1,060	2,448.2	25	1.02	0.66	1.51
Exeter V40         Exeter X3         993         1,730.4         11         0.64         0.32         1.14	Muller	RM cup	1,013	9,159.3	71	0.78	0.61	0.98
	Exeter V40	Exeter X3	993	1,730.4	11	0.64	0.32	1.14

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
Exeter V40	Duraloc	987	8,211.7	71	0.86	0.68	1.09
C-Stem AMT	Pinnacle	902	2,319.7	13	0.56	0.30	0.96
Exeter	Osteolock	836	9,449.5	59	0.62	0.48	0.81
MS 30	Morscher	787	7,842.8	51	0.65	0.48	0.85
CCA	ССВ	727	4,643.6	22	0.47	0.30	0.72
Exeter V40	Reflection cemented	718	3,124.9	11	0.35	0.18	0.63
CLS	Duraloc	699	7,272.5	62	0.85	0.65	1.09
CPT	Trilogy	697	4,213.6	41	0.97	0.70	1.32
CPT	Continuum TM	635	1,111.4	11	0.99	0.49	1.77
Exeter V40	Morscher	630	5,410.1	25	0.46	0.30	0.68
Elite plus	Duraloc	608	5,677.5	93	1.64	1.32	2.01
Exeter	Duraloc	553	6,645.3	76	1.14	0.90	1.43
Exeter	Morscher	551	6,829.9	29	0.42	0.28	0.61
CPT	ZCA	536	4,557.2	24	0.53	0.34	0.78
Exeter V40	Fitmore	528	1,937.9	4	0.21	0.06	0.53
Polarstem uncemented	R3 porous	503	690.0	7	1.01	0.41	2.09
CLS	Trilogy	469	2,322.7	13	0.56	0.30	0.96
Exeter V40	Reflection porous	466	2,502.1	7	0.28	0.11	0.58
Corail	Duraloc	464	3,810.8	32	0.84	0.57	1.19
MS 30	Muller PE cup	462	3,906.8	15	0.38	0.21	0.63
Charnley	Charnley	456	4,508.2	18	0.40	0.24	0.63
CLS	RM Pressfit cup	452	2,037.5	14	0.69	0.38	1.15
Femoral Stem Press Fit	Continuum TM	408	968.7	11	1.14	0.57	2.03
H-Max S	Delta-TT Cup	391	700.4	8	1.14	0.49	2.25
Versys cemented	ZCA	391	3,466.9	20	0.58	0.35	0.89
CLS	Continuum TM	383	831.2	7	0.84	0.34	1.74
Exeter V40	ССВ	380	1,486.8	5	0.34	0.11	0.78
Stemsys	Fixa Ti Por	378	612.2	6	0.98	0.36	2.13
Muller	Weber	377	3,051.2	12	0.39	0.20	0.69
Spectron	R3 porous	375	1,006.3	5	0.50	0.16	1.16
TwinSys uncemented	Delta-PF Cup	370	1,575.7	1	0.06	0.00	0.35
TwinSys cemented	ССВ	351	1,295.3	4	0.31	0.08	0.79
ABGII	Trident	342	2,914.7	21	0.72	0.45	1.10
Polarstem uncemented	Reflection porous	334	892.9	12	1.34	0.69	2.35
CBC Stem	RM Pressfit cup	322	1,335.3	13	0.97	0.52	1.66
S-Rom	Pinnacle	321	2,400.2	25	1.04	0.67	1.54
CLS	Reflection porous	318	1,852.5	13	0.70	0.37	1.20
Charnley	Charnley Cup Ogee	303	3,247.0	19	0.59	0.35	0.91
Elite plus	Charnley	298	3,219.2	21	0.65	0.40	1.00



Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
Trabecular Metal Stem	Continuum TM	298	653.3	13	1.99	1.06	3.40
Exeter V40	R3 porous	297	543.1	2	0.37	0.04	1.33
Elite plus	Elite Plus LPW	282	2,606.7	11	0.42	0.21	0.76
Muller	RM Pressfit cup	277	1,418.3	3	0.21	0.04	0.62
Versys	Trilogy	272	3,083.7	13	0.42	0.22	0.72
Exeter V40	Osteolock	270	2,575.2	10	0.39	0.19	0.71
Stemsys	DeltaMotion Cup	268	935.4	4	0.43	0.12	1.09
C-Stem AMT	Marathon cemented	260	873.9	6	0.69	0.25	1.49
Versys cemented	Trilogy	237	2,170.4	7	0.32	0.13	0.66
Accolade II	Trident	229	214.6	2	0.93	0.11	3.37
Accolade II	Tritanium	216	211.9	2	0.94	0.11	3.41
MS 30	Trilogy	216	1,019.8	3	0.29	0.06	0.86
Exeter	Trilogy	213	2,440.4	13	0.53	0.28	0.91
CPT	Duraloc	212	2,082.7	12	0.58	0.30	1.01
Spectron	Morscher	210	2,315.5	21	0.91	0.56	1.39
TwinSys uncemented	Trilogy	209	1,080.7	8	0.74	0.32	1.46
MS 30	Continuum TM	199	434.9	2	0.46	0.06	1.66
CLS	Durom	198	1,399.2	38	2.72	1.92	3.73
CLS	Allofit	192	1,315.8	15	1.14	0.64	1.88
CBC Stem	Expansys shell	183	1,295.0	19	1.47	0.88	2.29
Accolade	Pinnacle	180	970.8	2	0.21	0.02	0.74
Stemsys	Agilis Ti-por	179	227.2	1	0.44	0.01	2.45
Avenir Muller uncemented	Continuum TM	166	481.2	8	1.66	0.72	3.28
CLS	Trident	162	1,371.4	11	0.80	0.40	1.44
Stemsys	RM Pressfit cup	162	280.1	1	0.36	0.01	1.99
Friendly	Delta-PF Cup	159	1,076.6	3	0.28	0.06	0.81
Corail	ASR	156	915.0	71	7.76	6.06	9.79
Accolade	Tritanium	152	499.4	2	0.40	0.05	1.45
Lateral straight stem	Muller PE cup	152	1,290.7	9	0.70	0.32	1.32
Spectron	Mallory-Head	152	1,377.5	6	0.44	0.16	0.95
Exeter V40	Trabecular Metal Shell	149	547.3	8	1.46	0.63	2.88
Omnifit	Trident	149	1,350.2	12	0.89	0.46	1.55
TwinSys cemented	RM cup	148	1,005.6	4	0.40	0.11	1.02
CPT	Trident	145	1,146.7	11	0.96	0.48	1.72
Corail	Reflection porous	140	889.9	1	0.11	0.00	0.63
ABGII	Duraloc	139	1,560.9	24	1.54	0.99	2.29
Femoral Stem Press Fit	Trilogy	139	728.0	4	0.55	0.15	1.41
Muller	ZCA	138	667.5	2	0.30	0.04	1.08

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
Corail	Continuum TM	137	244.7	2	0.82	0.10	2.95
Corail	Ultima	135	1,014.3	3	0.30	0.06	0.86
Summit	Trilogy	135	757.7	5	0.66	0.21	1.54
CCA	RM Pressfit cup	132	937.9	3	0.32	0.07	0.93
CPT	Fitmore	131	537.8	8	1.49	0.64	2.93
S-Rom	ASR	130	661.4	87	13.15	10.54	16.23
Exeter	CLS Expansion	129	1,409.7	9	0.64	0.29	1.21
MS 30	Contemporary	128	1,028.4	7	0.68	0.27	1.40
Corail	Tritanium	127	283.4	3	1.06	0.22	3.09
Corail	Trilogy	125	356.7	3	0.84	0.17	2.46
Exeter V40	Monoblock Acetabular Cup	123	1,205.9	5	0.41	0.13	0.97
Muller	Continuum TM	123	304.9	2	0.66	0.08	2.37
Exeter V40	Bio-clad poly	122	634.0	2	0.32	0.04	1.14
TwinSys uncemented	RM cup	122	609.6	3	0.49	0.10	1.44
Exeter	Muller PE cup	119	1,288.1	6	0.47	0.17	1.01
TwinSys uncemented	Continuum TM	118	340.8	3	0.88	0.18	2.57
ABG	Duraloc	116	1,584.7	26	1.64	1.07	2.40
Muller	ZCA all-poly cup	116	298.9	1	0.33	0.01	1.86
Muller	Trilogy	115	634.9	13	2.05	1.09	3.50
Accolade	Muller PE cup	114	948.7	1	0.11	0.00	0.59
Synergy Porous	BHR Acetabular Cup	114	722.1	13	1.80	0.96	3.08
CLS	RM cup	113	856.9	13	1.52	0.81	2.59
Exeter	Bio-clad poly	113	1,144.8	6	0.52	0.19	1.14
Prodigy	Duraloc	113	1,267.8	16	1.26	0.72	2.05
Corail	Fitmore	110	95.8	2	2.09	0.25	7.54
Elite plus	Elite Plus Ogee	110	968.5	5	0.52	0.17	1.20
CPCS	R3 porous	109	125.1	0	0.00	0.00	2.95
ABGII	Delta-PF Cup	107	929.8	9	0.97	0.44	1.84
CLS	Weill ring	106	1,267.5	7	0.55	0.22	1.14
Avenir Muller uncemented	RM cup	105	455.4	1	0.22	0.01	1.22
Basis	Reflection porous	105	504.0	1	0.20	0.01	1.11
Mallory-Head	M2A	105	907.7	11	1.21	0.60	2.17
Stemsys	Delta-PF Cup	105	84.8	0	0.00	0.00	4.35
SL monoblock	Muller PE cup	101	910.4	3	0.33	0.07	0.96
Summit	Duraloc	101	883.7	5	0.57	0.18	1.32
Avenir Muller uncemented	Pinnacle	99	434.8	3	0.69	0.14	2.02
Corail	Monoblock Acetabular Cup	95	611.4	4	0.65	0.18	1.68
Exeter V40	Muller PE cup	94	718.4	3	0.42	0.09	1.22



Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
MS 30	ZCA all-poly cup	94	185.9	0	0.00	0.00	1.98
Anthology Porous	BHR Acetabular Cup	93	496.1	12	2.42	1.25	4.23
Exeter V40	Delta-TT Cup	92	170.1	0	0.00	0.00	2.17
Avenir Muller uncemented	Tritanium	91	322.4	0	0.00	0.00	1.14
Exeter V40	CLS Expansion	88	818.9	1	0.12	0.00	0.68
Summit	ASR	88	540.6	26	4.81	3.14	7.05
Synergy Porous	Delta-PF Cup	88	441.1	0	0.00	0.00	0.84
MS 30	RM Pressfit cup	87	535.4	2	0.37	0.05	1.35
H-Max M	Delta-TT Cup	86	350.5	2	0.57	0.07	2.06
CPT	Tritanium	85	298.5	5	1.68	0.54	3.91
CPT	Monoblock Acetabular Cup	84	690.6	7	1.01	0.41	2.09
Exeter	Trident	84	997.3	0	0.00	0.00	0.37
Exeter V40	ZCA all-poly cup	81	123.9	0	0.00	0.00	2.98
CLS	Monoblock Acetabular Cup	80	584.2	4	0.68	0.19	1.75
Corail	Delta-PF Cup	78	608.7	1	0.16	0.00	0.92
Muller	Duraloc	78	860.8	9	1.05	0.48	1.98
S-Rom	Ultima	78	989.4	8	0.81	0.35	1.59
Spectron	Fitmore	78	827.3	4	0.48	0.13	1.24
Spectron	Trident	78	692.4	3	0.43	0.09	1.27
CPT	ZCA all-poly cup	76	177.8	1	0.56	0.01	3.13
Muller	Trident	76	594.5	9	1.51	0.69	2.87
Corail	DeltaMotion Cup	75	211.0	0	0.00	0.00	1.75
AML MMA	Duraloc	74	829.4	9	1.09	0.50	2.06
CCA	Contemporary	74	723.0	10	1.38	0.66	2.54
Trabecular Metal Stem	Monoblock Acetabular Cup	74	543.9	3	0.55	0.11	1.61
ABG	ABGII	72	948.2	14	1.48	0.81	2.48
Contemporary	Contemporary	71	801.0	10	1.25	0.60	2.30
Exeter V40	ZCA	71	378.2	1	0.26	0.01	1.47
H-Max M	Delta-PF Cup	71	302.9	6	1.98	0.73	4.31
C-stem AMT	Pinnacle	70	54.2	2	3.69	0.45	13.33
Echo(TM) Bi-metric	G7 acetabular shell	70	61.0	1	1.64	0.04	9.14
Muller	Morscher	70	747.3	4	0.54	0.15	1.37
Spectron	Biomex acet shell porous	68	827.6	1	0.12	0.00	0.67
ABGII	Pinnacle	67	411.9	3	0.73	0.15	2.13
CLS	Pinnacle	66	339.4	0	0.00	0.00	1.09
Spectron	Muller PE cup	66	598.3	7	1.17	0.47	2.41
Anthology Porous	R3 porous	65	340.6	12	3.52	1.82	6.16

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
TwinSys cemented	Selexys TPS	65	251.1	4	1.59	0.43	4.08
CPT	Pinnacle	64	338.3	2	0.59	0.07	2.14
Furlong	Furlong	64	566.3	5	0.88	0.29	2.06
Tri-Lock BPS	Pinnacle	62	195.3	3	1.54	0.32	4.49
Wagner cone stem	Fitmore	62	558.6	3	0.54	0.11	1.57
Corail	Trident	61	195.2	3	1.54	0.32	4.49
CBC Stem	Fitmore	59	381.8	5	1.31	0.43	3.06
CLS	Artek	59	603.6	22	3.65	2.28	5.52
Femoral Stem Press Fit	Trident	59	126.9	1	0.79	0.02	4.39
Muller	CLS Expansion	59	409.3	4	0.98	0.27	2.50
Zimmer Femoral Stem Press-Fit	Continuum TM	59	142.6	2	1.40	0.17	5.06
Echo(TM) Bi-metric	Exceed ABT Ringloc-X	57	96.2	1	1.04	0.03	5.79
Muller	Fitmore	57	309.4	1	0.32	0.01	1.80
C-Stem	Elite Plus Ogee	55	472.2	2	0.42	0.05	1.53
Friendly	Delta-TT Cup	55	186.3	2	1.07	0.13	3.88
MS 30	Duraloc	55	661.3	6	0.91	0.33	1.97
TwinSys cemented	Continuum TM	54	66.7	0	0.00	0.00	5.53
AML	Duraloc	53	638.6	2	0.31	0.04	1.13
C-Stem	Duraloc	53	527.6	5	0.95	0.31	2.21
Corail	RM Pressfit cup	53	93.1	1	1.07	0.03	5.98
Exeter V40	Weber	53	449.5	0	0.00	0.00	0.82
Lateral straight stem	Weber	53	506.6	0	0.00	0.00	0.73
Femoral Stem Press Fit	Delta-TT Cup	52	87.0	2	2.30	0.28	8.30

# **Revisions versus Hip Prostheses Combinations Sorted on Revision Rate** Minimum of 50 primary registered arthroplasties

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% confidence interval	
*S-Rom	ASR	130	661.4	87	13.15	10.54	16.23
*Corail	ASR	156	915.0	71	7.76	6.06	9.79
*Summit	ASR	88	540.6	26	4.81	3.14	7.05
*C-stem AMT	Pinnacle	70	54.2	2	3.69	0.45	13.33
*CLS	Artek	59	603.6	22	3.65	2.28	5.52
*Anthology Porous	R3 porous	65	340.6	12	3.52	1.82	6.16
*CLS	Durom	198	1,399.2	38	2.72	1.92	3.73
*Anthology Porous	BHR Acetabular Cup	93	496.1	12	2.42	1.25	4.23
Femoral Stem Press Fit	Delta-TT Cup	52	87.0	2	2.30	0.28	8.30
Corail	Fitmore	110	95.8	2	2.09	0.25	7.54



Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		ct 95% ce interval
*#Muller	Trilogy	115	634.9	13	2.05	1.09	3.50
*#Trabecular Metal Stem	Continuum TM	298	653.3	13	1.99	1.06	3.40
H-Max M	Delta-PF Cup	71	302.9	6	1.98	0.73	4.31
*Synergy Porous	BHR Acetabular Cup	114	722.1	13	1.80	0.96	3.08
CPT	Tritanium	85	298.5	5	1.68	0.54	3.91
Avenir Muller uncemented	Continuum TM	166	481.2	8	1.66	0.72	3.28
*ABG	Duraloc	116	1,584.7	26	1.64	1.07	2.40
Echo(TM) Bi-metric	G7 acetabular shell	70	61.0	1	1.64	0.04	9.14
*Elite plus	Duraloc	608	5,677.5	93	1.64	1.32	2.01
TwinSys cemented	Selexys TPS	65	251.1	4	1.59	0.43	4.08
*ABGII	Duraloc	139	1,560.9	24	1.54	0.99	2.29
Corail	Trident	61	195.2	3	1.54	0.32	4.49
Tri-Lock BPS	Pinnacle	62	195.3	3	1.54	0.32	4.49
*CLS	RM cup	113	856.9	13	1.52	0.81	2.59
Muller	Trident	76	594.5	9	1.51	0.69	2.87
CPT	Fitmore	131	537.8	8	1.49	0.64	2.93
*ABG	ABGII	72	948.2	14	1.48	0.81	2.48
*CBC Stem	Expansys shell	183	1,295.0	19	1.47	0.88	2.29
Exeter V40	Trabecular Metal Shell	149	547.3	8	1.46	0.63	2.88
Zimmer Femoral Stem Press-Fit	Continuum TM	59	142.6	2	1.40	0.17	5.06
CCA	Contemporary	74	723.0	10	1.38	0.66	2.54
Polarstem uncemented	Reflection porous	334	892.9	12	1.34	0.69	2.35
CBC Stem	Fitmore	59	381.8	5	1.31	0.43	3.06
*#TwinSys uncemented	Selexys TPS	1,231	6,158.6	79	1.28	1.02	1.60
Prodigy	Duraloc	113	1,267.8	16	1.26	0.72	2.05
*#Exeter V40	Continuum TM	1,314	2,794.2	35	1.25	0.87	1.74
Contemporary	Contemporary	71	801.0	10	1.25	0.60	2.30
Mallory-Head	M2A	105	907.7	11	1.21	0.60	2.17
*Spectron	Duraloc	1,153	11,665.4	138	1.18	0.99	1.40
Spectron	Muller PE cup	66	598.3	7	1.17	0.47	2.41
*Exeter	Duraloc	553	6,645.3	76	1.14	0.90	1.43
H-Max S	Delta-TT Cup	391	700.4	8	1.14	0.49	2.25
CLS	Allofit	192	1,315.8	15	1.14	0.64	1.88
Femoral Stem Press Fit	Continuum TM	408	968.7	11	1.14	0.57	2.03
AML MMA	Duraloc	74	829.4	9	1.09	0.50	2.06
Corail	RM Pressfit cup	53	93.1	1	1.07	0.03	5.98
Friendly	Delta-TT Cup	55	186.3	2	1.07	0.13	3.88

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		ct 95% ce interval
Corail	Tritanium	127	283.4	3	1.06	0.22	3.09
Muller	Duraloc	78	860.8	9	1.05	0.48	1.98
S-Rom	Pinnacle	321	2,400.2	25	1.04	0.67	1.54
Echo(TM) Bi-metric	Exceed ABT Ringloc-X	57	96.2	1	1.04	0.03	5.79
Synergy Porous	R3 porous	1,060	2,448.2	25	1.02	0.66	1.51
Polarstem uncemented	R3 porous	503	690.0	7	1.01	0.41	2.09
CPT	Monoblock Acetabular Cup	84	690.6	7	1.01	0.41	2.09
CPT	Continuum TM	635	1,111.4	11	0.99	0.49	1.77
Stemsys	Fixa Ti Por	378	612.2	6	0.98	0.36	2.13
*#Spectron	Reflection cemented	2,945	25,725.1	252	0.98	0.86	1.11
Muller	CLS Expansion	59	409.3	4	0.98	0.27	2.50
CBC Stem	RM Pressfit cup	322	1,335.3	13	0.97	0.52	1.66
CPT	Trilogy	697	4,213.6	41	0.97	0.70	1.32
ABGII	Delta-PF Cup	107	929.8	9	0.97	0.44	1.84
*Exeter	Contemporary	1,551	16,334.7	158	0.97	0.82	1.13
CPT	Trident	145	1,146.7	11	0.96	0.48	1.72
C-Stem	Duraloc	53	527.6	5	0.95	0.31	2.21
Accolade II	Tritanium	216	211.9	2	0.94	0.11	3.41
Summit	Pinnacle	1,460	6,577.6	62	0.94	0.72	1.21
Accolade II	Trident	229	214.6	2	0.93	0.11	3.37
Exeter V40	Tritanium	1,374	2,906.7	27	0.93	0.61	1.35
MS 30	Duraloc	55	661.3	6	0.91	0.33	1.97
Spectron	Morscher	210	2,315.5	21	0.91	0.56	1.39
Omnifit	Trident	149	1,350.2	12	0.89	0.46	1.55
Furlong	Furlong	64	566.3	5	0.88	0.29	2.06
TwinSys uncemented	Continuum TM	118	340.8	3	0.88	0.18	2.57
Exeter V40	Duraloc	987	8,211.7	71	0.86	0.68	1.09
CLS	Duraloc	699	7,272.5	62	0.85	0.65	1.09
CLS	Continuum TM	383	831.2	7	0.84	0.34	1.74
Corail	Trilogy	125	356.7	3	0.84	0.17	2.46
Corail	Duraloc	464	3,810.8	32	0.84	0.57	1.19
Corail	Continuum TM	137	244.7	2	0.82	0.10	2.95
S-Rom	Ultima	78	989.4	8	0.81	0.35	1.59
CLS	Trident	162	1,371.4	11	0.80	0.40	1.44
Femoral Stem Press Fit	Trident	59	126.9	1	0.79	0.02	4.39
CLS	CLS Expansion	1,263	12,101.1	95	0.79	0.64	0.96
Muller	RM cup	1,013	9,159.3	71	0.78	0.61	0.98
TwinSys uncemented	Trilogy	209	1,080.7	8	0.74	0.32	1.46



Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		ct 95% ce interval
Spectron	Reflection porous	2,755	20,599.5	151	0.73	0.62	0.86
ABGII	Pinnacle	67	411.9	3	0.73	0.15	2.13
ABGII	Trident	342	2,914.7	21	0.72	0.45	1.10
Corail	Pinnacle	5,532	19,990.0	142	0.71	0.60	0.84
CLS	Reflection porous	318	1,852.5	13	0.70	0.37	1.20
Lateral straight stem	Muller PE cup	152	1,290.7	9	0.70	0.32	1.32
Avenir Muller uncemented	Pinnacle	99	434.8	3	0.69	0.14	2.02
CLS	RM Pressfit cup	452	2,037.5	14	0.69	0.38	1.15
C-Stem AMT	Marathon cemented	260	873.9	6	0.69	0.25	1.49
CLS	Monoblock Acetabular Cup	80	584.2	4	0.68	0.19	1.75
MS 30	Contemporary	128	1,028.4	7	0.68	0.27	1.40
Exeter	Exeter	1,326	13,420.2	90	0.67	0.54	0.82
Summit	Trilogy	135	757.7	5	0.66	0.21	1.54
Muller	Continuum TM	123	304.9	2	0.66	0.08	2.37
Corail	Monoblock Acetabular Cup	95	611.4	4	0.65	0.18	1.68
Elite plus	Charnley	298	3,219.2	21	0.65	0.40	1.00
MS 30	Morscher	787	7,842.8	51	0.65	0.48	0.85
Exeter	CLS Expansion	129	1,409.7	9	0.64	0.29	1.21
Exeter V40	Exeter X3	993	1,730.4	11	0.64	0.32	1.14
Exeter	Osteolock	836	9,449.5	59	0.62	0.48	0.81
TwinSys uncemented	RM Pressfit cup	3,735	15,116.5	90	0.60	0.48	0.73
CPT	Pinnacle	64	338.3	2	0.59	0.07	2.14
Charnley	Charnley Cup Ogee	303	3,247.0	19	0.59	0.35	0.91
TwinSys cemented	RM Pressfit cup	1,098	3,621.1	21	0.58	0.36	0.89
Versys cemented	ZCA	391	3,466.9	20	0.58	0.35	0.89
CPT	Duraloc	212	2,082.7	12	0.58	0.30	1.01
H-Max M	Delta-TT Cup	86	350.5	2	0.57	0.07	2.06
Summit	Duraloc	101	883.7	5	0.57	0.18	1.32
CPT	ZCA all-poly cup	76	177.8	1	0.56	0.01	3.13
C-Stem AMT	Pinnacle	902	2,319.7	13	0.56	0.30	0.96
CLS	Trilogy	469	2,322.7	13	0.56	0.30	0.96
Accolade	Trident	1,867	14,246.0	79	0.55	0.44	0.69
CLS	Weill ring	106	1,267.5	7	0.55	0.22	1.14
Trabecular Metal Stem	Monoblock Acetabular Cup	74	543.9	3	0.55	0.11	1.61
Femoral Stem Press Fit	Trilogy	139	728.0	4	0.55	0.15	1.41
Wagner cone stem	Fitmore	62	558.6	3	0.54	0.11	1.57
Muller	Morscher	70	747.3	4	0.54	0.15	1.37

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		ct 95% ce interval
Exeter	Trilogy	213	2,440.4	13	0.53	0.28	0.91
CPT	ZCA	536	4,557.2	24	0.53	0.34	0.78
Exeter	Bio-clad poly	113	1,144.8	6	0.52	0.19	1.14
Elite plus	Elite Plus Ogee	110	968.5	5	0.52	0.17	1.20
CLS	Fitmore	2,090	15,854.4	80	0.50	0.40	0.63
Spectron	R3 porous	375	1,006.3	5	0.50	0.16	1.16
Exeter V40	Pinnacle	1,413	5,062.3	25	0.49	0.32	0.73
TwinSys uncemented	RM cup	122	609.6	3	0.49	0.10	1.44
CLS	Morscher	1,682	17,317.8	84	0.49	0.39	0.60
Spectron	Fitmore	78	827.3	4	0.48	0.13	1.24
CCA	ССВ	727	4,643.6	22	0.47	0.30	0.72
Exeter V40	Exeter	1,635	11,950.3	56	0.47	0.35	0.61
Exeter	Muller PE cup	119	1,288.1	6	0.47	0.17	1.01
Exeter V40	Morscher	630	5,410.1	25	0.46	0.30	0.68
MS 30	Continuum TM	199	434.9	2	0.46	0.06	1.66
Synergy Porous	Reflection porous	1,162	7,613.6	35	0.46	0.32	0.64
Exeter V40	Trident	6,712	34,410.2	158	0.46	0.39	0.54
Exeter V40	Trilogy	2,190	11,676.9	53	0.45	0.34	0.59
Stemsys	Agilis Ti-por	179	227.2	1	0.44	0.01	2.45
Spectron	Mallory-Head	152	1,377.5	6	0.44	0.16	0.95
Spectron	Trident	78	692.4	3	0.43	0.09	1.27
Stemsys	DeltaMotion Cup	268	935.4	4	0.43	0.12	1.09
Exeter	Morscher	551	6,829.9	29	0.42	0.28	0.61
C-Stem	Elite Plus Ogee	55	472.2	2	0.42	0.05	1.53
Exeter V40	Contemporary	5,666	34,056.4	144	0.42	0.36	0.50
Elite plus	Elite Plus LPW	282	2,606.7	11	0.42	0.21	0.76
Versys	Trilogy	272	3,083.7	13	0.42	0.22	0.72
Exeter V40	Muller PE cup	94	718.4	3	0.42	0.09	1.22
Exeter V40	Monoblock Acetabular Cup	123	1,205.9	5	0.41	0.13	0.97
Accolade	Tritanium	152	499.4	2	0.40	0.05	1.45
Charnley	Charnley	456	4,508.2	18	0.40	0.24	0.63
TwinSys cemented	RM cup	148	1,005.6	4	0.40	0.11	1.02
Muller	Weber	377	3,051.2	12	0.39	0.20	0.69
Muller	Muller PE cup	1,693	14,530.0	57	0.39	0.30	0.51
Exeter V40	Osteolock	270	2,575.2	10	0.39	0.19	0.71
MS 30	Muller PE cup	462	3,906.8	15	0.38	0.21	0.63
MS 30	RM Pressfit cup	87	535.4	2	0.37	0.05	1.35
Exeter V40	R3 porous	297	543.1	2	0.37	0.04	1.33
Stemsys	RM Pressfit cup	162	280.1	1	0.36	0.01	1.99



Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		ct 95% ce interval
Exeter V40	Reflection cemented	718	3,124.9	11	0.35	0.18	0.63
MS 30	Fitmore	1,497	8,018.1	27	0.34	0.22	0.49
Exeter V40	ССВ	380	1,486.8	5	0.34	0.11	0.78
Muller	ZCA all-poly cup	116	298.9	1	0.33	0.01	1.86
SL monoblock	Muller PE cup	101	910.4	3	0.33	0.07	0.96
Muller	Fitmore	57	309.4	1	0.32	0.01	1.80
Versys cemented	Trilogy	237	2,170.4	7	0.32	0.13	0.66
ССА	RM Pressfit cup	132	937.9	3	0.32	0.07	0.93
Exeter V40	Bio-clad poly	122	634.0	2	0.32	0.04	1.14
AML	Duraloc	53	638.6	2	0.31	0.04	1.13
TwinSys cemented	ССВ	351	1,295.3	4	0.31	0.08	0.79
Muller	ZCA	138	667.5	2	0.30	0.04	1.08
Corail	Ultima	135	1,014.3	3	0.30	0.06	0.86
MS 30	Trilogy	216	1,019.8	3	0.29	0.06	0.86
Exeter V40	Reflection porous	466	2,502.1	7	0.28	0.11	0.58
Friendly	Delta-PF Cup	159	1,076.6	3	0.28	0.06	0.81
Exeter V40	ZCA	71	378.2	1	0.26	0.01	1.47
Exeter V40	RM Pressfit cup	1,247	4,653.8	11	0.24	0.12	0.42
Avenir Muller uncemented	RM cup	105	455.4	1	0.22	0.01	1.22
Muller	RM Pressfit cup	277	1,418.3	3	0.21	0.04	0.62
Exeter V40	Fitmore	528	1,937.9	4	0.21	0.06	0.53
Accolade	Pinnacle	180	970.8	2	0.21	0.02	0.74
Basis	Reflection porous	105	504.0	1	0.20	0.01	1.11
Corail	Delta-PF Cup	78	608.7	1	0.16	0.00	0.92
Exeter V40	CLS Expansion	88	818.9	1	0.12	0.00	0.68
Spectron	Biomex acet shell porous	68	827.6	1	0.12	0.00	0.67
Corail	Reflection porous	140	889.9	1	0.11	0.00	0.63
Accolade	Muller PE cup	114	948.7	1	0.11	0.00	0.59
TwinSys uncemented	Delta-PF Cup	370	1,575.7	1	0.06	0.00	0.35
CPCS	R3 porous	109	125.1	0	0.00	0.00	2.95
Stemsys	Delta-PF Cup	105	84.8	0	0.00	0.00	4.35
MS 30	ZCA all-poly cup	94	185.9	0	0.00	0.00	1.98
Exeter V40	Delta-TT Cup	92	170.1	0	0.00	0.00	2.17
Avenir Muller uncemented	Tritanium	91	322.4	0	0.00	0.00	1.14
Synergy Porous	Delta-PF Cup	88	441.1	0	0.00	0.00	0.84
Exeter	Trident	84	997.3	0	0.00	0.00	0.37
Exeter V40	ZCA all-poly cup	81	123.9	0	0.00	0.00	2.98

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% confidence interval	
Corail	DeltaMotion Cup	75	211.0	0	0.00	0.00	1.75
CLS	Pinnacle	66	339.4	0	0.00	0.00	1.09
TwinSys cemented	Continuum TM	54	66.7	0	0.00	0.00	5.53
Exeter V40	Weber	53	449.5	0	0.00	0.00	0.82
Lateral straight stem	Weber	53	506.6	0	0.00	0.00	0.73

Those marked with an \* in the above table have revision rates significantly higher than the overall rate of 0.72 /100 ocys @ the 95% confidence interval. There are several other combinations with high revision rates but without statistical significance because of the wide Cls.

Those marked with a # as well as an \* indicate those combinations used during 2013.

It is noteworthy that 49% of the ASR combinations have been revised.

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

Minimum of 50 primary registered arthroplasties

#### **Fully Cemented**

Combination		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
Exeter V40	Contemporary	5,666	34,056.4	144	0.42	0.36	0.50
Spectron	Reflection cemented	2,945	25,725.1	252	0.98	0.86	1.11
Muller	Muller PE cup	1,693	14,530.0	57	0.39	0.30	0.51
Exeter V40	Exeter	1,635	11,950.3	56	0.47	0.35	0.61
Exeter	Contemporary	1,551	16,334.7	158	0.97	0.82	1.13
Exeter	Exeter	1,326	13,420.2	90	0.67	0.54	0.82
Exeter V40	Exeter X3	993	1,730.4	11	0.64	0.32	1.14
CCA	ССВ	727	4,643.6	22	0.47	0.30	0.72
Exeter V40	Reflection cemented	718	3,124.9	11	0.35	0.18	0.63
CPT	ZCA	536	4,557.2	24	0.53	0.34	0.78
MS 30	Muller PE cup	462	3,906.8	15	0.38	0.21	0.63
Charnley	Charnley	456	4,508.2	18	0.40	0.24	0.63
Versys cemented	ZCA	391	3,466.9	20	0.58	0.35	0.89
Exeter V40	ССВ	380	1,486.8	5	0.34	0.11	0.78
Muller	Weber	377	3,051.2	12	0.39	0.20	0.69
TwinSys cemented	ССВ	351	1,295.3	4	0.31	0.08	0.79
Charnley	Charnley Cup Ogee	303	3,247.0	19	0.59	0.35	0.91
Elite plus	Charnley	298	3,219.2	21	0.65	0.40	1.00
Elite plus	Elite Plus LPW	282	2,606.7	11	0.42	0.21	0.76
C-Stem AMT	Marathon cemented	260	873.9	6	0.69	0.25	1.49
Lateral straight stem	Muller PE cup	152	1,290.7	9	0.70	0.32	1.32
Muller	ZCA	138	667.5	2	0.30	0.04	1.08



Combination		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
MS 30	Contemporary	128	1,028.4	7	0.68	0.27	1.40
Exeter V40	Bio-clad poly	122	634.0	2	0.32	0.04	1.14
Exeter	Muller PE cup	119	1,288.1	6	0.47	0.17	1.01
Muller	ZCA all-poly cup	116	298.9	1	0.33	0.01	1.86
Exeter	Bio-clad poly	113	1,144.8	6	0.52	0.19	1.14
Elite plus	Elite Plus Ogee	110	968.5	5	0.52	0.17	1.20
SL monoblock	Muller PE cup	101	910.4	3	0.33	0.07	0.96
Exeter V40	Muller PE cup	94	718.4	3	0.42	0.09	1.22
MS 30	ZCA all-poly cup	94	185.9	0	0.00	0.00	1.98
Exeter V40	ZCA all-poly cup	81	123.9	0	0.00	0.00	2.98
CPT	ZCA all-poly cup	76	177.8	1	0.56	0.01	3.13
ССА	Contemporary	74	723.0	10	1.38	0.66	2.54
Contemporary	Contemporary	71	801.0	10	1.25	0.60	2.30
Exeter V40	ZCA	71	378.2	1	0.26	0.01	1.47
Spectron	Muller PE cup	66	598.3	7	1.17	0.47	2.41
C-Stem	Elite Plus Ogee	55	472.2	2	0.42	0.05	1.53
Exeter V40	Weber	53	449.5	0	0.00	0.00	0.82
Lateral straight stem	Weber	53	506.6	0	0.00	0.00	0.73

# Uncemented

Combination		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 Component- years	Exact 95% ( inte	
Corail	Pinnacle	5,532	19,989.99	142	0.71	0.60	0.84
TwinSys uncemented	RM Pressfit cup	3,735	15,116.51	90	0.60	0.48	0.73
CLS	Fitmore	2,090	15,854.37	80	0.50	0.40	0.63
Accolade	Trident	1,867	14,246.04	79	0.55	0.44	0.69
CLS	Morscher	1,682	17,317.79	84	0.49	0.39	0.60
Summit	Pinnacle	1,460	6,577.59	62	0.94	0.72	1.21
CLS	CLS Expansion	1,263	12,101.08	95	0.79	0.64	0.96
TwinSys uncemented	Selexys TPS	1,231	6,158.56	79	1.28	1.02	1.60
Synergy Porous	Reflection porous	1,162	7,613.58	35	0.46	0.32	0.64
Synergy Porous	R3 porous	1,060	2,448.18	25	1.02	0.66	1.51
CLS	Duraloc	699	7,272.46	62	0.85	0.65	1.09
Polarstem uncemented	R3 porous	503	689.96	7	1.01	0.41	2.09
CLS	Trilogy	469	2,322.68	13	0.56	0.30	0.96
Corail	Duraloc	464	3,810.84	32	0.84	0.57	1.19
CLS	RM Pressfit cup	452	2,037.51	14	0.69	0.38	1.15
Femoral Stem Press Fit	Continuum TM	408	968.66	11	1.14	0.57	2.03
H-Max S	Delta-TT Cup	388	695.76	8	1.15	0.50	2.27

CLS         Continuum TM         383         831.22         7         0.84         0.34         1.74           Stemsys         Fixa Ti Por         378         612.21         6         0.98         0.36         2.13           TwinSys uncemented         Delta-PF Cup         370         1,575.74         1         0.06         0.00         0.35           ABGII         Trident         342         2,914.74         21         0.72         0.45         1.10           Polarstem uncemented         Reflection porous         334         892.92         12         1.34         0.69         2.35           CBC Stem         RM Pressfit cup         322         1,335.26         13         0.97         0.52         1.66
TwinSys uncementedDelta-PF Cup3701,575.7410.060.000.35ABGIITrident3422,914.74210.720.451.10Polarstem uncementedReflection porous334892.92121.340.692.35
ABGIITrident3422,914.74210.720.451.10Polarstem uncementedReflection porous334892.92121.340.692.35
Polarstem uncementedReflection porous334892.92121.340.692.35
CBC Stem         RM Pressfit cup         322         1,335.26         13         0.97         0.52         1.66
S-Rom Pinnacle 321 2,400.24 25 1.04 0.67 1.54
CLS         Reflection porous         318         1,852.47         13         0.70         0.37         1.20
Trabecular Metal StemContinuum TM298653.25131.991.063.40
Versys         Trilogy         272         3,083.67         13         0.42         0.22         0.72
Stemsys         DeltaMotion Cup         268         935.44         4         0.43         0.12         1.09
Accolade II Trident 229 214.64 2 0.93 0.11 3.37
Accolade II Tritanium 216 211.93 2 0.94 0.11 3.41
TwinSys uncemented         Trilogy         209         1,080.70         8         0.74         0.32         1.46
CLS Durom 198 1,399.24 38 2.72 1.92 3.73
CLS Allofit 192 1,315.82 15 1.14 0.64 1.88
CBC Stem         Expansys shell         183         1,295.00         19         1.47         0.88         2.29
Accolade Pinnacle 180 970.79 2 0.21 0.02 0.74
Stemsys         Agilis Ti-por         179         227.19         1         0.44         0.01         2.45
Avenir Muller uncementedContinuum TM166481.2181.660.723.28
CLS Trident 162 1,371.40 11 0.80 0.40 1.44
Stemsys         RM Pressfit cup         162         280.13         1         0.36         0.01         1.99
Corail ASR 156 914.95 71 7.76 6.06 9.79
Accolade Tritanium 152 499.35 2 0.40 0.05 1.45
Corail         Reflection porous         140         889.92         1         0.11         0.00         0.63
ABGII Duraloc 139 1,560.93 24 1.54 0.99 2.29
Femoral Stem Press Fit         Trilogy         139         728.05         4         0.55         0.15         1.41
Corail         Continuum TM         137         244.68         2         0.82         0.10         2.95
Summit         Trilogy         135         757.69         5         0.66         0.21         1.54
S-Rom ASR 130 661.40 87 13.15 10.54 16.23
Corail         Tritanium         127         283.36         3         1.06         0.22         3.09
Omnifit Trident 126 1,144.87 11 0.96 0.48 1.72
Corail Trilogy 125 356.71 3 0.84 0.17 2.46
TwinSys uncemented         RM cup         122         609.56         3         0.49         0.10         1.44
TwinSys uncemented         Continuum TM         118         340.79         3         0.88         0.18         2.57
ABG Duraloc 116 1,584.74 26 1.64 1.07 2.40
Synergy Porous         BHR Acetabular Cup         114         722.11         13         1.80         0.96         3.08
CLS RM cup 113 856.87 13 1.52 0.81 2.59



Combination		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 Component- years	Exact 95% ( inte	
Prodigy	Duraloc	113	1,267.85	16	1.26	0.72	2.05
Corail	Fitmore	110	95.84	2	2.09	0.25	7.54
ABGII	Delta-PF Cup	107	929.78	9	0.97	0.44	1.84
CLS	Weill ring	106	1,267.47	7	0.55	0.22	1.14
Avenir Muller uncemented	RM cup	105	455.36	1	0.22	0.01	1.22
Mallory-Head	M2A	105	907.68	11	1.21	0.60	2.17
Stemsys	Delta-PF Cup	105	84.83	0	0.00	0.00	4.35
Summit	Duraloc	101	883.69	5	0.57	0.18	1.32
Avenir Muller uncemented	Pinnacle	99	434.80	3	0.69	0.14	2.02
Corail	Monoblock Acetabular Cup	95	611.39	4	0.65	0.18	1.68
Anthology Porous	BHR Acetabular Cup	91	487.66	11	2.26	1.13	4.04
Avenir Muller uncemented	Tritanium	91	322.38	0	0.00	0.00	1.14
Summit	ASR	88	540.56	26	4.81	3.14	7.05
Synergy Porous	Delta-PF Cup	88	441.15	0	0.00	0.00	0.84
H-Max M	Delta-TT Cup	86	350.46	2	0.57	0.07	2.06
CLS	Monoblock Acetabular Cup	80	584.19	4	0.68	0.19	1.75
Corail	Delta-PF Cup	78	608.69	1	0.16	0.00	0.92
S-Rom	Ultima	78	989.39	8	0.81	0.35	1.59
Corail	DeltaMotion Cup	75	211.03	0	0.00	0.00	1.75
AML MMA	Duraloc	74	829.45	9	1.09	0.50	2.06
Trabecular Metal Stem	Monoblock Acetabular Cup	74	543.93	3	0.55	0.11	1.61
ABG	ABGII	72	948.18	14	1.48	0.81	2.48
H-Max M	Delta-PF Cup	71	302.85	6	1.98	0.73	4.31
Echo(TM) Bi-metric	G7 acetabular shell	70	60.98	1	1.64	0.04	9.14
ABGII	Pinnacle	67	411.88	3	0.73	0.15	2.13
CLS	Pinnacle	66	339.35	0	0.00	0.00	1.09
Anthology Porous	R3 porous	65	340.56	12	3.52	1.82	6.16
Furlong	Furlong	64	566.25	5	0.88	0.29	2.06
Tri-Lock BPS	Pinnacle	62	195.30	3	1.54	0.32	4.49
Wagner cone stem	Fitmore	62	558.64	3	0.54	0.11	1.57
Corail	Trident	61	195.24	3	1.54	0.32	4.49
CBC Stem	Fitmore	59	381.82	5	1.31	0.43	3.06
CLS	Artek	59	603.55	22	3.65	2.28	5.52
Femoral Stem Press Fit	Trident	59	126.92	1	0.79	0.02	4.39
Zimmer Femoral Stem Press-Fit	Continuum TM	59	142.65	2	1.40	0.17	5.06

Combination		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 Component- years	Exact 95% ( inte	
Echo(TM) Bi-metric	Exceed ABT Ringloc-X	57	96.16	1	1.04	0.03	5.79
AML	Duraloc	53	638.61	2	0.31	0.04	1.13
Corail	RM Pressfit cup	53	93.13	1	1.07	0.03	5.98
Femoral Stem Press Fit	Delta-TT Cup	52	87.01	2	2.30	0.28	8.30

# Hybrid

Combination		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
Exeter V40	Trident	6,712	34,410.2	158	0.46	0.39	0.54
Spectron	Reflection porous	2,755	20,599.5	151	0.73	0.62	0.86
Exeter V40	Trilogy	2,190	11,676.9	53	0.45	0.34	0.59
MS 30	Fitmore	1,497	8,018.1	27	0.34	0.22	0.49
Exeter V40	Pinnacle	1,413	5,062.3	25	0.49	0.32	0.73
Exeter V40	Tritanium	1,374	2,906.7	27	0.93	0.61	1.35
Exeter V40	Continuum TM	1,314	2,794.2	35	1.25	0.87	1.74
Exeter V40	RM Pressfit cup	1,247	4,653.8	11	0.24	0.12	0.42
Spectron	Duraloc	1,153	11,665.4	138	1.18	0.99	1.40
TwinSys cemented	RM Pressfit cup	1,098	3,621.1	21	0.58	0.36	0.89
Muller	RM cup	1,013	9,159.3	71	0.78	0.61	0.98
Exeter V40	Duraloc	987	8,211.7	71	0.86	0.68	1.09
C-Stem AMT	Pinnacle	902	2,319.7	13	0.56	0.30	0.96
Exeter	Osteolock	836	9,449.5	59	0.62	0.48	0.81
MS 30	Morscher	787	7,842.8	51	0.65	0.48	0.85
CPT	Trilogy	697	4,213.6	41	0.97	0.70	1.32
CPT	Continuum TM	635	1,111.4	11	0.99	0.49	1.77
Exeter V40	Morscher	630	5,410.1	25	0.46	0.30	0.68
Elite plus	Duraloc	608	5,677.5	93	1.64	1.32	2.01
Exeter	Duraloc	553	6,645.3	76	1.14	0.90	1.43
Exeter	Morscher	551	6,829.9	29	0.42	0.28	0.61
Exeter V40	Fitmore	528	1,937.9	4	0.21	0.06	0.53
Exeter V40	Reflection porous	466	2,502.1	7	0.28	0.11	0.58
Spectron	R3 porous	375	1,006.3	5	0.50	0.16	1.16
Exeter V40	R3 porous	297	543.1	2	0.37	0.04	1.33
Muller	RM Pressfit cup	277	1,418.3	3	0.21	0.04	0.62
Exeter V40	Osteolock	270	2,575.2	10	0.39	0.19	0.71
Versys cemented	Trilogy	237	2,170.4	7	0.32	0.13	0.66
MS 30	Trilogy	216	1,019.8	3	0.29	0.06	0.86
Exeter	Trilogy	213	2,440.4	13	0.53	0.28	0.91
CPT	Duraloc	212	2,082.7	12	0.58	0.30	1.01



Combination		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
Spectron	Morscher	210	2,315.5	21	0.91	0.56	1.39
MS 30	Continuum TM	199	434.9	2	0.46	0.06	1.66
Friendly	Delta-PF Cup	159	1,076.6	3	0.28	0.06	0.81
Spectron	Mallory-Head	152	1,377.5	6	0.44	0.16	0.95
Exeter V40	Trabecular Metal Shell	149	547.3	8	1.46	0.63	2.88
TwinSys cemented	RM cup	148	1,005.6	4	0.40	0.11	1.02
CPT	Trident	145	1,146.7	11	0.96	0.48	1.72
Corail	Ultima	134	1,006.6	3	0.30	0.06	0.87
CCA	RM Pressfit cup	132	937.9	3	0.32	0.07	0.93
CPT	Fitmore	131	537.8	8	1.49	0.64	2.93
Exeter	CLS Expansion	129	1,409.7	9	0.64	0.29	1.21
Exeter V40	Monoblock Acetabular Cup	123	1,205.9	5	0.41	0.13	0.97
Muller	Continuum TM	123	304.9	2	0.66	0.08	2.37
Muller	Trilogy	115	634.9	13	2.05	1.09	3.50
Accolade	Muller PE cup	114	948.7	1	0.11	0.00	0.59
CPCS	R3 porous	109	125.1	0	0.00	0.00	2.95
Basis	Reflection porous	105	504.0	1	0.20	0.01	1.11
Exeter V40	Delta-TT Cup	92	170.1	0	0.00	0.00	2.17
Exeter V40	CLS Expansion	88	818.9	1	0.12	0.00	0.68
MS 30	RM Pressfit cup	87	535.4	2	0.37	0.05	1.35
CPT	Tritanium	85	298.5	5	1.68	0.54	3.91
CPT	Monoblock Acetabular Cup	84	690.6	7	1.01	0.41	2.09
Exeter	Trident	84	997.3	0	0.00	0.00	0.37
Muller	Duraloc	78	860.8	9	1.05	0.48	1.98
Spectron	Fitmore	78	827.3	4	0.48	0.13	1.24
Spectron	Trident	78	692.4	3	0.43	0.09	1.27
Muller	Trident	76	594.5	9	1.51	0.69	2.87
C-stem AMT	Pinnacle	70	54.2	2	3.69	0.45	13.33
Muller	Morscher	70	747.3	4	0.54	0.15	1.37
Spectron	Biomex acet shell porous	68	827.6	1	0.12	0.00	0.67
TwinSys cemented	Selexys TPS	65	251.1	4	1.59	0.43	4.08
CPT	Pinnacle	64	338.3	2	0.59	0.07	2.14
Muller	CLS Expansion	59	409.3	4	0.98	0.27	2.50
Muller	Fitmore	57	309.4	1	0.32	0.01	1.80
Friendly	Delta-TT Cup	55	186.3	2	1.07	0.13	3.88
MS 30	Duraloc	55	661.3	6	0.91	0.33	1.97
TwinSys cemented	Continuum TM	54	66.7	0	0.00	0.00	5.53
C-Stem	Duraloc	53	527.6	5	0.95	0.31	2.21

# Prosthesis Combinations based on Femur in alphabetical order

A8GDuration1161.584.70.401.441.070.40A8GARGI77948.2141.180.012.28A8GIDuraton100929.999.70.441.84A8GIIPinnacle67411.930.030.151.213A8GIIIfident1.842.914.71.010.020.041.101AccoladoIfident1.841.424.60790.050.040.05AccoladoIfident1.861.979.42.00.050.1710.05AccoladoMiller P Cup114949.71.00.030.013.01AccoladoMiller P Cup114949.71.00.030.013.01Accolado IITitonum1201.0140.020.030.013.01Accolado IITitonum1200.1440.030.013.013.01Accolado IITitonum1200.149.030.113.013.01Accolado IITitonum1200.149.030.113.013.01Accolado IITitonum1200.149.030.113.013.01Accolado IITitonum1200.141.020.031.013.01Accolado IITitonum1200.141.020.031.013.01Accolado IITitonum1200.141.020.011.02<	Combination		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
AGIIDuraice1381.56.92.41.540.992.29AGGIDelto FF Cup107929.890.970.441.84AGGIPinnacle3422.914.72.10.720.151.13AGGITident1.8471.424.00710.550.440.06AccoladeTident1.8471.424.0070.0150.440.01AccoladeTitonium1184.949.41.20.020.020.02AccoladeMuller FE cup1119.4971.00.010.030.01Accolade IITitonium122214.40.20.030.013.37Adcolade IITitonium122214.40.20.030.041.13Adul MAADuraloc748.29.41.91.090.051.03AMLDuraloc748.29.41.91.090.022.04Anthology PorousR3 porous6.63.46.61.122.02.41.023.02Anthology PorousBIR Acelabular Cup94.416.11.021.023.023.04Arenir Muller uncermentedPinacle94.43.81.00.001.113.043.04Arenir Muller uncermentedPinacle93.8.851.310.433.043.04Arenir Muller uncermentedPinacle93.8.851.310.433.043.0	ABG	Duraloc	116	1,584.7	26	1.64	1.07	2.40
ABGIIDefor PF Cup100929.990.070.141.18ABGIITrident6.474.11.930.730.152.13ABGIITrident1.8422.91.472.010.720.451.10AccoladeTrident1.8671.42.460790.050.440.06AccoladePrinocle1.8671.42.460790.020.020.04AccoladePrinocle1.80970.820.020.040.05Accolade IITrident2.222.14.420.940.113.37Accolade IITrident2.222.14.420.930.103.37AMLDuroloc748.79.44.90.130.052.66Anthology PorousBHR Acerobulor Cup9.84.46.11.122.421.254.23Armin Muller uncementedContinuum TM1.66441.2A.0.000.001.12Arenir Muller uncementedMitory porousBrous 1.055.04.010.020.011.12Arenir Muller uncementedMitory porous1.161.291.010.001.121.29Arenir Muller uncementedMitory porous1.161.2021.011.2021.011.202CASemBrousy shell1.81.2951.181.40.001.111.2021.11CBC StemBrousy shell1.181.292 <td< td=""><td>ABG</td><td>ABGII</td><td>72</td><td>948.2</td><td>14</td><td>1.48</td><td>0.81</td><td>2.48</td></td<>	ABG	ABGII	72	948.2	14	1.48	0.81	2.48
AScilPinnocle66411.9330.730.152.13ABGIITident1.3422.91.472.10.720.451.10AccoladeTident1.36714.24.0790.550.440.09AccoladeTitonium15154.94.42.00.010.051.14AccoladeMiler Pinocle1809.741.00.010.010.01AccoladeMiler Pinocle1809.741.00.010.010.01Accolade IITitonium12162.14.62.00.010.010.01Accolade IITitonium12292.14.62.00.010.010.01Anthology Porous818 Acetabuler Cup9.846.84.20.030.011.33Anthology Porous818 Acetabuler Cup9.848.41.00.020.011.24Arenir Muller uncernentedConfinuum TiM1.6644.121.680.020.011.14Avenir Muller uncernentedPinocle9.943.481.010.000.011.14Avenir Muller uncernentedPinocle9.934.541.010.020.011.14Avenir Muller uncernentedPinocle9.934.541.010.000.011.14Avenir Muller UncernentedPinocle9.934.541.010.020.011.14CBC StemExpanya shell1.881.291.3<	ABGII	Duraloc	139	1,560.9	24	1.54	0.99	2.29
AGBIIIndentIndexQ.29147Q.1I.0.072I.0.48I.1.61AccoladeTridentI.867I.4246.0TPI.0.55I.0.44I.0.69AccoladeFinanumI.152I.494I.2I.0.01I.0.00I.1.5AccoladeMuller PE cupI.114I.948I.2I.0.11I.0.00I.0.012Accolade IITridentI.202I.214I.21I.0.13I.0.11I.3.11Accolade IITridentI.202I.214I.20I.0.13I.0.13I.3.13AMLDuralocI.53I.638I.20I.0.13I.0.14I.3.13AMLDuralocI.74I.282I.24I.0.2I.0.23I.0.14Anthology PorousR3 parousI.65I.404I.12I.252I.252I.252Arenir MullerConfinum TMI.66I.412I.68I.12I.252I.252Arenir MullerFinanumI.65I.944I.15I.14I.142I.142Arenir MullerReturp systellI.85I.945I.14I.948I.252I.142Arenir MullerI.1600I.945I.945I.945I.945I.945I.946I.945Arenir MullerI.1600I.945I.945I.945I.945I.946I.946I.946CAGC MERFebrany shallI.85I.945I.945I.945I.946I.946I.946CAGS LemFinanumI.945	ABGII	Delta-PF Cup	107	929.8	9	0.97	0.44	1.84
AccoladeTident1.8671.4.24607790.0.550.4.40.0.5AccoladeTitanium1524.99.420.0.40.0.51.4.5AccoladeMuller PE cup1149.94.710.0110.0020.02Accolade IITitanium216211.920.940.0113.1.1Accolade IITitanium216211.920.940.0113.1.1Accolade IITitanium216214.920.930.0113.1.1Accolade IITitanium21624.820.930.0130.010AntDuraloc5364.820.190.554.6.6Anthology PorousR3 porous165340.41.122.4.21.2.54.2.5Arenir Muller uncementedContnuum TM166441.28.11.0.60.0.11.2.5Avenir Muller uncementedFinocle1.0.5445.41.01.0.20.0.11.1.1CSC StemRicup1.0.55.04.01.0.11.0.20.0.11.1.1CGCCB7.33.1.85.0.11.0.1.90.0.21.1.1CGCARN Pessfr cup3.3.85.0.11.0.1.90.0.21.1.1CGACB7.33.1.85.0.11.0.1.90.0.11.1.1CGACACA7.3.93.1.85.1.31.0.10.0.21.1.1CGS StemFinore <t< td=""><td>ABGII</td><td>Pinnacle</td><td>67</td><td>411.9</td><td>3</td><td>0.73</td><td>0.15</td><td>2.13</td></t<>	ABGII	Pinnacle	67	411.9	3	0.73	0.15	2.13
AccoladeIntraium1524499.4020.0400.0551.44AccoladePinocle116970.820.010.020.074AccoladeMuler PE cup114948.71.10.0110.000.059Accolade IIItirahum216211.920.040.0113.11Accolade IIItirahum229214.620.030.0113.73AMLDuraloc7482240.90.030.041.13AML MAADuraloc7482740.10.4521.43Anthology PorousBHR Acetabular Cup93340.61.122.4221.254.23Avenir Muller uncementedContinuum IM1.66441.28.81.660.723.23Avenir Muller uncementedPinocle0.104.453.41.130.4090.0101.14Avenir Muller uncementedFinault9.103.2240.10.0200.111.14Avenir Muller uncementedFinault9.133.2421.130.433.041.14CS StemExpanya shell1.181.295.01.191.1470.433.44CGAContemportog7.47.331.30.070.311.44CGAContemportog7.47.331.30.430.441.45CGS StemExpanya shell1.3531.30.070.330.440.44CG	ABGII	Trident	342	2,914.7	21	0.72	0.45	1.10
AccoladePinnacle118970820.020.02AccoladeMuler PE cup1149487110.010.05Accolade IITitanium216211920.940.013.31Accolade IITident229214620.930.013.37AMLDuraloc53638.620.030.041.13AML MAADuraloc74829.491.090.052.06Anthology Porous818 Acetabular Cup93496.1122.421.254.28Anthology PorousBHR Acetabular Cup93496.1122.421.254.28Anchindugy PorousBHR Acetabular Cup93496.1122.421.254.28Anthology PorousBHR Acetabular Cup93496.11022.021.254.28Anthology PorousBHR Acetabular Cup93496.11122.421.254.28Anthology PorousBHR Acetabular Cup93496.11122.421.251.25Anthology PorousBHR Acetabular Cup93496.11122.421.251.25Anthology PorousRM cup1.05455.41.011.020.011.12Anthology PorousRM cup1.055.541.10.020.011.12AntonementedTitonium1.055.541.10.020.011.11CBS StemF	Accolade	Trident	1,867	14,246.0	79	0.55	0.44	0.69
AccoladeMuller PE cup111948.7110.010.000.05Accolade IITitdnium216211920.940.013.31Accolade IITident229214.620.330.0113.37AMLDuraloc53638.620.310.041.13AML MMADuraloc74892.491.090.0502.06Anthology PorousR3 porous65340.61.22.2421.254.23Anthology PorousBHR Acetabular Cup93446.11.22.0421.254.23Avenir Muller uncementedConfinuum TM1.66481.28.83.6.90.013.22Avenir Muller uncementedPinacle1.094.45.81.010.000.111.22Avenir Muller uncementedRM cup1.055.45.41.010.001.111.22Avenir Muller uncementedRM cup1.055.45.41.010.001.111.22Cos StemReflection porous1.055.45.41.010.001.113.353.351.310.011.11CBC StemFitmore1.020.011.310.351.310.313.363.321.021.353.35CCACCBCRB7.724.643.61.291.310.310.351.310.351.310.351.310.351.310.351.31 <td< td=""><td>Accolade</td><td>Tritanium</td><td>152</td><td>499.4</td><td>2</td><td>0.40</td><td>0.05</td><td>1.45</td></td<>	Accolade	Tritanium	152	499.4	2	0.40	0.05	1.45
Accolade IIItianium216211920.040.0113.31Accolade IITident229214620.030.013.37AMLDuraloc73638.620.030.041.13AML MMADuraloc74829.491.090.052.06Anthology Porous83 porous65340.6123.521.826.16Anthology PorousBHR Acetabular Cuo79446.1122.421.254.23Avenir Muller uncernentedContinuum TM166441.28.30.0690.013.20Avenir Muller uncernentedRM cup0.155.44.30.010.000.113.22Avenir Muller uncernentedRefection porous1.055.44.30.010.000.111.11CBC StemExponsy shell1.831.295.01.140.40.82.293.333.433.44.33.44.3CBC StemFitmore723.31.81.451.41.33.44.33	Accolade	Pinnacle	180	970.8	2	0.21	0.02	0.74
Accolade IIfrident222214.620.030.013.37AMLDuraloc633638.620.030.041.13AML MMADuraloc74829.491.090.502.08Anthology Porous83 porous645340.61.123.521.826.16Anthology PorousBHR Acetabular Cup93496.11.122.421.254.23Avenir Muller uncementedContinuum TM1.66481.281.660.723.28Avenir Muller uncementedPinnacle99434.81.610.020.011.22Avenir Muller uncementedRM cup1.05455.41.10.020.011.11CBC StemRefection porous1.05504.01.10.020.011.11CBC StemFilmore99381.851.130.433.04CBC StemRM Prestif cup3221.3351.031.043.043.04CCAContemporty74723.01.011.380.011.02CCARM Prestif cup333.247.01.031.040.030.01CLSArtek501.180.040.040.010.01CCACM Prestif cup3.3247.01.180.040.040.01CLSArtek501.3351.180.040.040.01CLSArtek1.3921.35	Accolade	Muller PE cup	114	948.7	1	0.11	0.00	0.59
AMLDuraic153638.620.010.041.11AML MMADuraic74829.491.090.052.06Anthology PorousR3 porous665340.61.123.521.826.16Anthology PorousBHR Acetabular Cup93496.11.122.4.231.4.234.2.3Avenir Muller uncementedContinuum TM1.166481.23.81.6.60.7.23.28Avenir Muller uncementedPinnacle	Accolade II	Tritanium	216	211.9	2	0.94	0.11	3.41
AML MMADuraic174829.491.090.0502.00Anthology PorousR3 porous65340.6123.521.826.16Anthology PorousBHR Acelabular Cup93446.1122.421.254.23Avenir Muller uncementedContinuum TM1.06481.21.881.060.723.28Avenir Muller uncementedPinacle.094.48.8.030.690.011.22Avenir Muller uncementedRM cup.0154.55.4.010.020.011.22Avenir Muller uncementedRflection porous.0155.54.0.010.000.011.11CBC StemExpanya shell1.181.275.0.0191.4.70.882.29CBC StemFitmore.0593.81.8.051.130.433.040CCAContemporary.014.023.0151.14.0151.014CCAContemporary.013.014.014.014.014.014CCAContemporary.013.024.015.015.015.016.014CCAContemporary.014.014.014.014.014.014.014CCAContemporary.015.015.016.014.014.014.014CCAContemporary.013.024.015.016.014.014.014.014CCAContemporary.013	Accolade II	Trident	229	214.6	2	0.93	0.11	3.37
Anthology PorousR3 porousR4 Acetabular CupR4R4 Cetabular CupR4	AML	Duraloc	53	638.6	2	0.31	0.04	1.13
Anthology PorousBHR Acetabular Cup9496.1122.421.284.23Avenir Muller uncementedContinuum TM166481.2681.660.723.28Avenir Muller uncementedFinnacle99434.830.690.142.02Avenir Muller uncementedRM cup105455.410.220.011.22Avenir Muller uncementedRM cup0.11322.40.00.000.001.14BasisReflection porous105504.010.200.011.11CBC StemExpansys shell1831.295.0191.470.882.29CBC StemFilmore99381.851.310.493.04CCAContemporary74723.01011.380.691.61CCACCB7274.443.6200.010.030.07CCARM Pressift cup132937.930.320.070.93CCACM Pressift cup132937.930.320.030.07CCACM Pressift cup1363.247.0190.490.430.49CLSMuller1983.392.0130.490.430.49CLSDuron1186.0541.391.390.451.45CLSDuron1186.458.9131.140.461.88CLSDuraloc6.49	AML MMA	Duraloc	74	829.4	9	1.09	0.50	2.06
Avenir Muller uncementedContinuum TM166481.281.660.723.38Avenir Muller uncementedPinnacle99434.830.690.142.02Avenir Muller uncementedRM cup105455.41.10.220.011.22Avenir Muller uncementedTritanium91322.400.000.001.14BasisReflection porous105504.010.020.011.11CBC StemExpansy shell1831.295.0191.470.882.29CBC StemFilmore59381.851.310.433.06CCAContemporary74723.0101.380.662.54CCACCB7274.643.6220.070.930.72CCACR Inney Cup Ogee3033.247.0190.450.030.72CCACharnley Cub Ogee3033.247.0190.590.350.91CharnleyCharnley Charnley4564.568.2180.400.240.33CLSDurom113856.9131.520.612.57CLSM cup113856.9131.520.631.25CLSDuraloc6497.272.5620.850.651.61CLSContinuum TM383831.270.840.341.74	Anthology Porous	R3 porous	65	340.6	12	3.52	1.82	6.16
uncementedPinnaclePinna	Anthology Porous	BHR Acetabular Cup	93	496.1	12	2.42	1.25	4.23
uncementedIndexIndexIndexIndexIndexIndexIndexAvenir Muller uncementedRM cupIn105A455.4In1In220.01In12Avenir Muller uncementedIritaniumIn19322.4In1In200.00In14BasisReflection porousIn105504.0In1In2.020.01In14CBC StemExpansy shellIn18In295.0In19In1.470.882.29CBC StemFilmoreIn19381.8In19In1.470.882.29CBC StemKM Pressfit cupIn12In135.3In13In19In1.47CCAContemporaryIn14In23.0In13In19In16CCACCBIn19In12In135.3In13In18In19CCACM Pressfit cupIn12In12In19In19In19CCAChamley Cup OgeeIn13In19In19In19In19CLSArtekIn19In132In18In19In19In19CLSArtekIn19In19In19In19In19In19CLSInformerIn19In19In19In19In19In19CLSInformerIn19In19In19In19In19In19CLSInformerIn19In19In19In19In19In19CLAInformerIn19In19In19In19In19In19		Continuum TM	166	481.2	8	1.66	0.72	3.28
uncementedinitanium <td></td> <td>Pinnacle</td> <td>99</td> <td>434.8</td> <td>3</td> <td>0.69</td> <td>0.14</td> <td>2.02</td>		Pinnacle	99	434.8	3	0.69	0.14	2.02
uncementedindexindexindexindexindexindexBasisReflection porousI1055504.0I11I.0.200.0.01I.1.11CBC StemExpanys shellI.1831.295.0I.19I.1.470.0.882.2.28CBC StemFilmoreI.59381.8I.5I.1.310.4.33.0.64CBC StemFilmoreI.3.22I.3.35.3I.1.30.0.97I.5.28I.6.68CBC StemContemporaryI.7.4I.723.0I.0.13I.0.130.0.52I.6.68CCAContemporaryI.7.4I.7.23.0I.0.13I.0.130.0.69I.6.68CCAContemporaryI.7.4I.7.23.0I.0.13I.0.13I.0.59I.0.59CCACBContemporaryI.7.27I.6.63I.0.29I.0.33I.0.79I.5.3CLSDuronI.1.18I.3.99.2I.3.18I.1.18I.1.18I.1.19I.3.18CLSDuralocI.1.19I.3.15I.1.14I.4.64I.3.99.2I.3.15I.1.14I.3.18CLSDuralocI.4.99I.3.15I.3.15I.1.14I.4.64I.3.19I.3.19I.3.18I.1.14I.3.19I.3.16I.1.14CLSDuralocI.4.99I.3.15I.3.15I.3.16I.3.16I.1.49I.3.19I.3.19CLSDuralocI.4.99I.3.15I.3.16I.3.16I.3.16I.3.16I.3.16I.3.16CLSD		RM cup	105	455.4	1	0.22	0.01	1.22
CBC StemExpansys shell1831.295.0191.470.082.29CBC StemFitmore59381.851.310.433.06CBC StemRM Pressfit cup3221.335.3130.970.521.66CCAContemporary74723.01001.380.662.54CCACCBCCB7274.643.62220.0470.030.72CCARM Pressfit cup132937.930.320.070.93CharnleyCharnley Cup Ogee3033.247.01190.590.350.91CharnleyCharnley4.5984.508.21180.642.54CLSNtek59603.62.280.020.72CLSNuron118856.91130.642.58CLSNuron113856.91381.521.13CLSNuroloc6697.272.56220.650.65CLSContinuum TM383831.270.840.34CLSTrident1161.621.371.410.800.401.44		Tritanium	91	322.4	0	0.00	0.00	1.14
CBC StemFilmoreImageImageImageImageImageImageImageImageImageImageCBC StemRM Pressfit cupImageI	Basis	Reflection porous	105	504.0	1	0.20	0.01	1.11
CBC StemRM Pressfit cup3221,335.31130.070.521.66CCAContemporary74723.01001.380.662.54CCACCB7274,643.62220.470.300.72CCARM Pressfit cup1132937.930.320.070.93CharnleyCharnley Cup Ogee3033,247.01190.590.350.91CharnleyCharnley4564,508.21180.400.240.63CLSArtek59603.62223.652.285.52CLSDurom11981,399.2382.721.923.73CLSAlloft11921,315.81151.140.641.88CLSDuraloc64997,272.5620.850.651.91CLSContinuum TM383831.270.840.401.44CLSTrident1.621,371.41110.600.401.44	CBC Stem	Expansys shell	183	1,295.0	19	1.47	0.88	2.29
CCAContemporary74723.01001.380.662.54CCACCB7274.643.6220.470.300.72CCARM Pressfit cup132937.930.320.070.93CharnleyCharnley Cup Ogee3033.247.01190.590.350.91CharnleyCharnley Cup Ogee3034.508.21180.400.240.63CharnleyCharnley4564.508.21180.400.240.63CLSArtek59603.62283.652.283.52CLSNu oup1181.399.23.81.520.812.59CLSDuraloc6191.315.81.140.641.88CLSDuraloc6497.272.56220.850.651.04CLSContinuum TM383831.270.840.341.44CLSTrident1161.621.371.41.110.800.401.44	CBC Stem	Fitmore	59	381.8	5	1.31	0.43	3.06
CCA         CCB         727         4,643.6         22         0.47         0.30         0.72           CCA         RM Pressfit cup         132         937.9         3         0.32         0.07         0.93           Charnley         Charnley Cup Ogee         303         3.247.0         119         0.59         0.35         0.91           Charnley         Charnley Cup Ogee         303         3.247.0         119         0.59         0.35         0.91           Charnley         Charnley Charnley         303         3.247.0         119         0.59         0.35         0.91           Charnley         Charnley Charnley         303         3.247.0         119         0.59         0.35         0.91           Charnley         Charnley Charnley         303         3.247.0         119         0.45         0.93         0.91           CLS         Artek         59         603.6         2.23         3.65         2.28         3.73           CLS         Nu cup         111         385.9         131         1.14         0.64         1.88           CLS         Duraloc         6499         7.272.5         62         0.84         0.34         1.74 <td>CBC Stem</td> <td>RM Pressfit cup</td> <td>322</td> <td>1,335.3</td> <td>13</td> <td>0.97</td> <td>0.52</td> <td>1.66</td>	CBC Stem	RM Pressfit cup	322	1,335.3	13	0.97	0.52	1.66
CCARM Pressfit cup132937.930.020.070.93CharnleyCharnley Cup Ogee3033.247.0190.590.350.91CharnleyCharnley4564.508.2180.400.240.63CLSArtek59603.62.223.652.285.52CLSDurom1181.399.2382.721.923.73CLSAllofit1191.315.81.140.641.88CLSDuraloc64997.272.56.220.850.651.09CLSContinuum TM383831.270.840.341.44CLSTrident1.621.371.41.00.800.401.44	CCA	Contemporary	74	723.0	10	1.38	0.66	2.54
CharnleyCharnley Cup Ogee3033,247.0190.690.650.71CharnleyCharnley Ogee3033,247.0190.590.350.91CharnleyCharnleyCharnley44564,508.2180.400.240.63CLSArtek59603.6223.652.285.52CLSDurom1113856.91331.520.812.59CLSAlloft11921.315.81131.620.850.63CLSDuraloc64997,272.56220.850.651.09CLSContinuum TM383831.270.840.341.74CLSTrident0.161.371.41.110.800.401.44	CCA	ССВ	727	4,643.6	22	0.47	0.30	0.72
CharnleyCharnleyAf564,508.2180.000.240.63CLSArtek59603.6223.652.285.52CLSDurom1981,399.2382.721.923.73CLSRM cup1113856.91131.520.812.59CLSAlloft1921,315.81151.140.641.88CLSDuraloc6697,272.5620.850.651.09CLSContinuum TM383831.270.840.341.74CLSTrident1621,371.4110.800.401.44	CCA	RM Pressfit cup	132	937.9	3	0.32	0.07	0.93
CLS         Artek         59         603.6         22         3.65         2.28         5.52           CLS         Durom         198         1,399.2         38         2.72         1.92         3.73           CLS         RM cup         1113         856.9         113         1.52         0.81         2.59           CLS         Alloft         112         1.315.8         115         1.14         0.64         1.88           CLS         Duraloc         669         7,272.5         62         0.85         0.65         1.09           CLS         Continuum TM         383         831.2         7         0.84         0.34         1.74           CLS         Irident         162         1,371.4         11         0.80         0.40         1.44	Charnley	Charnley Cup Ogee	303	3,247.0	19	0.59	0.35	0.91
CLSDurom1981,399.2382.721.923.73CLSRM cup113856.9131.520.812.59CLSAlloft1921,315.8151.140.641.88CLSDuraloc6697,272.5620.850.651.09CLSContinuum TM383831.270.840.341.74CLSIrident1621,371.4110.800.401.44	Charnley	Charnley	456	4,508.2	18	0.40	0.24	0.63
CLS         RM cup         113         856.9         13         1.52         0.81         2.59           CLS         Allofit         119         1,315.8         115         1.14         0.64         1.88           CLS         Duraloc         699         7,272.5         662         0.85         0.65         1.09           CLS         Continuum TM         383         831.2         7         0.84         0.34         1.74           CLS         Trident         162         1,371.4         11         0.80         0.40         1.44	CLS	Artek	59	603.6	22	3.65	2.28	5.52
CLSAllofit1921,315.8151.140.641.88CLSDuraloc6997,272.5620.850.651.09CLSContinuum TM383831.270.840.341.74CLSTrident1621,371.4110.800.401.44	CLS	Durom	198	1,399.2	38	2.72	1.92	3.73
CLS         Duraloc         669         7,272.5         662         0.655         0.65         1.09           CLS         Continuum TM         383         831.2         7         0.84         0.34         1.74           CLS         Trident         162         1,371.4         111         0.800         0.400         1.44	CLS	RM cup	113	856.9	13	1.52	0.81	2.59
CLS         Duraloc         669         7,272.5         662         0.655         0.65         1.09           CLS         Continuum TM         383         831.2         7         0.84         0.34         1.74           CLS         Trident         162         1,371.4         111         0.800         0.400         1.44			192		15			1.88
CLS         Continuum TM         383         831.2         7         0.84         0.34         1.74           CLS         Trident         162         1,371.4         111         0.80         0.40         1.44		Duraloc	699		62			
CLS         Trident         162         1,371.4         11         0.80         0.40         1.44			383					
			1,263		95			0.96



Combination		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
CLS	Reflection porous	318	1,852.5	13	0.70	0.37	1.20
CLS	RM Pressfit cup	452	2,037.5	14	0.69	0.38	1.15
CLS	Monoblock Acetabular Cup	80	584.2	4	0.68	0.19	1.75
CLS	Trilogy	469	2,322.7	13	0.56	0.30	0.96
CLS	Weill ring	106	1,267.5	7	0.55	0.22	1.14
CLS	Fitmore	2,090	15,854.4	80	0.50	0.40	0.63
CLS	Morscher	1,682	17,317.8	84	0.49	0.39	0.60
CLS	Pinnacle	66	339.4	0	0.00	0.00	1.09
Contemporary	Contemporary	71	801.0	10	1.25	0.60	2.30
Corail	ASR	156	915.0	71	7.76	6.06	9.79
Corail	Fitmore	110	95.8	2	2.09	0.25	7.54
Corail	Trident	61	195.2	3	1.54	0.32	4.49
Corail	RM Pressfit cup	53	93.1	1	1.07	0.03	5.98
Corail	Tritanium	127	283.4	3	1.06	0.22	3.09
Corail	Trilogy	125	356.7	3	0.84	0.17	2.46
Corail	Duraloc	464	3,810.8	32	0.84	0.57	1.19
Corail	Continuum TM	137	244.7	2	0.82	0.10	2.95
Corail	Pinnacle	5,532	19,990.0	142	0.71	0.60	0.84
Corail	Monoblock Acetabular Cup	95	611.4	4	0.65	0.18	1.68
Corail	Ultima	135	1,014.3	3	0.30	0.06	0.86
Corail	Delta-PF Cup	78	608.7	1	0.16	0.00	0.92
Corail	Reflection porous	140	889.9	1	0.11	0.00	0.63
Corail	DeltaMotion Cup	75	211.0	0	0.00	0.00	1.75
CPCS	R3 porous	109	125.1	0	0.00	0.00	2.95
CPT	Tritanium	85	298.5	5	1.68	0.54	3.91
CPT	Fitmore	131	537.8	8	1.49	0.64	2.93
СРТ	Monoblock Acetabular Cup	84	690.6	7	1.01	0.41	2.09
СРТ	Continuum TM	635	1,111.4	11	0.99	0.49	1.77
CPT	Trilogy	697	4,213.6	41	0.97	0.70	1.32
CPT	Trident	145	1,146.7	11	0.96	0.48	1.72
CPT	Pinnacle	64	338.3	2	0.59	0.07	2.14
CPT	Duraloc	212	2,082.7	12	0.58	0.30	1.01
CPT	ZCA all-poly cup	76	177.8	1	0.56	0.01	3.13
CPT	ZCA	536	4,557.2	24	0.53	0.34	0.78
C-Stem	Duraloc	53	527.6	5	0.95	0.31	2.21
C-Stem	Elite Plus Ogee	55	472.2	2	0.42	0.05	1.53
C-stem AMT	Pinnacle	70	54.2	2	3.69	0.45	13.33
C-Stem AMT	Marathon cemented	260	873.9	6	0.69	0.25	1.49

C Siem ANIPinnacie9022.319.71.310.360.09Echo[I/II BirneticG7 acetbolurs and Ringloc X704.001.140.049.14Echo[I/II BirneticG7 acetbolurs and Ringloc X709.421.141.040.035.77Elite plusDuraloc6.005.677.59.031.0.451.0.22.0.07Elite plusElite Plus Opeo1.006.0.50.0.50.0.50.0.71.0.2Elite plusElite Plus Opeo1.032.0.66.71.0.140.0.00.0.170.0.14EvelarDuraloc1.056.46.537.61.0.140.001.0.13EvelarDuraloc1.051.0.34.71.0.140.0.070.0.40.0.11EvelarDuraloc1.0.251.0.321.0.90.0.670.0.40.0.11EvelarOntemporary1.131.0.421.0.90.0.670.0.40.0.11EvelarOntemporary1.131.0.421.0.90.0.70.0.40.0.11EvelarOntemporary1.131.0.421.0.20.0.60.0.10.0.1EvelarOntemporary1.131.0.421.0.20.0.40.0.10.0.1EvelarMarcher1.141.0.421.0.20.0.40.0.10.0.1EvelarMarcher1.141.0.411.0.40.0.20.0.10.0.1EvelarMarcher1.141.0.411.0.40.0.	Combination		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
Etheql(M) Bernetin: Ringloc-XSorial94.294.210.110.000.030.77Ethe plusDurloc6685.677.56491.0.41.0.20.0.0Ethe plusEthe Nus Ogeo100948.30.50.0.20.0.70.0.2Ethe plusEthe Nus Ogeo100948.30.50.0.20.0.70.0.2Ethe plusEthe Nus Offer1222.0.6.71.0.40.0.20.0.20.0.7EveterDuratoc7.536.45.37.640.0.20.0.20.0.2EveterConterpory1.531.400.70.0.40.0.20.0.20.0.2EveterColcolock8.369.449.30.00.0.50.0.20.0.2EveterBiolocolock8.352.4041.0.20.0.20.0.10.0.1EveterBiolocolock1.332.4041.00.0.30.0.20.0.1EveterMuler PE cup1.111.288.10.40.0.20.0.10.0.1Eveter V40Muler PE cup1.141.288.10.40.0.20.0.10.0.1Eveter V40Solicolor Metal1.142.7421.50.0.40.0.20.0.1Eveter V40Continum TM1.342.7421.50.4.10.0.20.0.1Eveter V40Evetor V40Solicolor Metal1.0.21.0.21.0.41.0.20.0.1Eveter V40Evetor V40Evetor V40Solicolor Metal<	C-Stem AMT	Pinnacle	902	2,319.7	13	0.56	0.30	0.96
IndicesIndicesIntermIntermIntermIntermEllie plusDuration6365.677.3931.441.322.01Ellie plusCharnievy2285.55.67.50.0150.0171.02Ellie plusEllie Plus Oppe10109.85.5.671.11.40.991.43ExterDuratoc6.55.6.464.57.681.14.40.991.43ExterContemporary1.55.6.464.57.690.0420.0120.012ExterExterContemporary1.59.51.63.470.990.0430.020.121ExterContemporary1.79.51.49.70.990.0430.020.121ExterOstocock0.339.44.55.90.0420.040.020.01ExterMilory0.1181.28.11.680.0520.010.010.01ExterMonchor0.536.82.90.290.020.020.020.020.02ExterMonchor0.1311.28.11.680.020.020.0310.0310.031ExterMonchor0.1411.27.42.990.020.020.020.020.02ExterMonchor0.1412.7420.380.140.020.140.14ExterMonchor0.1342.7420.350.440.320.14ExterMonchor0.1342.7420.35	Echo(TM) Bi-metric	G7 acetabular shell	70	61.0	1	1.64	0.04	9.14
Hile plusChernley2793.219210.6.80.10Bite plusBite Plus Ogee11096.550.520.171.20EnterDuratoc6536.663.761.140.991.43ExelerDuratoc6536.663.761.140.991.43ExelerExelerContemporary1.5316.334.7790.6470.540.02ExelerExelerContemporary1.2181.402900.6470.540.02ExelerCosteolock48369.449.5590.6220.480.81ExelerMilory2132.440.4130.530.280.91ExelerMilory1131.14.860.520.111.14ExelerMoler PEcory1536.829290.420.280.41ExelerMoler PEcory1.342.9433.81.460.332.88ExelerMoler PEcory1.342.947.33.81.460.431.74Exeler V40Confinum TM1.342.947.33.81.460.431.74Exeler V40Confinum TM1.342.947.33.50.411.342.947.33.81.450.350.41Exeler V40Confinum TM1.342.947.33.81.460.390.411.74Exeler V40Exeler X39.931.7341.10.440.320.41 <td>Echo(TM) Bi-metric</td> <td></td> <td>57</td> <td>96.2</td> <td>1</td> <td>1.04</td> <td>0.03</td> <td>5.79</td>	Echo(TM) Bi-metric		57	96.2	1	1.04	0.03	5.79
Bille plusBille Plus Ogee110948.150.520.110.420.10Bilte plusBilte Plus LPW2822.666.7110.420.210.76ExelerDuroloc5556.645.3761.140.901.13ExelerCortemporory1.55116.334.20.900.670.821.11ExelerCortemporory1.2511.40270.900.670.820.11ExelerCortemporory1.281.40270.900.670.820.11ExelerCortemporory1.281.40270.620.121.41ExelerStoolock8389.449.51.590.620.121.41ExelerBio-clod poly1.111.144.56.630.220.111.41ExelerMorcher1.1511.288.16.60.630.030.030.03ExelerMorcher Ecure1.191.288.16.60.470.130.040.030.04Exeler V40Continum TM1.3142.79420.81.460.320.14Exeler V40Continum TM1.3412.79421.030.460.320.14Exeler V40Continum TM1.3412.79421.50.440.320.14Exeler V40Exeler X39.791.7341.110.440.320.14Exeler V40Exeler X39.791.7341.130.440.320.41<	Elite plus	Duraloc	608	5,677.5	93	1.64	1.32	2.01
Bille plusBille Plus LPW2822.606.71110.420.210.73ExelerDuroloc5536.445.37.61.1.40.901.4.31ExelerContemporary1.55114.334.71580.970.821.1.31ExelerExeler1.32013.400.29.00.6.70.6.820.82ExelerOsteolock2849.449.55.90.4.40.290.11ExelerNilogy2132.440.4130.020.110.14ExelerNoller PE cup1191.288.16.60.4.70.101.14ExelerMoller PE cup1191.288.16.60.4.70.010.000.00ExelerMoller PE cup1191.288.16.60.4.70.100.000.000.00Exeler Monscher5516.827.92.90.4.20.280.6.10.140.230.140.14Exeler V40Scolucle Medil1.442.794.23.51.2.50.6.80.140.230.14Exeler V40Continuum TM1.3142.794.23.51.2.50.8.91.741.3Exeler V40Exeler X40Filnnum1.3742.794.23.51.2.50.6.81.330.411.34Exeler V40Exeler X40Filnnum1.3451.750.31.4.50.4.70.4.70.4.70.4.70.4.70.4.70.4.70.4.70.4.70.4.	Elite plus	Charnley	298	3,219.2	21	0.65	0.40	1.00
EverDurdoc6536.4453761.140.091.43EvelerContemporary1.53116.334.71580.070.821.13EvelerEveler1.32413.4202900.640.290.21EvelerOsteolock8339.495590.640.290.21EvelerOsteolock8339.495590.640.020.11EvelerBio clad poly1131.144.860.220.011.144EvelerMolter PE cup1191.288.10.60.000.000.01EvelerMorscher5516.829.9290.420.430.41EvelerMorscher5516.829.9290.420.430.41EvelerMorscher5516.829.9290.420.430.41EvelerMorscher5516.829.9290.420.430.41EvelerMorscher5516.829.9290.420.430.41EvelerMorscher1.3142.742351.1450.430.43Eveler V40Continuum TM1.3142.742351.1450.430.431.14Eveler V40Findum1.3145.0421.011.0460.430.431.14Eveler V40Findue1.1435.0421.051.440.321.14Eveler V40Findue4.1435.0421.44 <td>Elite plus</td> <td>Elite Plus Ogee</td> <td>110</td> <td>968.5</td> <td>5</td> <td>0.52</td> <td>0.17</td> <td>1.20</td>	Elite plus	Elite Plus Ogee	110	968.5	5	0.52	0.17	1.20
EvelerContemporary1,55116,334711880.0970.0821.018ExolerExeler1.3261.32029000.6770.5430.581ExeterCLS Expansion1.291.407.790.640.0291.121ExelerOsteolock8369.447.59.990.620.0480.081ExeterTilogy2.132.440.41.330.530.280.91ExeterMoler PE cup1.131.144.86.60.420.100.01ExeterMonscher5.516.827.990.420.600.03ExeterMonscher5.616.827.990.420.630.43Exeter V40Trabecular Metal1.4142.967.31.6180.4330.430.43Exeter V40Continuum TM1.3142.967.77.930.611.335Exeter V40Continuum TM1.3142.967.77.930.611.335Exeter V40Duraloc9.9731.7341.140.430.431.44Exeter V40Exeter X401.1472.906.77.730.480.431.44Exeter V40Exeter X40Nonscher6.3142.905.77.930.411.35Exeter V40Nonscher6.3153.119.933.640.440.430.41Exeter V40Nonscher6.3431.149.93.440.430.410.45Exeter V40Nonscher </td <td>Elite plus</td> <td>Elite Plus LPW</td> <td>282</td> <td>2,606.7</td> <td>11</td> <td>0.42</td> <td>0.21</td> <td>0.76</td>	Elite plus	Elite Plus LPW	282	2,606.7	11	0.42	0.21	0.76
EvelerEveler1.32013,202900.640.0540.081ExelerCLS Exponsion1291.409790.640.0291.121ExelerOsteolock8369.449.5590.6220.480.81ExelerBio-clod poly1132.440.4130.530.0280.011ExelerMoler PE cop1191.281.660.440.071.010ExelerMoscher5516.829.9290.0280.030.03Exeter VA0Tidont1.44973.30.81.440.632.88Exeler V40Continuum IM1.3142.794.2351.1280.641.13Exeter V40Continuum IM1.3142.906.7200.030.611.134Exeter V40Duraloc9936.211.77.10.680.681.14Exeter V40Exeler X31.199.31.640.321.141Exeter V40Exeler X31.199.31.650.440.321.141Exeter V40Exeler X31.199.31.650.440.321.141Exeter V40Feder1.4335.4115.4230.440.420.43Exeter V40Feder1.4331.199.31.450.440.321.141Exeter V40Korter1.4331.199.31.450.440.330.51Exeter V40Korter1.4331.199.41.450.44 <t< td=""><td>Exeter</td><td>Duraloc</td><td>553</td><td>6,645.3</td><td>76</td><td>1.14</td><td>0.90</td><td>1.43</td></t<>	Exeter	Duraloc	553	6,645.3	76	1.14	0.90	1.43
EvelerCLS Exponsion11291.409790.640.291.121ExeterOsteolock8369.4495590.620.480.81ExeterTrilogy1132.44041130.530.280.91ExeterBio-Clod poly1131.1448460.520.191.14ExeterMuller FE cup1191.288.1460.470.071.01ExeterMoscher5516.8979290.420.080.03Exeter V40Trident.8499730.00.000.030.33Exeter V40Continuum TM1.3142.742351.1250.681.145Exeter V40Continuum TM1.3742.90677.070.030.611.35Exeter V40Exeter X39931.7301.110.6480.321.141Exeter V40Exeter1.4331.9035.460.470.320.73Exeter V40Exeter1.4331.1530.440.300.6140.32Exeter V40Koncher6.305.4101.250.440.320.73Exeter V40Koncher6.315.4101.450.440.390.54Exeter V40Koncher6.335.4101.450.440.390.54Exeter V40Koncher6.343.41641.440.420.340.54Exeter V40Contomporory5.4643.4154	Exeter	Contemporary	1,551	16,334.7	158	0.97	0.82	1.13
ExelerOsteolock8839.449.590.620.480.081ExeterHilogy2132.440.1130.530.080.01ExeterMuller PE cup1191.288.4.60.020.191.11ExeterMorscher5516.829.92.90.420.020.03ExeterTident84997.300.000.000.03Exeter V40Trobeclor Metol1.142.794.23.81.140.640.63Exeter V40Continuum TM1.3142.796.20.230.611.13Exeter V40Continuum TM1.3142.906.72.030.611.13Exeter V40Duroloc9.990.7301.110.640.031.14Exeter V40Exeter X39.931.730.41.110.640.031.14Exeter V40Finocle1.435.662.30.450.450.450.45Exeter V40Keter1.631.1950.35.60.460.030.61Exeter V40Keter1.653.4410.21.580.440.030.64Exeter V40Norscher6.635.410.12.550.460.030.64Exeter V40Norscher6.633.44021.580.440.040.05Exeter V40Nuller PE cup5.6663.45641.440.420.690.12Exeter V40Conlopolock2.075.451 <t< td=""><td>Exeter</td><td>Exeter</td><td>1,326</td><td>13,420.2</td><td>90</td><td>0.67</td><td>0.54</td><td>0.82</td></t<>	Exeter	Exeter	1,326	13,420.2	90	0.67	0.54	0.82
ExelerIrilogy2132.4401130.030.080.091ExeterBio-clod poly1131.144860.020.191.14ExeterMuller PE cup1191.288.16.60.0470.070.011ExeterMorscher5516.829.90.290.0420.0280.031ExeterTident0.84997.30.00.0000.032Exeter V40Trobeculor Metal Shell1.44547.381.460.632.88Exeter V40Continuum TM1.3142.906.72.031.0410.031.74Exeter V40Duraloc9978.211.77.030.041.331.33Exeter V40Duraloc9981.73041.110.040.021.74Exeter V40Exeter X39931.73041.110.040.031.14Exeter V40Finacle1.4335.06232.0490.030.0411.04Exeter V40Keter1.6351.15035.640.0470.030.040.05Exeter V40Norscher6.035.410.12.550.040.030.610.05Exeter V40Contempory5.6634.0541.440.420.360.040.05Exeter V40Muler PE cup9.41.841.440.420.40.050.04Exeter V40Muler PE cup2.041.641.440.420.40.05<	Exeter	CLS Expansion	129	1,409.7	9	0.64	0.29	1.21
ExeterBio-clad poly11131.144860.020.191.114ExeterMuller PE cup11191.288.16.60.470.011.010ExeterMoscher5516.829.90.290.420.0230.037Exeter V40Trident0.84997.30.00.0000.030.037Exeter V40Continuum IM1.3142.794.23.581.1250.671.74Exeter V40Continuum IM1.3142.906.72.070.030.011.33Exeter V40Duraloc9.878.211.77.110.6460.020.114Exeter V40Exeter X39.991.73041.010.6460.030.648Exeter V40Findencie1.63511.9505.660.470.350.64Exeter V40Moscher6.6305.410.12.550.460.390.648Exeter V40Moscher6.671234.40.21580.460.390.64Exeter V40Moler PE cup9.4411.676.95.550.410.030.041Exeter V40Moler PE cup9.773.416.11.440.420.340.017Exeter V40Solock2.772.5751.010.330.041.33Exeter V40Nonelock2.9763.31.451.310.310.030.04Exeter V40Solock2.775.511.010.030.011.33Ex	Exeter	Osteolock	836	9,449.5	59	0.62	0.48	0.81
ExerterMuller PE cup1191.288.160.470.171.010ExelerMoscher5516.8299290.420.080.017ExelerTident0.84997.30.00.0000.0030.037Exeter V40Trabeculor Metall1.149547.33.881.1460.632.888Exeter V40Continuum TM1.3142.794.23.551.250.071.747Exeter V40Tritanium1.3742.906.72.070.030.011.338Exeter V40Duraloc9.9878.211.77.110.6460.021.167Exeter V40Exeter X39.9931.73041.110.640.020.01Exeter V40Finacle1.1435.06231.050.410.020.01Exeter V40Norcher1.6351.195031.650.4140.020.04Exeter V40Kider6.033.40.21.0350.640.030.614Exeter V40Muller PE cup9.111.6451.040.030.011.02Exeter V40Monoblock Cuebular Cup2.5751.010.030.011.03Exeter V40Nonoblock Cuebular Cup2.5751.010.030.041.03Exeter V40Nonoblock Cuebular Cup2.5751.010.030.041.03Exeter V40Nonoblock Cuebular Cup2.5751.010.030.011.33 <t< td=""><td>Exeter</td><td>Trilogy</td><td>213</td><td>2,440.4</td><td>13</td><td>0.53</td><td>0.28</td><td>0.91</td></t<>	Exeter	Trilogy	213	2,440.4	13	0.53	0.28	0.91
ExeterMorscher5516.829.90.290.420.020.031ExeterTrident0.44997.300.000.000.037Exeter V40Tribecular Metal1.149547.33.81.1450.832.88Exeter V40Continuum TM1.3142.794.23551.250.871.74Exeter V40Duroloc9970.211.710.860.681.05Exeter V40Duroloc9970.211.710.860.681.05Exeter V40Exeter X39931.730.41110.640.321.14Exeter V40Finacle1.4135.062.32.550.490.320.61Exeter V40Keter1.6351.150.33.660.440.320.64Exeter V40Morscher6.635.410.12.550.440.350.64Exeter V40Moler Ecup9.41.167.93.410.21.430.450.450.45Exeter V40Kuller PEcup9.41.167.93.410.21.440.420.360.14Exeter V40Collenck2.795.4513.12.90.450.440.450.45Exeter V40Stolock2.795.4513.12.90.410.450.450.45Exeter V40Stolock2.795.4513.12.90.410.450.450.45Exeter V40Stolock2.795.4513.12.90.330.64<	Exeter	Bio-clad poly	113	1,144.8	6	0.52	0.19	1.14
ExeterTrident84997.300.000.000.03Exeter V40Trobeculor Metall Shell1.14547.381.160.632.88Exeter V40Continuum TM1.3142.794.2351.250.871.74Exeter V40Tritonium1.3742.906.72.770.930.611.35Exeter V40Duraloc9878.211.77.110.860.681.09Exeter V40Exeter X39931.730.41.110.640.321.14Exeter V40Finocle1.435.662.32.550.490.320.61Exeter V40Keter1.63511.950.35.660.470.350.64Exeter V40Morscher6.67134.410.21.580.460.300.68Exeter V40Trident6.71234.410.21.580.460.300.64Exeter V40Trideny2.19011.676.95.30.450.430.54Exeter V40Contemporary5.6634.055.41.440.420.300.01Exeter V40Muler PE cup911.876.930.610.030.01Exeter V40Monoblock cerented2.7751.000.390.140.13Exeter V40Coleolock2.797543.120.370.041.33Exeter V40Coleolock3.0202.575.21.00.390.140.48Exeter	Exeter	Muller PE cup	119	1,288.1	6	0.47	0.17	1.01
Exeter V40Trobeculor Metal Shell149547.381.481.460.032.88Exeter V40Continuum TM1.3142.794.2351.250.871.74Exeter V40Tritonium1.3742.906.72.030.011.35Exeter V40Duraloc9878.211.77.080.080.081.09Exeter V40Exeter X39931.730.41.110.640.021.14Exeter V40Finacle1.4135.062.32.550.040.030.01Exeter V40Keter1.63511.950.35.660.0470.030.06Exeter V40Korscher6.61234.410.21.580.040.030.061Exeter V40Trident6.71234.410.21.580.040.030.051Exeter V40Trident6.71234.410.21.580.450.030.051Exeter V40Contemporary5.66634.0541.440.420.360.51Exeter V40Muller PE cup97.18.43.420.030.010.122Exeter V40Steolock2.772.57521.00.330.040.133Exeter V40Steolock2.783.12.491.130.030.010.13Exeter V40Steolock2.783.12.491.130.350.010.13Exeter V40Steolock3.783.12.491.130.350.140.13	Exeter	Morscher	551	6,829.9	29	0.42	0.28	0.61
Index Exter V40ShellIndex I (314)Index I (374)Index I (374)Index I (374)Index I (374)Index I (374)Index I (374)Index Index Index Index Index Index Index Index Index 	Exeter	Trident	84	997.3	0	0.00	0.00	0.37
Exeter V40fritanium1.3742.906.72.270.930.611.335Exeter V40Duraloc9878.211.77.10.860.681.09Exeter V40Exeter X39931.730.41.10.640.321.14Exeter V40Pinnacle1.4135.062.32.550.490.320.73Exeter V40Exeter1.63511.950.35.660.470.350.61Exeter V40Morscher6305.410.12.550.480.300.68Exeter V40Trident6.71234.410.21.1580.460.390.616Exeter V40Trident6.71234.410.21.1580.460.340.659Exeter V40Trident6.71234.410.21.1580.460.340.659Exeter V40Contemporary5.66634.056.41.1440.420.360.59Exeter V40Muller PE cup9.47.18.43.40.410.011.22Exeter V40Ostoolck2.771.18.43.40.430.011.33Exeter V40R3 porous2.975.43.12.90.330.041.33Exeter V40Refection3.91.48.85.90.340.113.4Exeter V40CCB3.801.48.85.90.340.110.78Exeter V40Bio-clod poly1.126.34.02.70.350.340.11Exeter	Exeter V40		149	547.3	8	1.46	0.63	2.88
Exter V40DuralocM9878.211.7M71M.8.6M.6.6M.109Exter V40Exter X3M9931.7304M11M.6.6M.6.8M.101Exter V40Pinnacle1.4135.062.3A25M.4M.32M.733Exter V40Exter1.43511.950.3S66M.47M.32M.6Exter V40Morscher6.305.410.1A25M.46M.30M.6Exter V40Morscher6.671234.410.21.158M.46M.33M.6Exter V40Irident6.71234.410.21.158M.46M.33M.6Exter V40Contemporary5.66634.056.41.144M.42M.36M.5Exter V40Muller PE cupM.97.18.4M.3M.42M.039M.12Exter V40OsteolckM.702.575.2M.10M.3M.04M.3Exter V40R3 porous2.9775.43.1M.3M.14M.14M.13Exter V40R3 porousM.713.1247M.11M.13M.14M.14Exter V40CCBM.301.486.8M.3M.34M.14M.14Exter V40CCBM.34M.46M.3M.14M.14M.14Exter V40CCBM.34M.46M.3M.14M.14M.14Exter V40Sinclad polyM.12G.340M.14M.14M.14Exter V40Refection porousM.66M	Exeter V40	Continuum TM	1,314	2,794.2	35	1.25	0.87	1.74
Exeter V40Exeter X39931,730.41110.0.40.321.1.4Exeter V40Pinnacle1.1.415.062.32.050.0490.320.73Exeter V40Exeter1.63511.950.35.660.0470.350.61Exeter V40Morscher6.6305.410.12.050.460.300.68Exeter V40Irident6.67134.410.21.1580.460.390.54Exeter V40Trilogy2.10011.676.95.530.4.50.340.59Exeter V40Contemporary5.66634.056.41.440.420.300.50Exeter V40Muller PE cup9.947.18.43.040.430.091.22Exeter V40Osteolock2.7002.575.21.100.330.041.33Exeter V40Osteolock2.7075.43.12.00.330.041.33Exeter V40R3 porous2.775.43.12.100.390.011.33Exeter V40CCB3.301.486.85.50.340.110.78Exeter V40CCB3.801.486.85.50.340.011.48Exeter V40Bio-clad poly1.126.34.02.502.17.520.030.041.14Exeter V40CCB3.801.486.85.50.340.110.781.48Exeter V40Bio-clad poly1.126.34.01.40.280.11	Exeter V40	Tritanium	1,374	2,906.7	27	0.93	0.61	1.35
Exeter V40Pinnacle1,4135,062.3250,490,320,73Exeter V40Exeter1,63511,950.3560,470,350,41Exeter V40Morscher6,3005,410.1250,460,300,68Exeter V40Trident6,71234,410.21580,460,390,54Exeter V40Trident6,71234,410.21580,450,340,59Exeter V40Tridogy2,19011,676.95330,450,340,59Exeter V40Contemporary5,66634,056.41440,420,360,50Exeter V40Muller PE cup94718.430,420,091,22Exeter V40Monoblock Acetabular Cup11,2595,51100,390,010,71Exeter V40Osteolock2702,5752100,390,041,33Exeter V40Reflection cemented7183,124.91110,350,180,31Exeter V40CCB3801,486.850,340,110,78Exeter V40Bio-clad poly122634.020,320,041,14Exeter V40Reflection porous4662,502.170,280,110,58Exeter V40Reflection porous4662,502.170,280,110,58Exeter V40Keflection porous4662,502.170,280,110,58<	Exeter V40	Duraloc	987	8,211.7	71	0.86	0.68	1.09
Exeter V40ExeterExeter11,63511,950.35660.0470.0350.0.61Exeter V40Morscher6.6305,410.10.250.0.460.030.68Exeter V40Trident6.71234,410.21580.460.390.54Exeter V40Trilogy2,19011,676.9530.450.340.59Exeter V40Contemporary5,66634,056.411440.420.030.050Exeter V40Muller PE cup94718.430.420.0911.22Exeter V40Monoblock Acetabular Cup11231,205.950.410.190.12Exeter V40Osteolock2702,575.21000.390.041.33Exeter V40Reflection Remented7183,124.9110.350.041.33Exeter V40CCB3301,486.850.340.010.74Exeter V40Ecenoporus4662,502.170.230.041.14Exeter V40Bio-clad poly1122634.020.20.041.14Exeter V40Keflection porous4662,502.170.280.011.45Exeter V40Keflection porous4662,502.170.280.011.45Exeter V40Keflection porous4662,502.170.280.010.05Exeter V40Keflection porous4662,502.11 <td< td=""><td>Exeter V40</td><td>Exeter X3</td><td>993</td><td>1,730.4</td><td>11</td><td>0.64</td><td>0.32</td><td>1.14</td></td<>	Exeter V40	Exeter X3	993	1,730.4	11	0.64	0.32	1.14
Exeter V40Morscher66305,410.1250.460.300.68Exeter V40Irident6,71234,410.21580.460.390.54Exeter V40Trilogy2,19011,676.9530.450.340.59Exeter V40Contemporary5,66634,056.411440.4220.360.50Exeter V40Muller PE cup94718.430.420.091.22Exeter V40Monoblock Acetabular Cup11231,205.950.410.130.71Exeter V40Osteolock2702,575.21000.390.190.71Exeter V40R3 porous2297543.1220.330.041.33Exeter V40CCB3801,486.850.340.110.78Exeter V40Bio-clad poly122634.020.320.041.48Exeter V40Keflection porous142634.020.330.140.78Exeter V40Sio-clad poly122634.020.340.110.78Exeter V40Keflection porous14662,502.170.280.011.46.8Exeter V40Keflection porous14662,502.170.280.110.58Exeter V40Keflection porous14662,502.170.280.110.58Exeter V40Keflection porous14662,502.170.280.011.4	Exeter V40	Pinnacle	1,413	5,062.3	25	0.49	0.32	0.73
Exeter V40Trident6.71234.410.211580.0460.390.54Exeter V40Trilogy2.19011.676.9530.450.340.59Exeter V40Contemporary5.66634.056.411440.420.360.50Exeter V40Muller PE cup94718.430.420.091.22Exeter V40Monoblock Acetabular Cup11231.205.950.410.130.97Exeter V40Osteolock2702.575.21000.390.190.71Exeter V40Reflection cemented2077543.120.370.041.33Exeter V40CCB3801.486.850.340.110.678Exeter V40Bio-clad poly122634.020.320.041.14Exeter V40Reflection porous4462.502.170.280.110.58Exeter V40Kerlet V40Reflection porous14662.502.170.280.110.58Exeter V40Kerlet V40Reflection porous4462.502.170.280.110.58Exeter V40Kerlet V40Reflection porous4462.502.170.280.110.58Exeter V40Kerlet V40Reflection porous1462.502.170.280.011.47Exeter V40Kerlet V40Kerlet V40Kerlet V40Kerlet V400.010.011.47 <td>Exeter V40</td> <td>Exeter</td> <td>1,635</td> <td>11,950.3</td> <td>56</td> <td>0.47</td> <td>0.35</td> <td>0.61</td>	Exeter V40	Exeter	1,635	11,950.3	56	0.47	0.35	0.61
Exeter V40Trilogy2.19011.676.95330.450.340.59Exeter V40Contemporary5.66634.056.411440.420.360.50Exeter V40Muller PE cup94718.430.420.091.22Exeter V40Monoblock Acetabular Cup1231.205.93.010.410.130.97Exeter V40Osteolock2702.575.21000.390.190.71Exeter V40R3 porous297543.120.370.041.33Exeter V40Reflection cemented7183.124.91110.353.0180.63Exeter V40CCB38001.486.85.50.340.110.78Exeter V40Bio-clad poly122634.020.320.041.14Exeter V40Reflection porous4662.502.170.280.110.58Exeter V40CCA71378.21.10.260.011.47	Exeter V40	Morscher	630	5,410.1	25	0.46	0.30	0.68
Exeter V40Contemporary5,66634,056.41440.420.360.50Exeter V40Muller PE cup94718.430.420.091.22Exeter V40Monoblock Acetabular Cup1231,205.950.410.130.97Exeter V40Osteolock2702,575.2100.390.190.71Exeter V40R3 porous297543.120.370.041.33Exeter V40Reflection cemented7183,124.9110.350.180.63Exeter V40CCB3801,486.850.340.110.78Exeter V40Bio-clad poly122634.020.320.041.14Exeter V40Reflection porous4662,502.170.280.110.58Exeter V40Reflection porous4662,502.170.280.110.58Exeter V40Reflection porous4662,502.170.280.110.58Exeter V40Reflection porous4662,502.170.280.110.58Exeter V40Reflection porous4662,502.170.280.011.47	Exeter V40	Trident	6,712	34,410.2	158	0.46	0.39	0.54
Exeter V40Muller PE cup94718.430.420.091.22Exeter V40Monoblock Acetabular Cup1231,205.9550.410.130.97Exeter V40Osteolock2702,575.21000.0390.190.71Exeter V40R3 porous297543.120.370.041.33Exeter V40Reflection cemented7183,124.9110.350.180.63Exeter V40CCB3801,486.850.340.110.78Exeter V40Bio-clad poly122634.020.320.041.14Exeter V40Reflection porous4662,502.170.280.110.58Exeter V40XCAT1378.210.260.011.47	Exeter V40	Trilogy	2,190	11,676.9	53	0.45	0.34	0.59
Exeter V40Monoblock Acetabular Cup1231,205.950.10.110.130.97Exeter V40Osteolock2702,575.21000.390.190.71Exeter V40R3 porous297543.120.370.041.33Exeter V40Reflection cemented7183,124.91110.3550.180.63Exeter V40CCB3801,486.850.340.110.78Exeter V40Bio-clad poly112634.020.320.041.14Exeter V40Reflection porous4662,502.170.280.110.58Exeter V40ZCA71378.2110.260.011.47	Exeter V40	Contemporary	5,666	34,056.4	144	0.42	0.36	0.50
Acetabular CupImage: Constant CupImage: Constant CupImage: Constant CupExeter V40Osteolock2702,575.2100.0390.190.71Exeter V40R3 porous297543.120.370.041.33Exeter V40Reflection constant Cup7183,124.9110.350.180.63Exeter V40CCB3801,486.850.340.110.78Exeter V40Bio-clad poly122634.020.320.041.14Exeter V40Reflection porous4662,502.170.280.110.58Exeter V40ZCA71378.2110.260.011.47	Exeter V40	Muller PE cup	94	718.4	3	0.42	0.09	1.22
Exeter V40R3 porous297543.120.070.041.33Exeter V40Reflection cemented7183,124.91110.350.180.63Exeter V40CCB3801,486.850.340.110.78Exeter V40Bio-clad poly122634.020.320.041.14Exeter V40Reflection porous4662,502.170.280.110.58Exeter V40ZCA71378.210.260.011.47	Exeter V40		123	1,205.9	5	0.41	0.13	0.97
Exeter V40Reflection cemented7183,124.9110.350.180.63Exeter V40CCB3801,486.850.340.110.78Exeter V40Bio-clad poly122634.020.320.041.14Exeter V40Reflection porous4662,502.170.280.110.58Exeter V40ZCA71378.210.260.011.47	Exeter V40	Osteolock	270	2,575.2	10	0.39	0.19	0.71
cementedcementedcementedcementedcementedExeter V40CCB3801,486.850.340.110.78Exeter V40Bio-clad poly122634.020.320.041.14Exeter V40Reflection porous4662,502.170.280.110.58Exeter V40ZCA71378.210.260.011.47	Exeter V40	R3 porous	297	543.1	2	0.37	0.04	1.33
Exeter V40         Bio-clad poly         122         634.0         2         0.32         0.04         1.14           Exeter V40         Reflection porous         466         2,502.1         7         0.28         0.11         0.58           Exeter V40         ZCA         71         378.2         1         0.26         0.01         1.47	Exeter V40		718	3,124.9	11	0.35	0.18	0.63
Exeter V40         Reflection porous         466         2,502.1         7         0.28         0.11         0.58           Exeter V40         ZCA         71         378.2         1         0.26         0.01         1.47	Exeter V40	ССВ	380	1,486.8	5	0.34	0.11	0.78
Exeter V40         ZCA         71         378.2         1         0.26         0.01         1.47	Exeter V40	Bio-clad poly	122	634.0	2	0.32	0.04	1.14
	Exeter V40	Reflection porous	466	2,502.1	7	0.28	0.11	0.58
	Exeter V40	ZCA	71	378.2	1	0.26	0.01	1.47
	Exeter V40	RM Pressfit cup	1,247	4,653.8	11	0.24	0.12	0.42



Combination		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
Exeter V40	Fitmore	528	1,937.9	4	0.21	0.06	0.53
Exeter V40	CLS Expansion	88	818.9	1	0.12	0.00	0.68
Exeter V40	Delta-TT Cup	92	170.1	0	0.00	0.00	2.17
Exeter V40	ZCA all-poly cup	81	123.9	0	0.00	0.00	2.98
Exeter V40	Weber	53	449.5	0	0.00	0.00	0.82
Femoral Stem Press Fit	Delta-TT Cup	52	87.0	2	2.30	0.28	8.30
Femoral Stem Press Fit	Continuum TM	408	968.7	11	1.14	0.57	2.03
Femoral Stem Press Fit	Trident	59	126.9	1	0.79	0.02	4.39
Femoral Stem Press Fit	Trilogy	139	728.0	4	0.55	0.15	1.41
Friendly	Delta-TT Cup	55	186.3	2	1.07	0.13	3.88
Friendly	Delta-PF Cup	159	1,076.6	3	0.28	0.06	0.81
Furlong	Furlong	64	566.3	5	0.88	0.29	2.06
H-Max M	Delta-PF Cup	71	302.9	6	1.98	0.73	4.31
H-Max M	Delta-TT Cup	86	350.5	2	0.57	0.07	2.06
H-Max S	Delta-TT Cup	391	700.4	8	1.14	0.49	2.25
Lateral straight stem	Muller PE cup	152	1,290.7	9	0.70	0.32	1.32
Lateral straight stem	Weber	53	506.6	0	0.00	0.00	0.73
Mallory-Head	M2A	105	907.7	11	1.21	0.60	2.17
MS 30	Duraloc	55	661.3	6	0.91	0.33	1.97
MS 30	Contemporary	128	1,028.4	7	0.68	0.27	1.40
MS 30	Morscher	787	7,842.8	51	0.65	0.48	0.85
MS 30	Continuum TM	199	434.9	2	0.46	0.06	1.66
MS 30	Muller PE cup	462	3,906.8	15	0.38	0.21	0.63
MS 30	RM Pressfit cup	87	535.4	2	0.37	0.05	1.35
MS 30	Fitmore	1,497	8,018.1	27	0.34	0.22	0.49
MS 30	Trilogy	216	1,019.8	3	0.29	0.06	0.86
MS 30	ZCA all-poly cup	94	185.9	0	0.00	0.00	1.98
Muller	Trilogy	115	634.9	13	2.05	1.09	3.50
Muller	Trident	76	594.5	9	1.51	0.69	2.87
Muller	Duraloc	78	860.8	9	1.05	0.48	1.98
Muller	CLS Expansion	59	409.3	4	0.98	0.27	2.50
Muller	RM cup	1,013	9,159.3	71	0.78	0.61	0.98
Muller	Continuum TM	123	304.9	2	0.66	0.08	2.37
Muller	Morscher	70	747.3	4	0.54	0.15	1.37
Muller	Weber	377	3,051.2	12	0.39	0.20	0.69
Muller	Muller PE cup	1,693	14,530.0	57	0.39	0.30	0.51
Muller	ZCA all-poly cup	116	298.9	1	0.33	0.01	1.86
Muller	Fitmore	57	309.4	1	0.32	0.01	1.80
Muller	ZCA	138	667.5	2	0.30	0.04	1.08
Muller	RM Pressfit cup	277	1,418.3	3	0.21	0.04	0.62

Combination		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
Omnifit	Trident	149	1,350.2	12	0.89	0.46	1.55
Polarstem uncemented	Reflection porous	334	892.9	12	1.34	0.69	2.35
Polarstem uncemented	R3 porous	503	690.0	7	1.01	0.41	2.09
Prodigy	Duraloc	113	1,267.8	16	1.26	0.72	2.05
SL monoblock	Muller PE cup	101	910.4	3	0.33	0.07	0.96
Spectron	Duraloc	1,153	11,665.4	138	1.18	0.99	1.40
Spectron	Muller PE cup	66	598.3	7	1.17	0.47	2.41
Spectron	Reflection cemented	2,945	25,725.1	252	0.98	0.86	1.11
Spectron	Morscher	210	2,315.5	21	0.91	0.56	1.39
Spectron	Reflection porous	2,755	20,599.5	151	0.73	0.62	0.86
Spectron	R3 porous	375	1,006.3	5	0.50	0.16	1.16
Spectron	Fitmore	78	827.3	4	0.48	0.13	1.24
Spectron	Mallory-Head	152	1,377.5	6	0.44	0.16	0.95
Spectron	Trident	78	692.4	3	0.43	0.09	1.27
Spectron	Biomex acet shell porous	68	827.6	1	0.12	0.00	0.67
S-Rom	ASR	130	661.4	87	13.15	10.54	16.23
S-Rom	Pinnacle	321	2,400.2	25	1.04	0.67	1.54
S-Rom	Ultima	78	989.4	8	0.81	0.35	1.59
Stemsys	Fixa Ti Por	378	612.2	6	0.98	0.36	2.13
Stemsys	Agilis Ti-por	179	227.2	1	0.44	0.01	2.45
Stemsys	DeltaMotion Cup	268	935.4	4	0.43	0.12	1.09
Stemsys	RM Pressfit cup	162	280.1	1	0.36	0.01	1.99
Stemsys	Delta-PF Cup	105	84.8	0	0.00	0.00	4.35
Summit	ASR	88	540.6	26	4.81	3.14	7.05
Summit	Pinnacle	1,460	6,577.6	62	0.94	0.72	1.21
Summit	Trilogy	135	757.7	5	0.66	0.21	1.54
Summit	Duraloc	101	883.7	5	0.57	0.18	1.32
Synergy Porous	BHR Acetabular Cup	114	722.1	13	1.80	0.96	3.08
Synergy Porous	R3 porous	1,060	2,448.2	25	1.02	0.66	1.51
Synergy Porous	Reflection porous	1,162	7,613.6	35	0.46	0.32	0.64
Synergy Porous	Delta-PF Cup	88	441.1	0	0.00	0.00	0.84
Trabecular Metal Stem	Continuum TM	298	653.3	13	1.99	1.06	3.40
Trabecular Metal Stem	Monoblock Acetabular Cup	74	543.9	3	0.55	0.11	1.61
Tri-Lock BPS	Pinnacle	62	195.3	3	1.54	0.32	4.49
TwinSys cemented	Selexys TPS	65	251.1	4	1.59	0.43	4.08
TwinSys cemented	RM Pressfit cup	1,098	3,621.1	21	0.58	0.36	0.89
TwinSys cemented	RM cup	148	1,005.6	4	0.40	0.11	1.02



Combination		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
TwinSys cemented	ССВ	351	1,295.3	4	0.31	0.08	0.79
TwinSys cemented	Continuum TM	54	66.7	0	0.00	0.00	5.53
TwinSys uncemented	Selexys TPS	1,231	6,158.6	79	1.28	1.02	1.60
TwinSys uncemented	Continuum TM	118	340.8	3	0.88	0.18	2.57
TwinSys uncemented	Trilogy	209	1,080.7	8	0.74	0.32	1.46
TwinSys uncemented	RM Pressfit cup	3,735	15,116.5	90	0.60	0.48	0.73
TwinSys uncemented	RM cup	122	609.6	3	0.49	0.10	1.44
TwinSys uncemented	Delta-PF Cup	370	1,575.7	1	0.06	0.00	0.35
Versys	Trilogy	272	3,083.7	13	0.42	0.22	0.72
Versys cemented	ZCA	391	3,466.9	20	0.58	0.35	0.89
Versys cemented	Trilogy	237	2,170.4	7	0.32	0.13	0.66
Wagner cone stem	Fitmore	62	558.6	3	0.54	0.11	1.57
Zimmer Femoral Stem Press-Fit	Continuum TM	59	142.6	2	1.40	0.17	5.06

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

Size	Surfaces	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% confidence interval	
<=28	СС	721	5,405.9	43	0.80	0.58	1.07
<=28	СМ	21	81.7	2	2.45	0.30	8.84
<=28	СР	10,108	75,732.7	532	0.70	0.64	0.76
<=28	MM	2,834	30,016.0	213	0.71	0.62	0.81
<=28	MP	43,233	328,054.3	2,264	0.69	0.66	0.72
32	СС	3,124	17,716.3	108	0.61	0.50	0.74
32	СР	5,698	18,406.4	94	0.51	0.41	0.62
32	MM	480	3,177.9	29	0.91	0.61	1.31
32	MP	17,530	57,975.4	356	0.61	0.55	0.68
36	СС	5,302	22,447.3	143	0.64	0.54	0.75
36	СМ	443	2,051.6	16	0.78	0.45	1.27
36	СР	2,543	7,093.1	41	0.58	0.41	0.78
36	MM	1,002	7,151.6	93	1.30	1.05	1.59
36	MP	2,013	5,458.1	46	0.84	0.62	1.12
>36	СС	1,135	2,906.1	15	0.52	0.29	0.85
>36	СМ	7	34.5	0	0.00	0.00	10.68
>36	СР	4	4.2	0	0.00	0.00	88.82
>36	MM	1,648	10,517.3	366	3.48	3.13	3.86
>36	MP	30	110.2	1	0.91	0.00	5.06

#### Summary Revision Rates vs Head Size

Size	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% confidence interva	
<=28	56,917	439,290.7	3,054	0.70	0.67	0.72
32	26,832	97,276.0	587	0.60	0.56	0.65
36	11,303	44,201.8	339	0.77	0.69	0.85
>36	2,824	13,572.3	382	2.81	2.54	3.11

Head size > 36mm (64% are Metal on Metal articulation) has a significantly higher revision rate compared to the other 3 sizes and the 36mm head size has a significantly higher revision rate than 32mm head size.

#### **Revision Comparison Standard vs Cross linked Polyethylene**

Surfaces	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% confidence interval	
CC	10,283	48,478.2	309	0.64	0.57	0.71
СМ	471	2,167.8	18	0.83	0.49	1.31
СР	18,356	101,239.4	667	0.66	0.61	0.71
PS	6,780	60,702.8	447	0.74	0.67	0.81
PX	11,576	40,536.6	220	0.54	0.47	0.62
MM	5,966	50,870.7	701	1.38	1.28	1.48
MP	62,818	391,682.4	2,667	0.68	0.66	0.71
PS	34,921	275,121.5	1,930	0.70	0.67	0.73
PX	27,894	116,532.4	737	0.63	0.59	0.68

PS= standard polyethylene PX = cross linked polyethylene

CP (PX) has a significantly lower revision rate compared to the PS combination and the MP (PS).

# **Revision vs Bearing Surfaces of Uncemented Prostheses**

Surfaces	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% confidence interva	
СС	8,127	38,863.7	262	0.67	0.59	0.76
СМ	465	2,163.4	17	0.79	0.46	1.26
СР	11,926	60,478.0	402	0.66	0.60	0.73
MM	5,379	45,368.2	639	1.41	1.30	1.52
MP	11,865	60,207.8	498	0.83	0.76	0.90

The MM articulation has a significantly higher revision rate than all the others. CP has a significantly lower revision rate than MP.

#### **Revision vs Bearing Surfaces of Fully Cemented Prostheses**

Surfaces	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% confidence interva	
СР	662	4,607.1	39	0.85	0.60	1.16
MM	9	56.1	3	5.35	1.10	15.63
MP	22,597	161,915.0	998	0.62	0.58	0.66

There is no significant difference between CP and MP bearing surfaces.



#### **Revision vs Bearing Surfaces of Hybrid Prostheses**

Surfaces	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% confidence interval	
СС	2,156	9,614.4	47	0.49	0.36	0.65
СМ	4	3.4	1	29.84	0.76	166.26
СР	5,838	36,621.1	233	0.64	0.56	0.72
MM	561	5,428.4	60	1.11	0.84	1.42
MP	28,714	171,832.5	1,184	0.69	0.65	0.73

The CC has a significantly lower revision rate than the MP and MM bearing surfaces.

# Summary for Revision vs Bearing Surfaces

Surfaces	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% confidence interva	
CC	10,283	48,478.2	309	0.64	0.57	0.71
СМ	471	2,167.8	18	0.83	0.49	1.31
СР	18,356	101,239.4	667	0.66	0.61	0.71
MM	5,966	50,870.7	701	1.38	1.28	1.48
MP	62,818	391,682.4	2,667	0.68	0.66	0.71

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% cont	fidence interval
1,297	12,979.5	57	0.44	0.33	0.57

#### **Revision vs Age Bands**

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% confidence interval	
LT55	14,909	101,132.4	1,078	1.07	1.00	1.13
55_64	25,143	163,761.8	1,410	0.86	0.82	0.91
65_74	33,509	208,252.6	1,339	0.64	0.61	0.68
GE75	26,754	143,589.4	648	0.45	0.42	0.49

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

#### **Revision vs Acetabulum types**

Acetabulum type	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% confidence intervo	
Uncemented No Liner	15,965	100,893.6	859	0.85	0.80	0.91
Fully Cemented	23,265	166,539.1	1,040	0.62	0.59	0.66
Uncemented Liner	58,658	326,947.5	2,463	0.75	0.72	0.78

The fully cemented acetabulum has a significantly lower revision rate than the other two types.

# Revision vs Age Bands vs Bearing Surfaces

Bearing Surface	Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
СС	LT55	3,931	18,947	140	0.74	0.62	0.87
	55_64	4,233	20,462	110	0.54	0.44	0.65
	65_74	1,929	8,428	56	0.66	0.50	0.86
	GE75	190	639	3	0.47	0.10	1.37
СМ	LT55	180	819	5	0.61	0.20	1.42
	55_64	210	978	10	1.02	0.49	1.88
	65_74	72	333	3	0.90	0.19	2.63
	GE75	9	36	0	0.00	0.00	10.10
СР	LT55	3,570	22,505	193	0.86	0.74	0.99
	55_64	6,484	37,116	246	0.66	0.58	0.75
	65_74	6,012	31,532	173	0.55	0.47	0.64
	GE75	2,290	10,084	55	0.55	0.41	0.71
MM	LT55	2,881	26,262	342	1.30	1.17	1.45
	55_64	2,369	19,608	295	1.50	1.34	1.69
	65_74	649	4,722	58	1.23	0.93	1.59
	GE75	67	277	6	2.16	0.79	4.71
MP	LT55	4,103	30,042	374	1.24	1.12	1.38
	55_64	11,411	81,122	727	0.90	0.83	0.96
	65_74	23,953	154,483	1,009	0.65	0.61	0.69
	GE75	23,351	126,033	557	0.44	0.41	0.48

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% con	fidence interval
F	53,414	327,875.9	2,137	0.65	0.62	0.68
М	46,901	288,860.3	2,338	0.81	0.78	0.84

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% cont	îdence interval
LT10	1,206	8,522.4	85	1.00	0.79	1.23
10_25	11,017	68,326.6	546	0.80	0.73	0.87
26_50	42,656	262,579.7	2,007	0.76	0.73	0.80
51_75	24,698	145,791.9	888	0.61	0.57	0.65
76_100	9,854	56,722.6	380	0.67	0.60	0.74
GE100	10,884	74,793.1	569	0.76	0.70	0.83

Those surgeons performing 51-75 arthroplasties a year have a significantly lower revision rate than those in the three lower categories.

#### **Revision vs Approach**

Approach	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% conf	ìdence interval
Anterior	3,709	28,223.0	214	0.76	0.66	0.87
Posterior	63,935	383,111.0	2,841	0.74	0.71	0.77
Lateral	26,583	168,478.8	1,112	0.66	0.62	0.70
Troch	119	737.2	11	1.49	0.74	2.67

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% cont	îdence interval
Anterior	3,709	28,223.0	40	0.14	0.10	0.19
Posterior	63,935	383,111.0	821	0.21	0.20	0.23
Lateral	26,583	168,478.8	159	0.09	0.08	0.11
Troch	119	737.2	1	0.14	0.00	0.76
Total	94,346	580,550.1	1,021	0.18	0.17	0.19

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% cont	îdence interval
Cemented	24,279	177,972.2	1,084	0.61	0.57	0.65
Uncemented	38,145	210,152.3	1,836	0.87	0.83	0.91
Hybrid	37,891	228,611.7	1,555	0.68	0.65	0.71

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	672	5,907.7	107	1.81	1.48	2.19
Uncemented	10,939	69,360.9	675	0.97	0.90	1.05
Hybrid	3,298	25,863.9	296	1.14	1.02	1.28
55_64						
Cemented	2,415	21,587.5	228	1.06	0.92	1.20
Uncemented	13,932	79,969.3	718	0.90	0.83	0.97
Hybrid	8,796	62,205.1	464	0.75	0.68	0.82
65_74						
Cemented	8,585	70,899.3	458	0.65	0.59	0.71
Uncemented	9,709	46,583.0	337	0.72	0.65	0.80
Hybrid	15,215	90,770.3	544	0.60	0.55	0.65
>75						
Cemented	12,607	79,577.8	291	0.37	0.32	0.41
Uncemented	3,565	14,239.2	106	0.74	0.61	0.90
Hybrid	10,582	49,772.4	251	0.50	0.44	0.57

For the <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, 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 and uncemented hips.

#### **Revision vs ASA Status**

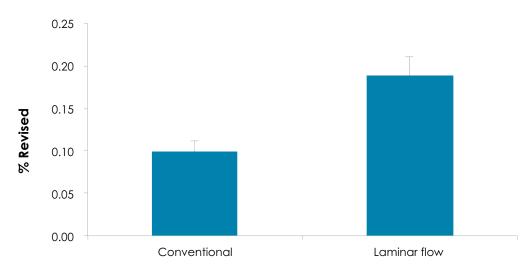
ASA Class	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% conf	îdence interval
1	11,246	50,445.4	428	0.85	0.77	0.93
2	39,498	167,045.4	1,161	0.70	0.66	0.74
3	15,450	59,512.1	403	0.68	0.61	0.75
4	562	1,697.8	18	1.06	0.63	1.68

ASA 1 has a significantly higher revision rate than ASA 2 and 3.



# Revision for Deep Infection within 6 months vs Theatre Environment

Theatre	Total Number	Number revised	%	Std Error
Conventional	57,961	57	0.098	0.013
Laminar flow	35,597	67	0.188	0.023

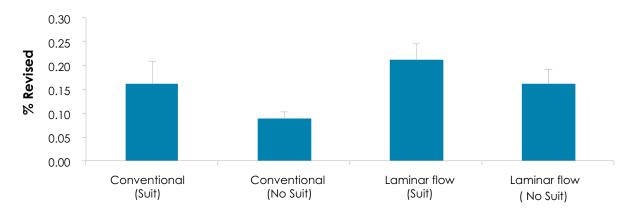


% Revision for Deep Infection Within 6 Months

There is a significant difference in revision rates (x2) for deep infection within 6 months of surgery between conventional and laminar flow theatres.

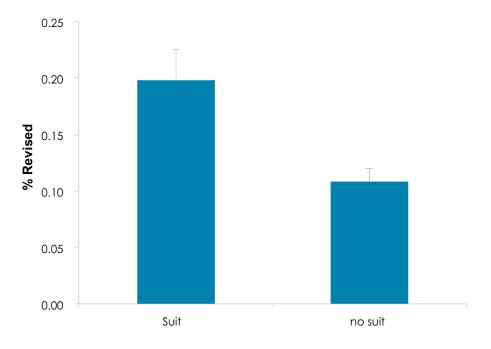
		Total Number	Number revised	%	Std Error
Conventional	Suit	7,444	12	0.161	0.046
	No suit	50,517	45	0.089	0.013
Laminar flow	Suit	18,355	39	0.213	0.034
	No suit	17,242	28	0.162	0.031

# % Revision for Deep Infection Within 6 Months



There is a significant difference in revision rates (2.4x) for laminar flow/suit compared to conventional/no suit environments

	Total Number	Number revised	%	Std Error
Suit	25,799	51	0.198	0.028
no suit	67,759	73	0.108	0.013

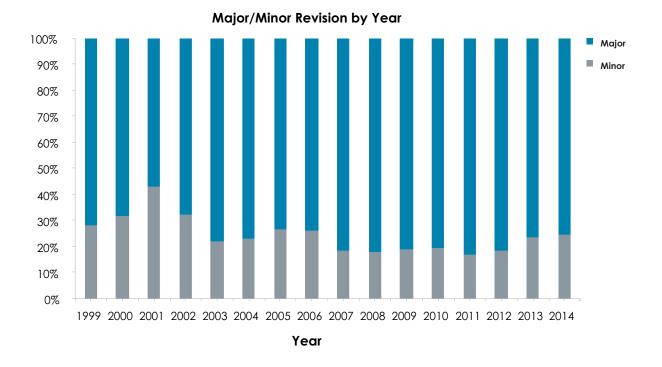


# % Revision for Deep Infection Within 6 Months

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 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

#### Comparison of Major vs Minor Revisions by Year



A major revision is defined as revision of acetabulum and/or femur including any of minor components and minor revision as change of head and/or liner only.

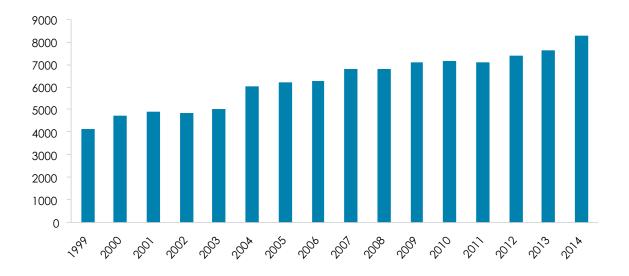
# Re revisions for Major vs Minor revisions

	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% conf	ìdence interval
Minor	962	3,877.1	159	4.10	3.49	4.79
Major	3,473	13,368.0	429	3.21	2.91	3.53

There is a significantly higher re-revision rate for minor compared to major revisions despite overlap of C.I.s (p=0.03).

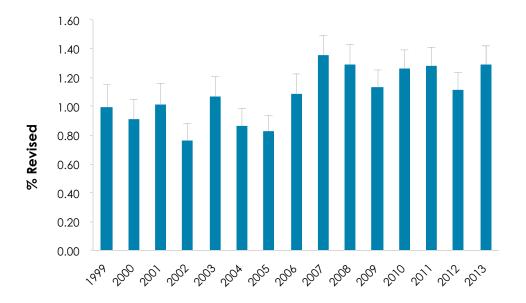
#### Percentage of hips revised in the first year

The following two bar graphs show that the percentage of hips revised in the first year after arthroplasty dropped in 2012 to a similar level as 2009.



Number of operations by year

% Revised within first year





# Resurfacing Arthroplasty All Patients

No. Op	os Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% cont	idence interval
1,518	8,099.0	104	1.28	1.05	1.56

There is a significantly higher revision rate compared to conventional hip arthroplasty (0.73/100 comp yrs.)

# **Resurfacing Prosthesis vs Revision Rate**

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% conf	îdence interval
Adept	4	27.1	0	0	0	13.61
ASR	132	988.9	32	3.24	2.21	4.57
BHR	1,335	6,860.6	67	0.98	0.76	1.24
BMHR	28	110.3	1	0.91	0.02	5.05
Conserve Superfinish	3	16.6	0	0	0	22.23
Durom	4	42.3	0	0	0	8.73
Mitch TRH Resurfacing Head	12	53.2	4	7.52	2.05	19.25

The Mitch TRH and ASR have very significantly higher revision rates but none have been implanted since 2010.

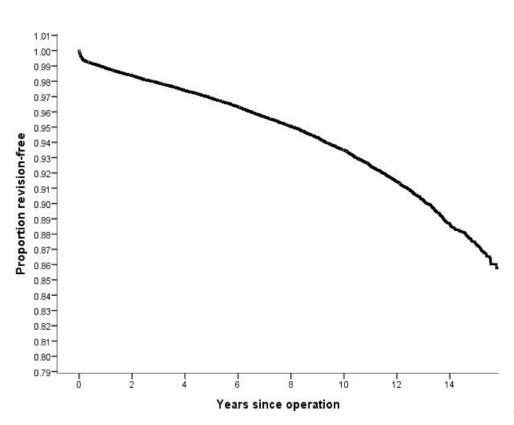
#### Head size vs Revision Rate

Hips resurfacing head size	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% conf	ìdence interval
<=44	99	557.0	24	4.31	2.76	6.41
45-49	324	1,868.0	33	1.77	1.22	2.48
50-54	1,011	5,107.0	40	0.78	0.56	1.07
>=55	84	567.0	7	1.23	0.50	2.54
ALL	1,518	8,099.0	104	1.28	1.05	1.56

The  $\leq$  44 mm head has a significantly higher revision rate than the 45-49mm head size, which in turn has a significantly higher revision rate than the 50-54mm head size.

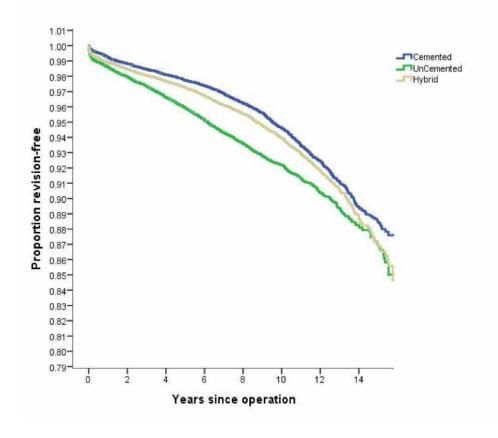
# **KAPLAN MEIER CURVES**

The following Kaplan Meier survival analyses are for the years 1999 - 2014 with deceased patients censored at time of death.



Years	% Revision- free	No in each year
1	98.90	89,510
2	98.40	80,375
3	97.90	71,532
4	97.40	63,095
5	96.90	54,787
6	96.30	46,851
7	95.70	39,606
8	95.00	32,719
9	94.30	26,652
10	93.50	20,953
11	92.50	15,755
12	91.40	11,545
13	90.20	7,929
14	88.70	4,712
15	87.30	2,026

The KM analysis is to 15 years rather than 16 as too few registered hips were revised in 2014.





Hybrid

Years	% Revision- free	No in each year
1	98.90	33,466
2	98.50	29,724
3	98.00	26,162
4	97.70	22,985
5	97.30	20,112
6	96.70	17,383
7	96.10	14,800
8	95.50	12,234
9	94.80	10,052
10	94.00	7,867
11	93.00	5,871
12	91.80	4,283
13	90.60	2,886
14	88.80	1,679
15	87.00	647

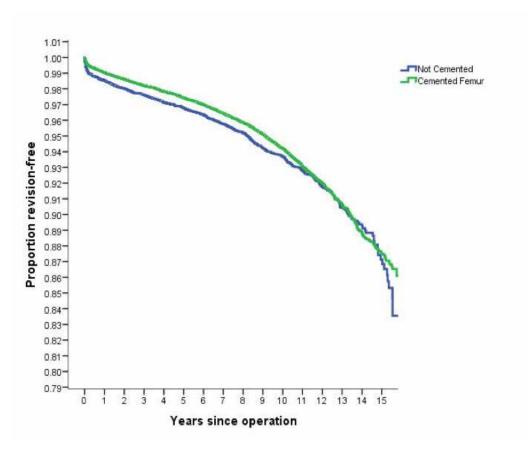
#### Uncemented

Uncernenied				
% Revision- free	No in each year			
98.60	33,739			
98.00	29,892			
97.40	26,280			
96.60	22,680			
95.90	18,816			
95.10	15,161			
94.30	12,110			
93.60	9,506			
92.80	7,360			
92.20	5,596			
91.40	4,143			
90.40	2,920			
89.40	1,984			
88.30	1,238			
87.00	492			
	% Revision-free           98.60           98.00           98.00           97.40           97.40           95.10           95.10           94.30           92.80           92.80           91.40           90.40           89.40           89.40			

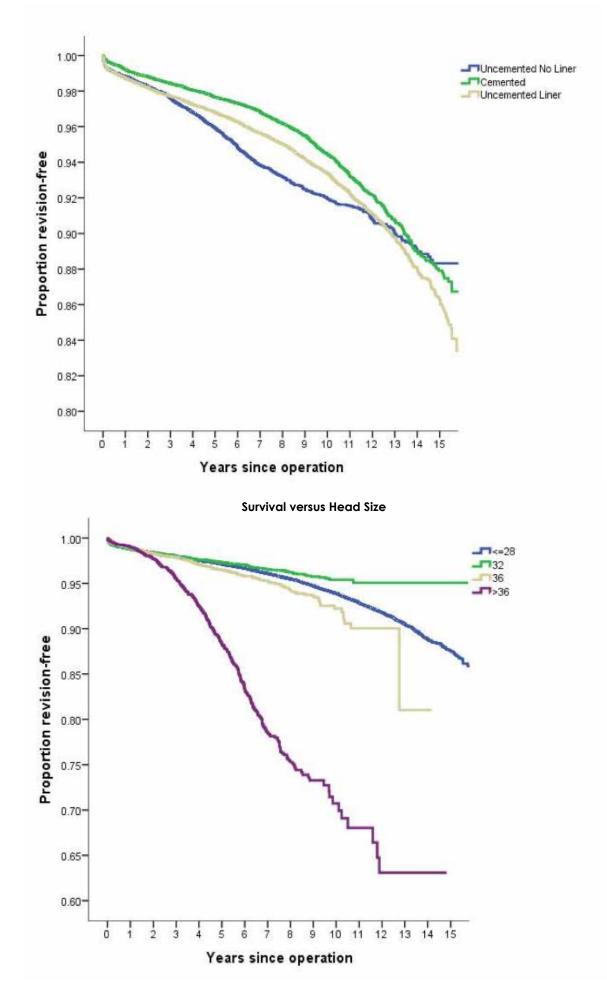
#### Cemented

Cemenied				
Years	% Revision- free	No in each year		
1	99.20	22,305		
2	98.80	20,761		
3	98.50	19,090		
4	98.10	17,430		
5	97.70	15,859		
6	97.40	14,307		
7	96.90	12,696		
8	96.20	10,979		
9	95.60	9,289		
10	94.60	7,490		
11	93.50	5,748		
12	92.40	4,357		
13	91.10	3,079		
14	89.50	1,883		
15	88.40	899		

Survival cemented vs uncemented stems

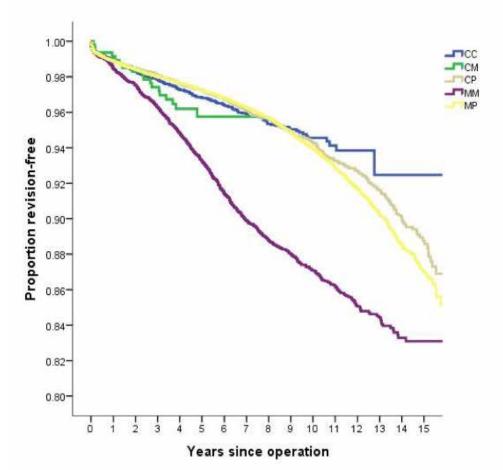






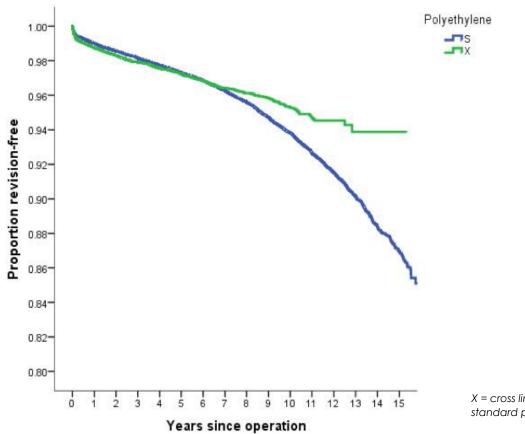


Survival vs Bearing Surface

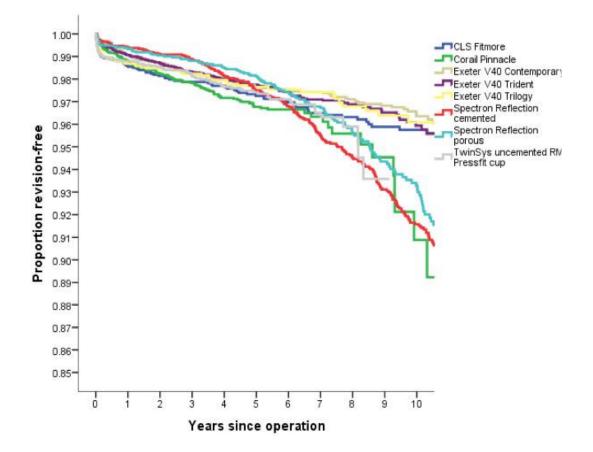


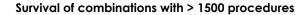
CC =ceramic/ceramic, CM = ceramic/metal, CP = ceramic/plastic, MM = metal/metal, MP = metal/plastic

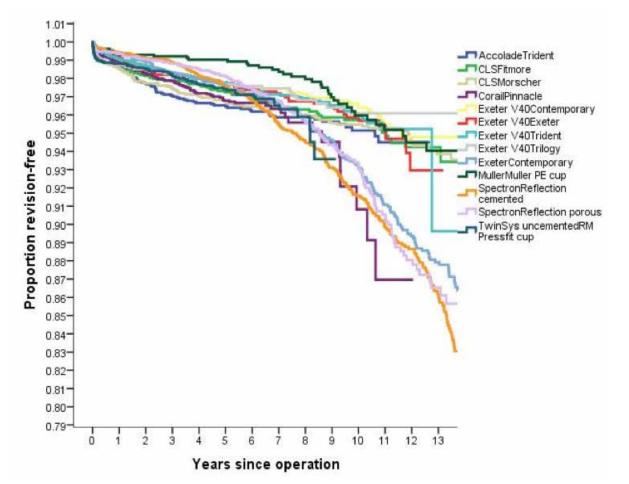
Survival of Crosslinked vs Standard polyethylene



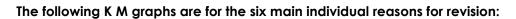
X = cross linked and S = standard polyethylene

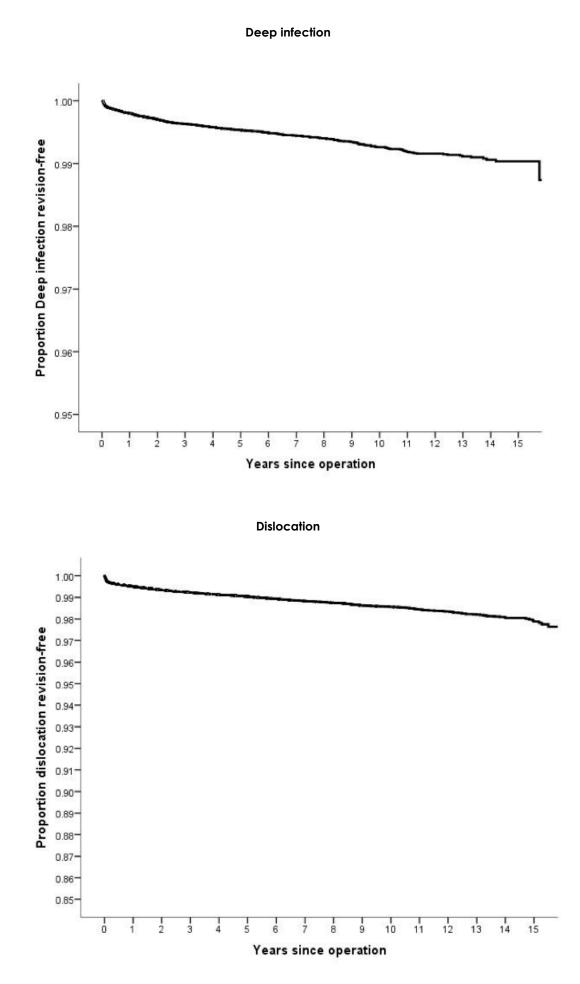




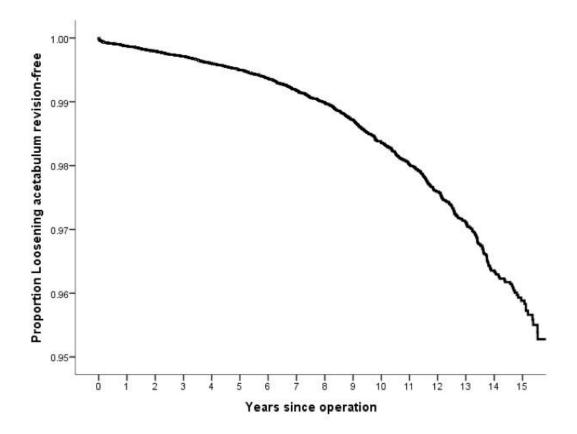




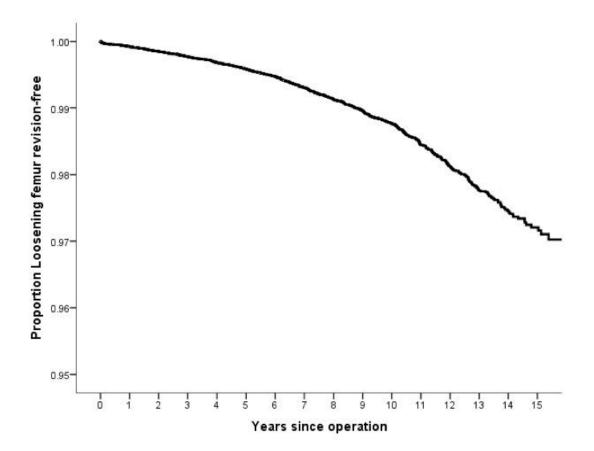




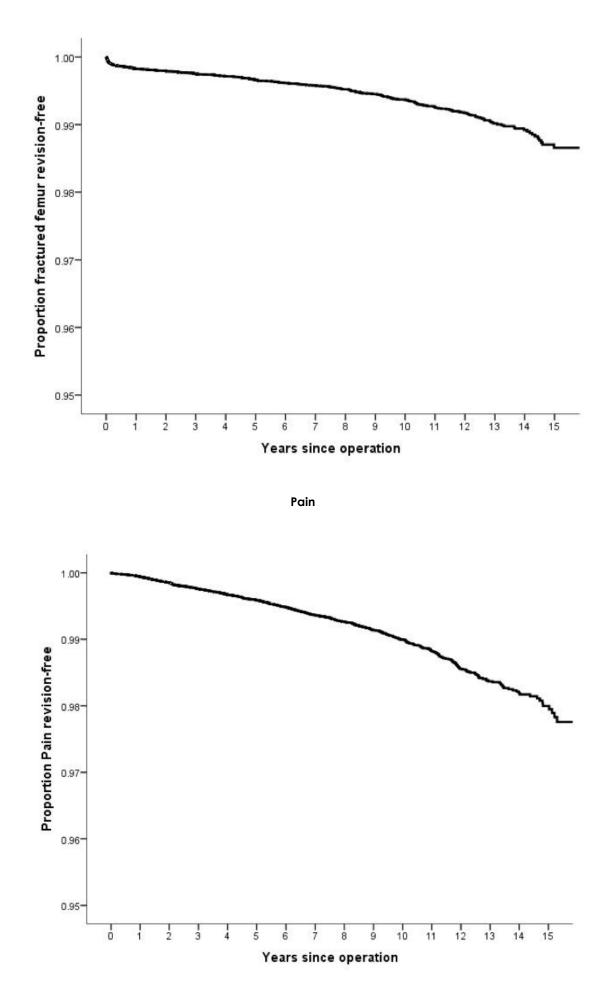
Loosening acetabular component

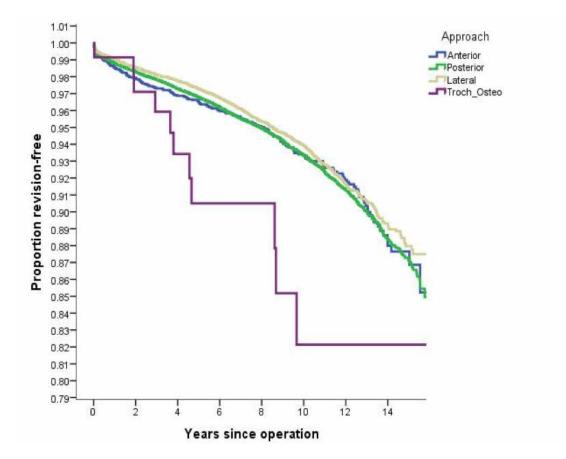


Loosening femoral component

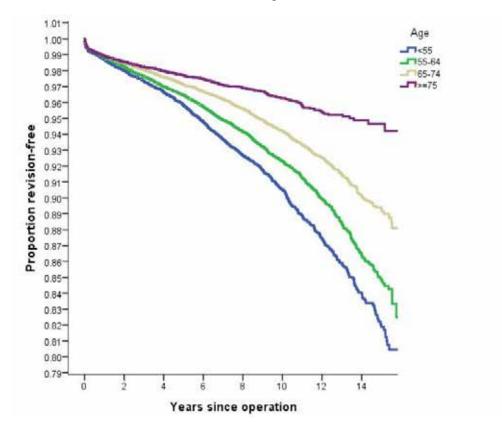


Fracture of femur



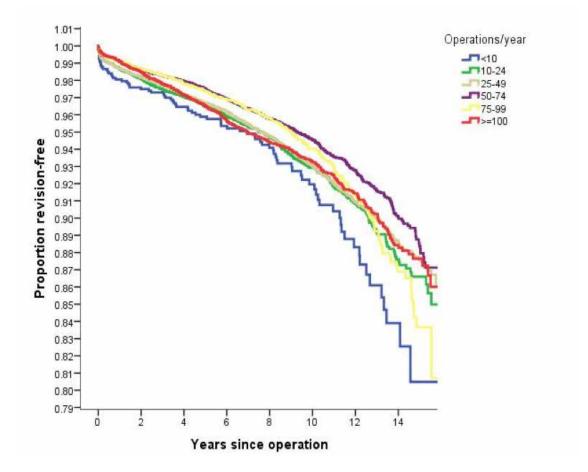


Survival for age bands

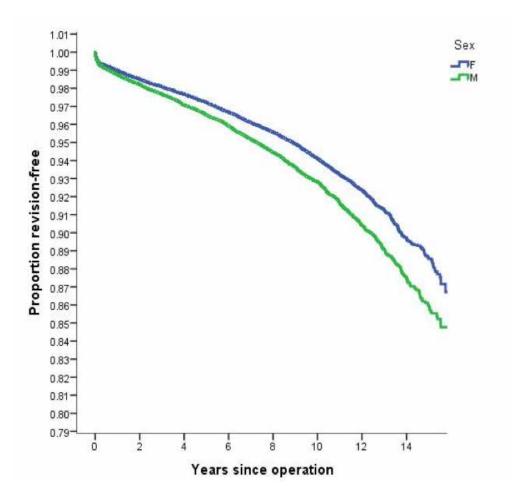




Survival for surgeon annual output



Survival male vs female



# **Re-revisions of conventional hips**

Analysis was undertaken of hip re-revisions.

There were 592 registered conventional hip replacements that had been revised twice, 122 that had been revised three times, 32 that had been revised four times, five that had been revised five times and one that had been revised six times.

# Second revision

Time between the first and second revisions averaged 748 days, with a range of 1 - 5,203 and a standard deviation of 940. This compares to an average of 1,764 days between the primary and first revision.

# **Reason for revision**

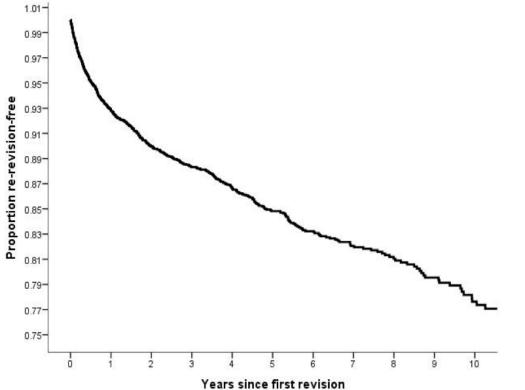
Dislocation	184
Deep infection	165
Loosening femoral component	79
Loosening acetabulum component	68
Pain	66
Fracture femur	41
Revision	
<b>Revision</b> Change of head	386
	386 190
Change of head	
Change of head Change of acetabulum	190
Change of head Change of acetabulum Change of liner	190 273

# **Re-revisions**

No.	Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% conf	îdence interval
4,4	70	17,440.1	592	3.39	3.13	3.68

The re-revision rate is highly significant when compared to the primary revision rate of 0.70 / 100 component years.





Years	% re-revision free
1	92.80
2	90.00
3	88.30
4	86.70
5	84.80
6	83.20
7	82.10
8	81.00
9	79.50

# Third revision

The average time between second and third revisions for the 122 arthroplasties was 606 days with a range of 1 - 4,451 and a standard deviation of 767.

# Fourth revision

The average time between the third and fourth revisions for the 32 arthroplasties was 434 days, with a range of 7 - 3,111 and a standard deviation of 710 days.

#### **Fifth revision**

There were five registered, with an average time to revision of 277 days.

# Sixth revision

There was one registered with a time to revision of 297 days.

Overall it can be noted that the time between successive revisions steadily decreases.

#### Re- revisions of resurfacing hip replacements

There have been 21 re-revisions.

The average time between the first and second revisions was 581 days, with a range of 12 - 2,387 and a standard deviation of 5,738.

This compares with an average of 1,568 days between the primary resurfacing and the first revision.

# PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX MONTHS, FIVE YEARS, TEN YEARS AND 15 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 sixteen year period, and as at July 2015, there were 28,152 primary hip questionnaire responses registered six months post-surgery. The mean hip score was 40.41 (standard deviation 7.67, range 48 – 2).

> 41	15,989	
34 - 41	7,640	
27 -33	2,689	
< 27	1,850	
	34 -41 27 -33	34 -417,64027 -332,689

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 five years post-surgery.

This dataset represents sequential Oxford hip scores for 8,974 individual patients.

At five years post-surgery, 89% of these patients achieved an excellent or good score and had a mean of 42.45.

# 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 hip scores for 5,736 individual patients.

At ten years post-surgery, 87% of these patients achieved an excellent or good score and had a mean of 41.90.

# Questionnaires at fifteen 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 15 years post-surgery. This dataset represents sequential Oxford hip scores for 680 individual patients.

# 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 problems were pain (Q1) and 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, at five years and at ten years post-surgery.

		6m%	5y%	10%
1	Moderate or severe pain from the operated hip	12	12	15
2	Only able to walk around the house or unable to walk before pain becomes severe	5	3	3
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	10	5	6
5	Extreme difficulty or impossible to do the household shopping on your own	4	2	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	1
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	4
12	Pain from your hip in bed most (or every) nights	5	3	4

As noted in previous years there is little significant change among the six month, five and ten year scores which means the six month score is indicative of the medium term outcome.

# Revision hip questionnaire responses

There were 7,412 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 35.65 (standard deviation 9.56, range 48 – 3).

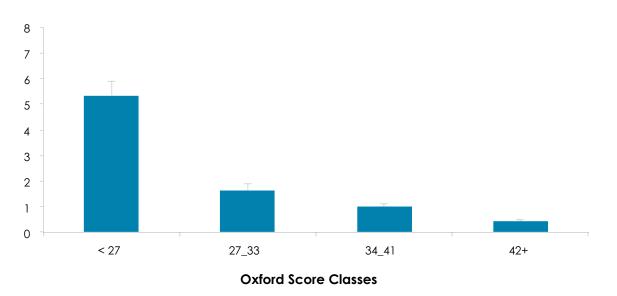


# OXFORD 12 SCORE AS A PREDICTOR OF HIP ARTHROPLASTY REVISION

A statistically significant relationship has been confirmed between the Oxford scores at six months and five years postsurgery 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 two years related to the Oxford score. A patient with a score below 27 has 12 times the risk of a revision within two years compared to a person with a score >41.



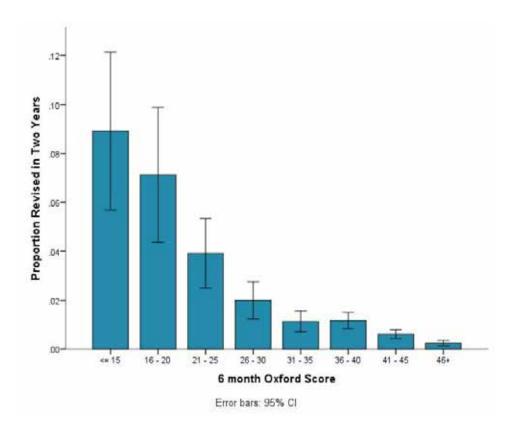
Revision (%) to 2 years - by Oxford score at 6 months

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

Kalairajah Group	No in Group	No. revised	%	Std error
< 27	1,552	83	5.35	0.57
27_33	2,224	36	1.62	0.27
34_41	6,433	64	0.99	0.12
42+	13,616	60	0.44	0.06

A person with a six month Oxford score >41 has a 0.44% risk of revision within two years compared to a 5.35% risk with a score of < 27.

In view of the large number of six month Oxford scores it is possible with statistical significance to further break down the score groupings to demonstrate an even more convincing relationship between score and risk of revision within two years



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

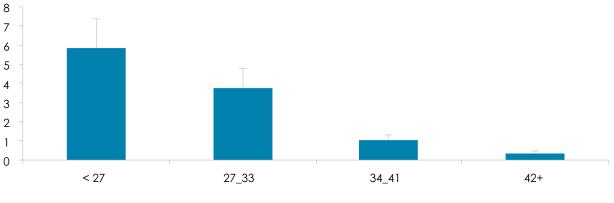
			Revision in 2 yrs		Total
			No	Yes	
Score 6 months	<= 15	Count	276	27	303
				8.9%	
	16 - 20	Count	313	24	337
				7.1%	
	21 - 25	Count	688	28	716
				3.9%	
	26 - 30	Count	1,276	26	1302
				2.0%	
	31 - 35	Count	2,281	26	2307
				1.1%	
	36 - 40	Count	3,984	47	4031
				1.2%	
	41 - 45	Count	7,507	46	7553
				0.6%	
	46+	Count	7,294	18	7312
				0.2%	
Total		Count	23,619	242	23861
				1.0%	

A person with a six month Oxford score >45 has a 0.20 % risk of revision within two years compared to an 8.90% (44.5x) risk with a score of <16.



#### Five year score and revision arthroplasty

As with the six month scores, plotting the patients' five 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 two years related to the Oxford score. A patient with a score below 27 has 14.5 times the risk of a revision within two years compared to a person with a score >41.



Revison (%) to 2 years -by Oxford score at 5 years

#### **Oxford Score Classes**

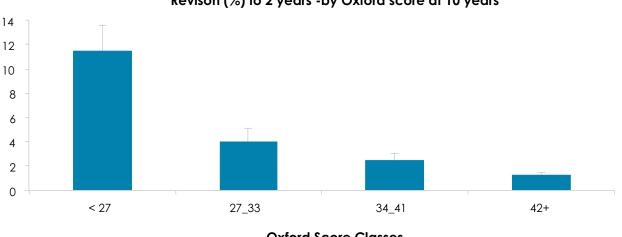
Revision risk versus Kalairajah groupings of Oxford scores within two years of the five year score date.

Kalairajah Group	No in Group	No. revised	%	Std error
< 27	264	16	6.06	1.47
27_33	385	13	3.38	0.92
34_41	1,139	12	1.05	0.30
42+	4,310	18	0.42	0.10

A person with a five year Oxford score >41 has a 0.42% risk of revision within two years compared to a 6.06% risk with a score <27.

#### Ten year score and revision arthroplasty

As with the six month and five year scores, plotting the patients' ten 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 two years related to the Oxford score. A patient with a score below 27 has nine times the risk of a revision within two years compared to a person with a score >41.



Revison (%) to 2 years -by Oxford score at 10 years

**Oxford Score Classes** 

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

Kalairajah Group	No in Group	No. revised	%	Std error
< 27	234	27	11.54	2.09
27_33	301	12	3.99	1.13
34_41	849	21	2.47	0.53
42+	2,805	36	1.28	0.21

A person with a 10 year Oxford score >41 has a 1.28% risk of revision within two years compared to an 11.54% risk with a score < 27.

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



## Revision (%) to 2 years -by Oxford score at Revision

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

Kalairajah Group	Revision to 2 yrs.	No. revised	%	Std error
< 27	1,075	109	10.14	0.92
27_33	1,081	58	5.37	0.69
34_41	1,958	48	2.45	0.35
42+	2,120	38	1.79	0.29

A person with a six month Oxford score >42 has a 1.79% risk of revision within two years compared to a 10.14% risk with a score < 27, which is is almost four times greater than for a primary hip.

## KNEE ARTHROPLASTY

## PRIMARY KNEE ARTHROPLASTY

The **sixteen**-year report analyses data for the period January The sixteen-year report analyses data for the period January 1999 – December 2014.There were 78,898 primary knee procedures registered, an additional 7,392 compared to last year's report representing a 4.3% increase over registrations in 2013 and 3 times the number registered in 1999.

The above total includes 356 patello-femoral prostheses with 64 registered in 2014 compared to 49 in 2013, a 30% increase.

1999	2,429	
2000	3,014	
2001	3,059	
2002	2,896	
2003	3,047	
2004	4,103	
2005	5,024	
2006	5,157	
2007	5,762	
2008	5,604	
2009	6,016	
2010	6,089	
2011	6,253	
2012	6,346	
2013	6,694	
2014	7,392	

## **Data Analysis**

#### Age and sex distribution

The average age for a knee replacement was 68.29 years, with a range of 8.19 - 100.49 years.

#### All knee arthroplasty

•	•	
	Female	Male
Number	40,783	38,115
Percentage	51.69	48.31
Mean age	68.63	67.92
Maximum age	100.49	98.68
Minimum age	10.17	8.19
Standard dev.	9.83	9.36

#### Conventional knee arthroplasty

	• •	
	Female	Male
Number	40,516	38,026
Percentage	51.59	48.41
Mean age	68.68	67.94
Maximum age	100.49	98.68
Minimum age	10.17	8.19
Standard dev.	9.80	9.35

#### Patello-femoral arthroplasty

	Female	Male
Number	267	89
Percentage	75.00	25.00
Mean age	60.19	59.36
Maximum age	87.75	83.70
Minimum age	31.15	31.20
Standard dev.	11.47	11.46

#### **Body Mass Index**

For the five-year period 2010 - 2014, there were 18,834 BMI registrations for primary knee replacements. The average was 31.18 (obese) with a range of 15 – 68.7 and a standard deviation of 6.01.

#### **Previous operation**

None	65,926
Menisectomy	8,134
Osteotomy	1,290
Ligament reconstruction	963
Internal fixation for juxtarticular fracture	609
Synovectomy	142

#### Diagnosis

Osteoarthritis	74,431
Rheumatoid arthritis	1,937
Post fracture	811
Other inflammatory	671
Post ligament disruption/reconstruction	531
Avascular necrosis	284
Tumour	76

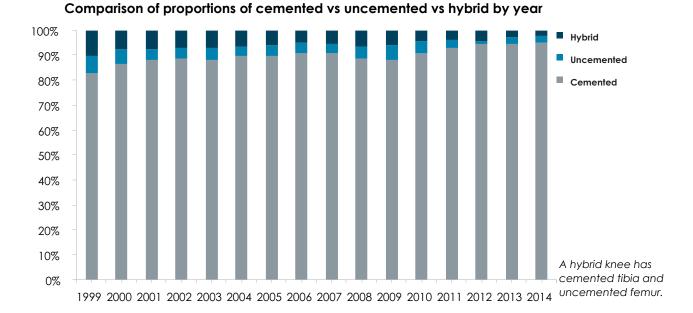
#### Approach

Medial parapatellar	71,279
Other	1,909
Lateral parapatellar	1,154
Image guided surgery	7,938
Minimally invasive surgery	156

Image guided surgery was added to the updated forms at the beginning of 2005 and in 2014 was used in 18% of primary arthroplasties.

#### Bone graft

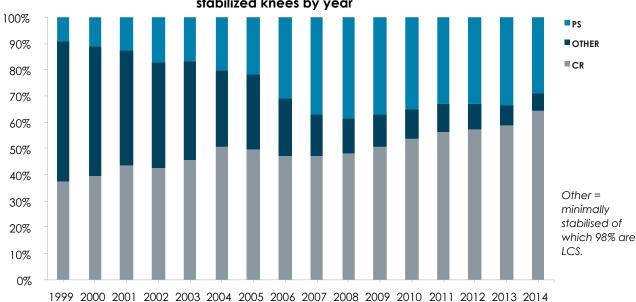
Femoral autograft	147
Femoral allograft	9
Femoral synthetic	6
Tibial autograft	84
Tibial allograft	19
Tibial synthetic	3



 Proportion of fixed vs mobile knees by year

 100%

 90%



Proportion of posterior stabilized vs cruciate retaining vs minimally stabilized knees by year



#### Cement

Femur cemented	72,007	91%
Antibiotic in cement	49,146	65%
Tibia cemented	74,989	95%
Antibiotic in cement	50,657	68%

#### Systemic antibiotic prophylaxis

Patient number receiving at least one		
systemic antibiotic	74,695	95%

A cephalosporin was used in 86% of arthroplasties.

#### Operating theatre

Conventional	43,561
Laminar flow	34,710
Space suits	25,741

In 2014, 50% of knee arthroplasties were performed in laminar flow theatres, up 1% from 2013 and space suits were used in 36%, down 1% from 2013

#### **ASA Class**

This was introduced with the updated forms at the beginning of 2005. For the ten-year period 2005 – 2014, there were 56,778 (94%) 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	6,550	12
2	36,185	63
3	13,796	24
4	247	1

#### Operative time (skin to skin in minutes)

Mean	83
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#### Surgeon grade

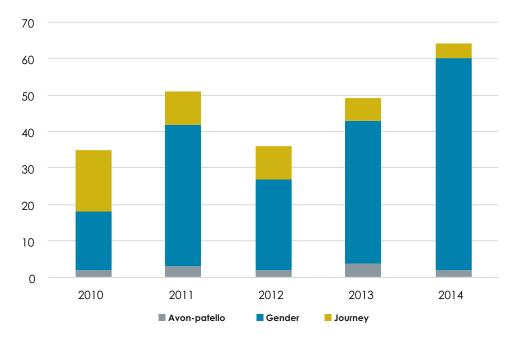
The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the ten-year period 2005 – 2014.

Consultant	52,773
Advanced trainee supervised	4,815
Basic trainee	1,283
Advanced trainee unsupervised	1,331

#### **Prosthesis usage**

#### Patello-femoral prostheses used in 2014

Gender	58	
Journey	4	
Avon patello	2	



## Patello - femoral prostheses used for 5 years 2010-2014

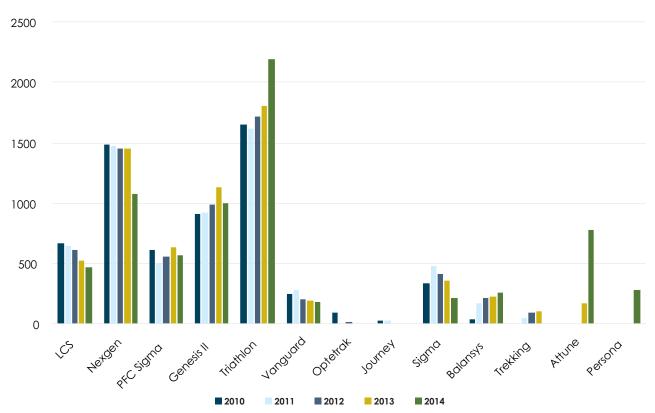
There are 356 patello-femoral procedures registered to 65 surgeons.

## Conventional primary knees

Top 10 knee	prostheses	used in 2014
-------------	------------	--------------

Triathlon	2,194
Nexgen	1,077
Genesis II	997
Attune	773
PFC Sigma	572
LCS	473
Persona	277
Balansys	260
Sigma	213
Vanguard	177

Persona has taken over Trekking from the 2013 list and Attune has climbed five places.



## Most Used Knee Prostheses for 5 years (2010 - 2014)

#### Surgeon and hospital workload

#### Surgeons

In 2014, 223 surgeons performed 7,392 total knee replacements, an average of 33 procedures per surgeon.

51 surgeons performed less than 10 procedures and 58 performed more than 40.

#### Hospitals

In 2014 primary knee replacement was performed in 51 hospitals. 27 were public hospitals and 24 were private.

Knee Arthroplasty

For 2014 the average number of total knee replacements per hospital was 145.



## **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 is 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 sixteen-year period from January 1999 to December 2014, there were 6,122 revision knee procedures registered. This is an additional 542 compared to last year's report.

The average age for a revision knee replacement was 69.59 years, with a range of 10.57 – 98.39 years.

#### **Revision knees**

	Female	Male
Number	2,940	3,182
Percentage	48.02	51.98
Mean age	69.94	69.27
Maximum age	95.80	98.39
Minimum age	10.57	15.49
Standard dev.	10.46	10.20

The percentage of revision knees to primary knees is 8%.

#### **Body Mass Index**

For the five-year period 2010 - 2014, there were 810 BMI registrations for revision knee replacements. The average BMI was 31.27(obese) with a range of 15 – 65 and a standard deviation of 6.19.

## REVISION OF REGISTERED PRIMARY KNEE ARTHROPLASTIES

This section analyses data for revisions of the primary registered knee arthroplasties for the sixteen-year period.

There were 2,242 revisions of the 78,542 primary conventional knee replacements (2.9%) and 30 revisions of the 356 patello-femoral prostheses (8.4%).

## Conventional knee replacement analysis Time to revision

Mean	1,260 days
Maximum	5,522 days
Minimum	1 day
Standard deviation	1,167 days

#### **Reason for revision**

Pain	672
Deep infection	579
Loosening tibial component	518
Patellar resurfacing	531
Loosening femoral component	259
Loosening patellar component	41
Fracture femur	34
Fracture tibia	32

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

	Loosening tibial component		Primary patellar component		Deep infection		Pain		Loosening femoral	
Years	Count	%	Count	%	Count	%	Count	%	Count	%
0	34	6.60	82	15.40	226	39.00	106	15.80	14	5.40
1	59	11.40	167	31.50	118	20.30	194	28.90	30	11.60
2	72	13.90	90	16.90	68	11.70	111	16.50	23	8.90
3	66	12.70	62	11.70	54	9.30	71	10.60	22	8.50
4	57	11.00	38	7.20	26	4.50	49	7.30	34	13.10
5	45	8.70	18	3.40	22	3.80	32	4.80	20	7.70
6	47	9.10	14	2.60	21	3.60	20	3.00	24	9.30
7	35	6.80	13	2.40	15	2.60	19	2.80	21	8.10
8	22	4.20	8	1.50	7	1.20	15	2.20	16	6.20
9	31	6.00	9	1.70	8	1.40	11	1.60	17	6.60
10	15	2.90	13	2.40	6	1.00	19	2.80	10	3.90
11	17	3.30	11	2.10	5	0.90	8	1.20	15	5.80
12	10	1.90	4	0.80	1	0.20	9	1.30	6	2.30
13	3	0.60	1	0.20	1	0.20	3	0.40	4	1.50
14	5	1.00	1	0.20	0	0.00	5	0.70	3	1.20
15	0	0.00	0	0.00	1	0.20	0	0.00	0	0.00

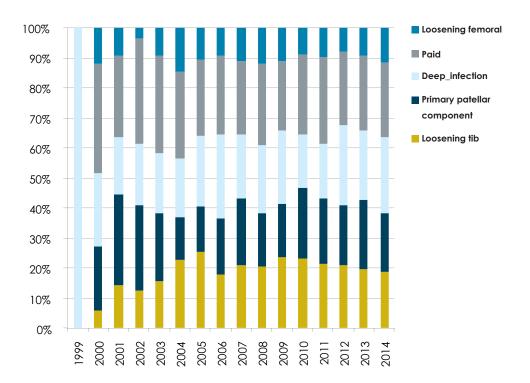
## Analysis by time of the 5 main reasons for revision

1 = Pain, 2 = Deep infection, 3 = Primary patellar component, 4 = Loosening tibial component

## Analyses of percentages of the 5 main reasons for revision by year

	Loosening tibial component	Primary patellar component	Deep infection	Pain	Loosening femoral component
Years	%	%	%	%	%
1999	0.00	0.00	50.00	0.00	0.00
2000	6.50	22.60	25.80	38.70	12.90
2001	16.10	33.90	21.40	30.40	10.70
2002	16.70	38.30	26.70	46.70	5.00
2003	20.00	29.30	25.30	41.30	12.00
2004	26.20	16.70	22.60	33.30	16.70
2005	27.60	16.20	25.70	27.60	11.40
2006	19.30	20.20	30.30	28.40	10.10
2007	24.20	25.80	24.20	28.00	12.90
2008	22.70	20.00	25.40	29.70	13.50
2009	27.20	20.40	28.30	26.70	12.60
2010	26.10	26.60	19.70	30.00	9.90
2011	24.20	24.70	20.50	32.60	11.20
2012	23.10	22.20	29.50	26.90	9.00
2013	23.30	27.80	27.40	29.30	11.30
2014	21.70	22.10	29.00	27.90	13.40

NB each year column does not add up to 100% as often more than one cause for revision is listed and there are other reasons for revision other than the 5 above listed in the registry.





## Patello-Femoral Arthroplasty

#### Revision of patello-femoral knees

Of the 356 registered, 30 have been revised.

#### Time to revision

Average Maximum Minimum Standard deviation	1,508 days 4,344 days 108 days 1,187 day
Reason for revision	
Pain	11
Loosening patellar	2
Deep infection	2
Other	11

#### Patellar resurfacing

67 % of the 78,542 registered conventional primary knees did not have the patella resurfaced and 33% were resurfaced. Of the group that was not resurfaced, 529 subsequently had the patella resurfaced.

#### Statistical note

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

## i) Observed component years

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

#### ii) 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 it is expressed 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% con	fidence interval
78,542	456,153.7	2,242	0.49	0.47	0.51

#### 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		confidence erval
Nexgen	16,950	98,020.8	521	0.53	0.49	0.58
Triathlon	13,669	50,502.9	212	0.42	0.37	0.48
LCS	13,372	102,086.9	525	0.51	0.47	0.56
Genesis II	11,085	59,809.3	297	0.50	0.44	0.56
PFC Sigma	9,485	59,877.7	234	0.39	0.34	0.44
Duracon	4,213	39,657.1	120	0.30	0.25	0.36
Vanguard	1,400	4,667.0	33	0.71	0.49	0.99
Sigma	958	2,248.6	16	0.71	0.41	1.16
Attune	946	532.6	3	0.56	0.12	1.65
Sigma CR150	920	2,604.8	14	0.54	0.29	0.90
Balansys	908	1,742.3	13	0.75	0.40	1.28
Scorpio	852	7,593.3	55	0.72	0.55	0.94
Maxim	822	7,938.2	41	0.52	0.37	0.70

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
Optetrak	660	3,867.0	34	0.88	0.61	1.23
AGC	376	3,895.5	15	0.39	0.22	0.64
Trekking	362	604.8	3	0.50	0.10	1.45
Persona	295	123.4	3	2.43	0.50	7.11
МВК	256	2,877.0	16	0.56	0.32	0.90
Insall/Burstein	249	2,652.8	46	1.73	1.27	2.31
Journey	171	608.3	5	0.82	0.27	1.92
Advance	157	1,506.3	5	0.33	0.11	0.77
Legion	103	153.7	2	1.30	0.16	4.70
АМК	95	1,140.4	2	0.18	0.02	0.63
ROCC	66	443.6	5	1.13	0.37	2.63

There are 48 different types of knee prostheses in the Registry with 19 (40%) with less than 10 registrations.

## Revision Rate of Individual Knee Prostheses Sorted by Revision Rate

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		confidence erval
Persona	295	123.4	3	2.43	0.50	7.11
Insall/Burstein	249	2,652.8	46	1.73	1.27	2.31
Legion	103	153.7	2	1.30	0.16	4.70
ROCC	66	443.6	5	1.13	0.37	2.63
Optetrak	660	3,867.0	34	0.88	0.61	1.23
Journey	171	608.3	5	0.82	0.27	1.92
Balansys	908	1,742.3	13	0.75	0.40	1.28
Scorpio	852	7,593.3	55	0.72	0.55	0.94
Sigma	958	2,248.6	16	0.71	0.41	1.16
Vanguard	1,400	4,667.0	33	0.71	0.49	0.99
Attune	946	532.6	3	0.56	0.12	1.65
MBK	256	2,877.0	16	0.56	0.32	0.90
Sigma CR150	920	2,604.8	14	0.54	0.29	0.90
Nexgen	16,950	98,020.8	521	0.53	0.49	0.58
Maxim	822	7,938.2	41	0.52	0.37	0.70
LCS	13,372	102,086.9	525	0.51	0.47	0.56
Genesis II	11,085	59,809.3	297	0.50	0.44	0.56
Trekking	362	604.8	3	0.50	0.10	1.45
Triathlon	13,669	50,502.9	212	0.42	0.37	0.48
PFC Sigma	9,485	59,877.7	234	0.39	0.34	0.44
AGC	376	3,895.5	15	0.39	0.22	0.64
Advance	157	1,506.3	5	0.33	0.11	0.77
Duracon	4,213	39,657.1	120	0.30	0.25	0.36
АМК	95	1,140.4	2	0.18	0.02	0.63

The Insall/Burstein and Optetrak are the only knee prostheses that have significantly higher revision rates than the overall rate of 0.49/100 ocys @ the 95% confidence interval. Neither was registered in 2014.



Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% confidence interval	
Cemented	71,283	406,726.3	1,922	0.47	0.45	0.49
Uncemented	3,150	20,895.5	172	0.82	0.70	0.96
Hybrid	41,09	28,531.9	148	0.52	0.44	0.61

The uncemented knees have a significantly higher revision rate than the other two variants.

Hybrid Knee: tibia cemented, femur uncemented

It is to be noted several variants of basically the same knee prosthesis type, e.g. Nexgen, LCS, which are registered separately have been 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 two prostheses.

#### 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		confidence erval
Persona	293	122.5	3	2.45	0.50	7.16
Insall/Burstein	249	2,652.8	46	1.73	1.27	2.31
Legion	103	153.7	2	1.30	0.16	4.70
Optetrak	281	1,740.9	20	1.15	0.70	1.77
Journey	171	608.3	5	0.82	0.27	1.92
Balansys	908	1,742.3	13	0.75	0.40	1.28
Scorpio	852	7,593.3	55	0.72	0.55	0.94
Vanguard	1,387	4,616.6	32	0.69	0.47	0.98
Sigma	881	1,944.1	13	0.67	0.36	1.14
МВК	247	2,784.5	16	0.57	0.33	0.93
Attune	946	532.6	3	0.56	0.12	1.65
Sigma CR150	919	2,604.2	14	0.54	0.29	0.90
Maxim	822	7,938.2	41	0.52	0.37	0.70
Trekking	362	604.8	3	0.50	0.10	1.45
Genesis II	11,032	59,308.0	293	0.49	0.44	0.55
Nexgen	16,173	93,232.2	502	0.42	0.36	0.50
LCS	9,032	72,453.6	302	0.42	0.37	0.47
Triathlon	13,512	49,666.5	207	0.42	0.36	0.48
AGC	376	3,895.5	15	0.39	0.22	0.64
PFC Sigma	8,880	56,855.8	214	0.38	0.33	0.43
Advance	157	1,506.3	5	0.33	0.11	0.77
	3,432	31,921.8	98	0.31	0.25	0.37
АМК	95	1,140.4	2	0.18	0.02	0.63

The Insall/Burstein, Optetrak, Scorpio and Oxford Tricompartmental Femoral prostheses have significantly higher revision rates than the overall rate of 0.50/100 ocys at 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		confidence erval
Sigma	77	304.5	3	0.99	0.20	2.88
PFC Sigma	598	2,980.8	20	0.67	0.41	1.04
Triathlon	155	825.7	5	0.61	0.20	1.41
Genesis II	51	495.9	3	0.61	0.12	1.77
LCS	1,960	14,439.3	73	0.51	0.40	0.64
Optetrak	379	2,126.1	14	0.49	0.21	0.97
Duracon	321	3,534.4	14	0.40	0.22	0.66
Nexgen	528	3,620.5	12	0.33	0.17	0.58

There are no significantly higher revision rates than the overall rate of 0.49 /100 ocys at the 95% confidence.

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

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years		confidence erval
LCS	2,380	15,193.9	150	0.99	0.84	1.16
Nexgen	249	1,168.1	7	0.60	0.24	1.23
Duracon	460	4,200.9	8	0.19	0.08	0.38

(Minimum of 50 primary registered arthroplasties)

The uncemented LCS prosthesis (179 implanted in 2014) has a significantly higher revision rate than the overall rate of 0.50/100 ocys at the 95% confidence.

#### **Revision Rates for Fixed vs Mobile Bearing Knees**

Prosthesis	Fixed/ Mobile	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years		confidence erval
AGC	Fixed	376	3,895.5	15	0.39	0.22	0.64
АМК	Fixed	95	1,140.4	2	0.18	0.02	0.63
Balansys	Fixed	905	1,739.6	13	0.75	0.40	1.28
Duracon	Fixed	4,207	39,590.7	119	0.30	0.25	0.36
Genesis II	Fixed	11,083	59,808.4	297	0.50	0.44	0.56
Insall/Burstein	Fixed	249	2,652.8	46	1.73	1.27	2.31
Journey	Fixed	143	597.4	5	0.84	0.27	1.95
LCS	Mobile	13,372	102,086.9	525	0.51	0.47	0.56
Maxim	Fixed	822	7,938.2	41	0.52	0.37	0.70
МВК	Mobile	256	2,877.0	16	0.56	0.32	0.90
Trekking	Mobile	362	604.8	3	0.50	0.10	1.45
Persona	Fixed	295	123.4	3	2.43	0.50	7.11
Nexgen	Fixed	14,082	83,525.9	452	0.54	0.49	0.59
	Mobile	2,669	13,650.9	62	0.45	0.35	0.58
PFC Sigma	Fixed	5,464	37,576.9	150	0.40	0.34	0.47
	Mobile	3,419	21,562.0	82	0.38	0.30	0.47
Scorpio	Fixed	737	6,602.3	47	0.71	0.52	0.95



Prosthesis	Fixed/ Mobile	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years		confidence erval
	Mobile	104	928.0	5	0.54	0.17	1.26
Sigma	Fixed	239	669.8	6	0.90	0.33	1.95
	Mobile	612	1,435.9	9	0.63	0.29	1.19
Sigma CR150	Fixed	172	559.7	5	0.89	0.29	2.08
	Mobile	734	2,031.4	9	0.44	0.20	0.84
Triathlon	Fixed	13,290	48,961.8	206	0.42	0.37	0.48
	Mobile	277	1,276.0	5	0.39	0.13	0.91
Attune	Fixed	470	221.5	1	0.45	0.01	2.52
	Mobile	475	310.6	2	0.64	0.08	2.33

Just the Insall/Burstein and the fixed version of the Scorpio have a significantly higher revision rate than the overall rate of 0.49/100 ocys at the 95% confidence.

#### **Overall Revision Rates for Fixed vs Mobile Bearing Knees**

Prosthe Fixed/Mobile	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Fixed	52,639	295,624.5	1,409	0.48	0.45	0.50
Mobile	22,290	146,796.6	718	0.49	0.45	0.53

For the second year in a row there is not 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 3,613 shortfall in the total number.

## Revision Rates for Cruciate Retaining (CR) vs Posterior Stabilised (PS)

Prosthesis	CR/PS	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years		confidence erval
AGC	PS	28	320.0	3	0.94	0.19	2.74
Insall/Burstein	PS	249	2,652.8	46	1.73	1.27	2.31
LCS	PS	67	241.1	0	0.00	0.00	1.53
Legion	PS	62	88.0	1	1.14	0.03	6.33
Sigma CR150	CR	920	2,604.8	14	0.54	0.29	0.90
Attune	CR	687	410.3	3	0.73	0.15	2.14
	PS	256	121.9	0	0.00	0.00	3.03
Balansys	CR	853	1,665.5	12	0.72	0.37	1.26
	PS	52	74.0	1	1.35	0.03	7.53
Genesis II	CR	5,879	38,053.9	146	0.38	0.32	0.45
	PS	5,198	21,707.1	151	0.70	0.59	0.82
Maxim	CR	657	6,277.4	30	0.48	0.32	0.68
	PS	165	1,660.8	11	0.66	0.33	1.19
Nexgen	CR	7,560	46,806.2	195	0.42	0.36	0.48
	PS	9,189	50,515.6	313	0.62	0.55	0.69
Optetrak	CR	436	2,539.3	15	0.59	0.33	0.97
	PS	224	1,327.6	19	1.43	0.86	2.23

Prosthesis	CR/PS	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years		confidence erval
Persona	CR	98	30.0	2	6.66	0.81	24.05
	PS	196	93.2	1	1.07	0.03	5.98
PFC Sigma	CR	7,530	47,079.3	159	0.34	0.29	0.39
	PS	1,888	12,465.7	73	0.59	0.46	0.74
Scorpio	CR	739	6,693.3	46	0.69	0.50	0.92
	PS	111	888.0	9	1.01	0.46	1.92
Sigma	CR	121	253.6	0	0.00	0.00	1.45
	PS	836	1,993.8	16	0.80	0.46	1.30
Trekking	CR	141	242.8	2	0.82	0.10	2.98
	PS	221	361.9	1	0.28	0.01	1.54
Triathlon	CR	11,324	40,366.1	168	0.42	0.36	0.48
	PS	2,340	10,127.5	44	0.43	0.32	0.58
Vanguard	CR	968	3,505.3	19	0.54	0.33	0.85
	PS	428	1,156.9	14	1.21	0.66	2.03

The Insall/Burstein, Nexgen PS, Genesis11 PS and the Optetrak PS have significantly higher revision rates than the overall rate of 0.49/100 ocys at the 95% confidence.

#### 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	37,913	196,528.0	811	0.41	0.38	0.44
MS	13,626	105,165.9	546	0.52	0.48	0.56
PS	21,513	105,817.6	703	0.66	0.62	0.72

The LCS prostheses account 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 Arthroplasty Fixation**

Fixation	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years		confidence erval
Cemented	71,283	406,726.3	1,922	0.47	0.45	0.49
Uncemented	3,150	20,895.5	172	0.82	0.70	0.96
Hybrid	4,109	28,531.9	148	0.52	0.44	0.61

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 Age Bands**

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<55	6,658	39,918.3	394	0.99	0.89	1.09
55_64	21,576	126,838.3	803	0.63	0.59	0.68
65_74	29,870	175,005.7	759	0.43	0.40	0.47
>74	20,438	114,391.4	286	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	
Female	40,516	239,610.4	1,083	0.45	0.43	0.48
Male	38,026	216,543.4	1,159	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	
<55	5,596	32,284.9	295	0.91	0.81	1.02
55_64	19,199	110,028.1	680	0.62	0.57	0.67
65_74	27,475	158,707.6	690	0.43	0.40	0.47
>74	19,013	105,705.7	257	0.24	0.21	0.27

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

Uncemented	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		% confidence hterval
<55	548	4,252.5	64	1.51	1.16	1.92
55_64	1,089	7,617.5	70	0.92	0.72	1.16
65_74	994	6,192.2	31	0.50	0.34	0.71
>74	519	2,833.4	7	0.25	0.10	0.51

The lowest age band has a significantly higher revision rate than the three highest bands and the 55-64 age band has a significantly higher revision rate than the highest two age bands.

Hybrid	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years		% confidence nterval
<55	514	3,381.0	35	1.04	0.72	1.44
55_64	1,288	9,192.7	53	0.58	0.43	0.75
65_74	1,401	10,105.9	38	0.38	0.27	0.52
>74	906	5,852.4	22	0.38	0.24	0.57

The lowest age band has a significantly higher revision rate than the two highest bands.

## **Revision vs Approach**

Approach	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years		confidence erval
Medial	70,875	407,845.2	1,976	0.48	0.46	0.51
Lateral	1,140	7,702.2	50	0.65	0.48	0.86
Other	1,824	12,097.5	47	0.39	0.29	0.52

There is no significant difference among the three approaches.

## **Revision vs Image Guidance**

Image Guided	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years		confidence erval
No	70,608	426,750.4	2,092	0.49	0.47	0.51
Yes	7,934	29,403.4	150	0.51	0.43	0.60

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		confidence erval
<10	1,788	12,192.3	60	0.49	0.38	0.63
10_25	17,402	106,534.9	561	0.53	0.48	0.57
26_50	37,473	219,999.1	1,065	0.48	0.46	0.51
51_75	12,672	67,753.1	327	0.48	0.43	0.54
76_100	7,127	39,546.3	191	0.48	0.42	0.56
>100	2,068	10,053.6	38	0.38	0.27	0.52

There is no significant difference among the groups.

## **Revision vs ASA Status**

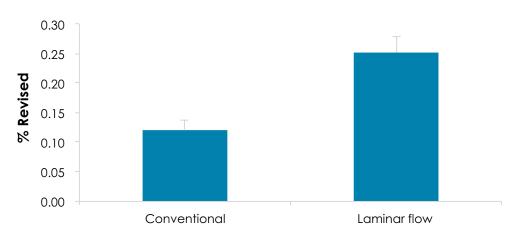
ASA Class	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years		confidence erval
1	6,459	27,637.8	151	0.55	0.46	0.64
2	36,001	151,911.8	791	0.52	0.49	0.56
3	13,760	55,885.5	312	0.56	0.50	0.62
4	247	909.7	6	0.66	0.24	1.44

There is no significant difference among the four classes.

## Revision for Deep Infection within 6months versus Theatre Environment

Theatre Environment	Total Number	Number Revised	%	Std Error
Conventional	41,133	49	0.119	0.017
Laminar	32,649	82	0.251	0.028

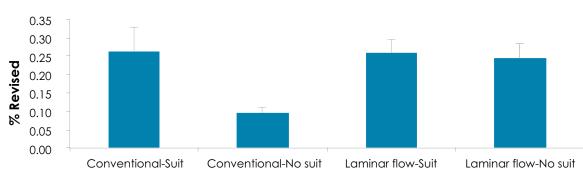




## % Revision for Deep infection within 6 months

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

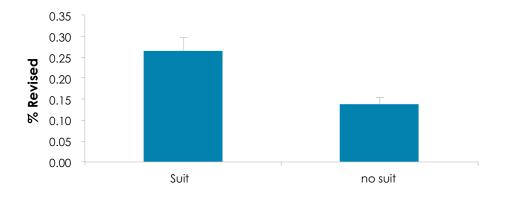
Theatre Environment	Suit/No Suit	Total Number	Number	%	Std Error
Conventional	Suit	6,081	16	0.263	0.066
	no suit	35,052	33	0.094	0.016
Laminar flow	Suit	17,803	46	0.258	0.038
	no suit	14,846	36	0.243	0.040



## % Revision for Deep infection within 6 months

There is a significant difference in the revision rates between conventional/no suit and the conventional/suit (2.8 x) and laminar /suit (2.7x) environments.

	Total Number	Number Revised	%	Std Error
Suit	24,170	64	0.265	0.033
no suit	50,321	69	0.137	0.017



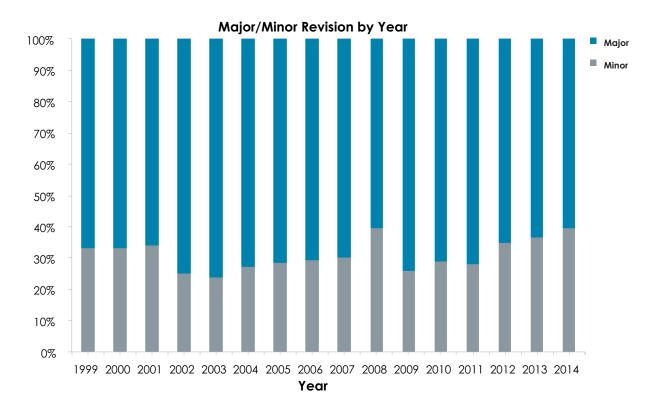
## % Revision for Deep infection within 6 months

Furthermore there is a significant increase in revision rates (2 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 six months following the arthroplasty and that there is no advantage to using laminar flow theatres.

#### Comparison of Major vs Minor Revisions by Year

A major revision is defined as revision of tibial and/or femoral components, including any of minor components and minor revision as change of bearing and/or patellar components only.



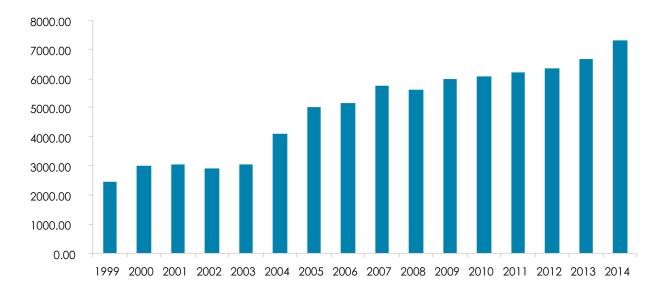


## Re revisions for major vs minor knee revisions

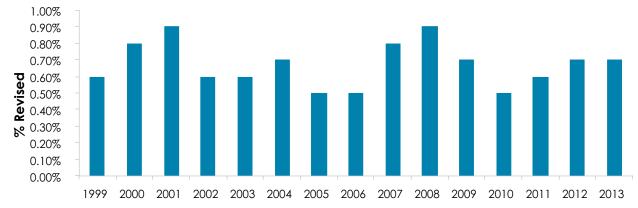
Major/Minor	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years		confidence erval
Minor	591	2,214.0	102	4.61	3.76	5.59
Major	1,236	5,324.0	158	2.97	2.52	3.47

There is a significantly higher re-revision rate for minor compared to major revisions.

### Percentage of Knees Revised in the First Year



## Number of operations by year



% Revised within first year

## Patello-Femoral Arthroplasty

No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% c inter	
356	1,415.3	30	2.12	1.43	3.03

The revision rate is over four times that for total knee arthroplasty.

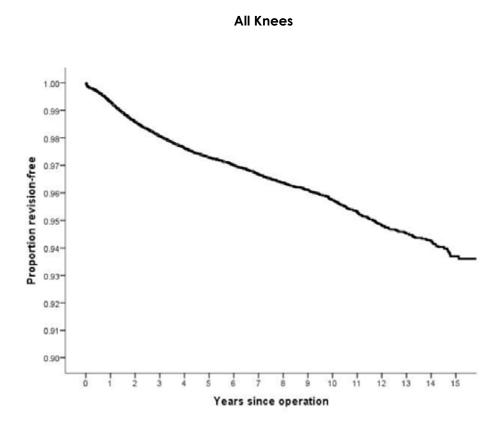
#### **Revised to:**

Total knee	26
Patello Femoral	2
Uniknee	2



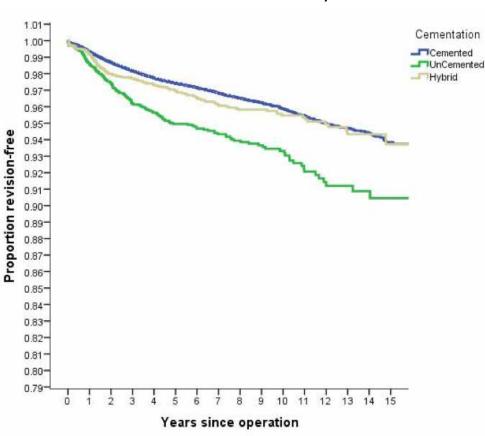
## **KAPLAN MEIER CURVES**

The following Kaplan Meier survival analyses are for years 1999 - 2014 with deceased patients censored at time of death.



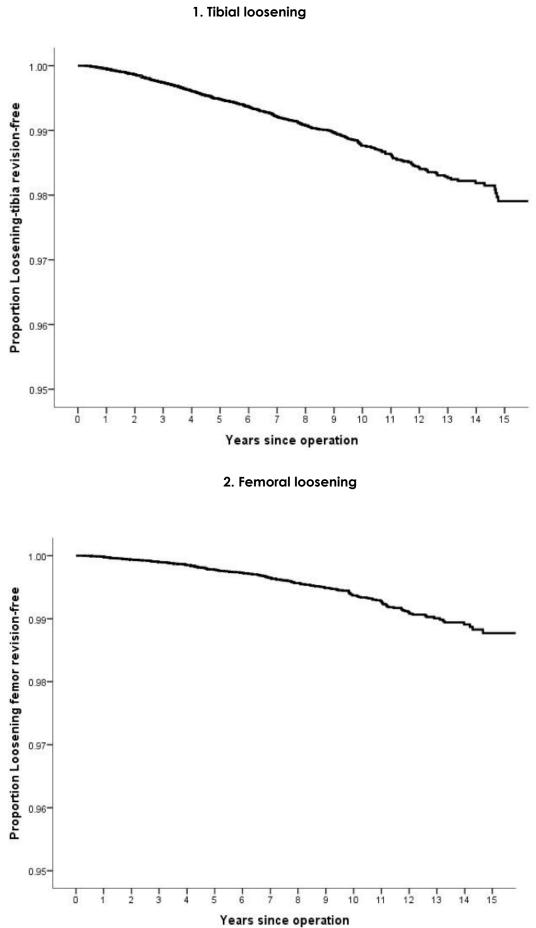
Years	% Revision- free	No in each year
1	99.31%	70,069
2	98.59%	62,231
3	98.06%	54,835
4	97.63%	47,756
5	97.29%	40,941
6	97.00%	34,403
7	96.68%	28,442
8	96.36%	22,632
9	96.10%	17,627
10	95.74%	13,026
11	95.31%	9,549
12	94.84%	7,018
13	94.50%	4,879
14	94.24%	2,879
15	93.68%	1,166
11 12 13 14	95.31% 94.84% 94.50% 94.24%	9,54 7,01 4,87 2,87 1,16

The KM analysis is to 15 years rather than 16 as too few registered knees were revised in 2014.

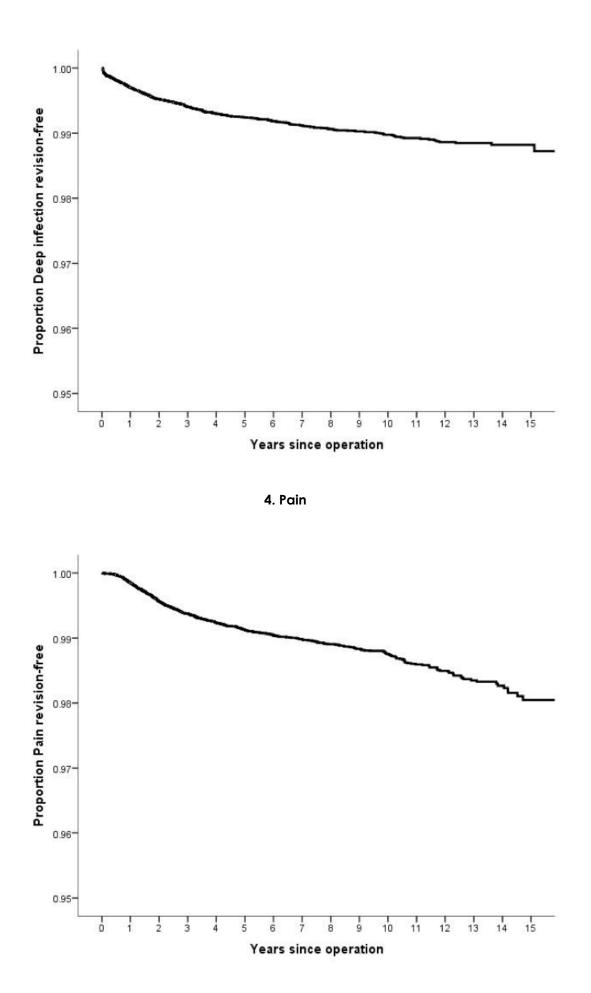


Cemented vs Uncemented vs Hybrid

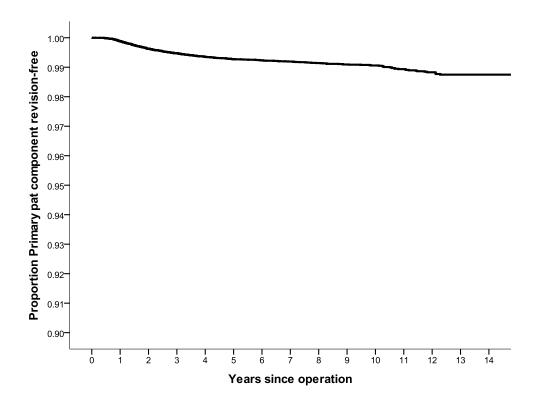
The following KM graphs are for the five main individual reasons for revision.

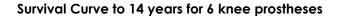


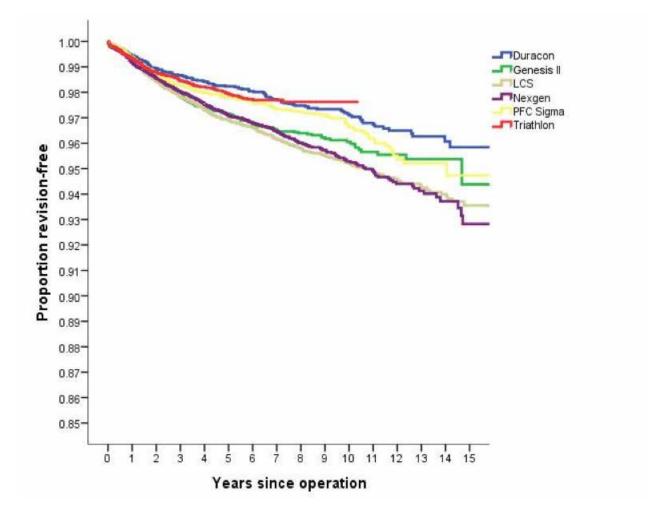
3. Deep infection



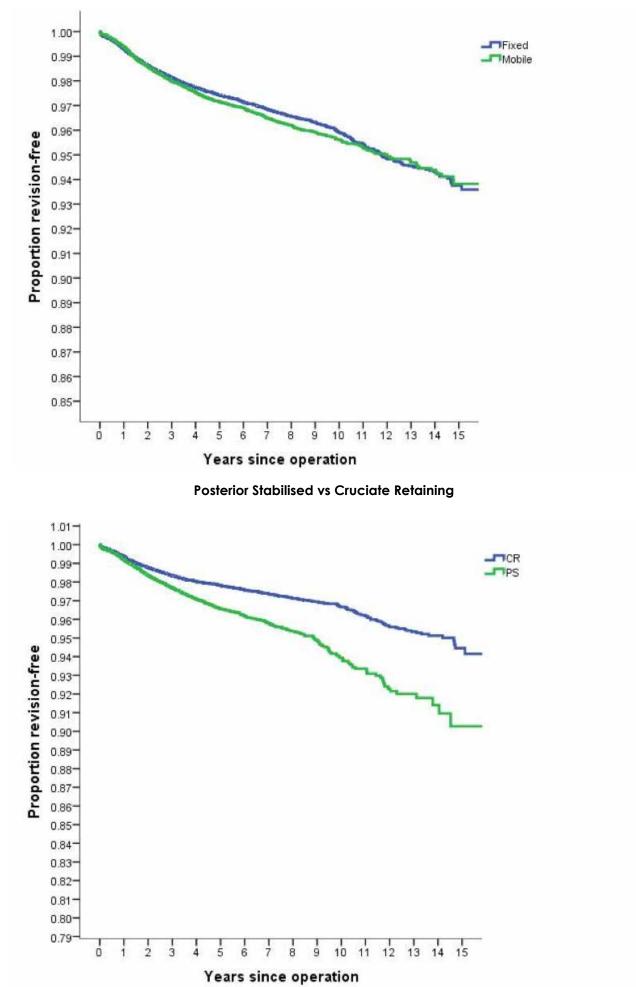




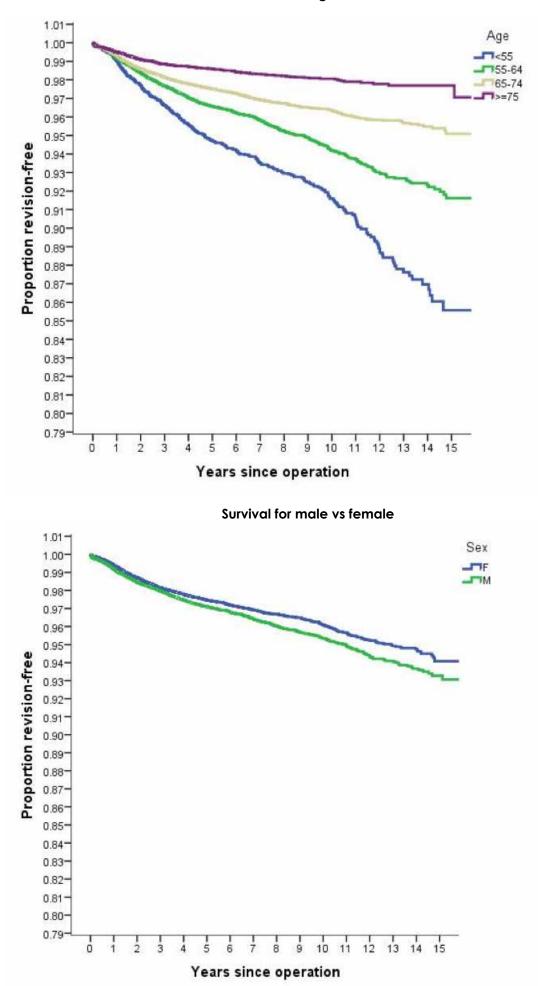




Fixed vs Mobile knees

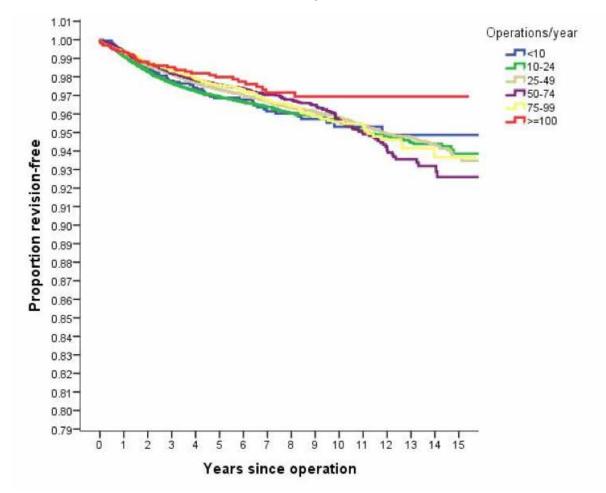


Survival for age bands





## Survival for for surgeon annual output



## **KNEE RE-REVISIONS**

Analysis was undertaken of re-revisions. There were 314 registered primary knee revisions that had been revised twice, 56 that had been revised three times, 13 that had been revised four times, three that had been revised five times and one that had been revised six times.

## Second revision

Time between the first and second revision for the 314 knee arthroplasties averaged 783 days, with a range of 2 – 4,654 and a standard deviation of 858 days. This compares to an average of 1,260 days between primary and first revision arthroplasty.

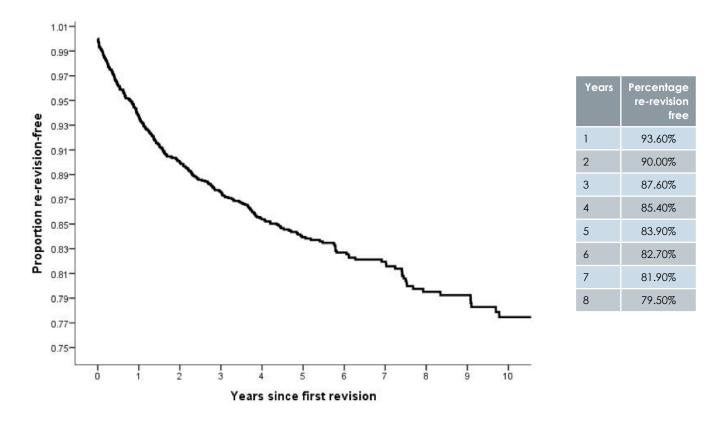
#### Reason for revision

Deep infection	148
Pain	69
Loosening tibial component	49
Loosening femoral component	39
Loosening patellar componen t	5
Fracture femur	1

## **Second Revisions**

Number of primary revisions	Observed comp. Yrs	Number Revised	Rate/100 Component- years	Exact 95% conf	ìdence interval
2,242	9,365.7	314	3.35	2.99	3.74

## Kaplan Meier survival curve for first revision knee arthroplasties



### Third revision

The average time between second and third revisions for the 56 knee arthroplasties was 658 days, with a range of 14 - 2,212 and a standard deviation of 580 days.

#### Fourth revision

The average time between third and fourth revisions for the 13 knee arthroplasties was 418 days, with a range of 23 - 1,454 and a standard deviation of 432 days.

#### **Fifth revision**

The average time between fourth and fifth revisions for the three knee arthroplasties was 631 days.

#### Sixth revision

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



## PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX MONTHS, FIVE YEARS, TEN YEARS AND 15 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 sixteen-year period and as at July 2015, there were 23,777 primary knee questionnaire responses registered at six months post-surgery.

The mean knee score was 37.40 (standard deviation 8.09, range 48 – 1).

Scoring	> 41	8,292
Scoring	34 – 41	7,834
Scoring	27 – 33	3,425
Scoring	< 27	2,446

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 years post-surgery.

This dataset represents sequential Oxford knee scores for 8,788 individual patients.

At five years post-surgery, 83% of patients achieved an excellent or good score and had a mean of 40.25.

#### 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 4,233 individual patients.

At ten years post-surgery, 81% of patients achieved an excellent or good score and had a mean of 39.83.

#### Questionnaires at fifteen tears post-surgery

All patients who had a six month registered questionnaire, and who had not had revision surgery were sent a further questionnaire at fifteen years post-surgery. This dataset represents sequential Oxford knee scores for 470 individual patients.

At fifteen years post-surgery, 79% of patients achieved an excellent or good score and had a mean of 39.02.

# 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 difficulty with kneeling (Q4).

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

		6 mths %	5 yrs %	10 yrs %
1	Moderate or severe pain from the operated knee	13	8	8
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	3	5
4	Extreme difficulty or impossible to kneel down and get up afterwards	41	38	42
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	2
7	Pain interfering greatly or totally with your work	6	4	4
8	Very painful or unbearable to stand up from a chair after a meal	4	2	2
9	Most of the time or always feeling that the knee might suddenly "give way"	2	2	2
10	Limping most or every day	10	7	7
11	Extreme difficulty or impossible to walk down a flight of stairs	7	6	6
12	Pain from your knee in bed most or every nights	10	4	4

As noted in previous years there is little significant change, apart from reduction of night and severe pain, among the six month, five and ten year scores which means the six month score is indicative of the medium term outcome.

#### Revision knee questionnaire responses

There were 3,314 revision hip responses with 54% achieving an excellent or good score. This group includes all revision knee procedures. The mean revision hip score was 33.11 (standard deviation 10.07, range 2 - 48).

# OXFORD 12 SCORE AS A PREDICTOR OF KNEE ARTHROPLASTY REVISION

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

## Six month score and revision arthroplasty

Plotting the patients' six month 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 two years related to the Oxford score. A patient with a score below 27 has 12 times the risk of a revision within two years compared to a person with a score >41.



Revision (%) to 2 years - by Oxford score at 6 months

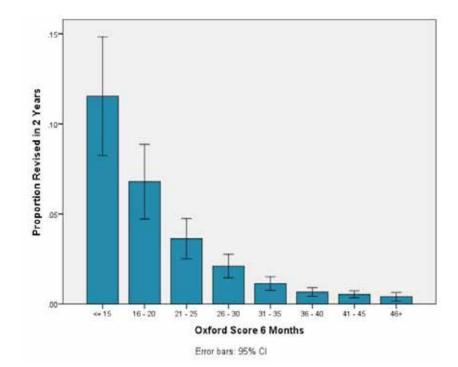
Revision risk versus Kalairajah groupings of Oxford scores within two years of the 6 month score date.

Kalairajah group	No in group	No. revised	%	Std error
< 27	2,311	131	5.67	0.48
27_33	3,088	45	1.46	0.22
34_41	6,970	52	0.75	0.10
42+	7,329	35	0.48	0.08

A person with an Oxford score >42 has a 0.48% risk of revision within two years compared to a 5.67% risk with a score of 27 or less.

In view of the large number of six month Oxford scores it is possible with statistical significance to further break down the score groupings to demonstrate an even more convincing relationship between score and risk of revision within two years.





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

			Revision	in 2 yrs	Total
			No	Yes	
Score 6	<= 15	Count	322	42	364
months				11.5%	
	16 - 20	Count	535	39	574
				6.8%	
	21 - 25	Count	1,033	39	1,072
				3.6%	
	26 - 30	Count	1,764	38	1,802
				2.1%	
	31 - 35	Count	2,884	33	2,917
				1.1%	
	36 - 40	Count	4,485	30	4,515
				0.7%	
	41 - 45	Count	5,712	31	5,743
				0.5%	
	46+	Count	2,700	11	2,711
				0.4%	
Total		Count	19,435	263	19,698
				1. <b>3</b> %	

A person with a 6 month Oxford score >45 has a 0.40 % risk of revision within two years compared to a 11.5% (29x) risk with a score of <16.

#### Five year score and revision arthroplasty

As with the six month scores, plotting the patients' five 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 two years related to the Oxford score. A patient with a score below 27 has 10 times the risk of a revision within two years compared to a person with a score >33.



Revison (%) to 2 years - by Oxford score at 5 Years

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

Kalairajah group	No in group	No. revised	%	Std error
< 27	444	14	3.15	0.83
27_33	574	5	0.87	0.39
34_41	1,563	5	0.32	0.14
42+	3,469	13	0.37	0.10

A person with an Oxford score >33 has a 0.32% risk of revision within two years compared to a 3.15% risk with a score of 27 or less.

#### Ten year score and revision arthroplasty

As with the six month and five year scores, plotting the patients' ten 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 two years related to the Oxford score. A patient with a score below 27 has 22 times the risk of a revision within two years compared to a person with a score >41.





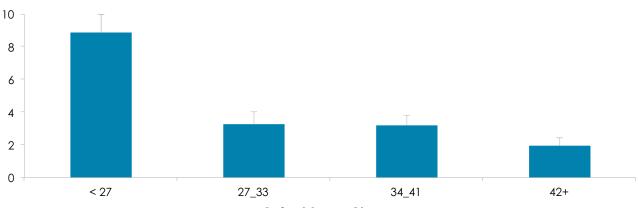
## Revison (%) to 2 years - by Oxford score at 10 Years

No. revised Kalairajah group No in group Std error < 27 231 14 6.06 1.57 27\_33 292 7 2.40 0.90 703 5 0.71 0.32 34\_41 42+ 1,445 0.28 4 0.14

A person with an Oxford score >33 has a 0.32% risk of revision within two years compared to a 3.15% risk with a score of 27 or less.

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

Plotting the patients six month scores following their first revision in the Kalairajah groupings against the proportion of knees revised for that same group again demonstrates that there is an incremental increase in risk during the next two years related to the Oxford score. A patient with a score below 27 has a 4.5 times the risk of a revision within two years compared to a person with a score >41.



#### Revison (%) to 2 years - by Oxford score at Revision

#### Oxford Score Classes

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

Kalairajah groups	No in group	No. revised	%	Std error
< 27	699	62	8.87	1.08
27_33	523	17	3.25	0.78
34_41	758	24	3.17	0.64
42+	629	12	1.91	0.55

A person with a six month Oxford score >42 has a 1.91% risk of revision within two years compared to an 8.87% risk with a score < 27.

The New Zealand Joint Registry

## UNICOMPARTMENTAL KNEE ARTHROPLASTY

## PRIMARY UNICOMPARTMENTAL KNEE ARTHROPLASTY

The **fifteen**-year report analyses data for the period January 2000 – December 2014. There were 8,826 unicompartmental knee procedures registered, an additional 712 for 2014, and this represents a 1.9% reduction compared to 2013.

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	
2013	726	
2014	712	

## **Data Analysis**

## Age and sex distribution

The average age for a unicompartmental knee replacement was 66.28 years, with a range of 18.28 – 94.71 years.

	Female	Male
Number	4,115	4,711
Percentage	46.62	53.38
Mean age	66.15	66.40
Maximum age	94.71	93.42
Minimum age	18.28	31.62
Standard dev.	10.13	9.11

#### **Body Mass Index**

For the five year period 2010 - 2014, there were 2,439 BMI registrations for unicompartmental knee replacements. The average was 29.63 with a range of 17 - 59.50 and a standard deviation of 4.95.

#### **Previous operation**

None	7,065
Menisectomy	1,339
Ligament reconstruction	42
Osteotomy	28
Internal fixation	27
Synovectomy	4

#### Diagnosis

0	
Osteoarthritis	8,633
Avascular necrosis	60
Post ligament disruption	40
Other inflammatory	22
Rheumatoid arthritis	17
Post fracture	14
Tumour	2

### Approach

Medial	6,644
Minimally invasive surgery	2,173
Other	205
Lateral	186
Image guided surgery	58

Image guided surgery was added to the updated forms at the beginning of 2005, but unlike the total knee arthroplasty, has never become popular.

#### Cement

Femur cemented	6,608	75%
Antibiotic in cement	4,325	64%
Tibia cemented	6,832	77%
Antibiotic in cement	4,401	64%

#### Systemic antibiotic prophylaxis

Patient number receiving at least one		
systemic antibiotic	8,499	96%

#### **Operating theatre**

Conventional	6,246
Laminar flow	2,486
Space suits	2,122

## ASA Class

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

For the ten- year period 2005 – 2014, there were 5,929 (95%) unicompartmental knee procedures with the ASA class recorded.

#### Definitions

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

1	1,151	19
2	3,830	65
3	934	15
4	14	1



## Operative time (skin to skin)

76 minutes

## Surgeon grade

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

The following figures are for the ten-year period 2005 – 2014.

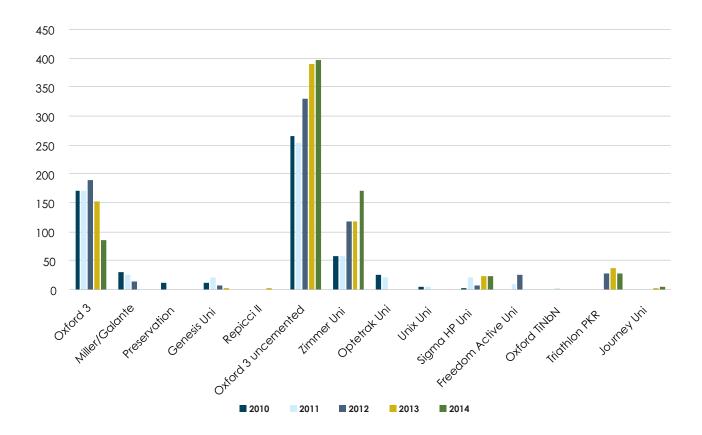
Consultant	5,940
Advanced trainee supervised	279
Advanced trainee unsupervised	14
Basic trainee	11

#### Prosthesis usage

#### Unicompartmental knee prostheses used in 2014

Oxford 3 uncemented	398
Zimmer Uni	172
Oxford 3	86
Triathlon PKR	28
Sigma HP Uni	24
Journey Uni	4

## Most Used Unicompartmental Prostheses 2010 – 2014



## Surgeon and hospital workload

#### Surgeons

In 2014, 74 surgeons (two fewer than 2013) performed 712 unicompartmental knee replacements, an average of just under 10 procedures per surgeon. 40 surgeons performed less than five procedures and 12 performed more than 15 procedures.

#### Hospitals

In 2014, unicompartmental knee replacements were performed in 34 hospitals; 18 were public and 16 were private.

For 2014, the average number of unicompartmental knee replacements per hospital was 21.

## **REVISION OF REGISTERED PRIMARY UNICOMPARTMENTAL ARTHROPLASTIES**

This section analyses the data for revision of unicompartmental knee replacement over the fifteen-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 667 revisions of the 8,826 registered unicompartmental knee replacements (7.6%). A further 68 had a second revision, eight a third revision and one a fourth revision.

559 of the 667 (84%) were revised to total knee replacements and 108 (16%) were revised to further unicompartmental replacements.

## Time to revision

Reason for revision	
Standard deviation	1,299 days
Minimum	10 days
Maximum	5,366 days
Mean	1,588 days

#### Reason for revision

Pain	226
Loosening tibial component	120
Loosening femoral component	92
Deep infection	25
Fracture tibia	22
Fracture femur	2

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

	Loosening	g femoral	Looseni	ng tibial	Pc	ain
Years	Count	Pain	Count	%	Count	%
0	12	13.00	26	21.70	36	15.90
1	19	20.70	33	27.50	58	25.70
2	9	9.80	10	8.30	32	14.20
3	15	16.30	8	6.70	13	5.80
4	5	5.40	9	7.50	22	9.70
5	6	6.50	5	4.20	13	5.80
6	3	3.30	10	8.30	10	4.40
7	7	7.60	7	5.80	13	5.80
8	5	5.40	2	1.70	8	3.50
9	3	3.30	6	5.00	8	3.50
10	3	3.30	2	1.70	7	3.10
11	1	1.10	2	1.70	3	1.30
12	4	4.30	0	0.00	3	1.30
13	0	0.00	0	0.00	0	0.00
14	0	0.00	0	0.00	0	0.00
Total	92	-	120	-	226	-

## Analysis by time of the three main reasons for revision

#### Statistical note

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

#### i) Observed component years

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

#### ii) 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 are expressed 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 (Cls) but sometimes significance can apply in the presence of Cl overlap.

#### All Primary Unicompartmental Knee Arthroplasties

No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% conf	îdence interval
8,826	53,349.1	667	1.25	1.16	1.35

### Revision Rate of Individual Unicompartmental Knee Prostheses Sorted Alphabetically

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% cont	ìdence interval
EIUS Uni Knee	22	168.0	0	0.00	0.00	2.20
Freedom Active Uni	36	89.8	5	5.57	1.81	13.00
Genesis Uni	359	2,815.6	39	1.39	0.98	1.89
HLS Uni Evolution	1	0.5	1	193.25	4.89	1,076.74
Journey Uni	6	4.9	0	0.00	0.00	74.73
LCS Uni	6	55.7	2	3.59	0.44	12.98
Miller/Galante	710	6,164.2	61	0.99	0.76	1.27
Optetrak Unicondylar Cemented	101	505.0	7	1.39	0.56	2.86
Oxford 3	3,865	28,945.3	401	1.39	1.25	1.53
Oxford 3 uncemented	2,167	6,886.9	47	0.68	0.00	0.91
Oxford TiNbN coated	1	3.5	0	0.00	0.00	106.85
Oxinium Uni	33	203.3	11	5.41	2.70	9.68
Preservation	484	3,904.6	57	1.46	1.11	1.89
Repicci II	98	1,027.2	18	1.75	0.00	2.77
Sigma HP Uni	80	154.1	0	0.00	0.00	2.39
Triathlon PKR	139	308.5	4	1.30	0.35	3.32
Unix Uni	14	57.5	2	3.48	0.42	12.56
Zimmer Unicompartmental Knee	704	2,054.7	12	0.58	0.30	1.02

The Oxinium, the Freedom Active and the Oxford 3 unis all have significantly higher revision rates but, despite widely varying revision rates for the other prostheses, there are no significant differences because of the relatively small numbers and wide Cls. No Oxinium or Freedom Active unis were recorded for 2014.

The uncemented Oxford and the Zimmer Unis have significantly lower revision rates than the overall mean of 1.25 /100ocys.

#### **Revision vs Arthroplasty Fixation**

Fixation	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% cont	îdence interval
Cemented	6,584	46,007.0	612	1.33	1.23	1.44
Uncemented	1,970	6,400.3	43	0.67	0.49	0.90
Hybrid	272	941.9	12	1.27	0.66	2.23

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% conf	ìdence interval
LT55	1,072	6,578.5	109	1.66	1.36	2.00
55_64	3,046	18,648.6	298	1.60	1.42	1.79
65_74	2,964	18,354.3	184	1.00	0.86	1.16
GE75	1,744	9,767.7	76	0.78	0.61	0.97

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

#### **Revision vs Gender**

Gender	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% conf	idence interval
Female	4,115	25,260.2	339	1.34	1.20	1.49
Male	4,711	28,089.0	328	1.17	1.04	1.30

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% conf	îdence interval
<10	4,040	26,836.9	390	1.45	1.31	1.60
>=10	4,784	26,504.8	276	1.04	0.92	1.17

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

#### **Revision vs Surgical Approach**

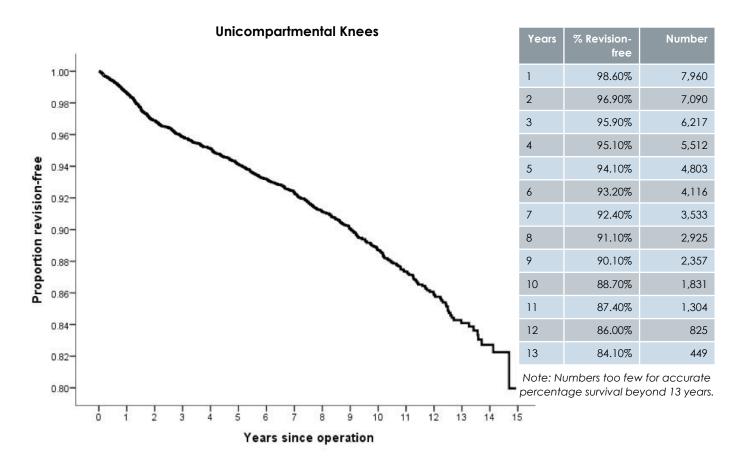
Approach	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% conf	idence interval
Standard parapatellar	6,653	41,996.4	557	1.33	1.22	1.44
Minimally Invasive	2,173	11,352.8	110	0.97	0.80	1.17

The minimally invasive technique has a significantly lower revision rate.



# **KAPLAN MEIER CURVES**

The following Kaplan Meier survival analyses are for the 15 years from 2000 to 2014, with deceased patients censored at time of death.

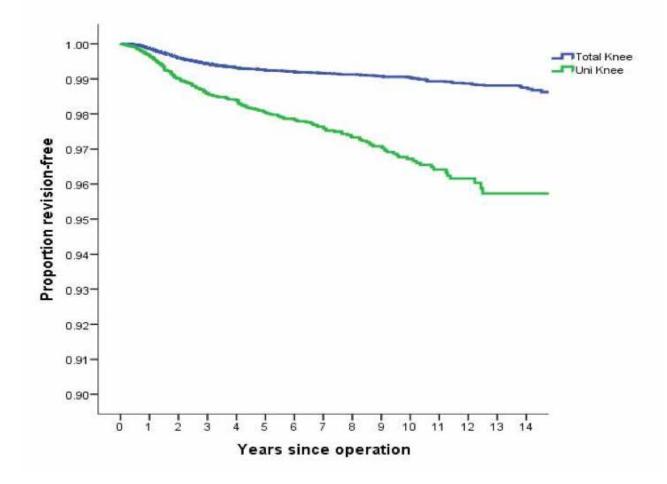


#### **Revision Rate for Re-revisions**

Re Revisions	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% conf	îdence interval
Revised to full	559	2,677.1	46	1.72	1.26	2.29
Revised to Uni	108	435.7	22	5.05	3.16	7.65

When compared to the primary total knee arthroplasty revision rate of 0.49 at the 95% confidence interval there is a significantly increased revision rate (3.5x) when a unicompartmental arthroplasty is converted to a total knee arthroplasty. This statistic is even more significant following revision 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.





Total vs UniKnees	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% col	nfidence interval
Total Knees	78,542.00	456,153.7	544	0.12	0.11	0.13
Uni Knees	8,826.00	53,349.1	189	0.35	0.31	0.41

There is a significantly better survivorship (3x) for total knees revised for pain alone than for uni-knees revised to total knees for pain alone. However, overall for both groups the survival at 12 years is still very good and this may reflect that there is no indication for further revision even if pain persists.



#### 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 fifteen year period and as at July 2015, there were 6,002 unicompartmental knee questionnaire responses registered at six months post-surgery. The mean unicompartmental knee score was 39.47 (standard deviation 7.34, range 3 – 48).

Scoring	> 41	2,974
Scoring	34 - 41	1,950
Scoring	27 -33	677
Scoring	< 27	401

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 years post-surgery.

This dataset represents sequential Oxford knee scores for 2,317 individual patients.

At five years post-surgery, 88 % of patients had achieved an excellent or good score and had a mean of 41.48.

#### 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 953 individual patients.

At ten years post-surgery, 83% of patients achieved an excellent or good score and had a mean of 40.41.

# 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 at six months, five years and ten years post- surgery.

		6m%	5y%	10y%
1	Moderate or severe pain from the operated knee	10	8	10
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	30	27	30
5	Extreme difficulty or impossible to do the household shopping on your own	2	2	3
6	Extreme difficulty or impossible to wash and dry yourself	0.5	0.4	0.7
7	Pain interfering greatly or totally with your work	3	3	4
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	7	5	5
11	Extreme difficulty or impossible to walk down a flight of stairs	3	3	5
12	Pain from your knee in bed most or every nights	7	4	6

# OXFORD 12 SCORE AS A PREDICTOR OF KNEE ARTHROPLASTY REVISION

A statistically significant relationship has been confirmed between the Oxford scores at six months and arthroplasty revision within two years of the Oxford 12 questionnaire date. Plotting the patients' six month 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 two years related to the Oxford score. A patient with a score below 27 has 14 times the risk of a revision within two years compared to a person with a score of 34-41.



Revision (%) to 2 years - by Oxford score at 6 months

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

Kalairajah group	Revision to 2 yrs	No. revised	%	Std error
0_26	337	62	18.40	2.11
27-33	558	26	4.66	0.89
34-41	1,552	22	1.42	0.30
GT 41	2,307	30	1.30	0.24

A person with an Oxford score >41 has a 1.30% risk of revision within two years compared to an 18.40% risk with a score of < 27.

# ANKLE ARTHROPLASTY

# **PRIMARY ANKLE ARTHROPLASTY**

The fifteen-year report analyses data for the period January 2000 - December 2014. There were 1,160 primary ankle procedures registered, an additional 102 compared to last year's report, which represents a 10.7% reduction compared to 2013.

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
2013	113
2014	102

# **Data Analysis**

#### Age and sex distribution

The average age for an ankle replacement was 65.52 years, with a range of 32.32 - 95.52 years.

	Female	Male
Number	444	716
Percentage	38.28	61.72
Mean age	63.26	66.93
Maximum age	95.52	90.26
Minimum age	32.32	34.15
Standard dev.	9.70	8.51

#### **Body Mass Index**

For the five-year period 2010 - 2014, there were 280 BMI registrations for primary ankle replacements. The average was 28.29 with a range of 17 – 43 and a standard deviation of 4.29.

#### **Previous operation**

•	
None	908
Internal fixation for juxtarticular fracture	117
Arthrodesis	39
Osteotomy	21
Diagnosis	
Osteoarthritis	858
Post trauma	196
Rheumatoid arthritis	107
Other inflammatory	18
Avascular necrosis	4
Approach	
Anterior	1,008
Anterolateral	34
Other	13

#### Bone graft

Tibia autograft	39
Tibia allograft	3
Tibia synthetic	1
Talus autograft	9
Talus allograft	3
Cement	

12 7

7

4

### TTibia cemented Antibiotic in cement Talus cemented Antibiotic in cement

#### Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic 1,116 (96%)

#### **Operating theatre**

Conventional	590
Laminar flow	557
Space suits	211

#### ASA Class

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

For the ten-year period 2005 -2014, there were 901 (89%) 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	173
2	561
3	164
٨	3

#### Operative time (skin to skin)

Mean

#### Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the ten-year period 2005 -2014.

121 minutes

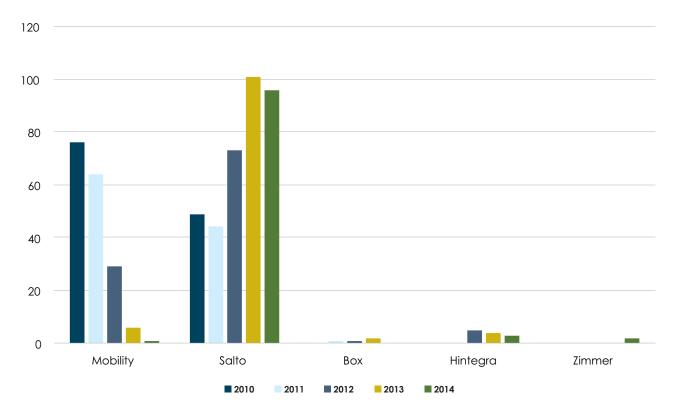
Consultant	1,008
Advanced trainee supervised	6

#### Prosthesis usage

#### Ankle prostheses used in 2014

Salto	96
Hintegra	3
Zimmer	2
Mobility	1
The Zimmer appears for the first time and the Bo	ox prosthesis was not registered in 2014.
Ankle Arthroplasty	P.115

The New Zealand Joint Registry



#### Most Used Ankle Prostheses 2010 - 2014

# Surgeon and hospital workload

#### Surgeons

In 2014, 18 surgeons performed 102 primary ankle procedures, an average of six procedures per surgeon. One surgeon performed more than 15 procedures and two performed one procedure.

#### Hospitals

In 2014, primary ankle replacement was performed in 27 hospitals. 13 were public and 14 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 fifteen year period from January 2000– December 2014, there were 161 revision ankle procedures registered.

The average age for an ankle revision was 65.02 years, with a range of 34.55 - 83.06.

	Female	Male
Number	60	101
Percentage	37.27	62.73
Mean	64.13	65.46
Maximum age	81.68	83.06
Minimum age	42.13	34.55
Standard dev.	9.49	8.45



# REVISION OF REGISTERED PRIMARY ANKLE ARTHROPLASTIES

This section analyses data for revisions of primary ankle procedures for the fifteen year period.

There were 120 revisions of the primary total ankle procedures of 1,160 (10.34%).

The big increase in the number of revision procedures in 2014 was due to the Registry receiving 51 back-dated revision forms.

#### Time to revision

Mean	1,438	days
Maximum	4,814	days
Minimum	21	days
Standard deviation	1,144	days
Reason for revision		
Pain		54
Loosening talar component		39
Loosening tibial component		128
Deep infection		14

#### Ankle re-revisions

There were 12 registered primary ankle procedures that were revised twice and two procedures that were revised three times.

Analysis by time of the 3 main reasons for revision

	Loosening tal	ar component	Pc	ıin	Looseni	ng tibial
Years	Count	%	Count	%	Count	%
0	3	7.7	4	7.4	1	3.6
1	3	7.7	14	25.9	7	25.0
2	7	17.9	9	16.7	3	10.7
3	6	15.4	8	14.8	3	10.7
4	6	15.4	8	14.8	3	10.7
5	4	10.3	3	5.6	1	3.6
6	2	5.1	3	5.6	2	7.1
7	1	2.6	2	3.7	1	3.6
8	1	2.6	1	1.9	2	7.1
9	3	7.7	1	1.9	2	7.1
10	1	2.6	1	1.9	1	3.6
11	1	2.6	0	0.0	1	3.6
12	0	0.0	0	0.0	1	3.6
13	1	2.6	0	0.0	0	0.0
Total	39	100.00%	54	100.00%	28	100.00%

#### Statistical note

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

#### i) Observed component years

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

#### ii) 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 it is expressed 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 (Cls) but sometimes significance can apply in the presence of Cl overlap.

### All Primary Ankle Arthroplasties

No.	Ops.	Observed comp. Yrs	Number Revised	Rate/100- component-years	Exact 95% cont	îdence interval
1,16	0	5,642.4	120	2.13	1.76	2.54

#### Revision vs Prosthesis Type Sorted in Alphabetical Order

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% cont	fidence interval
Agility	119	1,091.4	32	2.93	2.01	4.14
Вох	6	19.8	1	5.06	0.00	28.20
Hintegra	12	21.2	0	0.00	0.00	17.41
Mobility	450	2,319.7	52	2.24	1.67	2.94
Ramses	11	77.7	5	6.43	2.09	15.01
Salto	513	1,716.0	19	1.11	0.67	1.73
STAR	47	395.9	11	2.78	1.39	4.97
Zimmer Trabecular Metal Ankle	2	0.6	0	0.00	0.00	570.92

The Salto continues to greatly outperform all the other prostheses with respect to revision rate.

Revision vs Gender						
Gender	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% conf	îdence interval
Females	444.00	2,188.3	48	2.19	1.62	2.91
Males	716.00	3,454.1	72	2.08	1.63	2.63

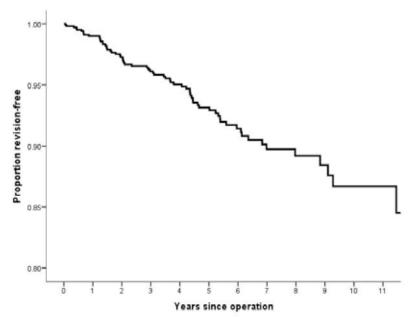
#### **Revision vs Age Bands**

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% cont	idence interval
LT55	136	654.8	25	3.82	2.47	5.64
55_64	402	2,089.0	51	2.44	1.82	3.21
65_74	445	2,145.8	39	1.82	1.29	2.48
GE74	177	752.9	5	0.66	0.22	1.55

The higher two age bands have significantly lower revision rates than the lower two and the >74 a significantly lower revision rate than the 65-74 age band.

# **KAPLAN MEIER CURVES**

The following Kaplan Meier survival analyses are for the 15 years from 2000 to 2014, with deceased patients censored at time of death.



Years	% Revision- free	No in each year N
1	98.40	1,037
2	96.30	891
3	94.20	757
4	92.20	656
5	90.20	514
6	88.60	390
7	86.20	278
8	85.10	210
9	83.10	152

There are insufficient numbers to give an accurate revision- free percentage beyond nine years.



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

At six months 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 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 published by Kalairajah et al, 2005 (see 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 fifteen year period and as at July 2015, there were 859 primary ankle questionnaire responses registered at six months post-surgery. The mean primary ankle score was 32.60 (standard deviation 9.48, range 2 - 48).

Scoring	> 41	207	
Scoring	34 - 41	287	
Scoring	27 -33	163	
Scoring	< 27	202	

At six months post-surgery, 58% 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. There were 287 primary ankle questionnaire responses registered at five years post-surgery.

At five years post-surgery, 69% achieved an excellent or good score. The average score was 36.85.

### Analysis of the individual questions

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

#### Percentage scoring 0 or 1 for each question at six-months

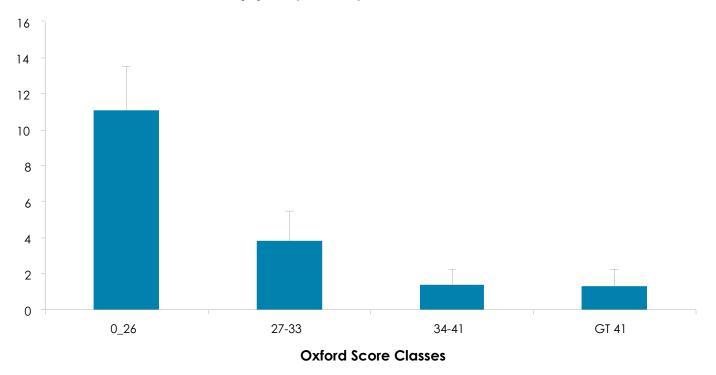
		%
1	Moderate or severe pain from the operated ankle	22
2	Only able to walk around the house or unable to walk before the pain becomes severe	6
3	Extreme difficulty or impossible to walk on uneven ground	14
4	Most of the time or always have to use an orthotic	22
5	Pain greatly or totally interferes with usual work	15
6	Limping most or every day	32
7	Extreme difficulty or impossible to climb a flight of stairs	6
8	Pain from your ankle in bed most or every night(s)	7
9	Pain from your ankle greatly or totally interferes with usual recreational activities	21
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 59 revision ankle responses with 29% achieving an excellent or good score. This group includes all revision ankle responses. The mean revision ankle score was 28.12 (standard deviation 10.33, range 8 – 48).

# OXFORD 12 SCORE AS A PREDICTOR OF ANKLE ARTHROPLASTY REVISION

A statistically significant relationship has been confirmed between the Oxford scores at six months and arthroplasty revision within two years of the Oxford 12 questionnaire date. Plotting the patients' six month scores in the Kalairajah groupings against the proportion of ankles revised for that same group demonstrates that there is an incremental increase in risk during the next two years related to the Oxford score. A patient with a score below 27 has 8.4 times the risk of a revision within two years compared to a person with a score >41.



#### Revision (%) to 2 years - by Oxford score at 6 months

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

Kalairajah group	Revision to 2 yrs	No. revised	%	Std error
0_26	163	18	11.04	2.45
27-33	132	5	3.79	1.66
34-41	213	3	1.41	0.81
GT 41	153	2	1.31	0.92

A person with an Oxford score >41 has a 1.31% risk of revision within two years compared to an 11.04% risk with a score of < 27.

# SHOULDER ARTHROPLASTY

# PRIMARY SHOULDER ARTHROPLASTY

The **fifteen**-year report analyses data for the period January 2000 – December 2014. There were 6,331 primary shoulder procedures registered, an additional 801 compared to last year's report, which represents a 7.2% increase over 2013 registrations and a 657% increase over the 15 years.

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	698
2013	747
2014	801

Of the 6,331 shoulder registrations, 1,586 are hemi shoulder replacements, 2,409 are conventional total shoulder replacements, 2,009 are reverse shoulder replacements, 208 are partial resurfacing shoulder replacements, 118 are total resurfacing replacements and one is a humeral sphere.

# **Data Analysis**

#### Age and sex distribution

The average age for all patients with a shoulder arthroplasty was 70.88 years, with a range of 15.63 – 99.36 years.

#### All shoulder arthroplasty

	Female	Male
Number	4,028	2,303
Percentage	63.62	36.38
Mean age	72.48	68.08
Maximum age	97.71	99.36
Minimum age	15.63	21.83
Standard dev.	9.62	10.29

#### Hemiarthroplasty

	Female	Male
Number	1,050	536
Percentage	66.20	33.80
Mean age	71.66	65.80
Maximum age	97.71	99.36
Minimum age	15.63	25.83
Standard dev.	11.01	12.15

#### Conventional total shoulder arthroplasty

	Female	Male
Number	1,531	878
Percentage	63.55	36.44
Mean age	70.78	67.20
Maximum age	94.62	89.11
Minimum age	26.64	29.38
Standard dev.	8.81	8.48

#### Reverse shoulder arthroplasty

	Female	Male
Number	1,297	712
Percentage	64.56	35.44
Mean age	76.05	73.31
Maximum age	96.82	92.65
Minimum age	40.70	48.96
Standard dev.	7.35	7.39

#### Partial resurfacing arthroplasty

-	• •	
	Female	Male
Number	74	134
Percentage	35.58	64.42
Mean age	58.60	55.87
Maximum age	87.06	86.12
Minimum age	20.70	21.83
Standard dev.	14.39	11.18

#### Total resurfacing arthroplasty

-	• •	
	Female	Male
Number	75	43
Percentage	63.56	36.44
Mean age	71.00	66.05
Maximum age	86.79	80.55
Minimum age	47.24	45.16
Standard dev.	8.16	8.38

#### Humeral sphere

One female patient aged 50.11 years.

#### **Previous operation**

None Internal fixation for juxtarticular fracture Previous stabilisation Osteotomy	5,344 160 119 4
Diagnosis	
Osteoarthritis	3,402
Cuff tear arthropathy	1,255

	000
Rheumatoid arthritis	510
Post old trauma	375
Avascular necrosis	194
Post recurrent dislocation	80
Other inflammatory	60

#### Approach

Deltopectoral	5,583
Deltoid split	161
Other	21
Bone graft	
Humeral autograft	98
Humeral allograft	20
Humeral synthetic	3
Glenoid autograft	71
Glenoid allograft	11
Cement	
Humerus cemented	1,483
Antibiotic in cement	910
Glenoid cemented	1,632
Antibiotic in cement	1,144

#### Systemic antibiotic prophylaxis

Patient number receiving at least one		
systemic antibiotic	5,928	(94%)

#### **Operating theatre**

Conventional	3,830
Laminar flow	2,480
Space suits	1,110

#### ASA Class

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

For the ten-year period 2005 – 2014 there were 5,088 (95%) 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	457	9
2	2,815	55
3	1,751	35
4	65	1

#### Operative time (skin to skin in minutes)

	Mean
Hemi	110
Total Sh.	128
Partial R.	94
Total R.	126
Reverse	118

#### Surgeon grade

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

The following figures are for the ten-year period 2005 – 2014.

Consultant Advanced trainee supervised Advanced trainee unsupervised Basic trainee	5,101 259 13 1
Top 10 shoulder prostheses 2014	
SMR	320
Delta Xtend Reverse	155
Aequalis	93
Aequalis Reversed	62
Global AP	58
Global Unite	24
Global	20
Epoca	18
Comprehensive	15
Bigliani/Flatow	11

The Comprehensive is a new addition to the list and has replaced the Global Cap Resurfacing from the 2013 list.

#### Surgeon and hospital workload

#### Surgeons

In 2014, 79 surgeons performed 801 shoulder procedures, an average of 10 procedures per surgeon. 12 surgeons performed more than 20 procedures and 15 surgeons performed one procedure.

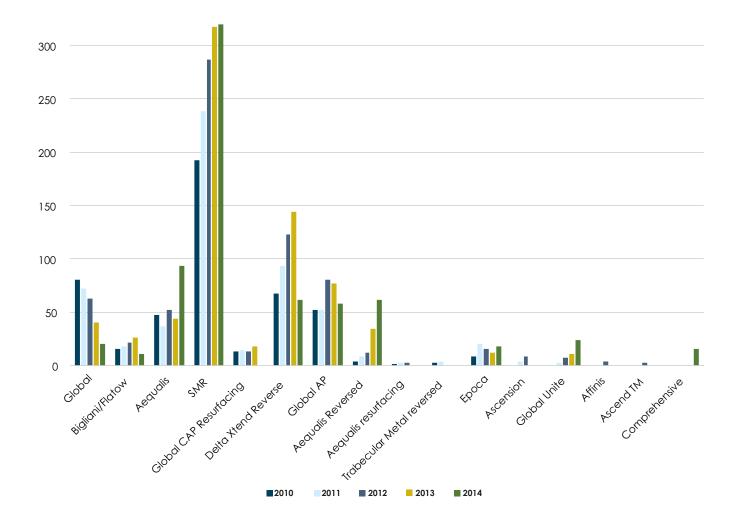
#### **Hospitals**

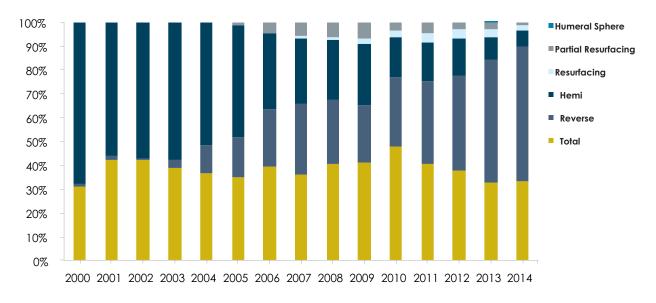
In 2014 shoulder replacement was performed in 47 hospitals. 26 were public and 21 were private.

The average number of shoulder replacements per hospital for 2014 was 14.



#### Most used shoulder prostheses 2010 - 2014





Percentages of the different types of shoulder prostheses used by year

The Reverse shoulder prostheses continue to dominate and in 2014 accounted for 56% of shoulder arthroplasties.

# **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 **fifteen-** year period January 2000 – December 2014, there were 502 revision shoulder procedures registered.

The average age for a shoulder revision was 68.46 years with a range of 24.05 - 89.95 years.

	Female	Male
Number	279	223
Percentage	55.58	44.42
Mean	70.03	66.49
Maximum age	89.95	88.46
Minimum age	33.20	24.05
Standard dev.	10.86	10.62

# REVISION OF REGISTERED PRIMARY SHOULDER ARTHROPLASTIES

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

There were 308 revisions of the primary group of 6,331(4.9%). There were 33 procedures that had been revised twice and four that had been revised three times.

#### Time to revision

Mean	917	days
Maximum	4,530	days
Minimum	0	days
Standard deviation	894	days

# Reason for revision

Pain	70
Dislocation/instability anterior	58
Sub acromial cuff impingement	55
Loosening glenoid	40
Deep infection	21
Loosening humeral	12
Instability posterior	10
Sub acromial tuberosity impingement.	5
Fracture humerus	3
Loosening both	2

#### Analysis by time for the 6 main reasons for revision

	Loose gler		Disloc	cation	Deep ir	fection	Pc	iin		romial uff	Loose Hum	ening Ieral
Years	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
0	10	25.00	34	58.62	7	33.33	17	24.29	11	20.00	2	16.67
1	9	22.50	10	17.24	8	38.10	19	27.14	15	27.27	1	8.33
2	4	10.00	3	5.17	3	14.29	11	15.71	11	20.00	1	8.33
3	2	5.00	2	3.45	2	9.52	6	8.57	3	5.45	3	25.00
4	1	2.50	3	5.17	1	4.76	5	7.14	3	5.45	1	8.33
5	4	10.00	4	6.90	0	0.00	1	1.43	4	7.27	3	25.00
6	3	7.50	0	0.00	0	0.00	4	5.71	2	3.64	0	0.00
7	0	0.00	0	0.00	0	0.00	2	2.86	2	3.64	0	0.00
8	1	2.50	1	1.72	0	0.00	2	2.86	0	0.00	0	0.00
9	4	10.00	0	0.00	0	0.00	2	2.86	2	3.64	0	0.00
10	2	5.00	0	0.00	0	0.00	1	1.43	2	3.64	1	8.33
11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
12	0	0.37	1	1.72	0	0.00	0	0.00	0	0.00	0	0.00
Total	40	-	58	-	21	-	70	-	55	-	12	-

#### Statistical note

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

#### i) Observed component years

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

#### ii) 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 are expressed 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 (Cls) but sometimes significance can apply in the presence of Cl overlap.

### All Total Shoulder Arthroplasties

No. Ops	Observed comp. Yrs	Number Revised	Rate/100 Exact 95% confidence in component- years		idence interval
6,331	29,121.5	308	1.06	0.94	1.18

#### Revision rate of Shoulder Prostheses vs Arthroplasty Type

Operation Type	No. Ops.	Observed	Number Revised	Rate/100 component- years	Exact 95% confidence interval	
Total	2,409	11,775.9	118	1.00	0.83	1.20
Reverse	2,009	6,062.8	58	0.96	0.72	1.23
Hemi	1,586	10,016.5	110	1.10	0.90	1.32
Resurfacing	118	339.2	1	0.29	0.01	1.64
Partial resurfacing	208	926.0	21	2.27	1.40	3.47
Humeral Sphere	1	1.1	0	0.00	0.00	344.59

There is a significantly higher revision rate for Partial Resurfacing compared to the overall mean and Conventional Total, Reverse and Hemi Arthroplasty.

#### Revision Rate of Individual Shoulder Prostheses Sorted on Alphabetical Order

Prothesis		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% o inte	
Conventional Total	Aequalis	352	1,541.0	12	0.78	0.40	1.36
	Affinis	3	7.6	0	0.00	0.00	48.50
	Anatomical	35	374.9	0	0.00	0.00	0.98
	Arthrex Eclipse	1	3.1	0	0.00	0.00	117.47
	Ascend TM	2	3.6	0	0.00	0.00	101.31
	Bi-Angular	8	72.3	0	0.00	0.00	5.10
	Bigliani/Flatow	263	1,859.0	7	0.38	0.15	0.78
	Cofield 2	21	210.1	0	0.00	0.00	1.76
	Comprehensive	6	2.2	0	0.00	0.00	168.21
	Delta Xtend Reverse	2	3.6	0	0.00	0.00	103.09
	Epoca Humeral stem	4	17.6	0	0.00	0.00	20.93
	Global	509	3,097.1	14	0.45	0.25	0.76
	Global AP	330	938.4	2	0.21	0.03	0.77
	Global Unite	13	2.5	0	0.00	0.00	144.72
	Humeral stem	1	2.3	0	0.00	0.00	157.40
	Neer 3	2	24.4	0	0.00	0.00	15.11
	Neer II	12	139.7	0	0.00	0.00	2.64
	Osteonics humeral component	49	426.5	6	1.41	0.52	3.06
	Sidus	1	0.3	0	0.00	0.00	1,132.24

Prothesis		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% confidence interval	
	Simpliciti TM	8	9.0	0	0.00	0.00	41.03
	SMR	782	3,008.1	77	2.56	2.02	3.20
	Univers 3D	5	32.5	0	0.00	0.00	11.35
Reverse	Aequalis	45	19.8	1	5.06	0.13	28.17
	Aequalis Reversed	73	201.0	1	0.50	0.01	2.77
	Aequalis Reversed Fracture	19	24.0	0	0.00	0.00	15.36
	Affinis	3	6.6	0	0.00	0.00	56.21
	Comprehensive	12	5.0	0	0.00	0.00	73.83
	Delta	55	422.9	2	0.47	0.06	1.71
	Delta Xtend Reverse	733	1,946.6	25	1.28	0.83	1.90
	SMR	1,049	3,392.9	29	0.85	0.57	1.23
	Trabecular Metal Reverse	19	40.5	0	0.00	0.00	9.12
	Vaios	1	3.7	0	0.00	0.00	99.73
Hemi	Aequalis	152	837.3	9	1.07	0.49	2.04
	Aequalis Reversed	1	2.4	0	0.00	0.00	153.46
	Affinis	5	4.0	0	0.00	0.00	91.47
	Anatomical	19	208.3	0	0.00	0.00	1.77
	Arthrex Eclipse	2	12.2	0	0.00	0.00	30.24
	Ascend TM	1	2.6	0	0.00	0.00	143.49
	Bi-Angular	19	192.9	2	1.04	0.13	3.75
	Bigliani/Flatow	137	1,072.8	13	1.21	0.65	2.07
	Bio-modular	1	7.1	1	14.00	0.35	78.03
	Cofield 2	50	501.6	0	0.00	0.00	0.74
	Delta	1	8.3	0	0.00	0.00	44.57
	Delta Xtend Reverse	17	50.4	3	5.95	1.23	17.39
	Global	721	4,926.5	47	0.95	0.70	1.27
	Global AP	66	199.9	2	1.00	0.12	3.61
	Global Unite	31	40.2	2	4.98	0.60	17.98
	MRS Humeral	4	14.9	0	0.00	0.00	24.69
	Neer II	24	208.5	0	0.00	0.00	1.77
	Osteonics humeral component	43	364.0	2	0.55	0.07	1.98
	Randelli	1	8.2	0	0.00	0.00	44.82
	SMR	289	1,345.2	29	2.16	1.44	3.10
	Trabecular Metal Reverse	1	5.2	0	0.00	0.00	70.51
	Univers 3D	1	3.8	0	0.00	0.00	96.59



Prothesis		No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% ( inte	confidence rval
Total Resurfacing	Aequalis Resurfacing Head	10	35.8	0	0.00	0.00	10.31
	Epoca Head	62	150.4	0	0.00	0.00	2.45
	Global CAP Resurfacing	44	145.6	1	0.69	0.02	3.83
	SMR Resurfacing	2	7.3	0	0.00	0.00	50.39
Partial resurfacing	Aequalis Resurfacing Head	1	3.0	0	0.00	0.00	121.06
	Arthrex Eclipse	3	7.9	2	25.22	3.05	91.09
	Ascension	20	47.1	1	2.12	0.05	11.82
	Copeland Resurfacing	19	107.4	2	1.86	0.23	6.73
	Custom Global Cap	1	3.4	0	0.00	0.00	108.14
	Epoca Head	16	39.2	1	2.55	0.06	14.20
	Global CAP Resurfacing	92	496.4	9	1.81	0.83	3.44
	Global Humeral Head	1	2.2	0	0.00	0.00	164.92
	Hemicap Resurfacing	6	34.9	0	0.00	0.00	10.56
	SMR Resurfacing	43	159.4	4	2.51	0.68	6.42
	SMR Resurfacing CTA	6	24.9	2	8.03	0.97	28.99

There are widely varying revision rates, most of which do not reach statistical significance. The stand out is SMR Conventional which has a markedly higher revision rate than the other main Conventional prostheses. Eighty-eight were implanted in 2014.

#### **Revision vs Glenoid Fixation** (Conventional Total arthroplasties only)

	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% conf	ìdence interval
Uncemented	838	3,298.4	74	2.24	1.76	2.82
Cemented	1,571	8,477.5	44	0.52	0.38	0.70

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% cont	îdence interval
LT55	409	2,198.7	45	2.05	1.49	2.74
55_64	1,169	5,729.8	91	1.59	1.27	1.94
65_74	2,375	10,977.5	108	0.98	0.81	1.19
GE74	2,378	10,215.5	64	0.63	0.48	0.80

The lower two age bands have a significantly higher revision rate than the higher two.

#### **Revision vs Prosthesis Group vs Age Bands**

Prosthesis	Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% c inter	
Total	LT55	124	594.2	15	2.52	1.41	4.16
	55_64	572	2,662.8	38	1.43	1.01	1.96
	65_74	1,051	5,218.0	46	0.88	0.65	1.18
	GE75	662	3,300.9	19	0.58	0.35	0.90
Reverse	LT55	14	33.4	2	5.98	0.72	21.62
	55_64	194	618.8	10	1.62	0.77	2.97
	65_74	732	2,125.2	24	1.13	0.72	1.68
	GE74	1,069	3,285.3	22	0.67	0.42	1.01
Hemi	LT55	180	1,171.2	16	1.37	0.78	2.22
	55_64	308	2,040.1	39	1.91	1.36	2.61
	65_74	492	3,303.6	32	0.97	0.66	1.37
	GE74	606	3,501.4	23	0.66	0.42	0.99
Resurfacing	LT55	5	14.1	1	7.09	0.18	39.51
	55_64	28	100.3	0	0.00	0.00	3.68
	65_74	56	150.2	0	0.00	0.00	2.45
	GE74	29	74.5	0	0.00	0.00	4.95
Partial resurfacing	LT55	85	384.6	11	2.86	1.43	5.12
	55_64	67	307.6	4	1.30	0.35	3.33
	65_74	44	180.3	6	3.33	1.22	7.24
	GE74	12	53.3	0	0.00	0.00	6.92

### **Revision vs Gender**

Gender	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% conf	ìdence interval
Female	4,028	18,806.2	177	0.94	0.81	1.09
Male	2,303	10,315.3	131	1.27	1.06	1.51

There is no significant difference between the two groups.

### **Revision vs Surgeon Annual Workload**

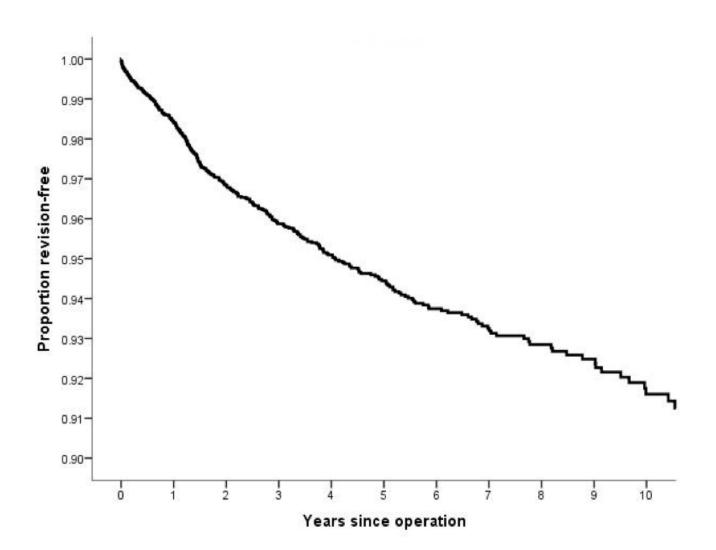
Consultant Number of ops/yr	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% cont	îdence interval
<10	2,759	12,886.5	148	1.15	0.97	1.35
>=10	3,572	16,235.0	160	0.99	0.84	1.15

There is no significant difference between the two groups.



# **KAPLAN MEIER CURVES**

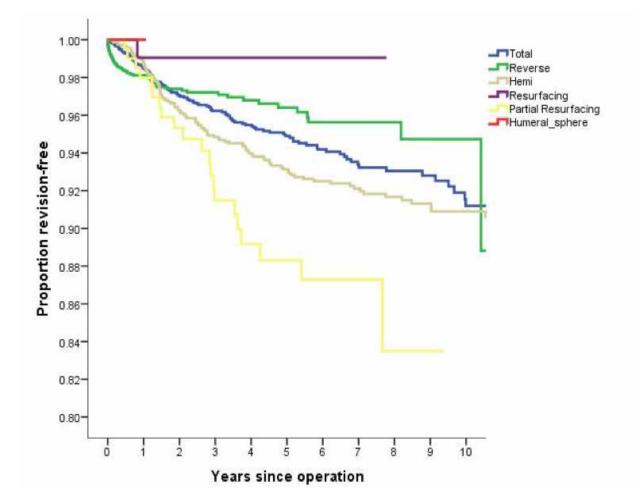
The following Kaplan Meier survival analyses are for the 15 years from 2000 to 2014, with deceased patients censored at time of death.



Years	% Revision- free	N
1	98.40%	5,364
2	96.80%	4,482
3	95.90%	3,690
4	95.10%	3,046
5	94.40%	2,509
6	93.70%	2,031
7	93.20%	1,546
8	92.80%	1,252
9	92.50%	899
10	91.60%	626

There are insufficient numbers to give an accurate revision free percentage beyond ten years.





#### PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX MONTH, FIVE YEARS AND TEN YEARS POST-SURGERY

#### Questionnaires at six months post-surgery

At six months post-surgery patients are sent the Oxford-12 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 fifteen-year period and as at July 2015, there were 4,225 shoulder questionnaire responses registered at six months post-surgery.

The mean shoulder score was 36.35 (standard deviation 9.52, range 2 - 48)

Scoring	> 41	1,565
Scoring	34 - 41	1,331
Scoring	27 - 33	641
Scoring	<27	688

At six months post-surgery, 69% 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.

This dataset represents sequential Oxford shoulder scores for 1,226 individual patients.

At five years post-surgery, 78% of these patients achieved an excellent or good score and had a mean of 39.60.

#### 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 shoulder scores for 245 individual patients.

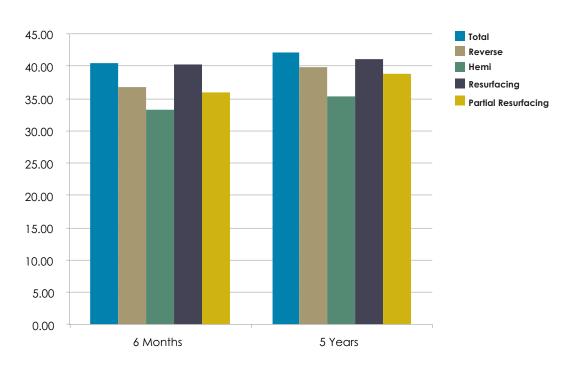
At ten years post-surgery, 73% of these patients achieved an excellent or good score and had a mean of 38.40.



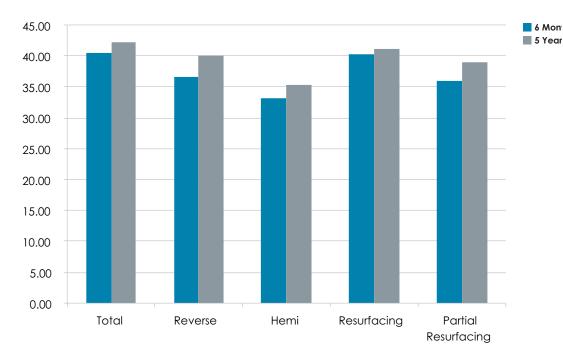
Prosthesis type	Time Post- Surgery	Mean Score	Std. Error	95% Confide	95% Confidence Interval	
				Lower Bound	Upper Bound	
Conventional Total	6 Months	40.54	0.35	39.86	41.22	
	5 Years	42.11	0.35	41.43	42.80	
Reverse	6 Months	36.67	0.54	35.62	37.72	
	5 Years	39.95	0.54	38.89	9 41.01	
Hemi	6 Months	33.16	0.44	32.29	34.03	
	5 Years	35.37	0.45	34.50	36.25	
Resurfacing	6 Months	40.33	2.79	34.85	45.82	
	5 Years	41.11	2.82	35.59 46.64	46.64	
Partial Resurfacing	6 Months	35.90	1.53	32.90	38.90	
	5 Years	38.90	1.54	35.87	41.93	

#### Six month and Five Year Oxford Scores for the different arthroplasty types

Conventional Total and Resurfacing Head types have significantly higher 6 month and 5 year scores.



### Comparison of 6 month and 5 year scores for different arthroplasty types



#### 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 at six-months and five-years.

		6mth %	5yr %
1	The worst pain from the shoulder is severe or unbearable	18	12
2	Usually have moderate or severe pain from the operated shoulder	22	14
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	5	2
5	Extreme difficulty or impossible to do the household shopping on your own	7	7
6	Extreme difficulty or impossible to carry a tray containing a plate of food across a room	9	8
7	Extreme difficulty or impossible to brush or comb hair with the operated arm	19	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	18	14
10	Extreme difficulty or impossible to wash and dry under both arms	10	6
11	Pain from operated shoulder greatly or totally interfering with usual work	14	12
12	Pain from shoulder in bed most or every night(s)	16	12

#### Revision shoulder questionnaire responses

There were 297 revision shoulder responses with 47% achieving an excellent or good score. This group includes all revision shoulder responses. The mean revision shoulder score was 31.11 (standard deviation 10.51, 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

Plotting the patients' six month scores in the Kalairajah groupings against the proportion of shoulders revised for that same group demonstrates that there is an incremental increase in risk during the next two years related to the Oxford score, although it is not as clear cut as for the hips and knees. A patient with a score below 27 has 5 times the risk of a revision within two years compared to a person with a score of 34-41 or >41.



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

Kalairajah group	No in group	No. revised	%	Std error
0_26	482	32	6.64	1.13
27-33	455	21	4.62	0.98
34-41	918	12	1.31	0.37
GT 41	1,073	14	1.30	0.35

A person with an Oxford score >41 has a 1.30% risk of revision within two years compared to a 6.64% risk with a score <27.

# ELBOW ARTHROPLASTY

# PRIMARY ELBOW ARTHROPLASTY

The **fifteen**-year report analyses data for the period January 2000 – December 2014. There were 435 primary elbow procedures registered, an additional 26 compared to 2013.

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	24	
2013	22	
2014	26	

# Data Analysis

#### Age and sex distribution

The average age for an elbow replacement was 66.86 years, with range of 15.16 – 92.41 years.

	Female	Male
Number	334	101
	76.78	23.22
Percentage	67.20	23.22 65.73
Mean age		
Maximum age	92.41	91.73
Minimum age	36.38	15.16
Standard dev.	11.91	13.57
Previous operatio	n	
None		367
Internal fixation for	juxtarticular fracture	20
Synovectomy+-rem	ioval radial head	14
Debridement		12
Osteotomy		2
Ligament reconstru	ction	1
Interposition arthroplasty		1
Diagnosis		
RRheumatoid arthri	tis	237
Post fracture		123
Osteoarthritis		58
Other inflammatory	,	8
Post dislocation		7
Post ligament disrup	otion	4
Approach		
••		
Posterior		272
Medial		86
Lateral		28

#### Bone graft

Humeral autograft	32
Humeral allograft	3
Humeral synthetic	1
Ulnar autograft	2
Cement	
Humerus comented	101

Humerus cemented		404
Antibiotic in cement	298	(74%)
Ulna cemented		382
Antibiotic in cement	277	(73%)
Radius cemented		22
Antibiotic in cement	21	(96%)

#### Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	404	(93%)
Operating theatre		
Conventional	298	
Laminar flow	133	
Space suits	64	

### ASA Class

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

For the ten-year period 2005 – 2014, there were 283 (92%) 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	128
3	140
4	7

#### Operative time (skin to skin)

140 minutes

#### Surgeon grade

Mean

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

The following figures are for the ten-year period 2005 - 2014.

Consultant	300
Advanced trainee supervised	7
Advanced trainee unsupervised	3



### Surgeon and hospital workload

In 2014, 16 surgeons performed 26 primary elbow procedures. Three surgeons performed two operations and 11 surgeons performed one operation each.

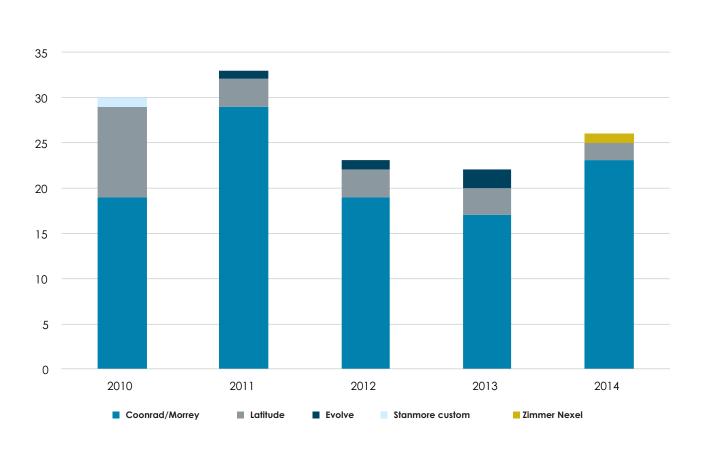
#### Hospitals

In 2014, primary elbow replacement was performed in 45 hospitals, of which 10 were public and 4 were private.

# Prosthesis usage

#### Elbow prostheses used in 2014

-	
Coonrad/Morrey	23
Latitude	2
Zimmer Nexel	1



# Most Used Elbow Prostheses 2010 – 2014

# **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 fifteen-year period January 2000 – December 2014, there were 78 revision elbow procedures registered.

The average age for a revision elbow replacement was 65.76 years, with a range of 30.97 - 88.95 years.

	Female	Male
Number	56	22
Percentage	71.79	28.21
Mean	66.16	64.73
Maximum age	88.95	84.17
Minimum age	42.23	30.97
Standard dev.	9.42	12.36

# REVISION OF REGISTERED PRIMARY ELBOW ARTHROPLASTIES

This section analyses data for revisions of primary elbow procedures for the fifteen-year period January 2000 – December 2014.

There were 28 revisions of the primary group of 435 (6.4%).

There were five that had been revised twice and one that had been revised three times.

#### Time to revision

Reason for revision	
Standard deviation	1,039 days
Minimum	62 days
Maximum	3,988 days
Mean	1,231 days

LLoosening humeral component	9
Deep infection	7
Loosening ulnar component	6
Pain	3
Fracture humerus	3
Loosening radial head component	2
Dislocation	2
Fracture ulna	1

#### Analysis by time for the 3 main reasons for revision

	Loosening	g humeral	Loosening Ulna		Deep infection	
Years	Count	%	Count	%	Count	%
0	0	0.00	0	0.00	0	0.00
1	2	22.20	0	0.00	4	57.10
2	3	33.30	3	50.00	1	14.30
3	2	22.20	2	33.30	0	0.00
4	1	11.10	0	0.00	0	0.00
5	0	0.00	0	0.00	0	0.00
6	0	0.00	0	0.00	1	14.30
7	0	0.00	0	0.00	0	0.00
8	0	0.00	0	0.00	1	14.30
9	0	0.00	0	0.00	0	0.00
10	0	0.00	1	16.70	0	0.00
11	1	11.10	0	0.00	0	0.00
Total	9	-	6	-	7	-

#### Statistical note

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

#### i) Observed component years

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

#### ii) 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 it is expressed 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 (Cls) but sometimes significance can apply in the presence of Cl overlap.



### All Primary Total Elbow Replacements

No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% confidence interval	
435	2,523.7	28	1.11	0.74	1.60

#### Revision Rate of Individual Prostheses Sorted in Alphabetic Order

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% conf	îdence interval
Acclaim	16	124.5	5	4.01	1.30	9.37
Coonrad/Morrey	317	1,864.3	13	0.70	0.37	1.19
Evolve Stem	10	43.9	0	0.00	0.00	8.40
Kudo	18	139.8	3	2.15	0.44	6.27
Latitude	71	339.8	7	2.06	0.83	4.24
Sorbie Questor	1	6.8	0	0.00	0.00	54.09
Stanmore custom implant	1	4.4	0	0.00	1.00	83.22
Zimmer Nexel	1	0.1	0	0.00	2.00	2,749.72

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

### **Revision vs Gender**

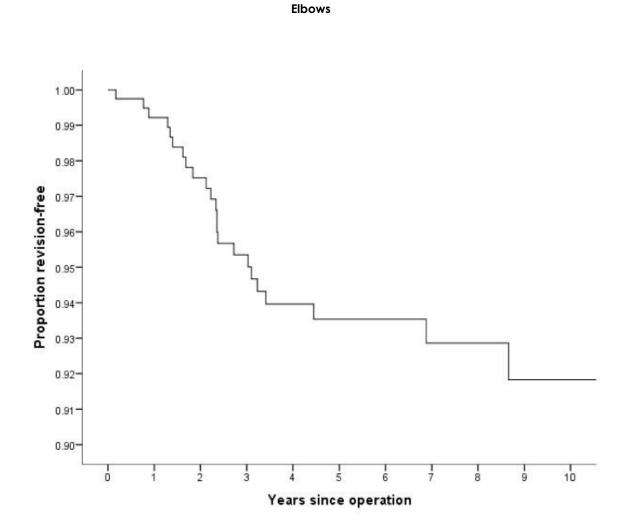
Gender	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% conf	îdence interval
Females	334	2,070.8	19	0.92	0.55	1.43
Males	101	452.9	9	1.99	0.91	3.77

# **Revision vs Age Bands**

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component- years	Exact 95% cont	îdence interval
LT55	77	536.0	5	0.93	0.30	2.18
55_64	113	734.1	10	1.36	0.65	2.51
65_74	119	660.6	9	1.36	0.62	2.59
GE74	126	593.0	4	0.67	0.18	1.73

# **KAPLAN MEIER CURVES**

The following Kaplan Meier survival analyses are for the 15 years from 2000 to 2014, with deceased patients censored at time of death.



Years	% Revision-free	N
1	99.30%	396
2	97.40%	356
3	95.40%	317
4	94.10%	290
5	93.40%	240

There are insufficient numbers to give an accurate revision- free percentage beyond five years.



### PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX-MONTHS POST SURGERY

#### Questionnaires at six months post surgery

At six months 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 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 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 fifteen-year period and as at July 2015, there were 294 primary elbow responses registered at six months post-surgery.

The mean primary elbow score was 37.05 (standard deviation 9.72, range 7 – 48).

> 41	129
34 - 41	71
27 - 33	39
<27	44
	34 - 41 27 - 33

At six months post-surgery, 69% had an excellent or good score.

#### Questionnaires at five-year 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, there were 84 registered responses. Of those, 88% achieved an excellent or good score.

### Analysis of the individual questions

Analysis of the individual questions showed that >10% of patients scored poorly in over half the questions.

# Percentage scoring 0 or 1 for each question at six months post- surgery

		6mth
1	The worst pain from the elbow is severe or unbearable	12
2	Extreme difficulty or impossible to dress yourself because of your operated elbow	5
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	18
6	Extreme difficulty or impossible to carry a tray containing a plate of food across a room	12
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	9
11	Pain from operated elbow greatly or totally interfering with usual work or hobbies	13
12	Pain from elbow in bed most or every night(s)	7

#### Revision elbow questionnaire responses

There were 43 revision elbow responses with 56% achieving an excellent or good score. This group includes all revision elbow responses. The mean revision elbow score was 33.21 (standard deviation 11.24, range 8 – 48).

# LUMBAR DISC REPLACEMENT

# PRIMARY LUMBAR DISC REPLACEMENT

This report analyses data for the **thirteen**-year period January 2002 – December 2014.There were 151 lumbar disc replacements registered, an additional two compared to last year's report.

# **Data Analysis**

The average age for a lumbar disc replacement was 40.31 years, with a range of 24.07 - 62.19 years.

	Female	Male
Number	72	79
Percentage	47.68	52.32
Mean age	40.42	40.19
Maximum age	62.19	60.71
Minimum age	24.07	27.19
Standard dev.	8.60	7.32
Disc replacement	levels	
L3/4		20
L4/5		103
L5/S1		32
Fusion levels		
L3/4		2
L4/5		12
L5/S1		57
Previous operation	ı	
Discectomy		29
L3/4		0
L4/5		14
L5/S1		191
Diagnosis		
Degenerative disc o	lisease	
L3/4		11
L4/5		61
L5/S1		83
Other		4
Annular tear MRI s	can	
L3/4		13
L4/5		67
L5/S1		26
Other		1
Discogenic pain a	on discography	
L3/4		20
L4/5		85
L5/S1		63
Other		1

#### Approach

Retroperitoneal midline Retroperitoneal lateral Transperitoneal Other- mini open horizontal	137 3 2 2
Intraoperative complications	
Damage to major veins Subsidence	13 1
Systemic antibiotic prophylaxis	
Patient number receiving systemic antibiotic prophylaxis	123
Operating theatre	
Conventional	85
Laminar flow	65
Spacesuits	2
Operative time (skin to skin)	
Mean	138 minutes
Surgeon grade	
Consultant	151



17

# REVISION OF REGISTERED PRIMARY LUMBAR DISC REPLACEMENTS

This section analyses data for revisions of primary lumbar disc replacements for the 12-year period.

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

There were two revisions of the primary group of 151 lumbar disc replacements and one re-revision.

#### Time to revision

Reason for revision	
Minimum	242 days
Maximum	672 days
Mean	457 days

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

Standard deviation

Modified Roland and Morris	119
Mean	15
Maximum	66
Minimum	1
Standard deviation	7
Oswestry Disability Index	44
Mean	57
Maximum	82
Minimum	30
Standard deviation	13
Post operative score	
Oswestry Disability Index n =	24
Mean	23
Maximum	58
Minimum	0

# CERVICAL DISC REPLACEMENT

This report analyses data for the eleven-year period January 2004 – December 2014. There were 268 primary cervical disc replacements, an increase of 44 from the previous year.

# Data Analysis

The average age for a cervical disc replacement was 44.26 years, with a range of 24.92 - 65.79 years.

	Female	Male
Number	112	156
Percentage	41.79	58.21
Mean age	45.67	43.24
Maximum age	65.79	63.00
Minimum age	27.73	24.92
Standard dev.	8.10	7.80
Disc replacement	levels	
C3/4		9
C4/5		21
C5/6		148
C6/7		121
C7T1		3
Other		3
Previous operation	1	
Foraminotomy		8
Adjacent level fusion		15
Adjacent level disc arthroplasty		2
Other		12
Diagnosis		
Acute disc prolapse		193
Chronic spondylosis		21
Neck pain		13
Other		29
Approach		
Anterior right		169
Anterior left		44
Other		1
Intra operative co	mplications	
Equipment failure		1
Removal of implant		1
Tear jugular vein		1
Systemic antibiotic	c prophylaxis	
Patient number rece		
antibiotic prophylax	is	214

#### **Operating theatre**

Conventional Laminar flow Spacesuits	147 118 1
<b>Operative time (skin to skin)</b> Mean	121 minutes
Surgeon grade	
Consultant	267
Advanced trainee supervised	1

#### **Revision Cervical disc replacement**

There was no change from the previous year, with one revision cervical disc replacement registered.

#### **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	136
Mean	45
Post-operative score	

Neck Disability Index	128
Mean	22

Murray, D.W et al, The use of the Oxford hip and knee scores. J Bone Joint Surg (Br) 2007; 89-B: 1010-14

Questionnaire on the perceptions of patients about shoulder surgery

Jill Dawson, Ray Fitzpatrick, Andrew Carr. J Bone Joint Surg B. 1996 July; 78(4) 593-600

Kalairajah, Y et al, Health outcome measures in the evaluation of total hip arthroplasties: a comparison between the Harris hip score and the Oxford hip score. J Arthroplasty 2005; 20: 1037-41

# **Publications in Peer Reviewed Journals**

Development of the New Zealand Joint Register. Rothwell A G. Bull Hosp Jt Dis. 1999;58(3):148-60

- The early failure of the Oxford Phase 3 unicompartmental arthroplasty an audit of revisions. The New Zealand experience. Hartnett NI, Tregonning RJA, Rothwell A, Hobbs T. J Bone Joint. Surg Br, Orthopaedic Proceedings 2006;88 B Supp II:318
- A New Zealand national joint registry review of 202 total ankle replacements followed for up to 6 years. Hosman AH, Mason RB, Hobbs T, Rothwell AG. Acta Orthop. 2007 Oct; 78(5):584-91
- Functional outcomes of femoral peri prosthetic fracture and revision hip arthroplasty: a matched pair study from the New Zealand Registry. Young SW, Walker CG, Pitto RP. Acta Orthop. 2008 Aug: 79(4); 483-8
- Bilateral total joint arthroplasty: the early results from the New Zealand National Joint Registry. Hooper GJ, Hopper NM, Rothwell AG, Hobbs T. J Arthroplasty. 2008 Dec
- Revision following cemented and uncemented primary total hip replacement: a seven year analysis from the New Zealand Joint Registry. Hooper GJ, Rothwell AG, Stringer M, Frampton C. J Bone Joint Surg Br. 2009 Apr;91(4):451-8
- An analysis of the Oxford hip and knee scores and their relationship to early joint revision; data from the New Zealand Joint Registry. Rothwell AG, Hooper GJ, Hobbs A, Frampton C. J Bone Joint Surg Br.2010 Mar;92(3)413-418
- The survivorship and functional outcomes of unicompartmental knee replacements converted to total knee replacements: The New Zealand National Joint Registry. Andrew J Pearse, Gary J Hooper, Alastair G Rothwell, Chris Frampton.J Bone Joint Surg Br. 2010 Apr;92(4):508-12
- Does the use of Laminar Flow and Space Suits Reduce Early Deep Infection in Total Hip and Knee Replacement? The ten year results of the New Zealand Joint Registry. G J Hooper, AG Rothwell, M Wyatt, C Frampton J bone Joint Surg Br.2011 Jan;93(1): 85-90
- Use of Patient-Reported Outcomes in the context of Different Levels of Data .O Rolfson, A Rothwell, K Chenok, E Bohm, K Bozic, G Garellick J Bone Joint Surg Am 2011;93 Suppl 3(E):66-71
- A Multinational Assessment of Metal in Metal bearings in Hip Replacement. S Graves, A Rothwell, K Tucker, J Jacobs, A Sedrakyan J Bone Joint Surg Am 2011;93 Suppl 3(E):43-7
- Osteotomy and Unicompartmental Knee Arthroplasty Converted to Total Knee Arthroplasty: Data From the New Zealand Joint Registry. Pearse AJ, Hooper GJ, Rothwell AG, Frampton C. J Arthroplasty. 2012 Oct 11
- Does the ASA physical rating score predict early complications or poorer outcomes following hip or knee arthroplasty. Analyses from the New Zealand Joint Registry. Hooper G J, Rothwell A G, Hooper N, Frampton C J Bone Joint Surg Am. 2012 Jun 20;94(12):1065-70.
- A Review of National Shoulder and Elbow Joint Replacement Registries. J V.Rasmussen, B S.Olsen, B S. Fevang, O Furnes, E Skytta, H Rahme, B Salomonsson, KD Mohammed, R S. Page, A J Carr, J Shoulder Elbow Surg. 2012 Oct;21(10):1328-35.
- Do joint registries report true rates of hip dislocation? Devane PA, Wraighte PJ, Ong DC, Horne JG.Clin Orthop Relat Res. 2012 Nov;470(11):3003-6
- Does orthopedic training compromise the outcome in total hip arthroplasty? Inglis T, Dalzell K, Hooper G, Rothwell A, Frampton C. J Surg Educ. 2013 Jan-Feb;70(1):76-80
- The ageing population and the increasing demand for joint replacement. Hooper G. N Z Med J. 2013 Jun 28;126(1377):5-6
- Effect of glenoid cementation on total shoulder arthroplasty for degenerative arthritis of the shoulder; a review of the New Zealand National Joint Registry. Harry D.S. Clitherow, Christopher M.A. Frampton, Timothy M. Ashley J Shoulder Elbow Surg. 2014 Jun;23(6):775-81.
- Current trends and projections in the utilisation rates of hip and knee replacement in New Zealand from 2001 to 2026. Gary Hooper, Alex J-J Lee, Alastair Rothwell, Chris Frampton NZMJ 29 August 2014, Vol 127 No 1401
- The effect of body mass index on outcome in total hip arthroplasty: early analysis from the New Zealand Joint Registry. Murgatroyd SE, Frampton CM, Wright MS. J Arthroplasty. 2014 Oct;29(10):1884-8

Hips		
	Stems	Cups
Stryker	Accolade	Trident
	Accolade II	Tritanium
	Exeter V40	Contemporary
	ABG II	Exeter X3 rimfit
	Securfit	Exeter
DePuy	Elite plus	Charnley
	Summit	Duraloc
	Charnley	Pinnacle
	corail	
	C-stem	
	Trilock	
	Proxima	
	Silent	
	S-rom	
	ASR	
Zimmer	ТМ	Fitek
	ML Taper	Fitmore
	Avenir Muller	Morscher
	CLS	ZCA
	CPT	Trilogy
	M\$30	Continum
	Versys	
	Muller	
Smith & Nephew	Spectron	
	Basis	Reflection cemented
	Polar uncemented	Reflection porus
	Synergy Porus	Polar cemented
	Anthology Porus	Polar uncemented
	Empirion Porus	EP uncemented
	Echelon Porus	R3 porus
	SL PLus	BHR porus
	BHR resurfacing	
	CPCS	

Mathys	Twinsys cemented	Selexys
	TwinSys uncemented	RM
	CCA	ССВ
	ССВ	
Biomet	Bi metric	Exceed Ring lock
Lima	H Max S stem	Delta TT
	H Max C stem	Delta PF
Knees		
Stryker	Duracon	
	Scorpio	
	Triathlon	
	Avon PF	
Biomet	AGC	
	Maxim	
	Vanguard	
DePuy	LCS	
	PFC Sigma	
	LSC PFJ	
	PFC	
	S-Rom Nollies	
	Attune	
Global Ortho	МВК	
S&N	Genesis II	
	Genesis Oxinium	
	Journey	
	Journey II	
	Legion	
Zimmer	Insall Bernstein	
	Nexgen	
Persona		
Orthotec	Optetrak	

#### Themis

Mathys	Balansys
Unicompartmental Knees	
Stryker	Eius
	Unix
	Triathlon PKR
Biomet	Oxford cemented
	Oxford cementless
	Repecci II
Zimmer	Miller Galanti
	Zimmer Uni - Zuc
DePuy	Preservation
	Sigma partial
S&N	Genesis Uni
	Oxinium Uni
Shoulders	
DePuy	Global
	Delta
Lima	SMR
Orthotec	Hemicap resurfacing
Rem Systems	Aequalis
Zimmer	Bigliani/Flatow
	Neer
Biomet	Copeland Resurfacing

Ankles	
DePuy	Agility
	Mobility
Orthotec	Ramses
REM Systems	Salto
Stryker	Star
Elbows	
Zimmer	Coonrad/Morrey
DePuy	Acclaim
Biomet	Kudo
	Discovery Elbow
REM Systems	Latitude

DO NOT PLACE IN PATIENT NOTES TO BE F	ETAINED IN THEATRE	SUITE			
NE	W ZEALAND JOIN				
	<b>Primary Replace</b>		-		
	l Hip Arthroplast	уЦ	Resurfacin	g Arthroplasty 🛛	
31.05.2010					
Date: Patient	Name:			Consultant:	
BMI:Addres	s:			[If different from	
				patient label]	
Side: **			Hos	pital:	
			Tow	vn/City	
Tick Appropriate Boxes					
PREVIOUS OPERATION ON INDEX JO	DINT				
<b>None</b>		ע ב	Arthrodesis	6	
Internal fixation for juxtartic	ular fractures	<b>_</b>	Other:		
Osteotomy					
DIAGNOSIS					
Osteoarthritis	1	<b>_</b>	Old fracture	e NOF	
Rheumatoid arthritis		_		dislocation	
Other inflammatory	I	ב ב	Avascular n	lecrosis	
Acute fracture NOF	I	<b>ב</b> :	Tumour		
Developmental dysplasia/dis	location	<b>)</b> - C	Other: Nam	e:	
APPROACH Image guided	surgery	נ ב	Minimally i	nvasive surgery	
🛛 Anterior 🖬 Poster	ior 🛛 🗎	Lateral		Trochanteric	
osteotomy					
FEMUR		CETABU	LUM		
Please do not fold			Plea	use do not fold	
STICK :	EXTRA LABELS O	N DEVE			
BONE GRAFT - FEMUR	EATRA LABELS U			CETABULUM	
Allograft		BONE	Allograft	CETABULUM	
Autograft D	Synthetic		Autograft		
	Synthetic	_	hetic		
FEMORAL HEAD		AUGM			
		- AUGIMI		1 ( C 1 1	
Please do not fold			Pleas	e do not fold	
her and ad label			han	and ad John 1	
bar-coded label			bar-	coded label	
STICK	EXTRA LABELS O	N REVE	RSE SIDE		
CEMENT					
🗅 Femur 💭 Acetabulu	m 🛛	Antibio	tic brand:		
SYSTEMIC ANTIBIOTIC PROP					
Name:	ASA Cla	ss: 1	2 3	4 (please circle one)	
OPERATING THEATRE	• • <del>-</del>	• •-	_		
Conventional Laminar flow or similar Space suits					
SKIN TO SKIN TIME mins Start skin Finish skin					
PRIMARY OPERATING SURGEON					
🗅 🛛 Adv Train	ee Unsupervised				
🖵 Consultant 🔲 Adv Train	ee Supervised	Year	••••••	Basic Trainee	
**NB If bilateral procedure			a manufinad		

	<b>NEW ZEALAND JOI</b>	NT REGISTRY		
	Revision Hi	p Joint		
Free Phone 0800-274-98	9			
07.04.2005				
Date:	Patient Name:	Consultant: m patient label]		
Side: **	Address:	Hospital:		
		Town/City:		
Tick Appropriate Boxes				
REASON FOR REVISION		Previous hemiarthroplasty		
Loosening acetabul	-	Deep infection		
<ul> <li>Loosening femoral</li> <li>Dislocation</li> </ul>	component	<ul> <li>Fracture femur</li> <li>Removal of components</li> </ul>		
Dislocation Desince Pain		<ul> <li>Removal of components</li> <li>Other: Name:</li> </ul>		
Date Index Operation: REVISION		If re-revision - Date previous revision:		
Change of femoral	•	Change of liner		
Change of acetabul	ar component	Change of all components		
Change of head				
APPROACH 🛛 Ima	ge guided surgery	Minimally invasive surgery		
□ Anterior □		Lateral I Trochanteric		
osteotomy				
FEMUR		ACETABULUM		
Please	do not fold	Please do not fold		
har as	oded label	bar-coded label		
Dai-CC	deu label	bai-coueu label		
	STICK EXTRA LABELS			
BONE GRAFT - FEMUR	STICK EXTRA LABELS	BONE GRAFT - ACETABULUM		
Allograft	Synthetic	□ Allograft □ Synthetic		
Autograft	<b>_</b> .,	□ Autograft		
C C				
FEMORAL HEAD		AUGMENTS		
Please do not fold Please do not fold				
Please d	lo not fold	Please do not fold		
	lo not fold ded label	Please do not fold bar-coded label		
	ded label	bar-coded label		
		bar-coded label		
bar-co	ded label	bar-coded label		
bar-coo CEMENT G Femur	ded label STICK EXTRA LABELS	bar-coded label		
bar-coo CEMENT G Femur SYSTEMIC ANTIB	ded label <i>STICK EXTRA LABELS</i>	bar-coded label       ON REVERSE SIDE       Antibiotic brand:		
bar-coe CEMENT Femur SYSTEMIC ANTIB Name OPERATING THEATRE	ded label STICK EXTRA LABELS Acetabulum IOTIC PROPHYLAXIS ASA C	bar-coded label         ON REVERSE SIDE         Antibiotic brand:         lass:       1       2       3       4 (please circle one)		
bar-coe CEMENT Femur SYSTEMIC ANTIB Name OPERATING THEATRE Conventional	ded label STICK EXTRA LABELS Acetabulum IOTIC PROPHYLAXIS ASA C Laminar flow o	bar-coded label         ON REVERSE SIDE         Antibiotic brand:         lass:       1       2       3       4 (please circle one)         or similar       Image: Space suits       Image: Space suits       Image: Space suits		
bar-coo CEMENT Femur SYSTEMIC ANTIB Name OPERATING THEATRE Conventional SKIN TO SKIN TIME mins	ded label          STICK EXTRA LABELS         Image: Constraint of the state of the sta	bar-coded label         ON REVERSE SIDE         Antibiotic brand:         lass:       1       2       3       4 (please circle one)         or similar       Image: Space suits       Image: Space suits       Image: Space suits		
bar-cod         CEMENT         Femur         SYSTEMIC ANTIB         Name         OPERATING THEATRE         Conventional         SKIN TO SKIN TIME mins         PRIMARY OPERATING SU	ded label          STICK EXTRA LABELS         Acetabulum         IOTIC PROPHYLAXIS         ASA C         Laminar flow o         Start skin         JRGEON	bar-coded label       ON REVERSE SIDE       Antibiotic brand:       lass:     1       2     3     4 (please circle one)       or similar     Image: Space suits        Finish skin		
bar-coo CEMENT Femur SYSTEMIC ANTIB Name OPERATING THEATRE Conventional SKIN TO SKIN TIME mins	ded label          STICK EXTRA LABELS         Image: Constraint of the state of the sta	bar-coded label       ON REVERSE SIDE       Antibiotic brand:       lass:     1       2     3     4 (please circle one)       or similar     Image: Space suits        Finish skin       d		

NEW ZEALAND JOINT REGISTRY Primary Replacement Knee Free Phone 0800-274-989 🗅 Total Knee Arthroplasty 🗅 Unicompartmental 🗅 Patellofemoral					
31.05.2010					
Date: BMI: Side: **	Patient Name: Address:	Consultant: [If different from patient label] Hospital: Town/City:			
Tick Appropriate Boxes					
<ul> <li>Ligament reconst</li> <li>Menisectomy</li> </ul>	or juxtarticular fracture ruction	Synovectomy         Osteotomy         Other: Name:			
DIAGNOSIS           Osteoarthritis           Rheumatoid arthritis           disruption/reconstruction           Other inflammato           Tumour	n	<ul> <li>Post fracture</li> <li>Post ligament</li> <li>Avascular necrosis</li> <li>Other: Name:</li> </ul>			
	ge guided surgery	Minimally invasive surgery ral parapatellar			
Medial parapatellar FEMUR	Later Later	ral parapatellar 🛛 Other TIBIA			
	o not fold	Please do not fold			
	ed label	bar-coded label			
	STICK EXTRA LABEL	S ON REVERSE SIDE			
BONE GRAFT - FEMUR Allograft Autograft	Synthetic	BONE GRAFT - TIBIA Allograft Autograft Synthetic			
PATELLA		AUGMENTS			
Please do bar-cod		Please do not fold bar-coded label			
CEMENT	STICK EXTRA LABEL	S ON REVERSE SIDE			
🗅 Femur 🗅 Tibia	Patella     IOTIC PROPHYLAXIS	□ Antibiotic brand:			
Name	ASA	Class: 1 2 3 4 (please circle one)			
OPERATING THEATRE	Laminar flow	v or similar 🛛 Space suits			
SKIN TO SKIN TIME mins					
PRIMARY OPERATING SU					
Consultant Consultant Traince	Adv Trainee Unsuper Adv Trainee Supervi	sed Year 🖬 Basic			

# DO NOT PLACE IN PATIENT NOTES

TO BE RETAINED IN THEATRE SUITE

NEW ZEALAND JOINT REGISTRY					
	<b>Revision F</b>	Knee Joint			
Free Phone 0800-274-989					
07.04.2005					
Date: Patient Nam	e:		Consultant:		
			[If different from patient label]		
Side:** Address:			Hospital:		
			<b>T</b> (0)		
			Town/City:		
Tick Appropriate Boxes					
REASON FOR REVISION		<b>Previous</b> U	nicompartmental		
Loosening femoral component		Deep infect	tion		
Loosening tibial component		G Fracture fe			
Loosening patellar component		G Fracture ti			
<b>Q</b> Pain			ils:		
Date Index Operation:		If re-revision	- Date previous revision:		
Change of femoral component		Change of	tibial polyethylene only		
Change of tibial component		-	all components		
<ul> <li>Change of patellar component</li> </ul>			f components		
<ul> <li>Addition of patellar component</li> </ul>		• Other			
APPROACH Image guided s	urgerv		nimally invasive surgery		
	Lateral parag		• Other		
FEMUR		TIBIA			
Please do not fold			Discus do not faid		
Flease do not loid			Please do not fold		
bar-coded label			bar-coded label		
			bai-coucu label		
STICK E	TATOA I ADEI	S ON REVERS	NE CIDE		
BONE GRAFT – FEMUR	AIKA LABEL	BONE GRAF			
Allograft		Allog			
Autograft	Synthetic		graft 🛛 Synthetic		
	<i></i>				
PATELLA		AUGMENTS			
Please do not fold			Please do not fold		
			Flease do not loid		
bar-coded label			bar-coded label		
			bai-coucu label		
	EXTRA LABEL	S ON REVERS	SE SIDE		
CEMENT					
	Patella	<b>Antib</b>	iotic brand:		
SYSTEMIC ANTIBIOTIC PROPHYLA					
Name OPERATING THEATRE	ASA	Class: 1	2 3 4 (please circle one)		
	Laminar flow	or similar	<b>Space suits</b>		
Conventional Laminar flow or similar Space suits					
SKIN TO SKIN TIME mins Start skin Finish skin					
PRIMARY OPERATING SURGEON					
Adv Trainee Unsupervised					
	rainee Superv		📮 Basic Trainee		

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

			POIOTDY		
1	NEW ZEALAND Primary Repla				
0800-274-989 🛛 Total sh 06.05.2009	• -		niarthroplasty 🛛 Reverse Shoulder		
Date:	Patient Name:		Consultant:		
			[If different from patient		
	Address:		label]		
Side: **			Hospital:		
			Town/City		
Tick Appropriate Boxes					
PREVIOUS OPERATION ON	INDEX JOINT				
🗅 None			Osteotomy		
Internal fixation for juz	starticular fracture		Arthrodesis		
Previous stabilisation			Other: Name:		
DIAGNOSIS					
Rheumatoid arthritis			Post recurrent dislocation		
Osteoarthritis			Avascular necrosis		
Other inflammatory			Cuff tear arthropathy		
Acute fracture proxima	l humerus		Post old trauma		
APPROACH			Other: Name:		
Deltopectoral		Other: sp	ecify		
HUMERUS		GLEI	-		
		1			
Please do no	ot fold		Please do not fold		
bar-coded	label		bar-coded label		
	STICK EXTRA LAB				
BONE GRAFT - HUMERUS		BON	E GRAFT - GLENOID		
<ul> <li>Allograft</li> <li>Autograft</li> </ul>	Syntheti	_	Allograft 🛛 Synthetic		
HUMERAL HEAD	G Syntheti		MENTS		
Please do not	fold	110 01	Please do not fold		
			i icuse do not ioid		
bar-coded la	abel		bar-coded label		
	STICK ALL LABE	LS ON PE	VERSE SIDE		
CEMENT	STICK ALL LADE				
-	lenoid 🛛	Antibio	tic brand:		
SYSTEMIC ANTIBIO					
Name:		ASA Class	: 1 2 3 4 (please circle		
one)					
OPERATING THEATRE					
Conventional	🛛 Laminar	flow or sig	milar 🛛 Space suits		
SKIN TO SKIN TIME mins Start skin Finish skin					
PRIMARY OPERATING SURGEON					
	Adv Trainee Uns	-			
🛛 Consultant 🗖	Adv Trainee Sup	ervised	Year D Basic Trainee		
**NB If bilateral	procedure two com	pleted for	ms are required		

NEV	W ZEALAND JO				
	<b>Revision Sl</b>	houl	der		
Free Phone 0800-274-989					
07.04.2005					
Date:			Consultant:		
Patient Side: **	Name:		[If different from patient label]		
Side: Addres	<b>.</b> .		Hospital:		
Addres	5.		Town/City:		
Tick Appropriate Boxes					
REASON FOR REVISION					
Loosening glenoid component			Subacromial tuberosity impingement		
Loosening humeral component			Subacromial cuff impingement/tear		
Loosening both components			Fracture humerus		
Dislocation/instability anterior	r		Deep infection		
Instability posterior			Pain		
			Other: Name:		
Date Index Operation:		If re	e-revision - Date previous revision:		
REVISION		_			
Change of head only			Change of all components		
Change of humeral component			Remove glenoid		
Change of glenoid component			Remove humerus		
Change of liner (glenoid non ce	mented)		Removal of components		
			Other Specify:		
APPROACH					
Deltopectoral		Jtne	r: specify		
HUMERUS		GL	ENOID		
Please do not fold			Please do not fold		
bar-coded labels			bar-coded labels		
		ON	REVERSE SIDE		
BONE GRAFT - HUMERUS	SAIRA LADELS	-	DNE GRAFT - GLENOID		
	Synthetic		Allograft		
Autograft	synthetic		Autograft		
HUMERAL HEAD			JGMENTS		
Please do not fold		AU	Please do not fold		
			Thease up not tota		
bar-coded labels			bar-coded labels		
	EXTRA LABELS	ON	REVERSE SIDE		
CEMENT		_			
Humerus C	Henoid		Antibiotic brand:		
SYSTEMIC ANTIBIOTIC PROPHYLAXIS					
Name ASA Class: 1 2 3 4 (please circle					
one) OPERATING THEATRE					
Conventional	Laminar flow	v or ·	similar 🖸 Space suits		
	Dammar nov	. 01 .	similar d Space suits		
SKIN TO SKIN TIME mins Start skin Finish skin					
PRIMARY OPERATING SURGEON					
Adv Trainee Unsupervised     Consultant     Adv Trainee					
Supervised Year	Basic Traine	e			

\*NB If bilateral procedure two completed forms are required

		JOINT REGISTRY accement Ankle			
Free Phone 0800-274-98 31.05.2010	• •				
Date:	Patient Name:	Consultant: [If different from patient label]			
BMI:	Address:	Hospital:			
Side: **		Town/City			
Tick Appropriate Boxes					
PREVIOUS OPERATION O	N INDEX JOINT				
	or juxtarticular fractur	Arthrodesis es Other: Name:			
Osteotomy	or justar croutar tractar				
DIAGNOSIS					
Osteoarthritis		Post trauma			
Rheumatoid arthr		Avascular necrosis talus			
Other inflammato	ry	Other: Name:			
•••••					
APPROACH					
Anterior		iterio-lateral 🛛 Other			
TIBIA		TALUS			
Please do n	ot fold	Please do not fold			
bar-coded	label	bar-coded label			
	STICK EXTRA LABE	LS ON REVERSE SIDE			
BONE GRAFT - TIBIA		BONE GRAFT - TALUS			
Allograft		□ Allograft			
🛛 Autograft 🔾	Synthetic	Autograft     Synthetic			
AUGMENTS					
Please do r	ot fold				
bar-coded	lahel				
Dar-coded	label	FUSION DISTAL TFJ			
	STICK ALL LABELS	ON REVERSE SIDE			
CEMENT					
🗅 Tibia 🗆	Talus	Antibiotic Brand:			
SYSTEMIC ANTIB	OTIC PROPHYLAXIS				
Name: ASA Class: 1 2 3 4 (please circle					
one) OPERATING THEATRE					
Conventional	Laminar f	low or similar 🔲 Space suits			
SKIN TO SKIN TIME mins	Start skin				
PRIMARY OPERATING SU	RGEON				
	Adv Trainee Unsu	-			
Consultan Basic Trai		ee Supervised Year 🛛			
Dasie IIdi					
**NB If bilatera	l procedure two compl	eted forms are required			

DO NOT PLACE IN PATIENT NOTES

TO BE RETAINED IN THEATRE SUITE

NEW ZEALAND JOINT REGISTRY					
Free Phone 0800-274-98		Revision An	kle Joint		07.04.2005
Date:	Patient Name Address:	2:		[If differen Hospital:.	it: nt from patient label]
Tick Appropriate Boxes				Town/Cit	t <b>y:</b>
REASON FOR REVISION					
Loosening talar cor	nponent			Deep infection	
Loosening tibial co	mponent			Fracture talus	
Dislocation			ū	Fracture tibia	
🗅 Pain			_	Dislocations	
				Other details:	
Date Index Operation: REVISION	••••••		lf re-revis	ion - Date previou	us revision:
Change of talar con	-			Change of all cor	•
Change of tibial conditions	-			Removal of comp Other Name:	
Change of polyethy APPROACH	lene only			Other Name:	
Anterior		) Ante	erio-lateral		Posterior
TIBIA			TALUS		
Please do	not fold			Please do	not fold
bar-code	d label			bar-code	d label
	STICK AL	L LABELS (	ON REVERS	SE SIDE	
BONE GRAFT - TIBIA			-	GRAFT - TALUS	
Allograft				Allograft	
Autograft AUGUMENTS		synthetic		Autograft	Synthetic
Please do :	not fold				
bar-code	d label			FUSION DIS	TAL TFJ
				Yes 🗖	No 🗖
	STICK EXT	RA LABELS	ON REVER	RSE SIDE	
CEMENT					
🗅 Talus	D	Tibia	🗅 Ar	ntibiotic brand:	
SYSTEMIC ANTIBIOTIC PROPHYLAXIS					
Name ASA Class: 1 2 3 4 (please circle one)					
Conventional		aminar flo	w or simila:	r 🗆 S	pace suits
SKIN TO SKIN TIME mins Start skin Finish skin					
PRIMARY OPERATING SURGEON  Adv Trainee Unsupervised					
Consultant Trainee		-	vised Yea:	r	Basic

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

Primary Replacement Elbow         Free Phone 0800-274-989         07.04.2005         Date:		NEW ZEALAND JOINT REGISTRY					
Date:       Patient Name:       Consultant:       If different from patient label         Side:       Address:       If different from patient label         Side:       Tek Appropriate Boxes       Town/City:         PREVIOUS OPERATION ON INDEX JOINT       Debridement       Town/City:         Internal fixation for juxtarticular fracture       Synovectomy ± removal radial head       Osteotomy ± removal radial head         Ligament reconstruction       Osteotomy       Other: Name:       Image: Synovectomy ± removal radial head         Interposition arthroplasty       Other: Name:       Image: Synovectomy ± removal radial head         Interposition arthroplasty       Other: Name:       Image: Synovectomy ± removal radial head         Osteoarthritis       Post fracture       Post ligament disruption         Other inflammatory       Other: Name:       Image: Synovectomy         Post dislocation       VLNA       Posterior         HUMERUS       ULNA       Image: Synovectomy       Synovectomy         BONE GRAFT - HUMERUS       BONE GRAFT - ULNA       Synovectomy       Synovectomy         Image: Autograft       Autograft       Autograft       Synovectomy         RablaL HEAD       AUGMENTS       Stick EXTRA LABELS ON REVERSE SIDE       Stick EXTRA LABELS ON REVERSE SIDE         CEMENT			Primar	y Repla	acement	t Elbow	Free Phone 0800-274-989
Date:       Patient Name:       Consultant:       If different from patient label]         Side:       Address:       If different from patient label]         Side:       Tick Appropriate Boxes         PREVIOUS OPERATION ON INDEX JOINT       Debridement         Internal fixation for juxtarticular fracture       Synovectomy ± removal radial head         Ligament reconstruction       Osteotomy         Interposition arthroplasty       Other: Name:         Osteoarthritis       Post fracture         Osteoarthritis       Post figament disruption         Other: Inflammatory       Other: Name:         Post dislocation       Posterior         HUMERUS       ULNA         Please do not fold       bar-coded label         STICK EXTRA LABELS ON REVERSE SIDE         BONE GRAFT - HUMERUS       BONE GRAFT - ULNA         Allograft       Allograft         Autograft       Autograft       Synthetic         RADIAL HEAD       AUGMENTS         STICK EXTRA LABELS ON REVERSE SIDE         CEMENT       Humerus       Ulna         Humerus       Ulna       Radius       Antibiotic brand:							
Patient Name:       Consultant:       If different from patient         Side:       Address:       Iabel]         Side:       Tick Appropriate Boxes       Town/City:         PREVIOUS OPERATION ON INDEX JOINT       Debridement       Town/City:         Internal fixation for juxtarticular fracture       Synovectomy + removal radial head       Osteotomy         Interposition arthroplasty       Other: Name:       Osteotomy         Interposition arthroplasty       Other: Name:       Osteotomy         Rheumatoid arthritis       Post fracture       Osteotomy         Other: inflammatory       Other: Name:       Other: Name:         Other inflammatory       Other: Name:       Osterior         HUMERUS       Lateral       Posterior         HUMERUS       ULNA       Please do not fold         bar-coded label       STICK EXTRA LABELS ON REVERSE SIDE         BONE GRAFT - HUMERUS       BONE GRAFT - ULNA         Allograft       Autograft       Synthetic         RabIAL HEAD       AUGMENTS       Synthetic         STICK EXTRA LABELS ON REVERSE SIDE       E       Synthetic         CEMENT       Humerus       Ulna       Radius       Antibiotic brand:         Imagene       Ulna       Radius       Antib	Date						01.01.2000
Pattern Name:       Address:       [If different from patient label]         Side:       Address:       Iddress:         Tick Appropriate Boxes       Town/City:	Date	•••••					Consultant:
Side:       Address:       iabel]         Hospital:       Town/City:         Tick Appropriate Boxes         PREVIOUS OPERATION ON INDEX JOINT       Debridement         Internal fixation for juxtarticular fracture       Synovectomy ± removal radial head         Ligament reconstruction       Osteotomy         Interposition arthroplasty       Other: Name:         DIAGNOSIS       Post fracture         Rheumatoid arthritis       Post fracture         Osteoarthritis       Post fracture         Osteoarthritis       Post fracture         Osteoarthritis       Post fracture         Medial       Lateral       Posterior         HUMERUS       ULNA         Please do not fold       bar-coded label         STICK EXTRA LABELS ON REVERSE SIDE       BONE GRAFT - HUMERUS         BONE GRAFT - HUMERUS       Allograft       Autograft         Autograft       Autograft       Synthetic         RADIAL HEAD       AUGMENTS       Silck EXTRA LABELS ON REVERSE SIDE         CEMENT       Humerus       Ulna       Radius         Humerus       Ulna       Radius       Antibiotic brand:			Patient Name:				
Side:			Address:				
Tick Appropriate Boxes         PREVIOUS OPERATION ON INDEX JOINT         Internal fixation for juxtarticular fracture       Synovectomy ± removal radial head         Ligament reconstruction       Osteotomy         Interposition arthroplasty       Other: Name:	Side:	**					Hospital:
Tick Appropriate Boxes         PREVIOUS OPERATION ON INDEX JOINT         Internal fixation for juxtarticular fracture       Synovectomy ± removal radial head         Ligament reconstruction       Osteotomy         Interposition arthroplasty       Other: Name:							Town/City:
None       Debridement         Internal fixation for juxtarticular fracture       Synovectomy ± removal radial head         Ligament reconstruction       Osteotomy         Interposition arthroplasty       Other: Name:         DIAGNOSIS       Post fracture         Osteoarthritis       Post ligament disruption         Other inflammatory       Other: Name:         Post dislocation       Post ligament disruption         APPROACH       Post fracture         Post dislocation       Posterior         HUMERUS       ULNA         Please do not fold       bar-coded label         bar-coded label       DAN REVERSE SIDE         BONE GRAFT - HUMERUS       BONE GRAFT - ULNA         Allograft       Autograft       Synthetic         RADIAL HEAD       AUGMENTS       Synthetic         RADIAL HEAD       AUGMENTS       Synthetic         STICK EXTRA LABELS ON REVERSE SIDE       Synthetic         RADIAL HEAD       AUGMENTS       Synthetic         Gastion       Ulna       Radius       Antibiotic brand:         Systemic ANTIBIOTIC PROPHYLAXIS       Vina       Radius       Antibiotic brand:	Tick Approj	priate Boxes					_ · · · _ , · · · y · · · · · · · · · · · · · · ·
Internal fixation for juxtarticular fracture       Synovectomy ± removal radial head         Ligament reconstruction       Osteotomy         Interposition arthroplasty       Other: Name:	PREVIOUS (	OPERATION ON	INDEX JOINT				
Ligament reconstruction       Osteotomy         Interposition arthroplasty       Other: Name:		-				Debride	ment
Interposition arthroplasty       Other: Name:	🛛 Inte	rnal fixation fo	r juxtarticular fr	acture		Synoved	ctomy <u>+</u> removal radial head
DIAGNOSIS         Rheumatoid arthritis       Post fracture         Osteoarthritis       Post figament disruption         Other inflammatory       Other: Name:         Post dislocation       Other: Name:         APPROACH       Medial       Lateral         Post dislocation       Posterior         HUMERUS       ULNA         Please do not fold       bar-coded label         bar-coded label       BONE GRAFT - HUMERUS         BONE GRAFT - HUMERUS       BONE GRAFT - ULNA         Allograft       Autograft         Autograft       Autograft         Please do not fold       bar-coded label         Synthetic       AUGMENTS         RADIAL HEAD       AUGMENTS         Please do not fold       bar-coded label         bar-coded label       bar-coded label         STICK EXTRA LABELS ON REVERSE SIDE       CEMENT         Humerus       Ulna       Radius       Antibiotic brand:         SYSTEMIC ANTIBIOTIC PROPHYLAXIS       Systemic Antibiotic brand:	8						•
Rheumatoid arthritis       Post fracture         Osteoarthritis       Post ligament disruption         Other inflammatory       Other: Name:		rposition arthr	oplasty			Other: N	lame:
Osteoarthritis Post ligament disruption   Other inflammatory Other: Name:   Post dislocation Other: Name:   APPROACH   Medial Lateral   Please do not fold Please do not fold   bar-coded label ULNA   STICK EXTRA LABELS ON REVERSE SIDE BONE GRAFT - HUMERUS   BONE GRAFT - HUMERUS BONE GRAFT - ULNA   Allograft Autograft   Autograft Autograft   Please do not fold bar-coded label   Synthetic   RADIAL HEAD AUGMENTS   Please do not fold bar-coded label   STICK EXTRA LABELS ON REVERSE SIDE CEMENT   Other: Name: Synthetic   STICK EXTRA LABELS ON REVERSE SIDE   SYSTEMIC ANTIBIOTIC PROPHYLAXIS			•	_	-		
Other inflammatory Other: Name:   Post dislocation   APPROACH   Medial Lateral   Please do not fold   bar-coded label   BONE GRAFT - HUMERUS   BONE GRAFT - ULNA   Allograft   Autograft   Autograft   Please do not fold   bar-coded label   Synthetic   RADIAL HEAD   AUGMENTS   Please do not fold   bar-coded label   STICK EXTRA LABELS ON REVERSE SIDE CEMENT   Quarter of the second se			:15	-			· · · · · · · · · · · · · · · · · · ·
Post dislocation     APPROACH   Medial Lateral   Please do not fold   bar-coded label     VULNA     Please do not fold   bar-coded label     STICK EXTRA LABELS ON REVERSE SIDE   BONE GRAFT - HUMERUS   Allograft   Allograft   Autograft   Autograft   Please do not fold   bar-coded label     Synthetic     Please do not fold   bar-coded label     BONE GRAFT - HUMERUS     Allograft   Autograft   Please do not fold   bar-coded label     Please do not fold   bar-coded label     BONE GRAFT - ULNA     AUGMENTS     File   Please do not fold   bar-coded label     STICK EXTRA LABELS ON REVERSE SIDE     CEMENT<						-	-
APPROACH  Medial Lateral Posterior  HUMERUS ULNA Please do not fold bar-coded label BONE GRAFT - HUMERUS Allograft Allograft Allograft Allograft Please do not fold bar-coded label BONE GRAFT - ULNA Allograft Allograft Allograft Allograft Allograft Please do not fold bar-coded label BONE GRAFT Allograft CEMENT Humerus ULNA SYSTEMIC ANTIBIOTIC PROPHYLAXIS			y		Oth	ler: Name:	
Image: Medial Image: Lateral Posterior   HUMERUS ULNA   Please do not fold Please do not fold   bar-coded label bar-coded label   STICK EXTRA LABELS ON REVERSE SIDE BONE GRAFT - HUMERUS   BONE GRAFT - HUMERUS BONE GRAFT - ULNA   Allograft Image: Allograft   Autograft Image: Allograft   Autograft Image: Allograft   Please do not fold Autograft   Please do not fold Dar-coded label   Bar-coded label Synthetic   STICK EXTRA LABELS ON REVERSE SIDE CEMENT   Image: Allograft Image: Allograft   Image: Allograft Imag							
HUMERUS       ULNA         Please do not fold       Please do not fold         bar-coded label       Please do not fold         bar-coded label       bar-coded label         STICK EXTRA LABELS ON REVERSE SIDE         BONE GRAFT - HUMERUS       BONE GRAFT - ULNA         Allograft       Allograft         Autograft       Allograft         Autograft       Autograft         Please do not fold       Please do not fold         bar-coded label       AUGMENTS         Please do not fold       bar-coded label         STICK EXTRA LABELS ON REVERSE SIDE         CEMENT         Humerus       Ulna         Radius       Antibiotic brand:         SYSTEMIC ANTIBIOTIC PROPHYLAXIS				Late	eral		Posterior
Please do not fold   bar-coded label     STICK EXTRA LABELS ON REVERSE SIDE   BONE GRAFT - HUMERUS   BONE GRAFT - HUMERUS   BONE GRAFT - HUMERUS   Allograft   Autograft   Autograft   Autograft   Please do not fold   bar-coded label     STICK EXTRA LABELS ON REVERSE SIDE     CEMENT   Humerus   Ulna   Radius   Antibiotic brand:			_				
bar-coded label       bar-coded label         STICK EXTRA LABELS ON REVERSE SIDE         BONE GRAFT - HUMERUS       BONE GRAFT - ULNA         Allograft       BONE GRAFT         Allograft       Allograft         Autograft       Allograft         Synthetic       Autograft         RADIAL HEAD       AUGMENTS         Please do not fold       Please do not fold         bar-coded label       bar-coded label         STICK EXTRA LABELS ON REVERSE SIDE         CEMENT       Image: Stick EXTRA LABELS ON REVERSE SIDE         CEMENT       Image: Stick EXTRA LABELS ON REVERSE SIDE         SYSTEMIC ANTIBIOTIC PROPHYLAXIS       Systemic Antibiotic brand:			L C-14		ULNA		anna da mat fald
STICK EXTRA LABELS ON REVERSE SIDE         BONE GRAFT - HUMERUS         Allograft         Allograft         Autograft         Autograft         Autograft         Please do not fold         bar-coded label         STICK EXTRA LABELS ON REVERSE SIDE         CEMENT         Humerus       Ulna         Radius       Antibiotic brand:         SYSTEMIC ANTIBIOTIC PROPHYLAXIS	<sup>1</sup>	Please do no	t 101a			PI	ease do not iold
STICK EXTRA LABELS ON REVERSE SIDE         BONE GRAFT - HUMERUS         Allograft         Allograft         Autograft         Autograft         Autograft         Please do not fold         bar-coded label         STICK EXTRA LABELS ON REVERSE SIDE         CEMENT         Humerus       Ulna         Radius       Antibiotic brand:         SYSTEMIC ANTIBIOTIC PROPHYLAXIS		har oddd l	ahal			1	har and ad label
BONE GRAFT - HUMERUS       BONE GRAFT - ULNA         Allograft       Allograft         Autograft       Autograft         Autograft       Autograft         Synthetic       Autograft         RADIAL HEAD       AUGMENTS         Please do not fold       Please do not fold         bar-coded label       Please do not fold         bar-coded label       bar-coded label         STICK EXTRA LABELS ON REVERSE SIDE         CEMENT       Humerus         Humerus       Ulna         SYSTEMIC ANTIBIOTIC PROPHYLAXIS		bar-coueu la	abei				bar-couled label
Allograft Allograft   Autograft Autograft   Synthetic Autograft   RADIAL HEAD AUGMENTS   Please do not fold Please do not fold   bar-coded label bar-coded label			STICK EXTRA	LABE	LS ON R	EVERSE SID	DE
Autograft C   Synthetic Autograft   RADIAL HEAD AUGMENTS   Please do not fold Please do not fold   bar-coded label bar-coded label	BONE GRAF	T - HUMERUS			BONE	GRAFT - ULI	NA
Autograft C   Synthetic Autograft   RADIAL HEAD AUGMENTS   Please do not fold Please do not fold   bar-coded label bar-coded label					_		
Synthetic       AUGMENTS         RADIAL HEAD       AUGMENTS         Please do not fold       Please do not fold         bar-coded label       bar-coded label         STICK EXTRA LABELS ON REVERSE SIDE         CEMENT         Humerus       Ulna         SYSTEMIC ANTIBIOTIC PROPHYLAXIS		-	D			-	
RADIAL HEAD       AUGMENTS         Please do not fold       Please do not fold         bar-coded label       bar-coded label         STICK EXTRA LABELS ON REVERSE SIDE         CEMENT         Humerus       Ulna         SYSTEMIC ANTIBIOTIC PROPHYLAXIS		ograft	u		u	Autograft	
Please do not fold       Please do not fold         bar-coded label       bar-coded label         STICK EXTRA LABELS ON REVERSE SIDE         CEMENT         Humerus       Ulna       Radius       Antibiotic brand:         SYSTEMIC ANTIBIOTIC PROPHYLAXIS       SYSTEMIC ANTIBIOTIC PROPHYLAXIS       Statematic and the s	•	۸D			AUGM	ENTS	
bar-coded label       bar-coded label         STICK EXTRA LABELS ON REVERSE SIDE         CEMENT         Humerus       Ulna       Radius       Antibiotic brand:         SYSTEMIC ANTIBIOTIC PROPHYLAXIS       SYSTEMIC ANTIBIOTIC PROPHYLAXIS       State of the formation of the formatio of the formation of the formation of the formation of					Г		
STICK EXTRA LABELS ON REVERSE SIDE       CEMENT       Humerus     Ulna       SYSTEMIC ANTIBIOTIC PROPHYLAXIS		Please do no	t 101a			Plea	se do not fold
CEMENT U Humerus Ulna Radius Antibiotic brand: SYSTEMIC ANTIBIOTIC PROPHYLAXIS		bar-coded la	abel			bar	-coded label
CEMENT U Humerus Ulna Radius Antibiotic brand: SYSTEMIC ANTIBIOTIC PROPHYLAXIS							
Humerus       Ulna       Radius       Antibiotic brand:         SYSTEMIC ANTIBIOTIC PROPHYLAXIS			STICK EXTRA	LABE	LS ON R	EVERSE SID	DE
SYSTEMIC ANTIBIOTIC PROPHYLAXIS	-	TT		<b>п</b>	1	D- 41	
		Humerus	5	u 0	ina 🗆	Kadius	Antibiotic brand:
Name ASA Class: 1 2 3 4 (please circle one)	D SYS'	TEMIC ANTIBIC	TIC PROPHYLA	XIS			
Name ADA Class: 1 2 3 4 (please circle one)	NT				101	Classe 1	
OPERATING THEATRE			•••••	••••	ASP	a ciass: 1	2 3 4 (please circle one)
Conventional Laminar flow or similar Space suits			D Lami	inar flo	woreit	nilar [	Snace suits
a conventional a Daminar now of Similar a Space suits		v sintivital			w 01 511		- opace suits
SKIN TO SKIN TIME mins Start skin Finish skin	SKIN TO SK	IN TIME mins	Start skin			Finish s	kin
PRIMARY OPERATING SURGEON						0	
Adv Trainee Unsupervised				Unsup	ervised		
Consultant C Adv Trainee Supervised Year Basic Trainee	Con:	sultant 🛛		-		Year	D Basic Trainee
**NB If bilateral procedure two completed forms are required	*****	6 1. 11 4	- 1	1-4 * * *		• • •	

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		sion Elbow	Joint		07.04.2005
Date:	Patient Name: Address:			Consultant: [If different fro label] Hospital:	om patient
				Town/City:	
Tick Appropriate Boxes					
REASON FOR REVISION			- <b>-</b>		
<ul> <li>Loosening humeral of</li> <li>Loosening ulnar con</li> </ul>			-	infection ure humerus	
<ul> <li>Loosening unar con</li> <li>Loosening radial heat</li> </ul>	-			ure ulna	
<ul> <li>Doosening radiar nea</li> <li>Pain</li> </ul>	u component			cations	
				Name:	
Date Index Operation:		If re		Date previous rev	
REVISION					
Change of humeral of	omponent		🛛 Chan	ge of all compone	ents
Change of ulnar com	iponent		🛛 Remo	val of componen	ts
Change of radial heat	d component		• Other	Name:	•••••
APPROACH Medial	D Later	-1		🗆 Posteri	
	Latera	ai		D Posteri	or
HUMERUS			ULNA		
Please do no	ot fold			Please do not	fold
bar-coded	label			bar-coded la	ıbel
	STICK EXTRA L	ABELS ON	REVERSE S	IDE	
<b>BONE GRAFT - HUMERUS</b>			BONE GRA	FT - ULNA	
Allograft			🗅 Allo	graft	
Autograft	Synth	letic	🛛 Aut	ograft 🛛	Synthetic
RADIAL HEAD			AUGMENTS	5	
Please do n	ot fold		]	Please do not :	fold
bar-coded	label			bar-coded lab	el
	STICK EXTRA L	ABELS ON	REVERSE S	IDE	
CEMENT					
<b>U</b> Humer	rus 🖸 U	lna (	<b>Radius</b>	<b>Antibic</b>	otic brand:
□ SYSTEMIC ANTIBIOTIC	DDODUVI AVIO				
Name		ASA Clas	s: 1 2	34 (pl	ease circle
one)					
OPERATING THEATRE		~			.,
Conventional	Lamir	nar flow or	sımılar	Space :	suits
SKIN TO SKIN TIME mins PRIMARY OPERATING SUI	Start skin		Finis	h skin	••
Adv Trainee Unsupervised					
Consultant	Adv Trainee	Supervised	l Year		Basic Trainee

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

	NEW ZEALAND JOIN	T REGISTRY
	<b>Primary Cervical Disc</b>	Replacement
Free Phone 0800-274-98	9	14.08.2008
Date:	Patient Name:	Consultant: [If different from patient label]
	Address:	Hospital:
		Town/City:
Tick Appropriate Boxes		ACC Q ACC Claim
No:		
LEVELS OF DISC REPLAC	CEMENT	PRE OP PATIENT SCORE
		(NECK DISABILITY INDEX)
□ C3/4 □ □ C4/5 □	C6/7	
C5/6 Other	· · · · · · · · · · · · · · · · · · ·	
PREVIOUS OPERATION	_	
G Foreminotomy		Adjacent Level Disc Arthroplasty
Adjacent Level Fu	sion 🛛	Other
DIAGNOSIS Acute Disc Prolapse		
Chronic Spondylos		
Neck Pain		
Other	••••••	
APPROACH		
Anterior Right		• Other
IMPLANTS		
Affix Sup	plier Label	Affix Supplier Label
	STICK EXTRA LABELS O	N REVERSE SIDE
	nlian Tabal	Affin Sumplian Labol
Anix Sup	plier Label	Affix Supplier Label
STICK EXTRA LABELS O	N REVERSE SIDE	
INTRAOPERATIVE COMP	LICATIONS	
•••••		
••••••		
SYSTEMIC ANTIBIOTIC P	ROPHYLAXIS	
Yes	🗅 No	
<b>OPERATIVE THEATRE</b>		
Conventional	Laminar flow o	r similar 🛛 Space suits
SKIN TO SKIN TIME mins		Finish skin
PRIMARY OPERATING SU	IRGEON	
	Adv Trainee Unsupervi	ised
🛛 Consultant 🗖	Adv Trainee Supervise	d Year 🖬 🛛 🛛 Basic Trainee

		JOINT REG				
	Revision Cervica	1 Disc Repla	cement			
Free Phone 0800-274-98 14.08.2008	39					
14.00.2000						
Date:	Patient Name:			sultant: ifferent from patient		
LEVEL OF REVISION	Address:		labe Hos	el] pital:		
□ C3/4 □ C6/7			Tow	vn/City:		
□ C4/5 □ C7/T1						
C5/6 C Other:						
Tick Appropriate Boxes			ACC Q	ACC Claim No:		
REASON FOR REVISION		-	A 41 4 4			
<ul> <li>Dislocation of com</li> <li>Failure of component</li> </ul>	-			lecompression required		
<ul> <li>Infection</li> </ul>	,iit			calcification		
Pain (Neck)			-	le:		
-	Date Index Operation:     If re-revision - Date previous revision:					
REVISION		_		-		
Replace disc prostl						
<ul> <li>Replace disc prostl</li> <li>Fuse</li> </ul>	nesis (different)		Otner:			
G Fuse						
APPROACH 🛛 Image	e guided surgery	Minimally	invasive surg	ery		
Anterior 🛛	Posterior 🛛	Lateral	_	Trochanteric		
Osteotomy	Posterior 🛛	Lateral		□ Trochanteric		
Osteotomy	Posterior 🛛	Lateral		Trochanteric		
		Lateral	Pleas	Trochanteric e do not fold		
Osteotomy IMPLANTS	o not fold	Lateral				
Osteotomy IMPLANTS Please do	o not fold ed label		bar-	e do not fold		
Osteotomy IMPLANTS Please do	o not fold		bar-	e do not fold		
Osteotomy IMPLANTS Please do	o not fold ed label STICK EXTRA LABE		bar- ERSE SIDE	e do not fold		
Osteotomy IMPLANTS Please do bar-code	o not fold ed label <i>STICK EXTRA LABE</i> o not fold		bar- ERSE SIDE Pleas	e do not fold coded label		
Osteotomy IMPLANTS Please do bar-codo	o not fold ed label <i>STICK EXTRA LABE</i> o not fold		bar- ERSE SIDE Pleas	e do not fold coded label e do not fold		
Osteotomy IMPLANTS Please do bar-codo	o not fold ed label <i>STICK EXTRA LABE</i> o not fold		bar- ERSE SIDE Pleas bar-	e do not fold coded label e do not fold		
Osteotomy IMPLANTS Please do bar-code SYSTEMIC ANTIBIOTIC F	o not fold ed label STICK EXTRA LABE o not fold ed label STICK EXTRA LABE PROPHYLAXIS		bar- ERSE SIDE Pleas bar- ERSE SIDE	e do not fold coded label e do not fold		
Osteotomy IMPLANTS Please do bar-code SYSTEMIC ANTIBIOTIC F	o not fold ed label <i>STICK EXTRA LABE</i> o not fold ed label <i>STICK EXTRA LABE</i>		bar- ERSE SIDE Pleas bar- ERSE SIDE	e do not fold coded label e do not fold		
Osteotomy IMPLANTS Please do bar-codo Please do bar-codo SYSTEMIC ANTIBIOTIC F Name	o not fold ed label <u>STICK EXTRA LABE</u> o not fold ed label <u>STICK EXTRA LABE</u> PROPHYLAXIS		bar- ERSE SIDE Pleas bar- ERSE SIDE	e do not fold coded label e do not fold		
Osteotomy IMPLANTS Please do bar-codo Please do bar-codo SYSTEMIC ANTIBIOTIC F Name	o not fold ed label STICK EXTRA LABE o not fold ed label STICK EXTRA LABE PROPHYLAXIS	LS ON REVI	bar- ERSE SIDE Pleas bar- ERSE SIDE	e do not fold coded label e do not fold coded label Space suits		
Osteotomy IMPLANTS Please do bar-codo  Please do bar-codo SYSTEMIC ANTIBIOTIC F Name OPERATING THEATRE Conventional	o not fold ed label <i>STICK EXTRA LABE</i> o not fold ed label <i>STICK EXTRA LABE</i> PROPHYLAXIS Laminar f s Start skin	LS ON REVI	bar- ERSE SIDE Pleas bar- ERSE SIDE 	e do not fold coded label e do not fold coded label Space suits		
Osteotomy IMPLANTS Please do bar-codo Please do bar-codo SYSTEMIC ANTIBIOTIC F Name	o not fold ed label <i>STICK EXTRA LABE</i> o not fold ed label <i>STICK EXTRA LABE</i> PROPHYLAXIS Laminar f s Start skin	LS ON REVI	bar- ERSE SIDE Pleas bar- ERSE SIDE 	e do not fold coded label e do not fold coded label Space suits		

	NEW ZEA	LAND JOINT	REGISTRY	·
	Primary L	umbar Disc Re	eplacemen	ıt
Free Phone 0800-274-989				
14.08.2008				
Deter	Patient Name:			
Date:				Consultant: [If different from patient label]
	Address:			Hospital:
				nospitali
				Town/City
Tick Appropriate Boxes			ACC	aACC Claim No
DISC REPLACEMENT Leve	ls FUSION L	evels	PRE	OP PATIENT SCORE
			-	Roland and Morris
🗅 L3/4	<b>L</b> L3/4	1	Total 1	number of "Yes"
responsesL4/5		L4/5	0	swestry Score 📮 L5/S1
_ ,-	_	•	U	•
<b>D</b> L5/S1	Percentage	score		Other
PREVIOUS OPERATION	<b>D -</b> / -	/ _		
Discectomy	<b>L</b> 3/4	<b>L</b> 4/5		5/S1 🛛 Other
 <b>D</b> Other	□ 1.3/4	<b>L</b> 4/5		5/\$1
	a 20/4	<b>a</b> 24/3		0,01
DIAGNOSIS				
1. Degenerative Disc disea	se 🛛 L3/4	🛛 L4/5		5/S1 🛛 Other
(plain x-ray changes pres			- ·	
2. Annular tear MRI scan	<b>L</b> 3/4	<b>L</b> 4/5		5/S1 🖸 Other
(normal plain x-ray)				
3. Discogenic pain on disc	ography 🛛 L	3/4 🛛	L4/5	L5/S1 Other
		-		
APPROACH				
Retroperitoneal mi				Transperitoneal
Retroperitoneal lat IMPLANTS	eral abdominal	wall incision		Other
Affix Suppl	ier Label		A	Affix Supplier Label
	STICK EXTRA	LABELS ON	REVERSE	SIDE
Affix Supr	lier Label			Affix Supplier Label
	24501			
STICK EXTRA LABELS ON	REVERSE SIDE			
INTRAOPERATIVE COMPL				
SYSTEMIC ANTIBIC	DTIC PROPHYLA	XIS		
Yes 🗅	No			
OPERATIVE THEATRE	<b>D</b> -	. ~		
Conventional	Lam Lam	inar flow or s	milar	<b>G</b> Space suits
SKIN TO SKIN TIME	Stant al-in		<b>F</b> <sup>1</sup> -1-	ah shin
SKIN TO SKIN TIME mins PRIMARY OPERATING SUB			F 11115	sh skin
I AMARI OF BRAING SUP				
Consultant	🛛 🛛 Adv Tra	inee	Year	🖸 Basic Trainee

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

NEW ZEALAND JOIN	T REGISTRY				
Revision Lumbar Disc Replacement					
Free Phone 0800-274-989					
14.08.2008					
Date: Patient Name:	Consultant:				
Date:	[If different from patient				
Address:	label]				
	Hospital:				
	Town/City:				
Tick Appropriate Boxes	ACC Q ACC Claim No:				
REASON FOR REVISION					
Loosening of components	Deep infection				
<ul> <li>Dislocation of articulating core</li> </ul>	Fracture of vertebra				
<ul> <li>Loss of spinal alignment</li> </ul>	Removal of components				
Pain	• Other: Name:				
Date Index Operation:	If re-revision - Date previous revision:				
REVISION					
Change of TDR components	Change of articulating core				
Change to Anterior Fusion	In-situ posterior instrumented fusion				
APPROACH	<b>-</b>				
<ul> <li>Retroperitoneal midline abdominal wall incision</li> <li>Retroperitoneal lateral abdominal wall incision</li> </ul>					
–	n <b>Q</b> Other				
Posterior Approach for in-situ fusion					
NEW DISC REPLACEMENT Levels NEW FUSION Le					
	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	1				
Affix Supplier Label	Affix Supplier Label				
	AIIIX Supplier Laber				
L					
STICK EXTRA LABELS O	N REVERSE SIDE				
After Sumpling Labol	Affin Sumplian Labol				
Affix Supplier Label	Affix Supplier Label				
STICK EXTRA LABELS ON REVERSE SIDE					
INTRAOPERATIVE COMPLICATIONS					
SYSTEMIC ANTIBIOTIC PROPHYLAXIS					
Yes 🛛 No 🖵					
OPERATIVE THEATRE					
Conventional Caminar flow or	r similar 🛛 Space suits				
SKIN TO SKIN TIME mins Start skin	Finish skin				
SKIN TO SKIN TIME mins Start skin PRIMARY OPERATING SURGEON	F1111SD SK1D				
Consultant CARTING SURGEON	Year 🛛 Basic Trainee				

Patient Name:	
Patient Address:	••••••

Date of Birth:	•••
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**

P	lease circle the SIDE on which you had your surgery	perfo	
1	How would you describe the pain you usually had	8	After a meal (sat at a table), how painful has it
	from your operated on hip?		been for you to stand up from a chair because
	4 None		of your operated on hip?
	3 Very mild		4 Not at all painful
	2 Mild		3 Slightly painful
	1 Moderate		2 Moderately painful
	0 Severe		1 Very painful
2	For how long have you been able to walk before the		0 Unbearable
	pain from your operated on hip becomes severe?	9	Have you had any sudden, severe pain -
	(with or without a stick)		'shooting', 'stabbing' or 'spasms' - from the
	4 No pain/more than 30 minutes		affected operated on hip?
	3 16 to 30 minutes		4 No days
	2 5 to 15 minutes		3 Only 1 or 2 days
	1 Around the house only		2 Some days
	0 Unable to walk because of severe pain		1 Most days
3	Have you had any trouble getting in and out of a		0 Every day
Ŭ	car or using public transport because of your	10	Have you been limping when walking, because
	operated on hip?	10	of your operated on hip?
	4 No trouble at all		4 Rarely/never
	3 Very little trouble		3 Sometimes or just at first
	2 Moderate trouble		2 Often, not just at first
	1 Extreme difficulty		1 Most of the time
	0 Impossible to do		0 All of the time
	4 Have you been able to put on a pair of socks,	11	Have you been able to climb a flight of stairs?
	stockings or tights?	11	4 Yes, easily
	4 Yes, easily		3 With little difficulty
	3 With little difficulty		2 With moderate difficulty
	2 With moderate difficulty		1 With extreme difficulty
	1 With extreme difficulty		0 No, impossible
	0 No, impossible	12	Have you been troubled by pain from your
5	Could you do the household shopping on your	14	operated on hip in bed at night?
	own?		4 No nights
	4 Yes, easily		3 Only 1 or 2 nights
	3 With little difficulty		2 Some nights
	2 With moderate difficulty		1 Most nights
	1 With extreme difficulty		0 Every night
	0 No, impossible		o Every light
6	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		
7	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		
1	- Louiny	1	

 $\Box$  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.

	Patient Name: Patient Address:	Date of Birth: Operating Surgeon:
		Date of Surgery:
	We would like you to score yourself on the following 12	
	least to most difficulty or severity: 4 being the least di	
	Please circle the number which best describes yoursel	
	Please circle the SIDE on which you had your	
1	How would you describe the pain you usually had	8 After a meal (sat at a table), how painful has
	from your operated on hip?	been for you to stand up from a chair becaus
	4 None	of your operated on hip?
	3 Very mild	4 Not at all painful
	2 Mild	3 Slightly painful
	1 Moderate	2 Moderately painful
_	0 Severe	1 Very painful
2	For how long have you been able to walk before the	0 Unbearable
	pain from your operated on hip becomes severe?	9 Have you had any sudden, severe pain -
	(with or without a stick)	'shooting', 'stabbing' or 'spasms' - from the
	4 No pain/more than 30 minutes	affected operated on hip?
	3 16 to 30 minutes 2 5 to 15 minutes	4 No days 3 Only 1 or 2 days
	1 Around the house only	2 Some days
	0 Unable to walk because of severe pain	1 Most days
3	Have you had any trouble getting in and out of a car	0 Every day
0	or using public transport because of your operated	10 Have you been limping when walking, becaus
	on hip?	of your operated on hip?
	4 No trouble at all	4 Rarely/never
	3 Very little trouble	3 Sometimes, or just at first
	2 Moderate trouble	2 Often, not just at first
	1 Extreme difficulty	1 Most of the time
	0 Impossible to do	0 All of the time
4	Have you been able to put on a pair of socks,	11 Have you been able to climb a flight of stairs?
	stockings or tights?	4 Yes, easily
	4 Yes, easily	3 With little difficulty
	3 With little difficulty	2 With moderate difficulty
	2 With moderate difficulty	1 With extreme difficulty
	1 With extreme difficulty	0 No, impossible
-	0 No, impossible	12 Have you been troubled by pain from your
5	Could you do the household shopping on your own? 4 Yes, easily	operated on hip in bed at night? 4 No nights
	<ul><li>4 Yes, easily</li><li>3 With little difficulty</li></ul>	3 Only 1 or 2 nights
	2 With moderate difficulty	2 Some nights
	1 With extreme difficulty	1 Most nights
	0 No, impossible	0 Every night
6	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	
-	TT 11 1 A	
7	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	

	άσται ανών	NT - OUFSTIONNAIPF			
	TOTAL KNEE REPLACEMEI Patient Name:	Date of Birth:			
	Patient Address:	Operating Surgeon:			
		Date of Surgery:			
	We would like you to score yourself on the following 12	•••			
	least to most difficulty or severity: 4 being the least diff				
	Please circle the number which best describes yourself				
21	ease circle the SIDE on which you had your surgery	performed Left Right			
	How would you describe the pain you usually have	8 After a meal (sat at a table), how painful has			
	from your operated on knee?	it been for you to stand up from a chair			
	4 None	because of your operated on knee?			
	3 Very mild	4 Not at all painful			
	2 Mild 1 Moderate	<ul><li>3 Slightly painful</li><li>2 Moderately painful</li></ul>			
	1 Moderate 0 Severe	1 Very painful			
	For how long have you been able to walk before the	0 Unbearable			
	pain from your operated on knee becomes severe?	9 Have you felt that your operated on knee			
	(with or without a stick)	might suddenly "give way" or let you down?			
	4 No pain/more than 30 minutes	4 Rarely/never			
	3 16 to 30 minutes	3 Sometimes, or just at first			
	2 5 to 15 minutes	2 Often, not just at first			
	1 Around the house only	1 Most of the time			
	0 Unable to walk because of severe pain	0 All of the time			
	Have you had any trouble getting in and out of a car	10 Have you been limping when walking,			
	or using public transport because of your operated	because of your operated on knee?			
	on knee?	4 Rarely/never			
	<ul><li>4 No trouble at all</li><li>3 Verv little trouble</li></ul>	3 Sometimes, or just at first 2 Often, not just at first			
	<ol> <li>Very little trouble</li> <li>Moderate trouble</li> </ol>	2 Often, not just at first 1 Most of the time			
	1 Extreme difficulty	0 All of the time			
	0 Impossible to do	11 Could you walk down one flight of stairs?			
	Could you kneel down and get up again afterwards	4 Yes, easily			
	on your operated knee?	3 With little difficulty			
	4 Yes, easily	2 With moderate difficulty			
	3 With little difficulty	1 With extreme difficulty			
	2 With moderate difficulty	0 No, impossible			
	1 With extreme difficulty	12 Have you been troubled by pain from your			
	0 No, impossible	operated on knee in bed at night?			
	Could you do the household shopping on your own?	4 No nights			
	<ul><li>4 Yes, easily</li><li>3 With little difficulty</li></ul>	<ul><li>3 Only 1 or 2 nights</li><li>2 Some nights</li></ul>			
	2 With moderate difficulty	1 Most nights			
	1 With extreme difficulty	0 Every night			
	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				

#### **REVISION KNEE REPLACEMENT - QUESTIONNAIRE**

Patient Name: Patient Address:

# 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, fromleast 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 yo	
How would you describe the pain you usually have	8 After a meal (sat at a table), how painful has
from your operated on knee?	it been for you to stand up from a chair
4 None	because of your operated on knee?
3 Very mild	4 Not at all painful
2 Mild	3 Slightly painful
1 Moderate	2 Moderately painful
0 Severe	1 Very painful
For how long have you been able to walk before the	0 Unbearable
pain from your operated on knee becomes severe?	9 Have you felt that your operated on knee
(with or without a stick)	might suddenly "give way" or let you down?
4 No pain/more than 30 minutes	4 Rarely/never
3 16 to 30 minutes	3 Sometimes, or just at first
2 5 to 15 minutes	2 Often, not just at first
1 Around the house only	1 Most of the time
0 Unable to walk because of severe pain	0 All of the time
Have you had any trouble getting in and out of a car	10 Have you been limping when walking,
or using public transport because of your operated	because of your operated on knee?
on knee?	4 Rarely/never
4 No trouble at all	3 Sometimes, or just at first
3 Very little trouble	2 Often, not just at first
2 Moderate trouble	1 Most of the time
1 Extreme difficulty	0 All of the time
0 Impossible to do	11 Could you walk down one flight of stairs?
Could you kneel down and get up again afterwards?	4 Yes, easily
4 Yes, easily	3 With little difficulty
3 With little difficulty	2 With moderate difficulty
2 With moderate difficulty	1 With extreme difficulty
1 With extreme difficulty	0 No, impossible
0 No, impossible	12 Have you been troubled by pain from your
Could you do the household shopping on your own?	operated on knee in bed at night?
4 Yes, easily	4 No nights
3 With little difficulty	3 Only 1 or 2 nights
2 With moderate difficulty	2 Some nights
1 With extreme difficulty	1 Most nights
0 No, impossible	0 Every night
Have you had any trouble with washing and drying	Additional Information
yourself (all over) because of your operated on knee?	
4 No trouble at all	
<ul><li>4 No trouble at all</li><li>3 Very little trouble</li></ul>	
3 Very little trouble	
<ol> <li>Very little trouble</li> <li>Moderate trouble</li> <li>Extreme difficulty</li> <li>Impossible to do</li> </ol>	
<ol> <li>Very little trouble</li> <li>Moderate trouble</li> <li>Extreme difficulty</li> </ol>	
<ol> <li>Very little trouble</li> <li>Moderate trouble</li> <li>Extreme difficulty</li> <li>Impossible to do</li> </ol>	
<ul> <li>3 Very little trouble</li> <li>2 Moderate trouble</li> <li>1 Extreme difficulty</li> <li>0 Impossible to do</li> <li>How much has pain from your operated on knee</li> </ul>	
<ul> <li>3 Very little trouble</li> <li>2 Moderate trouble</li> <li>1 Extreme difficulty</li> <li>0 Impossible to do</li> <li>How much has pain from your operated on knee</li> <li>interfered with your usual work (including</li> </ul>	
<ul> <li>3 Very little trouble</li> <li>2 Moderate trouble</li> <li>1 Extreme difficulty</li> <li>0 Impossible to do</li> <li>How much has pain from your operated on knee interfered with your usual work (including housework)?</li> </ul>	
	How would you describe the pain you usually have from your operated on knee?4None3Very mild2Mild1Moderate0SevereFor how long have you been able to walk before the pain from your operated on knee becomes severe? (with or without a stick)4No pain/more than 30 minutes316 to 30 minutes25 to 15 minutes1Around the house only0Unable to walk because of severe painHave you had any trouble getting in and out of a car or using public transport because of your operated on knee?4No trouble at all3Very little trouble2Moderate trouble1Extreme difficulty0Impossible to doCould you kneel down and get up again afterwards?4Yes, easily3With little difficulty1With moderate difficulty2With moderate difficulty3With little difficulty4Yes, easily3With little difficulty2With moderate difficulty3With little difficulty3With little difficulty4Yes, easily3With little difficulty1With extreme difficulty2With moderate difficulty3With little difficulty4Yes, easily3With little difficulty4Yes, easily3With little difficulty4Yes, easi

□ 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.

1

0

Greatly

Totally

TOTAL ANKLE REPLACEME Patient Name:		Date of Birth:				
	Patient Address:		ating Surgeon:			
•		Date	of Surgery:			
ľ	Ve would like you to score yourself on the following 12 q	uestio	ns. Each question is scored from 4 to 0, from			
1	east to most difficulty or severity: 4 being the least diffic	cult/se	evere and 0 being the most difficult/severe.			
F	Please circle the number which best describes yourself	OVER	THE LAST 4 WEEKS			
	Please circle the SIDE on which you had yo	our su	rgery performed Left Right			
	How would you describe the pain you usually have	8	Have you been troubled by pain from your			
	from your operated on ankle?		operated on ankle in bed at night?			
	4 None		4 No nights			
	3 Very mild		3 Only one or two nights			
	2 Mild		2 Some nights			
	1 Moderate		1 Most nights			
	0 Severe	0	0 Every night			
	For how long have you been able to walk before the pain from your operated on ankle becomes severe?	9	How much has pain from your operated on ankle interfered with your usual			
	4 No pain up to 30 minutes		recreational activities?			
	3 16 to 30 minutes		4 Not at all			
	2 5 to 15 minutes		3 A little bit			
	1 Around the house only		2 Moderately			
	0 Unable to walk at all because of severe pain		1 Greatly			
	Have you been able to walk on uneven ground?		0 Totally			
	4 Yes, easily	10	Have you had swelling of your foot?			
	3 With little difficulty		4 None at all			
	2 With moderate difficulty		3 Occasionally			
	1 Extreme difficulty		2 Often			
	0 No impossible		1 Most of the time			
	Have you had to use an orthotic (shoe insert), heel		0 All the time			
	lift, or special shoes?	11	After a meal (sat at a table) how painful has			
	4 Never		it been for you to stand up from a chair because of your operated on ankle?			
	3 Occasionally		4 Not at all painful			
	<ol> <li>Often</li> <li>Most of the time</li> </ol>		3 Slightly painful			
			2 Moderately painful			
	0 Always How much has pain from your ankle interfered with		1 Very painful			
	your usual work (including housework and hobbies)?		0 Unbearable			
	4 Not at all	12	Have you had any sudden severe pain -			
	3 A little bit		shooting, stabbing or spasms from your operated on ankle?			
	2 Moderately		4 No days			
	1 Greatly		3 Only 1 or 2 days			
	0 Totally		2 Some days			
	Have you been limping when walking because of your		1 Most days			
	operated on ankle?		0 Every day			
	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	1				

 $\Box$  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

]	Patient Name:	•••••	Date	of Bi	rth:	• • • • • • • • • • • • • • • •	•••••
]	Patient Address:		Oper	ating	Surgeon:		•••••
	•••••		Date	of Sı	irgery:		•••••
	We would like you to	score yourself on the following 12	questio	ns. Ea	ach question is	scored	from 4 to 0, from
1	least to most difficulty	y or severity: 4 being the least dif	ficult/se	evere	and 0 being the	e most d	ifficult/severe.
]	Please circle the num	ber which best describes yourself	OVER '	THE I	LAST 4 WEEKS	3	
	Please cir	cle the SIDE on which you had	your su	rgery	performed	Left	Right
1	How would you desc	cribe the pain you usually have	8	Hav	e you been troi	ubled by	pain from your
	from your operated	on ankle?		oper	rated on ankle	in bed a	t night?
	4 None			4	No nights		
	3 Very mild			3	Only one or tw	vo nights	8
	2 Mild			2	Some nights		
	1 Moderate			1	Most nights		
	0 Severe			0	Every night		
2		ou been able to walk before the	9				our operated of
		ated on ankle becomes severe?			le interfered wi	-	usual
	4 No pain up to 3				eational activit	ies?	
	3 16 to 30 minut			4	Not at all		
	2 5 to 15 minutes			3	A little bit		
	1 Around the hou			2	Moderately		
~		at all because of severe pain.		1	Greatly		
3	-	to walk on uneven ground?	10	0	Totally		
	4 Yes, easily	1.	12		e you had swel None at all	ling of y	our foot?
	3 With little diffic	-		4			
	2 With moderate	-		3 2	Occasionally Often		
	1 Extreme difficu	Ity		1	Most of the tir	me	
1	0 No impossible.	an anthatic (abac in cart) bacl		0	All the time	iic	
1		e an orthotic (shoe insert), heel	13	-		t a table)	how painful h
	lift, or special shoes 4 Never	?	15		een for you to s		
					ause of your op		
	3 Occasionally 2 Often			4	Not at all pain		
	1 Most of the tim	e		3	Slightly painfu	ıl	
	0 Always			2	Moderately pa	inful	
5	5	from your ankle interfered with		1	Very painful		
5		cluding housework and hobbies)?		0	Unbearable		
	4 Not at all	industries and hobbles).	12	Hav	e you had any	sudden	severe pain –
	3 A little bit				oting, stabbing		ms from your
	2 Moderately			opei 4	rated on ankle? No days	,	
	1 Greatly			3	Only 1 or 2 da	avs	
	0 Totally			2	Some days	Ly G	
5	5	ing when walking because of your		1	Most days		
	operated on ankle?	8		0	Every day		
	4 No days						
	3 Only one or two	o days					
	2 Some days	-					
	1 Most days						
	0 Every day						
7		to climb a flight of stairs?					
	4 Yes, easily						
	3 With little diffic	sulty					
	2 With moderate	-					
	1 With extreme d	-					
	0 Impossible						

 $\Box$  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:	•••••
Patient Address:	•••••
•••••••••••••••••••••••••••••••••••••••	

Date of Birth: ..... 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

1       How would you describe the worst pain you have had from your operated on shoulder?       8       Have you had any trouble dressing your because of your operated on shoulder?         4       None       3       A little bit of trouble         1       Severe       2       Moderate trouble       2       Moderate trouble         0       Unbearable       2       Moderate trouble       1       Extreme difficulty         3       Very mild       3       With little difficulty       3       With moderate difficulty         3       Nore       3       With moderate difficulty       1       With moderate difficulty         4       No trouble at all       3       With little difficulty       2       With moderate difficulty         4       No trouble at all       3       With little difficulty       1       With moderate difficulty         2       Moderate trouble       1       With moderate difficulty       1       With moderate difficulty         3       Nittle difficulty       3       With little difficulty       1       With extreme difficulty         4       Yes, easily       3       A little bit       1       1         4       Yes, easily       3       A little bit       1       1
4None4No trouble at all3Mild3A little bit of trouble2Moderate2Moderate trouble1Severe0Impossible to do2How would you describe the pain you usually have from your operated on shoulder?0Impossible to do3Very mild3Very mild22Mild4Yes, easily3Very mild2With moderate difficulty2Mild2With moderate difficulty3No trouble at all3With little difficulty3No trouble at all3With little difficulty3A little bit of trouble2With moderate difficulty4No trouble at all3With little difficulty3A little bit of trouble2With moderate difficulty4Yes, easily3With little difficulty3With inter difficulty1With extreme difficulty4Yes, easily3A little bit3With inter difficulty1Moderately4Yes, easily3A little bit3With little difficulty1Moderately4Yes, easily3A little bit4Yes, easily3A little bit5Could you do the household shopping on your own?44Yes, easily3A little bit5Could you do the household shopping on your own?44Yes
3       Mild       3       A little bit of trouble         2       Moderate       1       Severe       1         0       Unbearable       1       Extreme difficulty       0         2       How would you describe the pain you usually have from your operated on shoulder?       0       Impossible to do         4       None       3       With difficulty       2         2       Mild       3       With ittle difficulty         2       Mild       2       With moderate difficulty         0       Severe       3       With ittle difficulty         3       Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?       1       With extreme difficulty         4       No trouble at all       3       With little difficulty         3       A little bit of trouble       2       With moderate difficulty         1       Extreme difficulty       1       With extreme difficulty         2       Moderate trouble       1       With ittle difficulty         3       With little difficulty       2       With moderate difficulty         4       Yes, easily       3       A little bit         4       Yes, easily       3
2Moderate1Severe2Moderate trouble1Severe1Extreme difficulty2How would you describe the pain you usually have from your operated on shoulder?9Could you hang your clothes up in a wardrobe – using the operated on arm?4None9Could you hang your clothes up in a wardrobe – using the operated on arm?4None9With ittle difficulty2Mild3With little difficulty1Moderate0No, impossible3Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?1With extreme difficulty3A little bit of trouble1Have you been able to use a knife and fork at the same time?3With little difficulty4Yes, easily3With little difficulty1With extreme difficulty1With extreme difficulty1With extreme difficulty12With moderate difficulty1With extreme difficulty3With little difficulty2Moderate little bit4Yes, easily3A little bit3With moderate difficulty1Moderate little bit4Yes, easily3A little bit3With ittle difficulty1Greatly4Yes, easily1Greatly5Could you do the household shopping on your own?44Yes, easily33With little d
1Severe1Extreme difficulty0Unbearable1Extreme difficulty2How would you describe the pain you <b>usually</b> have from your operated on shoulder?0Impossible to do3Very mild3With moderate32Mild3With little difficulty23Very mild3With ittle difficulty1Moderate0No, impossible3Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?1With moderate difficulty4No trouble at all3With little difficulty22Moderate trouble1With moderate difficulty3A little bit of trouble2With moderate difficulty4Yes, easily3With little difficulty5Could you do the household shopping on your own? 4Yes, easily33With little difficulty1Greatly4Yes, easily3Onderate difficulty5Could you do the household shopping on your own? 4Yes, easily3With little difficulty13With little difficulty4Yes, easily3With little difficulty4Yes, easily3With little difficulty4Yes, easily3With little difficulty4Yes, easily3With little difficulty4Yes, easily3 </th
0Unbearable2How would you describe the pain you usually have from your operated on shoulder?4None3Very mild2Mild1Moderate0Severe3Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?4No trouble at all3A little bit of trouble2Moderate trouble1Extreme difficulty2Moderate trouble3A little difficulty1Extreme difficulty0Impossible to do4Yes, easily3With little difficulty0Impossible to do4Have you been able to use a knife and fork at the same time?4Yes, easily3With little difficulty1With extreme difficulty2With moderate difficulty3With little difficulty4Yes, easily3With little difficulty1With extreme difficulty2With moderate difficulty1With extreme difficulty2With moderate difficulty3With little difficulty4Yes, easily3With little difficulty4Yes, easily3With little difficulty4Yes, easily3With little difficulty4Yes, easily3With little difficulty4Yes, easily<
<ul> <li>2 How would you describe the pain you usually have from your operated on shoulder?</li> <li>4 None</li> <li>3 Very mild</li> <li>2 Mild</li> <li>1 Moderate</li> <li>0 Severe</li> <li>3 Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?</li> <li>4 No trouble at all</li> <li>3 A little bit of trouble</li> <li>2 Moderate trouble</li> <li>1 Extreme difficulty</li> <li>0 Impossible to do</li> <li>4 Have you been able to use a knife and fork at the same time?</li> <li>4 Yes, easily</li> <li>3 With little difficulty</li> <li>2 With moderate difficulty</li> <li>0 Impossible to do</li> <li>4 Have you been able to use a knife and fork at the same time?</li> <li>4 Yes, easily</li> <li>3 With little difficulty</li> <li>2 With moderate difficulty</li> <li>3 With little difficulty</li> <li>4 Yes, easily</li> <li>3 With little difficulty</li> <li>4 No tat all</li> <li>3 A little bit</li> <li>4 Not at all</li> <li>4 Not at all</li> <li>3 A little bit</li> <li>4 Not at all</li> <li>5 Could you do the household shopping on your own?</li> <li>4 Yes, easily</li> <li>3 With little difficulty</li> <li>2 With moderate difficulty</li> <li>3 With little difficulty</li> <li>4 Yes, easily</li> <li>3 With little difficulty</li> <li>4 No raily</li> <li>1 Have you been troubled by pain from yoo operated on shoulder in bed at night?</li> <li>4 No nights</li> <li>3 Only 1 or 2 nights</li> </ul>
from your operated on shoulder?wardrobe - using the operated on arm?4None4Yes, easily3Very mild3With little difficulty2Mild2With moderate difficulty1Moderate1With extreme difficulty0Severe0No, impossible3Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?1With extreme difficulty4No trouble at all3With little difficulty3A little bit of trouble2With moderate difficulty2Moderate trouble1With extreme difficulty1Extreme difficulty0No, impossible4Yes, easily3With little difficulty3With little difficulty1How much has pain from your operated shoulder interfered with your usual wor hobbies or recreational activities (includ housework)?4Yes, easily3A little bit3With little difficulty2Moderately1With extreme difficulty1Greatly2With moderate difficulty1Greatly3With little difficulty1Have you been troubled by pain from yo operated on shoulder in bed at night?4Yes, easily3Only 1 or 2 nights
4None4Yes, easily3Very mild3With little difficulty2Mild3With little difficulty1Moderate1With extreme difficulty0Severe1With extreme difficulty3Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?1With extreme difficulty4No trouble at all3With little bit of trouble1Have you been able to use at hife and fork at the same time?3With little difficulty1Extreme difficulty1With extreme difficulty1With extreme difficulty3With little difficulty4Not at all3A3With little difficulty1Greatly0Totally5Could you do the household shopping on your own?4Yes, easily3Only 1 or 2 nights3With little difficulty3Only 1 or 2 nights4
3Very mild3With little difficulty2Mild2With1Moderate1With moderate difficulty0Severe1With extreme difficulty3Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?1With extreme difficulty4No trouble at all3With little difficulty2With moderate difficulty2Moderate trouble2With moderate difficulty2With moderate difficulty1Extreme difficulty0No, impossible10Impossible to do11How much has pain from your operated same time?1With extreme difficulty4Yes, easily3With little difficulty4Not at all 3A little bit2With moderate difficulty1Greatly0Totally3With little difficulty1Greatly0Totally5Could you do the household shopping on your own? 4Yes, easily3Nith little difficulty3With little difficulty2Have you been troubled by pain from yo operated on shoulder in bed at night?4Yes, easily3Only 1 or 2 nights
2Mild2With moderate difficulty1Moderate0Severe3Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?0No, impossible4No trouble at all3A little bit of trouble 20Moderate difficulty3A little bit of trouble 2Moderate trouble 12With moderate difficulty1Extreme difficulty 01With extreme difficulty 20No, impossible4Yes, easily 33With little difficulty 11How much has pain from your operated shoulder interfered with your usual wor hobbies or recreational activities (includ housework)?4Yes, easily 3A little bif 2Moderate difficulty5Could you do the household shopping on your own? 4Yes, easily 31Greatly 05Could you do the household shopping on your own? 4Yes, easily 31Greatly 05Could you do the household shopping on your own? 41Have you been troubled by pain from yo operated on shoulder in bed at night?4Yes, easily 33Only 1 or 2 nights
1Moderate1With extreme difficulty0Severe1With extreme difficulty3Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?10Have you been able to wash and dry yourself under both arms?4No trouble at all3With little difficulty2With moderate difficulty3A little bit of trouble2With moderate difficulty1With extreme difficulty1Extreme difficulty0No, impossible1With extreme difficulty0Impossible to do11How much has pain from your operated shoulder interfered with your usual wor hobbies or recreational activities (includ housework)?4Yes, easily3Nith little difficulty2Moderately1With extreme difficulty2Moderately12With moderate difficulty2Moderately13With little difficulty2Moderately14Yes, easily3A little bit25Could you do the household shopping on your own? 4Yes, easily3O3With little difficulty2With moderate difficulty12With moderate difficulty3Only 1 or 2 nights
0Severe0No, impossible3Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?10Have you been able to wash and dry yourself under both arms?4No trouble at all 3A little bit of trouble 24Yes, easily 33With little difficulty 22Moderate trouble 12With moderate difficulty 01With extreme difficulty 01With extreme difficulty 014Yes, easily 3With little difficulty 20No, impossible114Yes, easily 33A little difficulty 41How much has pain from your operated shoulder interfered with your usual wor hobbies or recreational activities (includ housework)? 41How much has pain from your operated shoulder interfered with your usual wor hobbies or recreational activities (includ housework)? 41Have you been troubled by pain from you operated on shoulder in bed at night? 45Could you do the household shopping on your own? 4Yes, easily 312Have you been troubled by pain from yo operated on shoulder in bed at night? 45Could you do the household shopping on your own? 4Yes, easily 33Only 1 or 2 nights
0Severe0No, impossible3Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?10Have you been able to wash and dry yourself under both arms?4No trouble at all 3A little bit of trouble 24Yes, easily 33With little difficulty 22Moderate trouble 12With moderate difficulty 01With extreme difficulty 01With extreme difficulty 014Yes, easily 3With little difficulty 20No, impossible114Yes, easily 33A little difficulty 41How much has pain from your operated shoulder interfered with your usual wor hobbies or recreational activities (includ housework)? 41How much has pain from your operated shoulder interfered with your usual wor hobbies or recreational activities (includ housework)? 41Have you been troubled by pain from you operated on shoulder in bed at night? 45Could you do the household shopping on your own? 4Yes, easily 312Have you been troubled by pain from yo operated on shoulder in bed at night? 45Could you do the household shopping on your own? 4Yes, easily 33Only 1 or 2 nights
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<ul> <li>4 No trouble at all</li> <li>3 A little bit of trouble</li> <li>2 Moderate trouble</li> <li>1 Extreme difficulty</li> <li>0 Impossible to do</li> <li>4 Have you been able to use a knife and fork at the same time?</li> <li>4 Yes, easily</li> <li>3 With little difficulty</li> <li>2 With moderate difficulty</li> <li>3 With little difficulty</li> <li>2 With moderate difficulty</li> <li>3 With little difficulty</li> <li>5 Could you do the household shopping on your own?</li> <li>4 Yes, easily</li> <li>3 With little difficulty</li> <li>2 With moderate difficulty</li> <li>3 With little difficulty</li> <li>4 Yes, easily</li> <li>3 With little difficulty</li> <li>3 With little difficulty</li> <li>3 With little difficulty</li> <li>4 Yes, easily</li> <li>3 With little difficulty</li> <li>3 With little difficulty</li> <li>4 Yes, easily</li> <li>3 With little difficulty</li> <li>4 Yes, easily</li> <li>3 With little difficulty</li> <li>4 Yes, easily</li> <li>3 With little difficulty</li> <li>4 No nights</li> <li>3 Only 1 or 2 nights</li> </ul>
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<ul> <li>4 Have you been able to use a knife and fork at the same time?</li> <li>4 Yes, easily</li> <li>3 With little difficulty</li> <li>2 With moderate difficulty</li> <li>1 With extreme difficulty</li> <li>2 With moderate difficulty</li> <li>5 Could you do the household shopping on your own?</li> <li>4 Yes, easily</li> <li>3 With little difficulty</li> <li>2 With moderate difficulty</li> <li>3 With little difficulty</li> <li>4 Yes, easily</li> <li>3 With little difficulty</li> <li>2 With moderate difficulty</li> <li>3 With little difficulty</li> <li>2 With moderate difficulty</li> <li>3 With little difficulty</li> <li>4 No nights</li> <li>3 Only 1 or 2 nights</li> </ul>
same time?hobbies or recreational activities (include housework)?4Yes, easilyMot at all3With little difficultyA little bit2With moderate difficultyModerately1With extreme difficultyModerately1With extreme difficultyGreatly0No, impossibleGreatly5Could you do the household shopping on your own?Have you been troubled by pain from yo operated on shoulder in bed at night?3With little difficultyHave you been troubled by pain from yo operated on shoulder in bed at night?2With moderate difficulty33Only 1 or 2 nights
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1With extreme difficulty1Greatly0No, impossible1Greatly5Could you do the household shopping on your own?1Have you been troubled by pain from yo4Yes, easily1Have you been troubled by pain from yo3With little difficulty4No nights2With moderate difficulty3Only 1 or 2 nights
0No, impossible0Totally5Could you do the household shopping on your own?12Have you been troubled by pain from yo operated on shoulder in bed at night?3With little difficulty4No nights2With moderate difficulty3Only 1 or 2 nights
<ul> <li>5 Could you do the household shopping on your own?</li> <li>4 Yes, easily</li> <li>3 With little difficulty</li> <li>2 With moderate difficulty</li> <li>12 Have you been troubled by pain from yo operated on shoulder in bed at night?</li> <li>4 No nights</li> <li>3 Only 1 or 2 nights</li> </ul>
4Yes, easilyoperated on shoulder in bed at night?3With little difficulty4No nights2With moderate difficulty3Only 1 or 2 nights
3With little difficulty4No nights2With moderate difficulty3Only 1 or 2 nights
0 No, impossible 1 Most nights
6 Could you carry a tray containing a plate of food 0 Every night
across a room?
4 Yes, easily
3 With little difficulty
2 With moderate difficulty
1 With extreme difficulty
0 No, impossible
7 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
□ I wish to receive a progress report on the study. <b>NB:</b> 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:	•••••
Patient Address:	•••••

Date of Birth: ..... 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 Right Left How would you describe the **worst** pain you have 8 Have you had any trouble dressing yourself had from your operated on shoulder? because of your operated on shoulder? No trouble at all None 4 4 3 3 A little bit of trouble Mild 2 2 Moderate trouble Moderate 1 Severe 1 Extreme difficulty 0 0 Unbearable Impossible to do 2 How would you describe the pain you **usually** have 9 Could you hang your clothes up in a from your operated on shoulder? wardrobe - using the operated on arm? None 4 Yes, easily 4 3 Very mild 3 With little difficulty 2 Mild 2 With moderate difficulty Moderate With extreme difficulty 1 1 0 No, impossible 0 Severe Have you had any trouble getting in and out of a car 10 Have you been able to wash and dry yourself 3 or using public transport because of your operated under both arms? on shoulder? 4 Yes, easily No trouble at all 3 With little difficulty 4 3 A little bit of trouble 2 With moderate difficulty With extreme difficulty 2 Moderate trouble 1 1 Extreme difficulty 0 No, impossible 0 Impossible to do How much has pain from your operated on 11 Have you been able to use a knife and fork at the shoulder interfered with your usual work hobbies or recreational activities (including same time? housework)? 4 Yes, easily Not at all 4 3 With little difficulty 3 A little bit 2 With moderate difficulty 2 Moderately With extreme difficulty 1 1 Greatly 0 No, impossible 0 Totally Could you do the household shopping on your own? 5 12 Have you been troubled by pain from your 4 Yes, easily operated on shoulder in bed at night? 3 With little difficulty No nights 4 2 With moderate difficulty 3 Only 1 or 2 nights 1 With extreme difficulty 2 Some nights 0 No, impossible Most nights 1 6 Could you carry a tray containing a plate of food 0 Every night across a room? ..... Yes, easily 4 3 With little difficulty 2 With moderate difficulty 1 With extreme difficulty 0 No, impossible 7 Could you brush/comb your hair with the operated on arm? Yes, easily 4 3 With little difficulty 2 With moderate difficulty 1 With extreme difficulty 0 No, Impossible

Patient Name:	••••••
Patient Address:	•••••
••••••••••••••••••••••••	••••••

Date of Birth:..... 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

1	Please circle the SIDE on which you had yo		
1	How would you describe the <b>worst</b> pain you have	8	How would you describe the pain you
	had from your operated on elbow?		<b>usually</b> have from your operated on elbow?
	4 None		4 None
	3 Mild		3 Very mild
	2 Moderate		2 Mild
	1 Severe		1 Moderate
	0 Unbearable		0 Severe
2	Have you had any trouble dressing yourself because	9	Could you hang your clothes up in a
	of your operated on elbow?		wardrobe – using the operated on arm?
	4 No trouble at all		4 Yes, easily
	3 A little bit of trouble		3 With little difficulty
	2 Moderate trouble		2 With moderate difficulty
	1 Extreme difficulty		1 With extreme difficulty
	0 Impossible to do		0 No, impossible
3	Can you lift a teacup safely with your operated on	14	Have you been able to wash and dry
	arm?		yourself under both arms?
	4 No trouble at all		4 Yes, easily
	3 A little bit of trouble		3 With little difficulty
	2 Moderate trouble		2 With moderate difficulty
	1 Extreme difficulty		1 With extreme difficulty
	0 Impossible to do		0 No, impossible
4	Have you been able to get your hand to your mouth?	15	How much has pain from your operated on
•	4 Yes, easily		elbow interfered with your usual work
	3 With little difficulty		hobbies or recreational activities (including
	2 With moderate difficulty		hobbies and housework)?
	1 With extreme difficulty		4 Not at all 3 A little bit
	0 No, impossible		2 Moderately
5	Could you carry the household shopping with your		5
5	operated on arm?		5
	-	10	0 Totally
	<ol> <li>Yes, easily</li> <li>With little difficulty</li> </ol>	12	Have you been troubled by pain from your operated on elbow in bed at night?
	-		4 No nights
	5		3 Only 1 or 2 nights
	1 With extreme difficulty 0 No. impossible		2 Some nights
c			1 Most nights
6	Could you carry a tray containing a plate of food		0 Every night
	across a room?		o Every inglit
	4 Yes, easily		
	3 With little difficulty		
	2 With moderate difficulty		
	1 With extreme difficulty		
_	0 No, impossible		
7	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	1	

 $\Box$  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.

	Patient Name: Patient Address:	••••••		of Birth: ating Surgeon:
1		••••••		of Surgery:
ĭ				ns. Each question is scored from 4 to 0, from
				evere and 0 being the most difficult/severe.
	-			<b>THE LAST 4 WEEKS</b> Which is your
	lominant arm?	_	UVER	THE LAST 4 WEEKS WINCH IS your
C		5	4	
		le the SIDE on which you ha	-	
	•	ibe the <b>worst</b> pain you have	8	How would you describe the pain you
	had from your operat	ed on elbow?		<b>usually</b> have from your operated on elbow
	4 None			4 None
	3 Mild			3 Very mild
	2 Moderate			2 Mild
	1 Severe			1 Moderate
	0 Unbearable			0 Severe
		uble dressing yourself becaus	e 9	Could you hang your clothes up in a
	of your operated on e	lbow?		wardrobe – using the operated on arm?
	4 No trouble at all			4 Yes, easily
	3 A little bit of trou			3 With little difficulty
	2 Moderate trouble			2 With moderate difficulty
	1 Extreme difficult	У		1 With extreme difficulty
	0 Impossible to do			0 No, impossible
		safely with your operated on	16	Have you been able to wash and dry
	arm?			yourself under both arms?
	4 No trouble at all			4 Yes, easily 2 With little difficulty
	3 A little bit of trou			3 With little difficulty
	2 Moderate trouble			2 With moderate difficulty 1 With outcome difficulty
	1 Extreme difficult	-		1 With extreme difficulty
	0 Impossible to do		1 /7	0 No, impossible
	Have you been able to	o get your hand to your mouth	17	How much has pain from your operated or elbow interfered with your usual work
	4 Yes, easily			hobbies or recreational activities (including
	3 With little difficu	-		hobbies and housework)?
	2 With moderate d	-		4 Not at all
	1 With extreme dif	ficulty		3 A little bit
	0 No, impossible			2 Moderately
		nousehold shopping with your		1 Greatly
	operated on arm?			0 Totally
	4 Yes, easily		12	Have you been troubled by pain from your
	3 With little difficu			operated on elbow in bed at night?
	2 With moderate d			4 No nights
	1 With extreme dif	ficulty		3 Only 1 or 2 nights
	0 No, impossible			2 Some nights
		y containing a plate of food		1 Most nights
	across a room?			0 Every night
	4 Yes, easily		:	
	3 With little difficu	-		
	2 With moderate d	-		
	1 With extreme dif	ficulty		
	0 No, impossible			
		nb your hair with the affected		
	arm?			
	4 Yes, easily			
	3 With little difficu	lty		
	2 With moderate d	ifficulty		
	1 With extreme dif	ficulty		
	0 No, Impossible		1	

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